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Abstract: Some students who would benefit from college may choose not to attend if they are unaware of all costs and benefits involved. In this case, publically provided information may induce personally optimal attendance decisions, and if such information is cheap enough to provide then government intervention may also be socially optimal. Evidence from the Texas "GO Center" project suggests that this may indeed be the case. GO Centers are novel high-school information and awareness centers, usually a dedicated classroom, that provide many traditional guidance counseling services – with the exception that they are run by student peers. They target academically prepared students who might not otherwise choose to attend college, providing motivation and information on all aspects of the college-going process. We use the roll-out of the program to identify its impact, along with detailed panel data on the universe of Texas public school students. The program significantly increased college applications which led to increased enrollment rates, especially amongst Hispanic and low-income students. One-year college persistence rates also increased significantly. These results have important policy implications, suggesting that a relatively cheap intervention can induce meaningful increases in human capital by reducing informational asymmetries.

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1 Introduction

Leaders from the state of Texas believe that higher education enrollment rates are "too low," and that two key factors inhibit otherwise academically prepared students from enrolling in college (Closing the Gaps 2000). First, state leaders are concerned that there is a culture of aversion towards academic success that is particularly pervasive amongst low-income and minority students attending low-performing high schools. Second, state leaders are concerned about informational asymmetries in the market for higher education. Specifically, there is concern that students attending low-performing schools lack easily accessible information about the college going process – information on college choice, applications, financial aid, SAT taking, and the actual experience of attending college. To address these concerns, in the fall of 2003 the state founded 41 high school based "GO Centers" whose goal is to provide information on college choice, the application process, financial aid, and SAT-taking to current high school students, as well as to convince students of the value of a college education by creating a "college-going culture" amongst students. The key question that we address in this paper is whether providing such information and assistance increases college outcomes for the targeted populations.

From an economic point of view, the GO Center program attacks the problem of low college enrollment rates on two fronts. First, the program uses an extensive marketing campaign relying heavily on the power of peer-to-peer persuasion to alter students' underlying preferences for college. The emphasis here is on creating a "college-going culture" to replace the perceived culture of apathy in low-performing schools. Second, the program uses on-campus computing resources and dedicated staff members knowledgeable about the college application process to alleviate informational asymmetries in the market for higher education. Provided the program is successful in its mission we would expect to see an increase in college applications and, conditional on acceptance, an increase in college enrollment. As GO Centers specifically target those students on the margin of attending college, we would also expect the program to have heterogeneous effects across the student population.

To test these predications empirically, we link data on the location and expansion of GO Centers over time to an extensive database that follows the universe of Texas high school students into Texas colleges. Using a differences-in-differences estimator, we isolate, conditional on several key assumptions, the causal impact of GO Centers on a range of potential outcomes. We further explore how this impact varies for different sub-groups in the student population. As we do not know which students in a GO Center school actually used the centers' services, we can only estimate the Average Intent to Treat (AIT) – the average impact of the program for all students in the school regardless of whether they used the center or not.

While a differences-in-differences estimator controls for any time-constant, unobservable factors impacting both GO Center adoption and educational outcomes, it is not robust to time-specific shocks that are simultaneously related to program adoption and outcomes of interest. Any causal interpretation rests on the assumption that changes in outcomes for schools receiving GO Centers would have been the same as the corresponding change in outcomes for schools not receiving GO Centers, had they actually received the program.

Selection into treatment can potentially invalidate this identifying assumption. Since the state targeted the program towards schools with historically low college enrollment rates and

disproportionately large numbers of Hispanic and low-income students, we need to address the issue of common support between treatment and control schools. Therefore, we use a propensity score matching procedure to construct various sets of control schools that are similar to first-year GO Center schools on pre-program demographics, course-taking, and trends in outcome variables. We then show that there are an ample number of schools that are similar to GO Center schools yet did not receive treatment, and proceed to present treatment effects for a range of econometric specifications with different assumptions regarding selection into treatment.

Overall, we find convincing evidence that the first group of 41 GO Centers implemented in the 2003-04 school year had a large and statistically significant impact on college application, acceptance, enrollment, and persistence rates. Encouragingly, treatment effects are relatively consistent across model specifications. In the first year of the program, we find significant program impacts on college application rates (4-6 percentage points, depending on specification) but we do not find an impact on college enrollment.. Not surprisingly, the impact was largest (7-10 percentage points) among the low-income and Hispanic students who were both targeted by the program and were most likely to be on the "margin" of attending college. The impact on enrollment amongst low income and Hispanic students in the first year varied from 1.6 to 4.3 percentage points, depending on specification, and was statistically significant for most specifications. Encouragingly, when looking at the second year impact, program effects are larger for those students who were exposed to the program in both their Junior and Senior years. In particular, we find significant two-year program impacts of 8-9 and 3-5 percentage points overall on college application and enrollment rates respectively. We also find suggestive evidence that GO Centers shifted some students from two- to four-year colleges - an encouraging finding given the dismal results associated with community college attendance (Kane and Rouse, 1995; Miller, 2007a; Sandy, et al., 2006; McFarlin, 2008).

We are also interested in the types of students affected by the program. If the program is indeed alleviating inefficiencies in the market for higher education as the state hopes, we would expect that the students enrolling in college in response to the intervention are relatively well-prepared. On the other hand, the program may simply be operating by extending the margin of college attendance. Given the evidence on the impact of college for marginal students, we would not expect these students to benefit much from enrolling (Turner, 2004). To address this question, we look at the program's impact on the probability of enrolling in college and being required to take remedial coursework. We find some evidence that GO Centers are indeed extending the margin of college enrollment; treatment effects are small and only marginally significant.. This is an unfortunate finding given the relatively poor results associated with the remedial education program in Texas (Martorell and McFarlin, 2008; Miller, 2007c).

Numerous studies have attempted to quantify the impact of traditional government interventions such as need- (Abraham and Clark, 2006; Dynarski, 2003; Kane, 2003; Kane, 2007) and merit-based (Dynarski, 2004; Cornwell, et. al., 2006) tuition subsides and tax credits (Long, 2004) on college attendance. An excellent survey by Dynarski (2002) finds that the results of these studies are remarkably robust, indicating that a $1000 tuition subsidy increases the likelihood of college attendance by 3 to 4 percentage points. However, likely due to the complex FAFSA form, very few studies have found a significant impact of the largest

federal student aid program, the Pell Grant, on college attendance (Dynarski, 2008). Others have gone a step further by quantifying the impact of tuition subsidies on college persistence and completion (Dynarski, 2003; Bound and Turner, 2002; Bettinger, 2004). In his study of the Pell Grant, Bettinger finds that a $1000 tuition subsidy increases college persistence rates by roughly 4 percentage points.

GO Centers, however, are not a typical form of government intervention such as tuition subsidies or tax credits. Rather, they aim to increase demand for higher education by altering students' preferences and providing information about the benefits of college. Thus, it is important to compare the enrollment and persistence impacts of GO Centers to those of the larger literature on tuition subsidies. Overall, our point estimates indicate that simply having a GO Center in a student's high school could be equally as effective at increasing college attendance and persistence rates as a $1000 tuition subsidy. Our best estimate is that a fully implemented GO Center costs the state approximately $80,000 per school to operate (Gates GO Center Proposal). Considering there are an average of 197 high school graduates in each GO Center high school, this indicates that GO Centers achieve the same result as a $1000 tuition subsidy at a cost of roughly $400 per student. Since college enrollment rates at GO Center high schools are roughly 50 percent, a $1000 tuition subsidy costs roughly $500 per high school graduate, so our back of the envelope estimate indicates that GO Centers could offer roughly a 20 percent savings to taxpayers, relative to an extension of more traditional tuition subsidies.

While our estimates indicate that GO Centers are likely more cost effective than tuition subsidies at increasing college enrollment and persistence rates, it is a separate, and perhaps more relevant question to consider whether GO Centers provide a net benefit to society. Since roughly 4% of students are induced to attend college by GO Centers, this implies that it costs approximately $\$400/.04 = \$10{,}000$ to induce one student to attend college with a GO Center. This implies that with a 50 year time horizon and discount rate of .97, for the state to see a net return on its $10,000 investment, the economic benefit of college enrollment must be at least $383 per year, approximately one percent of U.S median personal income. While there is certainly no consensus on the economic return to attending college, nearly every credible estimate meets or exceeds this figure. Even though the students most likely to be affected by the program are marginal students, it seems likely that their return to attending college should exceed $383 per year. However, as we track GO Center students over time, we will be able to observe the economic return to attending college for these marginal students, and this will allow us to better gauge the economic benefits of the program.

While numerous studies have looked at the effect of information on choice behavior in other economic settings, we are aware of only a few studies that have done so in relation to education. Several studies have examined the impact of published college rankings on college choice (Griffith and Rask 2007; Monks and Ehrenberg 1999; Meredith, 2004). Kane and Avery (2004) study the Boston COACH Program, which gave supplemental advising and college-related information to students at two low-performing high schools in the Boston metropolitan area. They find that students at low-performing, inner-city schools had roughly the same information about the college application process and the economic benefits of college as their peers at more affluent, suburban high schools. However, students at low-performing schools were overly optimistic about their prospects for college, particularly in relation to their preparation levels. Unfortunately, they have not studied the impact of the

program on college-going.

We also contribute to the literature on color blind affirmative action policies that seek to increase racial diversity on college campuses without resorting to explicit race-based admissions policies (Chan & Eyster 2003; Fryer, Loury & Yuret 2003). Since the GO Center program is specifically targeted at schools with large minority populations, it could potentially increase the proportion of minority students enrolling in the state's higher education system in a manner consistent with recent court limitations on affirmative action and other race-based programs.

Finally, GO Centers provide an important service usually delegated to the traditional, and often over-assigned, high school guidance counselor. Reseach suggests that guidance counselors in schools with a large number of minority and low-income students cannot devote the necessary time to college guidance (McDonough 2004; Lee and Ekstrom 1986). GO Centers, using the power of peer-to-peer persuasion and information dissemination, have the potential to fill this important role in a relatively cost effective manner. While numerous papers have studied the effect guidance counseling services have on college choice, they are mostly descriptive and tend to suffer from omitted variable bias (e.g., Plank & Jordan 2001; McDonough 2004).[1] To the best of our knowledge, our study is the first to measure the impact of counseling services on college choice that adequately deals with selection issues.

We describe the GO Center program in detail in section 2. Section 3 describes the data and the sample, focusing on the program expansion over time. Section 4 discusses identification and estimation. Section 5 discusses the issue of common support and the results of the propensity score matching procedure. Section 6 presents results and we conclude with a discussion.

2 GO Centers

Figure 1 shows that Texas has one of the poorest records in the nation in terms of college enrollment and completion. In 2002, college enrollment rates varied considerably by state, with a high of 43% in Connecticut and a low of 24% in Georgia, Nevada, and Arkansas - Texas, however, ranks 44^{th} in the nation, with just 27% of 18 to 24 year olds enrolling in college.[2] Texas also lags other states in terms of college completion rates – even when these rates are made conditional on college enrollment. Figure 2 displays 6-year college completion rates of college enrollees by state in 2002, which ranges from a high of 65% in Rhode Island to a low of 25% in Alaska - again, Texas ranks on 35^{th}. Finally, like many other states, there are wide disparities in college-going rates amongst racial and ethnic groups within Texas. In 2004, the college enrollment rate among white Texas public high school graduates was 59.5%; the corresponding rates for African Americans and Hispanics were 49.4% and 46.1%, respectively (Miller 2007).

[1] Carrel and Carrel (2006) use the year-to-year change in student to counselor ratios across schools to study the impact of high school counseling on student disciplinary actions and find that counselors reduce student disciplinary problems. However, they do not study the impact of counseling on college enrollment or persistence.

[2] This low enrollment rate is certaintly due in part to the large numbers Latin American immigrants. However, Texas is ranked below other states with similar populations such as New Mexico, Florida, Mississippi, and Alabama.

In response to these statistics, the state initiated the College for All Texans Campaign in the year 2000 (THECB 2000) . The goal was to develop a statewide marketing and outreach network to encourage academically prepared high school students to enroll in college. Integral to the program are GO Centers , which serve as college recruiting centers providing information about the college application and enrollment process, preparation strategies such as course taking and SAT/ACT taking, and financial aid applications.[3] Operating under the assumption that peer-to-peer persuasion is more effective at influencing actual behavior than the traditional (and often over-assigned) high school Guidance Counselor, GO Center staff members are supplemented by a trained group of high school students known as a "G Force."

The Texas Higher Education Coordinating Board (THECB) is responsible for managing the GO Center program. The state agency provides GO Center schools with marketing materials (informational pamphlets, banners, application brochures, FAFSA forms), as well as financial and technical support. THECB targets its resources for GO Centers towards high schools with traditionally low college participation rates. Starting in the 2003-04 academic year, the program initially consisted of 41 GO Center schools, spread across the state, and by February of 2007 the program had expanded to a total of 196 schools. However, the program has suffered widely fluctuating levels of state support and oversight over time and across schools, which affects the evaluation as described below.

In the remainder of this section, we first discuss the causal mechanisms by which the program may affect college choice. We then briefly discuss the effort to expand the program after the initial year.

2.1 The GO Center Model

The goal of the GO Center Program is to increase college enrollment rates of academically prepared students, particularly those from traditionally underserved groups. The need for intervention is motivated by a belief that underprivileged high school students often (i) do not place an appropriate value on academic success, and (ii) lack easy access to information and guidance regarding the college going process. The former idea is consistent with recent models of economics of culture and identity (Austen-Smith & Fryer, 2003). The latter is consistent with literature showing that first generation and minority college students tend to lack the kinds of at-home and in-school information and guidance that traditional college-going students take for granted (Lee and Ekstrom 1987; McDonough 2004; Plank and Jordan 2001). However, this belief is inconsistent with evidence from recent work by Kane and Avery (2004) which suggests that low-income students in inner city schools have as much knowledge about the college-going process as their peers at more affluent suburban schools.

There are three elements to the GO Center Model: 1) a substantial marketing campaign emphasizing student involvement and peer-to-peer persuasion, 2) a staffed facility with computer resources and easily accessible information about the college application process, and 3) linkages with local colleges and universities and/or the local business community. With the goal of changing targeted students' underlying preferences for college, the marketing campaign disseminates information regarding the benefits of higher education and the availability of financial aid for needy students. Interestingly, much of the marketing materials

[3]The name Go Center comes from the state's marketing motto "Education: Go Get It!"

produced by the state might be considered deceptive. The state produces banners and flyers reporting the median earnings by educational attainment, and claims that the difference in earnings for college and high school graduates is the economic return to college. Since this calculation fails to account for selection into college, it likely overstates the true economic benefits of a college degree. An example of one such flyer is shown in Figure 3.

The marketing campaign also places strong emphasis on peer-to-peer persuasion. A core group of motivated, college-going high school seniors, called the G-Force, is trained by the state to coach fellow students through the college application process. The hope is that the presence of a student G-Force will serve to create a "college going culture" within the high school, and generate excitement amongst students about the college application process. By actively promoting a venue for capable students to come to identify with a motivated "college-going" peer group, and providing them with the necessary information and guidance to complete the college application process, the hope is that these traditionally unmotivated students will respond with increased college enrollment levels.

The second element of the GO Center Model is the facility itself. While traditional college students can often obtain information about the college application process from parents or their high school counselor, the students targeted by GO Centers are often first-generation college students (or Americans) who attend cash-strapped high schools with limited counseling resources. To rectify these informational asymmetries, each school in the program operates a facility referred to as the "GO Center," which consists of a room on the high school campus with computers, internet access, and other information regarding the college application process. Each facility is staffed by a full-time employee whose job is to help students use the internet to research colleges, sign up for college entrance exams, apply for financial aid, and apply to colleges. The employee is often supplemented by the school's G-Force. Ideally, each student who visits the GO Center meets repeatedly with the faculty member or a G-Force member to complete the college application process.

The final aspect of the GO Center Model involves students from local colleges, referred to as a Collegiate G-Force, and local business leaders. These players serve to reinforce both the marketing campaign and the informational aspects of the GO Center. Whenever possible, one or both groups are directly involved with the G-Force in a partner GO Center school, making regular school visits, and often providing mentorship towards individual high schools students. The hope is that underprivileged students, who often lack the at-home role models of more traditional college-going students, will find that role model in a Collegiate G-Force member or local business leader. The Collegiate G-Force is also instrumental in providing information about the college application process, and college life more generally, particularly at their own college campuses. In some instances, Collegiate G-Forces organize visits to their college campus for their partner GO Center schools.

It is important to note that the above description is of an ideal GO Center. Due to lack of funding and oversight, many GO Centers are missing one or more elements of the full GO Center Model. For example, many schools do not have a full-time employee to staff the GO Center, and some do not have a Collegiate G-Force. Unfortunately, the state has only kept accurate data on which schools had a GO Center and not on how those centers were implemented. Our empirical results below therefore reflect the effects of the GO Centers as implemented. As such, the observed program impacts should be taken as a lower bound of an ideally implemented GO Center program.

2.2 The GO Center Expansion

In 2003, the THECB hired an independent contractor to choose and initiate a pilot group of 25 GO Centers in low-performing Texas high schools. The THECB placed minimal requirements on the contractor's choice of initial treatment schools, only specifying that he choose schools with traditionally low college enrollment rates and large numbers of Hispanic and underprivileged students from a variety of regions within the state. After choosing 25 schools fitting these criteria, the contractor was approached by an additional 18 schools hoping to be included in the pilot group. For the most part, it appears that these schools selected into the program by virtue of having a close relationship with one of the initial 25 schools. The 18 schools that self-selected tended to be in close proximity to, and often in the same district as, the 25 chosen by the contractor. In any case, the state obliged and the contractor invited 43 schools to an independent training session in the summer of 2003. 41 schools attended the training and it is these schools that we identify as the initial treatment group. However, as a robustness check we replicate our statistical models using the original 25 schools chosen by the contractor as the treatment group; results are roughly similar, albeit less precise.

The state also facilitated the formation of Collegiate G-Forces on local college campuses. For each GO Center, the state identified a set of potential partner colleges based on proximity. Before the 2003-04 school year, the state contacted each potential partner college attempting to initiate a Collegiate G-Force. However, very few colleges responded to the request, and only a handful of four-year colleges had Collegiate G-Forces in the initial year of the program. Unfortunately, we only have anecdotal evidence on the partnerships for the initial year of the program. Responding to the low interest in the program amongst the states colleges, in 2004 the state initiated the Collegiate G-Force Grant, which gives $500 scholarships to Collegiate G-Force members. To receive this money, colleges were required to submit a Collegiate G-Force partnership proposal to the state. This initiative increased the number of (and accurate data documenting) Collegiate G-Force programs on college campuses to 64 for the second year of the program; the program continues to expand to this day.

Unfortunately, the GO Center program suffered from fluctuating levels of government support and oversight in the years following the pilot year. (Appendix A discusses the reasons for these fluctuations.) As such, the state's record-keeping on the location of GO Centers over time has been tenuous at best. In many cases, records indicate that a school had a GO Center in a particular year, when it in fact did not. In others, the state was unaware that a school had a GO Center in a particular year. Moreover, as the GO Center program expanded and knowledge of its mission increased, some schools adopted aspects of the program unbeknownst to the THECB. However, none of these data issues were a concern in the first year of the program and we have verified with the independent contractor that the set of schools identified by the state as GO Center schools 2003-04 were indeed GO Center schools. For this reason, we only evaluate the impact of the GO Center program on the initial set of pilot schools.

3 The Data and the Sample

Several administrative databases track the universe of students in Texas public schools from high school, through the college application process, and into college.[4] Our sample includes six cohorts of Texas public high school graduates – those who completed a high school diploma anytime between the 1999-2000 and the 2004-05 academic years. We exclude graduates of charter and magnet schools. While it would be preferable to use the cohort of, say, 11th graders, to avoid concerns that GO Centers might affect the probability of completing high school, we only observe demographic variables for high school graduates. However, we have a separate database of high school course-taking that includes courses taken from 9th to 12th grade. Since we are concerned that GO Centers might impact high school course-taking, we use pre-determined11th grade courses as controls in the estimated models.

3.1 Datasets

Information on the implementation and expansion of the GO Center program was provided by the THECB. Their records identify the location of GO Center high schools over the first four years that the program was in existence (2003-04 to 2006-07). There were 41 original GO Center schools in the fall of 2003, 92 in November of 2004, 138 by March of 2005, 183 in March of 2006, and finally 196 in February of 2007.[5] Despite the monotonic increase in the number of GO Center schools over time, there were some GO Centers that closed during this period. In practice, we only make use of information from the first two years of GO Center location data provided by THECB. The models for the one-year impact of GO Centers use only the first year – all other schools in the state are potential control schools. Models for the two year impact make use of the second year as well – we must exclude as potential controls any school that received a GO Center during the second year of the program.

A database from the Texas Education Agency (TEA) provides information on all graduates of public high schools in the state of Texas, as well as demographic characteristics. These characteristics include gender, race, whether the student is bilingual or Limited English Proficient (LEP), Title I eligibility status (low-income), courses taken, and participation in various school programs – Gifted and Talented programs, Vocational Education, and Special Education. Data on SAT taking come from a separate database provided by the College Board. To these we append information collected by THECB on college applications, acceptances, and enrollment at public colleges in Texas, and enrollment information (but, unfortunately, not applications and acceptances) from private colleges in Texas.

There are a few things to note about Texas colleges and the limitations of our data. First, there is no formal application process for community colleges (2-yr colleges) in Texas; we therefore do not have data on applications nor acceptances to these schools, only enrollment data. Second, we also do not have data on applications and acceptances to private colleges

[4] These limited-access databases are linked through Student Social Security Numbers and are sercurely housed at the THECB offices.

[5] While there are 41 original Go Center schools, we must drop 2 in our analysis. Hemphill High School did not send the necessary HS graduation data to the state for the 2003-2004 academic year. Estacado High School was newly opened, and students were being phased in grade by grade – the first graduating class of Estacado was 2004-2005.

in Texas – again, only enrollment data are available. Third, we do not have any data on collegiate applications or enrollments at schools outside the state of Texas. We do not believe these last two limitations will cause serious concerns since more than 90% of Texans enrolled in academic higher education institutions attend state-funded schools, and few leave the state for college. Furthermore, the types of students targeted by GO Centers are traditionally the least likely to either go to a private or out-of-state school, mitigating this selection problem posed by the lack of data. The data is therefore not ideal, and we will address potential biases in our analysis when they arise.

One final important issue with the THECB data is the fact that there are a substantial number of Texas high school students for which the state has no valid social security number.[6] While the TEA creates a unique identification number for these students, this number is not shared with the THECB, so we cannot track these students into college. Overall, we are missing social security numbers for 8.9 percent of Texas high school students in GO Center schools, but this number is much higher among the traditionally underrepresented groups most targeted by GO Centers. While just 3.8% of white students in our sample are missing SSNs, 12.2% of Hispanics and 12.1% of Title I eligible students are missing SSNs. In Appendix B, we present some analysis on the effect of this issue on our results. While students in treatment schools are disproportionately more likely to have missing social security numbers, we provide evidence that this should have no effect on our fixed effects results because the percentage of students with missing social security numbers changed at roughly the same rate at treatment and control schools.[7]

We merge the above data to two other school-level databases that we use for various purposes.[8] First, we use a listing of distances between all Texas public high schools and each institution of higher education in the state to explore whether GO Centers induced students to attend colleges closer to home . This may be the case as collegiate G-Forces from local colleges could influence students to stay local, or it could be that students on the margin (those likely to be affected by GO Centers) are those that are more likely to not move far for college. We also use a school-level database from the Texas Education Agency with information on school funding, school accountability ratings, high school exit exam scores, and teacher characteristics of all high schools in the state. This data is used to help construct our matched control samples.

[6] There are two reasons why the state might not have a valid social security number for a given student. First, the student may simply not have a social security number because he or she is an immigrant or his or her parents never registered the student with the Social Security Administration. Second, the state allows parents to withhold their child's social security number for privacy purposes.

[7] While we find that this issue does not affect the causal interpretation of our differences-in-differences estimates, it does impact the way one should interpret our results. In particular, we estimate the causal impact of Go Centers on academic outcomes for students with valid social security numbers.

[8] We also use the Barron's Magazine ranking of competitiveness of undergraduate admissions at U.S. colleges and universities to see whether Go Centers differentially affected the quality of schools students applied to and subsequently attended. These results are not particularly informative – the main conclusion is that students affected by Go Centers largely apply to and enroll at lower tiered schools. We do not include these results in the paper, but they are available upon request.

3.2 Summary Statistics

The state's decision to target high schools with disproportionately large populations of Hispanic and low-income students, as well as those with historically low college enrollment rates is reflected in Table 1. Hispanics make up 27.3% of Texas high school graduates overall, but 56.4% of graduates at the 39 first year GO Centers. Similarly, while 32.6% of Texas high school graduates were eligible for the federally funded free-lunch program during their senior year of high school (low-income students), the corresponding statistic for graduates of first year GO Centers is 53.0%. Finally, while the state average college enrollment rate is 55.1% of graduates, only 50.0% of graduates from GO Center high schools go on to enroll in college.

Given that the state targeted high schools that were historically underrepresented in higher education, it is not surprising that students at GO Center schools were less prepared for college than the average Texas high school graduate. Table 1 shows that graduates from GO Center schools scored lower on the state's high school exit exam (TAKS exam) and are less likely to take Advanced Placement courses and Calculus. For example, while the state average score on the TAKS Mathematics Exam is 68.8, the corresponding score for graduates of first-year GO Centers is 64.5.

Table 1 also reflects the fact that because Hispanic students tend to be urbanized in Texas, GO Center schools tend to be larger than the typical Texas high school – the state wide average graduating class size is 161 students, compared to 197 for GO Center schools. Furthermore, while graduates of GO Center high schools have somewhat lower college enrollment rates, they are more likely than other Texas high school graduates to enroll in 2-year colleges. The overall enrollment rate at Texas 2-year colleges is 33.9%, while the corresponding statistic for graduates of GO Center high schools is 34.5%. These differences highlight the need to choose a control group with care, a task we turn to in the next section.

4 Empirical Strategy and Identification

The goal of this empirical exercise is determining the independent influence of GO Centers on outcomes related to the college going process. Towards this end, we estimate differences-in-differences regression models to control for factors other than GO Centers that may have affected these outcomes of interest. To estimate the impact of exposure to the program for one year, we estimate models of the following form at the student level:

$$Y_{ist} = \beta_1 \left(TREAT_{is} * POST_t\right) + \beta_2 Treat_{is} + \beta_3 POST_t + X_i\delta + \mu_s + \varepsilon_{ist} \qquad (1)$$

Y_ist is an outcome of interest for student i, $TREAT_{is}$ is an indicator taking the value one if a school had a GO Center in the 2003-04 school year (the first year in which the program was launched), $POST_t$ is an indicator for the 2003-04 academic year, and X_i is a vector of observable student characteristics. μ_s is a vector of school dummy variables and ε_{ist} captures any unobserved characteristics affecting the outcome. $TREAT * YR^{04}$ is an indicator for being in a treatment school in the 2003-04 school year. β_1 is the coefficient of interest, which reflects the average increase in the outcome due to the presence of a GO Center, over and above the corresponding increase for an otherwise similar control school. To increase precision, we include observable student-level characteristics, X_i, and school-level dummies.

The school-level dummies control for any time-fixed, unobservable school characteristics that affect college going behavior. To account for correlation within schools, we cluster our standard errors at the school-level.

To estimate program impacts for those students that were exposed to the program for two years, we estimate versions of equation (1) using the 2004-05 graduating cohort instead of the 2003-04 graduating cohort. While equation (1) describes a linear regression function for expositional purposes, all binary outcomes are estimated using a probit model and multinomial outcome variables are estimated by ordinary least squares. As GO Center services are targeted towards specific subpopulations, we look for heterogeneous program effects by estimating equation (1) separately for racial and income subgroups.

Central to the validity of our empirical strategy is the choice of control schools. In the above model, identification of program effects hinges on the assumption that, conditional on the observable characteristics, Xi, and the school-level fixed effects, Si, the changes in outcome patterns at comparison schools during the GO Center implementation period are similar to what would have happened at the treatment schools, had they not had a GO Center that was actively working to influence these outcomes. This assumption is particularly problematic in the current application. Since the state actively recruited high schools with historically low college enrollment rates and disproportionately large numbers of Hispanic and low-income students, there is strong selection into treatment. In the most extreme case, where selection is perfect on these variables, we would be unable to find a suitable set of control schools that are both similar to first-year GO Center schools on the selection variables, and did not receive the program.

Since we can control directly for a set of observable selection variables, we are ultimately most concerned with the issue of common support – there must be a sufficient number of comparison schools in our data that are within the support of the first-year GO Center schools (Dehejia & Wahba 2002, Black & Smith 2004, Caliendo & Kopeinig 2008). If GO Center schools are sufficiently different from non-GO Center schools such that there are no schools in the treatment group that are comparable to the control group, then a parametric model like OLS or a probit is identified solely by the functional form assumption. If that assumption does not hold, then such models could be biased. Thus, the exercise of choosing a matched control sample is essentially an endeavor to loosen the parametric restriction implied by OLS or probit by restricting attention to a region of the support that is local to the treatment schools.

We therefore implement a propensity score matching procedure to select various sets of control schools that are similar to GO Center schools on demographics, course-taking and pre-program trends in outcome variables. There are many specific matching methods one could use to choose appropriate control schools in our context; standard techniques include nearest neighbor matching, kernel-based methods, and caliper band approaches (Caliendo & Kopeinig, 2008). While no method is a priori preferred to any other, there is a definite tradeoff between precision and potential bias stemming from the inclusion of inappropriate control schools. As we require control schools to be more and more similar to treatment schools, we reduce potential bias stemming from inappropriate extrapolation, but we loose precision by reducing the number of observations, thereby reducing the utility of our results. As researchers, we must balance these two concerns. To resolve this conflict, we produce a range of estimates using a series of different matching methods representing the full range

of this spectrum.

We begin by describing our first stage model for estimating the propensity for treatment. At the school level, we estimate models of the following form:

$$TREAT_{i,2004} = \beta_0 + \gamma' Outcomelags_s + \delta' X_{s,2003} + \varepsilon_i \quad (2)$$

where $Treat_{i,2004}$ is an indicator variable taking on the value 1 if and only if school s is a first-year GO Center school, $Outcomelags_s$ is a function of lagged school-level outcome variables for school s , and $X_{s,2003}$ is a matrix of school-level observable characteristics for school s in the 2002-2003 school year – the year prior to program introduction.[9] The idiosyncratic error term is assumed to be uncorrelated with the included regressors.

We create six alternative estimation samples using the estimated propensity score – the estimated probability of treatment conditional on preprogram observables – from equation (2) above. The first sample includes all schools with propensity scores that fall in the region of common support. This control group is referred to as the common support control group, and contains 35 of 39 treatment schools and 152 of 1161 untreated schools in the state as controls.

Next, we go on to restrict the control sample further by implementing a series of formal matching procedures to select specific control schools to match to each first-year GO Center school. All procedures use nearest neighbor matching with replacement, restricting attention to schools within the common support. The first three specifications use 5-, 3- and 1-nearest neighbor matching with replacement, respectively. These samples all contain 35 treatment schools, but contain 89, 66 and 26 control schools, respectively. We refer to these control groups as the N-Nearest Neighbor control groups. Finally, we construct two control samples combining 5-nearest neighbor matching with a caliper band. These samples use caliper bands of .01 and .005, and contain 77 and 62 control schools, respectively. We refer to these control groups as the 5NN, X-caliper control groups.

A final word must be said about our models isolating the two-year impact of GO Centers. Here, we must exclude as potential controls any school that received a GO Center during the second year of the program. Otherwise, we would underestimate the full two-year impact of GO Centers on academic outcomes. Other than this slight modification, all models looking at two-year impacts of GO Centers are run identically as those looking only at the first year of the program.

5 Common Support

As discussed previously, identification of program impacts in the differences-in-differences model (Eq 1) rests on the assumption that, conditional on our student-level observables and school-level fixed effects, the outcomes at GO Center schools increased at the same rate as they would have at control schools had the control schools participated in the program. Due to strong selection amongst Texas high schools into treatment, we must first verify that there are schools in the state that both did not receive a GO Center in the first year of the program

[9] In practice, we "dummy out" the lagged outcome variables and percent Hispanic, since most selection into treatment is determined by these variables.

and would have benefited as much as first year GO Center schools from receiving the program – the issue of ample common support. We show below that there are indeed enough schools in Texas that are similar to first year GO Center schools and likely satisfy the identifying assumption for our differences-in-differences model. In particular, we follow Dehejia and Wahba (2002) in using a propensity score matching procedure to produce matched samples of control schools that are similar to first-year GO Center schools. In practice, our propensity score models include preprogram demographics, course-taking, accountability ratings, high school exit exam scores, dropout rates, teacher characteristics, and trends in our outcome variables.

5.1 Propensity Score Matching

In order to construct our matched control samples, we make use of the estimated propensity score from models of the form presented in Eq2 above. In particular, we predict the probability that a high school received a GO Center in the 2003-2004 school year as a function of school level observables, Xs,2003, and a "dummied-out" function of lagged outcome variables for school s, Outcomelagss. Xs,2003 contains school-level demographics, high school course-taking patterns, teacher characteristics, high school exit exam scores, school accountability ratings, high school dropout rates, and school funding. To account for the fact that the program may have affected factors like high school course-taking patterns, all variables in Xs,2003 are measured during the 2002-2003 school year. Outcomelagss contains school level college application and enrollment rates for the 1999-2000 through the 2002-2003 academic years. Tables II below presents the point estimates for the fully-specified version of Eq1. Results of other specifications are available upon request.

The results in Table II reflect the state's targeting of the GO Center program. In particular, we find that conditional on other observables, schools with larger preprogram Hispanic and low income populations, and lower preprogram college enrollment rates are more likely to receive treatment.

To demonstrate the degree of selection into treatment in our data, we present a histogram of the estimated propensity score by treatment status for our preferred specification in Figure 4 below. Histograms for the other specifications are available upon request, but the general interpretation is similar to that of our preferred specification.

There are two key points to take away from Figure 4. The distribution of propensity scores for control schools is extremely left skewed, with very few potential control schools having a very large propensity for treatment. The median propensity score for control schools is 0.0000238, and only the top 5% of the distribution of propensity scores for control schools is above 0.15. This observation simply reflects the fact that our propensity score model is quite good at distinguishing treatment schools from non-GO Center schools.

Second, on average, treatment schools have much higher propensity scores than control schools. While the median propensity score for treatment schools is 0.36, just 2% of non-GO Center schools have an estimated propensity for treatment that high. This simply reflects the fact that the state actively recruited high schools with particular characteristics – large proportions of Hispanics and low-income students as well as historically low college enrollment rates – to the program. Thus, schools with these characteristics – largely first year GO Center schools – will have the highest propensities to receive a GO Center. The

vast majority of non-GO Center schools do not look very much like first-year GO Center schools, and have very low treatment propensities.

Third, despite the large differences in propensity for treatment across groups, there is considerable overlap of support between the two distributions. The majority of treatment schools have propensity scores between 0.1 and 0.7. While the distribution of propensity scores for control schools is not very thick in that region, the sheer number of high schools in the state ensures that there are an ample number of control schools with propensities between 0.1 and 0.7. In fact, there are actually more control schools – 152 – in the region of common support than there are treatment schools - 35.

Finally, the overall conclusion one should take away from Figure 4 is the fact that, while not particularly thick, there is ample common support between treatment and control schools in our data. While the vast majority of control schools have propensities below .05, and many of these schools are not in the common support, there are a sufficient number of potential control schools with propensity scores mirroring those of actual first-year GO Center schools. Only 4 treatment schools have estimated propensity scores above that of any potential control school, and hence must be dropped from our analysis.

5.2 Matched Control Groups

We use the estimated propensity scores from the above models to choose a series of matched control groups from the set of all high schools in Texas. We do this in three ways: First, we simply discard schools with propensity scores that do not fall in the region of common support – those treatment schools with propensity scores larger than that of any potential control school, as well as those potential control schools with propensity scores lower than that of any treatment school. We refer to control groups constructed in this way as common support control groups. Second, we narrow our focus even further by using a nearest neighbor matching procedure to select specific control schools to match to each first-year GO Center school. Specifically, we use 5-, 3- and 1-nearest neighbor matching with replacement, using only schools within the common support. We refer to control groups constructed in this way as N-NN control groups. Finally, we combine nearest neighbor matching with a caliper band. Specifically, we use 5-nearest neighbors with caliper bands of .01 and .005, referring to control groups constructed in this way as 5-NN-X-Band control groups.

Table III below presents summary statistics of selected demographic and other observable control variables by treatment status for the state as a whole, and the six alternative control groups generated from the fully specified propensity model. Similar tables for other specifications are available upon request, but the key interpretation is similar.

The key point to take away from Table III is the fact that the matched control samples look much more similar to GO Center schools in terms of demographics and other observable variables than does the set of all non-GO Center schools in the state. While Hispanics make up 31.2% of students in non-GO Center schools, they make up 53-64% of our control sample, depending upon method. Since Hispanics make up 67.6% of students in GO Center schools, the matched samples look much more similar to the treatment group than does the set of all non-GO Center schools in the state. Similarly, while 55.1% of students in GO Center schools come from low income families, the corresponding statistics for the set of non-GO Center schools is 29.1%. The corresponding statistic for our matched control sample ranges from

46-53%, depending on method, so the matched control samples are much closer. Similar statements can be made for nearly all variables in Table III.

5.3 Outcome Trends

While it is nice to show that our matched control samples are similar to first year GO Center schools on observable variables, it is ultimately more important – crucial in fact – for the causal interpretation of our results that first year GO Center schools are similar to our matched control schools in terms of pre-existing trends in the outcome variables we study. In particular, the identifying assumption for a causal interpretation of our differences in differences model requires that, conditional on student-level observables and time-constant school factors, outcome trends in the control schools are identical to what would have occurred at GO Center schools had they not received the program. For this assumption to be credible, it must be the case that the trends in outcome variables at GO Center schools mirrored the trends in control schools in the years preceding program implementation.[10]

To examine the extent to which outcome trends at GO Center schools approximate those at control schools, we present in Figures 5-6 trends in college application rates by treatment status for the state as a whole and the 5NN-.01-Band control samples from our favored specification of the propensity model. In both figures, the thick line represents the mean for each group, while the dotted lines illustrate the 95% confidence interval around the mean. Similar figures for other control samples are available in the Appendix, but the key interpretation is similar.

We begin by looking at Figure 5, which presents the trends in college application rates at treatment schools and the rest of the public high schools in Texas. This gives us a baseline for demonstrating the validity of our matching procedure for producing our matched control samples. The application rates at GO Center schools increased at a much faster rate than they did at non-GO Center schools after the program was implemented in the 2003-2004 school year. During the 2 years following program implementation, college application rates at GO Center schools increased from 32% to 43%, an increase of approximately 11 percentage points. This corresponds to an increase from 33% to 34% at non-GO Center schools, an increase of just 1 percentage point over the same period. Armed with just this single piece of evidence, one is tempted to claim that GO Centers increased college application rates. However, there are at least two fundamental problems with this interpretation.

First, the treatment schools had lower application rates than other school statewide during the 1999-2000 school year. On average, 27% of graduates at treatment schools applied to a Texas public 4-year college during the 1999-2000 school year – the corresponding figure for non-GO Center schools is 32%. Thus, as one would expect given the targeting of the program, GO Center schools have historically low college application rates. While this may seem problematic, this is precisely the kind of pre-existing school-level factors for which our differences-in-differences model is designed to control.

More problematic for our identification strategy is the fact that college application rates at treatment schools were trending upward relative to those at non-GO Center schools during

[10] This statement can be relaxed in the sense that it can be made conditional upon the observable covariates and the school-level fixed effects. We have also plotted the outcome variables conditional upon our observable control variables, and we find similar results.

the years prior to program implementation. Over the 4 school years preceding program implementation, college application rates increased from 27% to 33% at treatment schools, a difference of 6 percentage points. In contrast, application rates at non-GO Center schools increased from 33% to 34%, an increase of just 1 percentage point over the same 4 year period. Thus, while treatment schools increased their application rates at a much faster rate than non-GO Center schools after program implementation, this finding may simply be due to a continuation of pre-existing trends in college application rates. If these pre-existing trends are not captured by student-level observables and time-constant school-level variation, then the identifying assumption for our differences-in-differences model does not hold.

To investigate the extent to which the pre-existing trends in our outcome variables are captured by school level observables, thereby salvaging our identifying assumption, we now present in Figure 6 below, the trends in outcome variables by treatment status for our 5-NN-.005-Band control sample generated by the fully specified specification for the propensity score model. The results in Figure 6 bode well for our identifying assumption. While not perfect, the pre-existing trends for treatment schools look much more similar to those of the matched controls than they did to those of other non-GO Center schools. During the four years preceding program implementation, college application rates at GO Center schools increased from 28% to 32%, an increase of 4 percentage points. At the matched control schools, college application rates increased from 26% to 28% over the same period. These results certainly are not ideal - outcomes at matched control schools still increased at a relatively slower rate than they did at treatment schools. However, the trends in Figure 6 do make it much more plausible that the difference in pre-existing trends in outcome variables for treatment and control schools can be fully captured by the added school-level fixed effects and student-level observable data.

One other factor to take away from Figure 6 is the fact that the difference in post-implementation trends in outcome variables for treatment vs. matched controls provide a prelude to the more robust differences-in-differences results presented in the next section. In particular, we find that during the 2 years post-implementation, college application rates at GO Center schools increased from 32% to 43%, an increase of 11 percentage points. In contrast, college application rates at matched control schools increased from 28% to 30%, an increase of just 2 percentage points. Thus, a rough estimate of the causal two-year impact of GO Centers on overall college application rates is $11 - 2 = 9$ percentage points. In the next section, we further refine this estimate by controlling for student level observables and all time constant, school-level variation that may be correlated with treatment.

6 Results for Program Impact and Discussion

For each outcome, we present point estimates from six separate differences-in-differences models of the form presented in Eq1. The key distinction in these models is the control group used – 1) the common support control group, 2) the 5-, 3-, and 1-nearest neighbor control groups, and 3) the 5-NN-.01-Band and 5-NN-.005-Band control samples. Relatively constant across specifications, the results indicate that GO Centers had a positive and statistically significant overall impact for most of the outcomes considered. Not surprisingly, the impact is larger and more significant for students targeted most heavily by the state – Hispanics

and low-income students – as well as students exposed to the program for longer periods of time.

This section proceeds as follows: We begin by discussing the overall program impact of GO Centers. Next we discuss some methodological concerns related to breaking the impact of GO Centers down by race and income. Finally, we present the results for the program impact of GO Centers by race and income for the groups for which we are able to do so.

6.1 Overall Program Impact of GO Centers

Table IV presents our treatment effects for the program impact of GO Centers by control group. The point estimates shown here are derived from the full probit models including school-level fixed effects and student-level observables. Overall, we find convincing evidence that GO Centers had a positive overall impact upon all of the outcomes we study, and these results are not sensitive to model specification.

Our results indicate that in the first year of the program GO Centers increased college application rates by 4.1-6.5 percentage points overall, depending on specification, and this estimate is statistically distinguishable from zero for most specifications. This impact is quite substantial, representing an increase of roughly 12-19% over the 2003 treatment-school average probability of applying to college. Not surprisingly, the impact of GO Centers upon college application rates is larger for students exposed to the program for two academic years. In particular, among students exposed to the program during the junior year of high school, we find that GO Centers increased the probability of applying to a Texas public 4-year college by 7.7-8.8 percentage points, depending upon specification. This represents an increase of 23-26% over the baseline college application rate at GO Center high schools.

Not only did GO Centers increase college application rates, but we also find a large and statistically significant impact of GO Centers on the number of college applications submitted. In particular, for the first year of the program, we find that GO Centers increased the average number of college applications submitted by 0.064-0.096 applications per student overall, depending upon specification. Given that there were 7687 students in GO Center high schools and using the midpoint of our range of effects, this implies that GO Centers caused approximately 7687*0.08 = 615 new applications to the state's public colleges. Once again, we find a larger impact – roughly .12 applications per student – for students exposed to the program for two years.

Since most students induced to apply to college by GO Centers applied to lower tiered colleges with essentially open admissions policies, the impact of GO Centers upon college acceptance rates mirrors that of college application rates.[11] In particular, we find that GO Centers increased college acceptance rates by 3.0-5.5 percentage points, depending upon specification, for students exposed to the program for just one year. While this estimate is only statistically significant at the .1 level for half of our specification, it represents an increase of 10-18% over the baseline acceptance rate of 31%. Once again, the impact was larger for students exposed to the program during their junior year of high school. In particular, we

[11] The claim that most of the increased applications attributable to Go Centers were submitted to lower tiered schools comes from a separate analysis not presented in this paper. Using the Barron's Competitiveness Rankings, we find that Go Centers disproportionately increased college applications to less competitive colleges – an expected result. The results of this analysis are available upon request.

find that, among students exposed to the program during their junior year of high school, GO Centers increased college acceptance rates by 6.9-7.9 percentage points, depending upon specification, and this represents an increase of 22-25% over the baseline rate.

Similarly, GO Centers increased the number of acceptances to 4-year public colleges as well. In particular, we find that for students exposed to the program for one year, GO Centers increased the number of collegiate acceptances per student by .051-.078, depending upon specification. While this estimate is only statistically significant for 3 of 6 specification, it translates to roughly 495 students being accepted to the state's public college system due to the GO Center program. As before, this impact is larger – roughly .09 applications per student – for students exposed to the program for two years.

Turning to college enrollment rates, we only find significant overall program impacts for students exposed to the program for more than one year. In particular, we find that among students exposed to the program during their junior year, GO Centers increase college enrollment rates by 3.4-5.3 percentage points, depending on specification. Using the midpoint of this range, this represents a 7.5% increase over the baseline enrollment rate of 57%.

We also find that most of the students induced by GO Centers to enroll in college enrolled in 4-year – as opposed to 2-year – colleges. In particular, for students exposed to the program for two years, we find that GO Centers increased the probability of enrolling at a 4-year college by 3.4-5.3 percentage points, depending upon specification. However, we find no statistically significant impacts on enrollment at 2-year colleges.

Turning to one-year college persistence rates, we find no evidence that GO Centers increased persistence rates for students exposed to the program for a single year. However, among students exposed to the program during their junior year of high school, we find some evidence that GO Centers may have increased college persistence rates. While the point estimates are all positive and economically significant, ranging from 2.5 – 4.8 percentage points, we only find a statistically significant impact for two of six specifications. However, using the midpoint of the range of effects, this indicates that GO Centers increased one-year college persistence rates by roughly 9% over the baseline rate of 40%.

Finally, we are interested in the types of students affected by the program. If the program is indeed alleviating inefficiencies in the market for higher education as the state hopes, we might expect well-prepared students to enroll in college in response to the intervention. On the other hand, the program may simply be operating by extending the margin of college attendance. To address this question, we looked at the impact of the program on the probability of enrolling in college and being required to take a developmental course. If the program is extending the margin of higher education, then we would expect to find a positive impact on this variable. However, the evidence here is inconclusive. In particular, while the point estimates for these models are all positive and economically significant, ranging from 1.7-3.3 percentage points, we only achieve statistical significance for a single specification.

6.2 Race and Income Specific Treatment Effects – Methodological Concerns

Before moving on to produce subgroup-specific treatment effects for the impact of GO Centers, we must address a minor methodological issue. The concern stems from the state's priorities for targeting GO Centers. In particular, since the state focused attention upon high schools with large proportions of Hispanic and low-income students, the vast majority of students attending treatment schools come from those two groups. As such, we are concerned that, once we limit the analysis to schools in the common support, there will be too few students from other subgroups – African Americans, Whites, and non-low-income students – to get very precise estimates of the program impact of GO Centers. That is, since very few students attending GO Center schools were, say African American, there will be very few African Americans in the common support control group so that our differences-in-differences models run solely on African Americans will suffer from low N – and hence low precision. This is not a methodological problem in the sense that our identifying assumption is violated, but rather a statistical issue that potentially limits the scope of our subgroup-specific analysis to Hispanic and low-income students. If we had more observations on blacks and whites, we could say something about the impact of GO Centers on those groups.

To investigate this concern further, we produce in Figures 7-11 trends in college application rates by treatment status for Hispanics, African Americans, Whites, and low income and non-low income students, respectively. In all figures, the solid line represents the subgroup-specific mean application rate, while the dotted lines represent the 95% confidence interval around that mean. We report only the trends for the 5-NN-.005-Band control group generated from the fully specified propensity score model, but trends using other control groups are similar and are available upon request.

We begin by presenting the subgroup-specific trends for Hispanics and low income students, the groups most targeted for GO Centers by the state. The key point to take away from Figures 7-8 is the fact that these trends largely mirror those run on all students. As before, the identifying assumption for our differences-in-differences model to isolate the causal impact of GO Centers upon, say Hispanic application rates, is that the trends in Hispanic application rates at control schools must be the trends that would have occurred at GO Center schools if they had not received the program. Given the subgroup-specific trends reported above, logic similar to what we used when looking at the overall trends in application rates can be used to argue that this identifying assumption is likely to hold for these two subgroups. For both groups, the pre-program trends for treatment schools mirror those that occurred in control schools.[12]

As before, we can back out a rough estimate of the subgroup-specific program impact of GO Centers upon college application rates for these two subgroups. In particular, Hispanic application rates at treatment schools increased from 30% to 44% during the 2 years following program implementation – an increase of 14 percentage points. The corresponding increase among control schools in the common support was just 4 percentage points. Thus, a rough

[12] In an effort to get a better fit for these race-specific models, we also attempted to run our propensity score models by race –thereby generating a separate matched control sample of schools for each race. While this model is more flexible, it did not add anything substantial and the results are nearly identical to those presented here.

estimate of the causal impact of GO Centers upon Hispanic college application rates is 14 – 4 = 10 percentage points. Similar logic yields a program impact of GO Centers upon college application rates among low-income students of roughly 11 percentage points.

Turning to the other subgroups, the key point to take away from Figures 9-11 is the large confidence intervals around the trends in college application rates. These results confirm our suspicion that subgroup-specific point estimates can only be made for Hispanics and low-income students. Those for African Americans, Whites, and non-low income students should be too imprecise to make any meaningful inferences.

6.3 Subgroup-Specific Treatment Effects – Results

Table V presents our estimates for the treatment effect of GO Centers among the targeted subgroups of Hispanics and low income students. While we ran these models separately for Hispanics and low-income students, the results do not vary systematically by subgroup. Thus, the models in Table V pool these two groups to increase precision. Results for models run separately by targeted subgroup are available in the Appendix. Overall, we find larger and more precise impacts of GO Centers among Hispanics and low-income students than we did for the overall impact of GO Centers.

For the initial year of the program, we find that GO Centers increased college application rates by 5.6-8.6 percentage points among Hispanic and low income students, and this effect is statistically significant at the 0.1 level or higher for four of six specifications. Moreover, for all specifications, this effect is larger than the overall impact of 4.1-6.5 percentage points. As before, we find a larger impact of GO Centers upon college application rates among students exposed to the program for two years. In particular, we find that among students exposed to the program during the junior year of high school, GO Centers increased college application rates by 8.9-11.7 percentage points, depending upon specification.

We also find that GO Centers increased the number of applications submitted by Hispanic and low income students – and this impact is larger than the corresponding impact upon the population as a whole. In particular, Hispanic and low-income students exposed only during the first year of the program, we find that GO Centers increased the number of applications per student by 0.083-0.126, depending upon specification. Considering there were 4972 low income and Hispanic students in treatment schools, this implies that GO Centers increased the number of applications submitted by targeted students by roughly 520. Once again, these impacts are large for students exposed to the program for two years – 0.124-0.174 applications per student, depending upon specification.

As before, the impact of GO Centers upon the college acceptance rates of Hispanics and low-income students largely mirrors the corresponding impacts upon college application rates. In particular, we find that, during the initial year of the program, GO Centers increased the college application rates of Hispanics and low-income students by 5.0-7.4 percentage points – considerably more than the 3.0-5.5 percentage point impact upon the population at large. Similarly, the two year impact was larger than the one year impact for both subgroups. In particular, we find that among students exposed to the program during their junior year of high school, GO Centers increased college acceptance rates by 6.9-7.9 percentage points among Hispanics and low-income students, depending upon specification.

There was also a larger impact of GO Centers on the number of college acceptances

received for Hispanics and low income students than for other ethnicities and income groups. In particular, we find that for the first year of the program, GO Centers increased the number of college acceptances received per student by 0.068-0.108 – corresponding to a total increase of 438 acceptances for targeted students. These impacts are larger – 0.095-0.137 applications per student – for targeted students exposed to the program during the junior year.

Turning to the program impact upon Hispanic and low-income college enrollment rates, we see a similar, but muted pattern to the corresponding impacts upon college application and acceptance rates. In particular, for the first year of the program, we find that GO Centers increased the college enrollment rates of Hispanics and low-income students by 1.9-3.1 percentage points, but this impact is only significant at the 0.1 level for two of six specifications. However, considering that, for the first year of the program, we found no evidence of an impact of GO Centers on college enrollment rates among the population at large, there is some evidence of a larger enrollment impact on targeted subgroups. Once again, this impact is larger for students exposed to the program for two years. In particular, we find that, among targeted students exposed to the program during the junior year of high school, GO Centers increased college enrollment rates by 5.3-7.3 percentage points. As before, we find that all of the impact of GO Centers on college Hispanic and low-income college enrollment is due to increases in enrollment at 4-year colleges.

Considering the program impact of GO Centers upon the college persistence rates of Hispanics and low-income students, we find no statistical evidence that the program improved in its initial year. However, we do find a large and meaningful program impact of GO Centers upon college persistence rates among Hispanics and low-income students exposed to the program during their junior year of high school. In particular, we find that GO Centers increased the college persistence rates of these students by 3.6-6.2 percentage points, and this impact is statistically significant at the 0.1 level for five of six specifications.

Finally, we find scant evidence for the notion that GO Centers may be acting to extend the margin of higher education enrollment among targeted subgroups. In particular, we find that GO Centers increased the number of targeted students who enroll in higher education and are required to take a developmental course by 1.9-3.3 percentage points. However, this point estimate is only statistically significant for one of six specifications, so we cannot make any conclusive statement for this question.

7 Conclusions and Extensions

In this paper, we have attempted to estimate the causal impact of the Texas GO Center Program, a statewide college information and awareness campaign targeted at academically prepared students who were not attending college. The program's philosophy is grounded in the idea that low-income and minority students tend to place low value on academic success and lack access to information about the college application process. As such, the key goal of the program is to increase demand for college, particularly for traditionally underserved students, by changing these students' preferences for college and increasing their access to important information about how to apply to college. Central to this effort is a massive marketing and information campaign touting the benefits of higher education. At the school level, the program emphasizes the power of peer-to-peer persuasion to create a "college-going

culture" amongst students, and the provision of free guidance services and easily accessible information about the college application process.

Linking data on the location and expansion of GO Centers over time to an extensive database that follows the universe of Texas high school students into Texas colleges, we use a differences-in-differences estimation strategy to isolate the causal impact of the GO Center Program on college application, acceptance, enrollment, and persistence rates. However, in line with the state's long term goal of increasing college enrollment rates among low income and Hispanic students, the state purposefully targeted first year GO Centers in schools with large proportions of these "traditionally underserved" students. Mindful of this selection process, we are careful to examine the role of selection into treatment in our data. To address concerns over a lack of common support, we use a propensity score matching procedure to construct a series of matched control schools that are similar to first-year GO Center schools on pre-program demographics, course-taking and trends in outcome variables. We use these matched control samples to produce treatment effects for a range of specifications, each with different assumptions about the degree of selection into treatment. By and large, the estimates are robust to the chosen specification.

Overall, we find convincing evidence that GO Centers had a positive impact on all of the college-going outcomes of study. We find the largest impacts on college application and acceptance rates. In particular, we find that among students exposed to the program for just one year, GO Centers increased college application rates by 4.1-6.5 percentage points – corresponding to a 12-19% increase over the baseline rate for students at treatment schools. We find positive, but more muted impacts of GO Centers on college enrollment and persistence outcomes. Not surprisingly, the program's impact is concentrated mainly amongst the Hispanic and low-income students targeted by the program. There is also evidence that the program impacts are larger for students exposed to GO Centers for more than one year.

Overall, the results of this study provide strong evidence that the GO Center program, as implemented, is an effective way to increase college application, acceptance, enrollment, and persistence rates – particularly among the traditionally underserved students that were targeted by the program. These results are consistent with the state's view of a market failure in the market for higher education. The provision of supplementary high school guidance services and useful information about the college application process, coupled with a vigorous marketing campaign may have served to alleviate a market failure stemming from informational asymmetries in the market for higher education.

At this point, many questions remain to be answered. In particular, at this stage, we are unable to answer the question of why GO Centers have succeeded as well as they have. For example, is it "peer-to-peer" persuasion or easy access to information that is most responsible for GO Center success? We are currently administering a statewide survey of every Texas high school to collect detailed information on GO Center activity in individual high schools. Armed with this new information, we will be able to shed more light on the mechanisms through which GO Centers work, and inform policy for the future.

Furthermore, GO Centers are still a relatively new program and, as such, we do not know the program's impact upon long term outcomes such as college completion rates, employment, and wages – arguably the outcomes we are ultimately most interested in. As the first cohorts of students exposed to GO Centers progress through college and into the labor market, we plan to study these outcomes, using Texas Workforce Commission data,

which is housed at the THECB.

References

Abraham, K., and Melissa Clark. (2006). "Financial Aid and Students' College Decisions: Evidence from the District of Columbia Tuition Assistance Grant Program." Journal of Human Resources. 41(3): 578-610.

Agodoni, R., and Mark Dynarski (2004). "Are experiments the only option? A look at dropout prevention programs." Review of Economics and Statistics. 86(1): 180-194.

Ashenfelter, O. (1978). "Estimating the effect of training programs on earnings." Review of Economics and Statistics. 6(1): 47-57.

Augurzky, B., and Jochen Kluve (2004). "Assessing the performance of matching algorithms when selection into treatment is strong." IZA Discussion Paper # 1301.

Avery, C., and Caroline Hoxby (2004). "Financial Aid Packages and Students' College Choices." In Caroline Hoxby, ed. College Choices: The Economics of Where to Go, When to Go, and How to Pay for It. Chicago: University of Chicago Press.

Avery, C., and Thomas Kane (2004). "Student Perceptions of College Opportunities: The Boston COACH Program." In Caroline Hoxby, ed. College Choices: The Economics of Where to Go, When to Go, and How to Pay for It. Chicago: University of Chicago Press.

Belley, P., and Lance Lochner (2007). "The Changing Role of Family Income and Ability in Determining Educational Achievement." NBER Working Paper No. 13527.

Bettinger, E. (2004). "How Financial Aid Affects Persistence." In Caroline Hoxby, ed. College Choices: The Economics of Where to Go, When to Go, and How to Pay for It. Chicago: University of Chicago Press.

Black, D., and Jeffrey Smith (2004). "How robust is the evidence on the effects of college quality? Evidence from matching." Journal of Econometrics 121: 99-124.

Caliendo, M., and Sabine Kopeinig (2008). "Some practical guidance for the implementation of propensity score matching." Journal of Economic Surveys 22(1): 31-72.

Carrell, S., and Susan Carrell (2006). "Do Lower Student to Counselor Ratios Reduce School Disciplinary Problems?" Contributions to Economic Analysis and Policy 5(1): Art. 11.

Chan, J., and Erik Eyster (2003). "Does banning affirmative action lower college student quality?" American Economic Review 93(3): 858-872.

College for All Texans Foundation (2007). "Go Center Partnership: A Proposal to the Bill and Melinda Gates Foundation." Texas Higher Education Coordinating Board.

Cornwell, C., David Mustard, and Deepa Sridhar (2006). "The Enrollment Effects of Merit-Based Financial Aid: Evidence from Georgia's HOPE Program." Journal of Labor Economics. 24(4): 761-786.

Dehejia, R., and Sadek Wahba (2002). "Propensity score matching methods for nonexperimental causal studies." Review of Economics and Statistics 84(1): 151-161.

Dickson, L. (2006). "Does ending affirmative action in college admissions lower the percent of minority students applying to college?" Economics of Education Review. 25: 109-119.

Dynarski, S. (2003). "Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion." American Economic Review. 93(1): 279-288.

Dynarski, S. (2004). "The New Merit Aid." In Caroline Hoxby, ed. College Choices: The Economics of Where to Go, When to Go, and How to Pay for It. Chicago: University of Chicago Press.

Dynarski, S. (2005). "Building the Stock of College Educated-Labor." NBER Working Paper No. 11604.

Dynarski, S., and Judith Scott-Clayton (2008). "Complexity and Targeting in Federal Student Aid: A Quantitative Analysis." NBER Working Paper No. 13801.

Fryer, R., Glenn Loury and Tolga Yuret. (2003). "Colorblind affirmative action." NBER Working Paper Series.

Griffith, A., and Kevin Rask. (2007). "The influence of the U.S. News and World Report collegiate rankings on the matriculation decisions of high-ability students: 1995-2004." Economics of Education Review. 26: 244-255.

Kain, J., Dan O'Brien and Paul Jargowsky. (2005). "Hopwood and the Top Ten Percent Law: How they have affected the college enrollment decisions of Texas high school graduates." Texas Schools Project Working Paper Series.

Kane, T. (1994). "College Entry by Blacks since 1970: The Role of College Costs, Family Background, and the Returns to Education." Journal of Political Economy. 102(5): 878-911.

Kane, T. (2003). "A Quasi-Experimental Estimate of the Impact of Financial Aid on College-Going." NBER Working Paper No. 9703.

Kane, T. (2007). "Evaluating the Impact of the D.C. Tuition Assistance Grant Program." Journal of Human Resources. 42(3): 555-582.

Lee, V., and Ruth Ekstrom (1987). "Student access to guidance counseling in high school." American Educational Research Journal. 24(2): 287-310.

Leicht, K., and Teresa Sullivan. (2000). "Minority Student Pipelines Before and After the Challenges to Affirmative Action." Unpublished Manuscript.

Levin, H., Clive Belfield, Peter Muennig, and Cecilia Rouse (2007). "The Public Returns to Public Educational Investment in African American Males." Economics of Education Review. 26: 700-709.

Long, B. (2004). "The Impact of Federal Tax Credits for Higher Education Expenses." In Caroline Hoxby, ed. College Choices: The Economics of Where to Go, When to Go, and How to Pay for It. Chicago: University of Chicago Press.

Long, B. (2004). "How Have College Decisions Changed Over Time? An Application of the Conditional Logistic Choice Model." Journal of Econometrics. 121: 271-296.

Long, M. (2004). "College applications and the effect of affirmative action." Journal of Econometrics. 121: 319-342.

McDonough, P. (2004). "Counseling and college counseling in America's high schools." National Association for College Admission Counseling.

Meredith, M. (2004). "Why do universities compete in the ratings game? An empirical analysis of the effects of the U.S. News and World Report College Rankings." Research in Higher Education. 45(5): 443-461.

Miller, D. (2007a). "Isolating the Causal Impact of Community College Enrollment on Educational Attainment and Labor Market Outcomes in Texas." SIEPR Discussion Paper No. 06-33.

Miller, D. (2007b). "The Propensity to Enroll in Higher Education in Texas: The Margin is NOT the Average." Working Paper.

Miller, D. (2007c). "Using Institution-Specific Placement Policies to Identify the Impact of Developmental Mathematics Courses on Early College Academic Outcomes for Students at Texas Community Colleges." Working Paper.

Monks, J., and Ronald Ehrenberg. (1999). "The impact of U.S. News and World Report college rankings on admissions outcomes and pricing policies at selective private institutions." NBER Working Paper Series.

National Center For Public Policy and Education (2008). "Measuring Up: The National Report Card on Higher Education."

Office for Civil Rights. (2003). "Race-neutral alternatives in postsecondary education: innovative approaches to diversity."

Pallais, A., and Sarah Turner. (2006). "Opportunities for Low-Income Students at Top Colleges and Universities: Policy Initiatives and the Distribution of Students." National Tax Journal. 64(2): 357-286.

Plank, S., and Will Jordan (2001). "Effects of information, guidance, and actions on postsecondary destinations: a study of talent loss." American Educational Research Journal 38(4): 947-979.

Rylander, C. (2002). "Guiding our children toward success: How Texas School Counselors Spend their Time." Texas Comptroller.

Sandy, J., Arturo Gonzalez, and Michael Hilmer (2006). "Effects of Attending a 2-Year School on the Probability of Completing a 4-Year Degree. Economics of Education Review. 25: 463-471.

Singell, L. (2004). "Come and Stay a While: Does Financial Aid Effect Retention Conditioned on Enrollment at a Large Public University?" Economics of Education Review. 23: 459-471.

Texas Higher Education Coordinating Board (THECB) (2000). "Closing the Gaps: The Texas Higher Education Plan," Available at http://www.thecb.state.tx.us/reports/PDF/0379.PDF.

Texas Higher Education Coordinating Board (THECB) (2005). "Go Center Manual."

Turner, S. (2004). "Going to College and Finishing College: Explaining Different Educational Outcomes." In Caroline Hoxby, ed. College Choices: The Economics of Where to Go, When to Go, and How to Pay for it. Chicago: University of Chicago Press.

A GO Center Expansion

In the spring of the 2003-04 academic year, THECB hired approximately 20 staff members referred to as "Regional Coordinators," whose job it was to both oversee existing GO Centers and expand the program to other high schools with traditionally low college-going rates ("target schools"). Each Regional Coordinator was responsible for a specific geographic region of the state, and all regions of the state had a Regional Coordinator. However, from discussions with former Regional Coordinators, it appears that there was much variation in expansion efforts across regions, with some regional coordinators contacting all target schools and other regions having considerable turnover in the Coordinator position and subsequently seeing little oversight of existing Centers or expansion of new ones. Furthermore, and crucial to this analysis, records on the expansion and location of GO Centers were often missing or incomplete during the second year of the program (2004-05 school year).

The Regional Coordinator position was abolished in August 2005 due to lack of funding, and GO Center schools were left without contact or support from the state for the 2005-06 academic year – the third year of the GO Center Program. However, starting in the 2006-07 school year, THECB launched a new campaign, the P-16 Initiative, to coordinate resources between all schools from pre-school through college. Central to this initiative is the P-16 Field Specialist who, like the Regional Coordinator of years past, is in charge of GO Center oversight and expansion in a particular region. While P-16 Field Specialists were operating in most of the state at the time of this study, some sparsely populated areas of the state either did not have a Field Specialist or only had one hired on a part-time basis.

B Missing Social Security Numbers

We now address a source of potential sample selection bias and present evidence that it does not significantly bias our results, although it may slightly change the interpretation of those results. Approximately 9 percent of students in the Texas high school database (the TEA database) did not have recorded Social Security Numbers (SSN) and thus could not be tracked into the THECB databases on college outcomes. We first take a look at the types of students that have missing SSNs and, not surprisingly, find that these students are disproportionately likely to be minority and low-income students. For example, while 3.8%

of white students have missing SSNs, the corresponding statistics for blacks, Hispanics, and "other races" (largely Asians) are 7.3%, 12.2% and 15.4%, respectively. Moreover, 12.1% of Title I eligible students have missing SSNs while just 6.4% of ineligible students are missing SSNs. One implication of this sample selection is that results presented in this study are only the effect of GO Centers on those students who have SSNs. Furthermore, the types of students that are most likely to be missing SSNs are also those students most likely to be targeted by GO Centers. So, if we assume that GO Centers are most effective at improving the academic outcomes of students targeted by the program, then our key findings should understate the true impact of GO Centers.

We also find that there is a higher percentage of students with missing SSNs in treatment schools (9.3%) than in control schools (8.8%). Our fixed effects estimator controls for this difference under the assumption that the percentage of students with missing SSNs changed at the same rate at treatment and control schools before and after GO Center implementation. In particular, for one to interpret our results as the causal impact of GO Centers on academic outcomes (for students with valid SSNs), we must only assume that the change in academic outcomes in treatment schools would have been the same as in control schools if the treatment schools had not received GO Centers. For this to be the case, it only needs to be true that the percentage of students with missing SSNs changed at the same rate in treatment and control schools during the period of our study. We show that this is indeed the case by estimating equation (1) where the outcome is an indicator of whether the student is missing a SSN.

Table A.1 presents the results. The coefficient on TREAT, represents the difference in the percentage of students with missing SSNs in treatment and control schools, and we can see that students in treatment schools are approximately 2 percentage points more likely to have missing SSNs. This result makes sense given that more treatment than control schools were located along the Mexican border. The coefficient of interest can be interpreted as the average increase in the percentage of students with missing SSNs in treatment schools, over and above the corresponding increase in control schools. The results indicate that the percentage of students with missing SSNs changed at roughly the same rate at treatment and control schools during our period of study, and this should alleviate any concerns over the impact of missing SSNs on the causal interpretations presented in this study.

Table I - Pre-Treatment Means of Selected Outcome and Demographic Variables for 2002-03 Graduates

	Entire State (other than treatment schools)	1st Year Treated Schools
Number of High Schools	1110	39
Number of Students in Graduating Cohort	161.378	197.103
	(5.051)**	(22.954)**
Outcome Variables		
Apply to Any 4-yr Public College	0.294	0.268
	(0.004)**	(0.023)**
Number of 4-yr Public Applications	0.441	0.413
	(0.009)**	(0.045)**
Accepted at Any 4-yr Public College	0.249	0.235
	(0.004)**	(0.022)**
Number of 4-yr Public Acceptances	0.361	0.351
	(0.007)**	(0.040)**
Enroll in Any College (2- or 4-yr)	0.551	0.5
	(0.004)**	(0.018)**
Enroll in 2-year college	0.339	0.345
	(0.004)**	(0.019)**
Enroll in 4-yr College (Pub. or Prvt.)	0.213	0.154
	(0.004)**	(0.014)**
Demographic Variables		
TAKS english score	68.768	64.464
	(0.497)**	(2.187)**
TAKS math score	66.988	58.682
	(0.478)**	(2.188)**
% Economically Disadvantaged Students	0.326	0.53
	(0.006)**	(0.040)**
% Limited English Proficient	0.014	0.046
	(0.001)**	(0.010)**
% male	0.502	0.507
	(0.003)**	(0.011)**
% Black	0.111	0.102
	(0.005)**	(0.022)**
% Hispanic	0.273	0.564
	(0.008)**	(0.055)**
% White	0.598	0.323
	(0.009)**	(0.051)**
% "At Risk" of not graduating	0.338	0.498
	(0.006)**	(0.034)**
% enrolled in calculus	0.086	0.069
	(0.003)**	(0.007)**
% taking AP or IB exam	0.444	0.397
	(0.013)**	(0.033)**

Table II - Propensity Score Probit - Outcome Variable is GO Center Treatment School in 2003-04 - Observations are at the school level - All Regular Instructional, non-charter HSs in Texas included

Variable	Coef.	s.e.
Lagged College Application Rates		
2001 App. Rate = [0,.1] dummy	0.91	(1.32)
2001 App. Rate = (.1,.2] dummy	0.03	(1.02)
2001 App. Rate = (.2,.3] dummy	0.49	(0.83)
2001 App. Rate = (.3,.4] dummy	0.36	(0.66)
2002 App. Rate = [0,.1] dummy	-5.00	(1.42)**
2002 App. Rate = (.1,.2] dummy	-3.16	(1.07)**
2002 App. Rate = (.2,.3] dummy	-2.59	(0.85)**
2002 App. Rate = (.3,.4] dummy	-2.62	(0.78)**
2003 App. Rate = [0,.1] dummy	3.55	(1.66)*
2003 App. Rate = (.1,.2] dummy	2.25	(1.25)
2003 App. Rate = (.2,.3] dummy	1.99	(1.00)*
2003 App. Rate = (.3,.4] dummy	1.35	(0.76)
App. Rate 2001 - App. Rate 2000	3.50	(3.23)
App. Rate 2003 - App. Rate 2002	6.84	(3.44)*
Lagged College Enrollment Rates		
2001 Enr. Rate = [0,.25] dummy	1.58	(1.70)
2001 Enr. Rate = (.25,.35] dummy	1.10	(0.99)
2001 Enr. Rate = (.35,.45] dummy	0.01	(0.70)
2001 Enr. Rate = (.45,.55] dummy	0.21	(0.49)
2002 Enr. Rate = [0,.25] dummy	3.16	(1.70)
2002 Enr. Rate = (.25,.35] dummy	1.44	(1.17)
2002 Enr. Rate = (.35,.45] dummy	1.16	(0.78)
2002 Enr. Rate = (.45,.55] dummy	1.21	(0.52)*
2003 Enr. Rate = [0,.25] dummy	-3.13	(2.11)
2003 Enr. Rate = (.25,.35] dummy	-1.76	(1.17)
2003 Enr. Rate = (.35,.45] dummy	-1.42	(0.78)
2003 Enr. Rate = (.45,.55] dummy	-1.16	(0.53)*
Enr. Rate 2001 - Enr. Rate 2000	-2.16	(2.94)
Enr. Rate 2003 - Enr. Rate 2002	-6.79	(3.66)

(continued)		
School Characteristics in 2002-03		
Mean TAKS science score	-0.02	(0.02)
Mean TAKS english score	0.02	(0.01)
Mean TAKS math score	0.00	(0.02)
Mean TAKS Soc. Studies	0.00	(0.03)
% of teachers < 5 yrs exp	0.03	(0.02)
Student - Teacher ratio	0.05	(0.09)
Teacher salary	0.00	0.00
Graduation rate	-0.05	(0.02)*
% Economically Disadv.	0.19	(1.39)
% LEP	-0.11	(8.69)
% male	3.94	(2.21)
% Black	-8.95	(2.89)**
% Hispanic = [.2,.6] dummy	-0.98	(0.89)
% Hispanic = (.6,.8] dummy	-0.57	(1.55)
% Hispanic = (.8,.9] dummy	-2.77	(1.92)
% Hispanic = (.9,1] dummy	-2.26	(2.05)
% White	-6.16	(2.69)*
% Gifted and Talented	2.39	(2.13)
% ESL	-7.42	(10.30)
% Special Education	-0.56	(3.09)
% "At Risk" of not grad'ing	0.63	(0.82)
# graduates	0.02	(0.005)**
# graduates squared	0.00	(0.000)*
% enrolled in calculus	-1.72	(5.57)
% enrolled in precalc	1.62	(1.54)
% enrolled in algebra 2	0.26	(2.09)
% enrolled in algebra 1	3.38	(8.93)
% enrolled in geometry	4.18	(2.65)
% enrolled in biology	2.88	(3.64)

(continued)		
% enrolled in chemistry	-0.13	(1.78)
% enrolled in physics	3.04	(1.39)*
% enrolled 1st yr For Lang	10.78	(3.73)**
% enrolled 2nd yr For Lang	2.07	(1.43)
% enrolled 3rd yr For Lang	1.01	(2.19)
% enrolled 4th yr For Lang	-12.42	(8.93)
% enrolled in Debate	-1.84	(7.14)
% enrolled in Music	0.12	(1.17)
% enrolled in Theater	2.36	(1.21)
% enrolled in Visual Arts	0.29	(1.04)
% taking AP or IB exam	-0.10	(0.95)
% taking AP math exam	1.06	(5.19)
% taking AP engligh exam	-1.93	(2.20)
% taking AP for lang exam	-5.37	(11.31)
% taking AP science	-0.37	(3.51)
region 3 dummy	0.38	(0.85)
region 4 dummy	2.35	(0.85)**
region 5 dummy	2.49	(0.92)**
region 6 dummy	-2.00	(0.95)*
region 7 dummy	-0.61	(0.87)
region 8 dummy	-1.87	(0.75)*
region 10 dummy	-2.73	(0.97)**
N	1000	

Table III - Pre-Treatment Means of Selected Outcome and Demographic Variables for 2002-03 Graduates - Various Treatment and Control Samples

	All Treated Schools	All Non-Treated Schools in State	All Treated Schools in C.S.	All Non-Treated Schools in C.S.	All .01 Caliper Control Schools in C.S	All .005 Caliper Control Schools in C.S	All 5NN Control Schools in C.S.	All 3NN Control Schools in C.S.	All 1NN Control Schools in C.S.
TAKS english score	61.813	69.007	62.190	65.089	64.974	65.367	64.812	66.599	65.521
TAKS math score	58.555	68.366	59.489	61.543	60.783	60.567	61.274	62.402	61.268
Student - Teacher ratio	14.789	14.783	14.448	15.026	14.894	14.968	14.730	14.701	14.778
Graduation rate	82.213	87.155	82.724	83.761	82.637	82.615	82.689	82.137	83.052
% Low Income	0.558	0.291	0.547	0.463	0.515	0.511	0.517	0.527	0.531
% Limited English Proficient	0.047	0.018	0.040	0.033	0.039	0.037	0.039	0.041	0.045
% male	0.488	0.491	0.489	0.492	0.490	0.487	0.489	0.491	0.486
% Black	0.071	0.134	0.073	0.108	0.108	0.111	0.099	0.072	0.068
% Hispanic	0.676	0.312	0.652	0.531	0.602	0.592	0.613	0.638	0.623
% White	0.241	0.521	0.264	0.340	0.276	0.281	0.273	0.277	0.297
% "At Risk" of not graduating	0.456	0.347	0.452	0.472	0.526	0.530	0.522	0.534	0.513
# students in cohort	298.684	336.712	298.063	308.789	296.573	307.058	295.274	304.776	271.216
% enrolled in calculus	0.068	0.1	0.067	0.080	0.072	0.072	0.075	0.076	0.068
% taking AP or IB exam	0.435	0.585	0.450	0.476	0.445	0.449	0.454	0.459	0.447
Number of High Schools	39	1110	35	152	77	62	89	66	26

Table 4: Program Impacts - Dif-in-Dif Marginal Effects on Treatment x Year 2004 Interaction Terms (s.e.)

Dependent Variable	Control Group: All Non-Treated Schools in State	Control Group: All Non-Treated Schools in C.S.	Control Group: All 5NN Schools in C.S
Cohort Exposed to GO Center for 1 year			
Apply to Any 4-yr Public College	0.23	0.21	0.21
	(9.60)**	(8.17)**	(7.73)**
Number of 4-yr Public Applications	0.11	0.12	0.11
	(7.64)**	(7.13)**	(6.23)**
Accepted at Any 4-yr Public College	0.21	0.18	0.19
	(8.66)**	(7.20)**	(6.80)**
Number of 4-yr Public Acceptances	0.09	0.10	0.09
	(7.32)**	(7.02)**	(6.24)**
Enroll in Any College (2- or 4-yr)	0.04	0.04	0.04
	(1.73)	(1.61)	(1.72)
Enroll in 2-year college	0.00	(0.02)	(0.01)
	(0.09)	(0.99)	(0.43)
Enroll in 4-yr College (Pub. or Prvt.)	0.05	0.09	0.08
	(2.22)*	(3.32)**	(2.72)**
1 yr. Persistence (Any college)	0.00	0.01	0.01
	(0.18)	(0.39)	(0.41)
N	374240	97288	50155
Cohort Exposed to GO Center for 2 years			
Apply to Any 4-yr Public College	0.35	0.33	0.31
	(14.58)**	(12.66)**	(11.17)**
Number of 4-yr Public Applications	0.20	0.19	0.17
	(12.39)**	(11.03)**	(9.73)**
Accepted at Any 4-yr Public College	0.32	0.31	0.28
	(13.34)**	(11.92)**	(10.30)**
Number of 4-yr Public Acceptances	0.15	0.16	0.14
	(11.67)**	(11.09)**	(9.55)**
Enroll in Any College (2- or 4-yr)	0.09	0.11	0.10
	(4.03)**	(4.42)**	(4.06)**
Enroll in 2-year college	0.02	0.00	0.00
	(0.73)	(0.18)	(0.05)
Enroll in 4-yr College (Pub. or Prvt.)	0.11	0.16	0.15
	(4.61)**	(5.78)**	(5.22)**
1 yr. Persistence (Any college)	0.06	0.10	0.10
	(2.76)**	(4.08)**	(3.72)**
N	350701	82858	52712

Table 5: Program Impacts by Subgroup - Dif-in-Dif Marginal Effects on Treatment x Year 2004 Interaction Terms (s.e.) - Control Group is all Schools in Common Support

Dependent Variable	All	Not Low Income	Low Income	Hispanic	Black	White
Cohort Exposed to GO Center for 1 year						
Apply to Any 4-yr Public College	0.206	0.042	0.303	0.287	0.074	-0.02
	*(8.17)***	*(1.08)*	*(9.10)***	*(9.24)***	*(0.76)*	*(0.39)*
Number of 4-yr Public Applications	0.115	0.033	0.172	0.149	0.095	0.007
	*(7.13)***	*(1.33)*	*(8.17)***	*(7.42)***	*(1.52)*	*(0.23)*
Accepted at Any 4-yr Public College	0.183	0.001	0.29	0.275	-0.002	-0.068
	*(7.20)***	*(0.02)*	*(8.64)***	*(8.81)***	*(0.02)*	*(1.35)*
Number of 4-yr Public Acceptances	0.095	0.021	0.145	0.134	0.053	-0.011
	*(7.02)***	*(1.02)*	*(8.06)***	*(7.68)***	*(1.17)*	*(0.47)*
Enroll in Any College (2- or 4-yr)	0.038	-0.048	0.092	0.088	-0.015	-0.084
	(1.61)	*(1.32)*	*(3.01)***	*(3.06)***	*(0.17)*	*(1.80)*
Enroll in 2-year college	-0.024	-0.004	-0.039	-0.049	0.127	-0.025
	-0.99	-0.11	-1.21	-1.61	-1.45	-0.53
Enroll in 4-yr College (Pub. or Prvt.)	0.087	-0.053	0.183	0.184	-0.232	-0.087
	*(3.32)***	*(1.32)*	*(5.25)***	*(5.67)***	*(2.16)**	*(1.66)*
1 yr. Persistence (Any college)	0.009	-0.037	0.042	0.031	-0.097	-0.028
	(0.39)	*(1.02)*	*(1.34)*	*(1.07)*	*(1.09)*	*(0.60)*
N	97288	46083	51205	57239	9650	28799

	All	Not Low Income	Low Income	Hispanic	Black	White
Cohort Exposed to GO Center for 2 years						
Apply to Any 4-yr Public College	0.326	0.24	0.394	0.436	0.15	0.072
	*(12.66)***	*(6.30)***	*(11.21)***	*(13.61)***	*(1.57)*	*(1.41)*
Number of 4-yr Public Applications	0.189	0.142	0.228	0.253	0.054	0.066
	*(11.03)***	*(5.46)***	*(10.03)***	*(11.77)***	*(0.88)*	*(2.01)**
Accepted at Any 4-yr Public College	0.31	0.23	0.373	0.429	0.105	0.036
	*(11.92)***	*(5.97)***	*(10.54)***	*(13.32)***	*(1.07)*	*(0.69)*
Number of 4-yr Public Acceptances	0.16	0.127	0.189	0.221	0.035	0.042
	*(11.09)***	*(5.96)***	*(9.66)***	*(11.93)***	*(0.81)*	*(1.57)*
Enroll in Any College (2- or 4-yr)	0.106	0.091	0.103	0.157	0.077	-0.029
	*(4.42)***	*(2.55)**	*(3.17)***	*(5.27)***	*(0.86)*	*(0.61)*
Enroll in 2-year college	0.004	-0.003	-0.012	-0.008	0.061	-0.029
	-0.18	-0.08	-0.37	-0.25	-0.71	-0.59
Enroll in 4-yr College (Pub. or Prvt.)	0.156	0.144	0.178	0.247	0.001	-0.005
	*(5.78)***	*(3.65)***	*(4.80)***	*(7.39)***	*(0.01)*	*(0.10)*
1 yr. Persistence (Any college)	0.098	0.109	0.071	0.128	0.043	0.013
	*(4.08)***	*(3.08)***	*(2.17)**	*(4.29)***	*(0.48)*	*(0.28)*
N	82858	40830	42028	48828	8800	24105

Table A1 - Robustness check for missing Social Security Numbers in high school datasets - Probit predicting the probability of having a missing SSN

Dependent Variable	1 if Social Security Number is missing, 0 o/w	
Treatment school dummy	0.006	-0.007
	(1.73)	(2.10)*
(Treatment school x Year 2004) dummy	-0.002	-0.002
	(.37)	-0.55
Year 2004 dummy	0.001	-0.003
	(.38)	(2.13)*
Black Dummy		0.039
		(14.01)**
Hispanic Dummy		0.07
		(36.65)**
"Other Ethnicity" dummy		0.159
		(28.13)**
Male dummy		0.003
		(2.46)*
Title 1 Eligible dummy		0.023
		(15.00)**
Migrant dummy		-0.01
		(2.16)*
Enrolled in Special Education dummy		-0.034
		(15.76)**
"At Risk" of dropping out dummy		0.028
		(19.38)**
Observations	155407	155407

Table A2 - Program Impacts for Hispanics - Dif-in-Dif Marginal Effects on Treatment x Year 2004 Interaction Terms (Robust s.e. - Clustered at School Level), Includes School-Level Fixed Effects

	Control Group					
Dependent Variable	CS	5NN .01 Caliper	5NN .005 Caliper	5NN	3NN	1NN
Cohort Exposed to GO Center for 1 year						
Apply to Any 4-yr Public College	0.067	0.083	0.093	0.067	0.067	0.072
	(0.031)**	(0.035)**	(0.037)**	(0.036)*	(0.039)*	(0.053)
Number of 4-yr Public Applications	0.079	0.107	0.125	0.083	0.083	0.116
	(0.046)*	(0.050)**	(0.053)**	(0.052)	(0.057)	(0.078)
Accepted at Any 4-yr Public College	0.061	0.078	0.088	0.063	0.062	0.063
	(0.030)**	(0.034)**	(0.036)**	(0.035)*	(0.038)	(0.050)
Number of 4-yr Public Acceptances	0.073	0.099	0.113	0.074	0.075	0.096
	(0.041)*	(0.045)**	(0.048)**	(0.047)	(0.051)	(0.069)
Enroll in Any College (2- or 4-yr)	0.016	0.029	0.034	0.023	0.019	0.024
	(0.015)	(0.016)*	(0.017)**	(0.016)	(0.018)	(0.019)
Enroll in 2-year college	-0.022	-0.021	-0.022	-0.018	-0.019	-0.032
	(0.011)**	(0.013)	(0.015)	(0.013)	(0.014)	(0.022)
Enroll in 4-yr College (Pub. or Prvt.)	0.038	0.053	0.060	0.042	0.039	0.056
	(0.018)**	(0.019)***	(0.021)***	(0.021)**	(0.023)	(0.031)*
Enroll Not Ready	0.004	-0.001	0.001	0.001	0.002	-0.011
	(0.016)	(0.017)	(0.017)	(0.016)	(0.017)	(0.021)
1 yr. Persistence (Any college)	0.003	0.011	0.018	0.007	-0.005	-0.004
	(0.016)	(0.017)	(0.018)	(0.018)	(0.019)	(0.022)
Treatment Schools	35	35	35	35	35	35
Control Schools	152	77	62	89	66	26
N	41760	27099	23569	30188	24167	14920
Cohort Exposed to GO Center for 2 years						
Apply to Any 4-yr Public College	0.107	0.090	0.103	0.097	0.111	0.093
	(0.038)***	(0.045)**	(0.048)**	(0.043)**	(0.048)**	(0.062)
Number of 4-yr Public Applications	0.160	0.126	0.149	0.126	0.172	0.134
	(0.061)**	(0.071)*	(0.072)**	(0.070)*	(0.076)**	(0.089)
Accepted at Any 4-yr Public College	0.104	0.086	0.098	0.093	0.104	0.087
	(0.037)***	(0.044)*	(0.047)**	(0.042)**	(0.047)**	(0.060)
Number of 4-yr Public Acceptances	0.134	0.101	0.120	0.103	0.140	0.106
	(0.055)**	(0.064)	(0.064)*	(0.062)*	(0.068)**	(0.078)
Enroll in Any College (2- or 4-yr)	0.051	0.064	0.069	0.058	0.067	0.066
	(0.019)***	(0.021)***	(0.021)***	(0.020)***	(0.021)***	(0.024)***
Enroll in 2-year college	0.006	0.017	0.017	0.013	0.012	0.001
	(0.012)	(0.017)	(0.019)	(0.016)	(0.018)	(0.021)
Enroll in 4-yr College (Pub. or Prvt.)	0.048	0.051	0.057	0.049	0.056	0.067
	(0.023)**	(0.028)*	(0.030)*	(0.027)*	(0.029)*	(0.038)*
Enroll Not Ready	0.014	0.022	0.031	0.021	0.022	0.022
	(0.018)	(0.021)	(0.021)	(0.019)	(0.020)	(0.024)
1 yr. Persistence (Any college)	0.032	0.051	0.070	0.036	0.049	0.056
	(0.023)	(0.027)*	(0.025)***	(0.026)	(0.027)*	(0.029)*
Treatment Schools	35	35	35	35	35	35
Control Schools	122	47	42	59	49	24
N	35267	17240	15820	21181	17252	12808

Table A3 - Program Impacts for Low Income Students - Dif-in-Dif Marginal Effects on Treatment x Year 2004 Interaction Terms (Robust s.e. - Clustered at School Level), Includes School-Level Fixed Effects

	Control Group					
Dependent Variable	CS	5NN .01 Caliper	5NN .005 Caliper	5NN	3NN	1NN
Cohort Exposed to GO Center for 1 year						
Apply to Any 4-yr Public College	0.074	0.095	0.101	0.081	0.082	0.086
	(0.030)**	(0.034)***	(0.035)***	(0.035)**	(0.038)**	(0.050)*
Number of 4-yr Public Applications	0.097	0.130	0.144	0.109	0.110	0.143
	(0.044)**	(0.048)***	(0.051)***	(0.050)**	(0.055)**	(0.072)*
Accepted at Any 4-yr Public College	0.068	0.086	0.091	0.073	0.077	0.077
	(0.029)**	(0.033)***	(0.034)***	(0.034)**	(0.037)**	(0.047)*
Number of 4-yr Public Acceptances	0.082	0.113	0.122	0.092	0.093	0.121
	(0.039)**	(0.042)***	(0.045)***	(0.044)**	(0.048)*	(0.063)*
Enroll in Any College (2- or 4-yr)	0.022	0.038	0.043	0.033	0.032	0.032
	(0.015)	(0.016)**	(0.017)**	(0.016)**	(0.018)*	(0.018)*
Enroll in 2-year college	-0.017	-0.015	-0.016	-0.013	-0.019	-0.033
	(0.012)	(0.015)	(0.016)	(0.014)	(0.016)	(0.022)
Enroll in 4-yr College (Pub. or Prvt.)	0.039	0.054	0.062	0.047	0.052	0.064
	(0.018)**	(0.020)***	(0.023)**	(0.021)**	(0.024)*	(0.032)**
Enroll Not Ready	0.009	0.004	0.007	0.006	0.005	-0.007
	(0.014)	(0.014)	(0.015)	(0.014)	(0.016)	(0.021)
1 yr. Persistence (Any college)	0.010	0.027	0.034	0.020	0.014	0.016
	(0.019)	(0.019)	(0.020)*	(0.019)	(0.021)	(0.024)
Treatment Schools	35	35	35	35	35	35
Control Schools	152	77	62	89	66	26
N	38008	24070	21111	26684	21266	13201
Cohort Exposed to GO Center for 2 years						
Apply to Any 4-yr Public College	0.099	0.068	0.084	0.075	0.092	0.097
	(0.040)**	(0.048)	(0.050)*	(0.046)	(0.053)*	(0.064)
Number of 4-yr Public Applications	0.149	0.087	0.110	0.093	0.141	0.135
	(0.065)**	(0.074)	(0.072)	(0.074)	(0.081)*	(0.086)
Accepted at Any 4-yr Public College	0.084	0.054	0.071	0.064	0.076	0.077
	(0.038)**	(0.046)	(0.047)	(0.045)	(0.051)	(0.061)
Number of 4-yr Public Acceptances	0.105	0.051	0.071	0.061	0.098	0.079
	(0.058)*	(0.065)	(0.063)	(0.067)	(0.074)	(0.076)
Enroll in Any College (2- or 4-yr)	0.040	0.037	0.044	0.039	0.043	0.039
	(0.018)**	(0.025)	(0.027)*	(0.023)*	(0.026)*	(0.039)
Enroll in 2-year college	0.009	0.015	0.012	0.014	0.010	-0.014
	(0.018)	(0.024)	(0.026)	(0.023)	(0.024)	(0.029)
Enroll in 4-yr College (Pub. or Prvt.)	0.031	0.022	0.034	0.024	0.030	0.057
	(0.027)	(0.034)	(0.035)	(0.033)	(0.037)	(0.048)
Enroll Not Ready	0.027	0.031	0.045	0.031	0.024	0.014
	(0.018)	(0.021)	(0.022)**	(0.020)	(0.020)	(0.026)
1 yr. Persistence (Any college)	0.015	0.018	0.034	0.016	0.024	0.025
	(0.024)	(0.031)	(0.029)	(0.028)	(0.032)	(0.038)
Treatment Schools	35	35	35	35	35	35
Control Schools	122	47	42	59	49	24
N	29423	14414	13073	17306	14215	10438

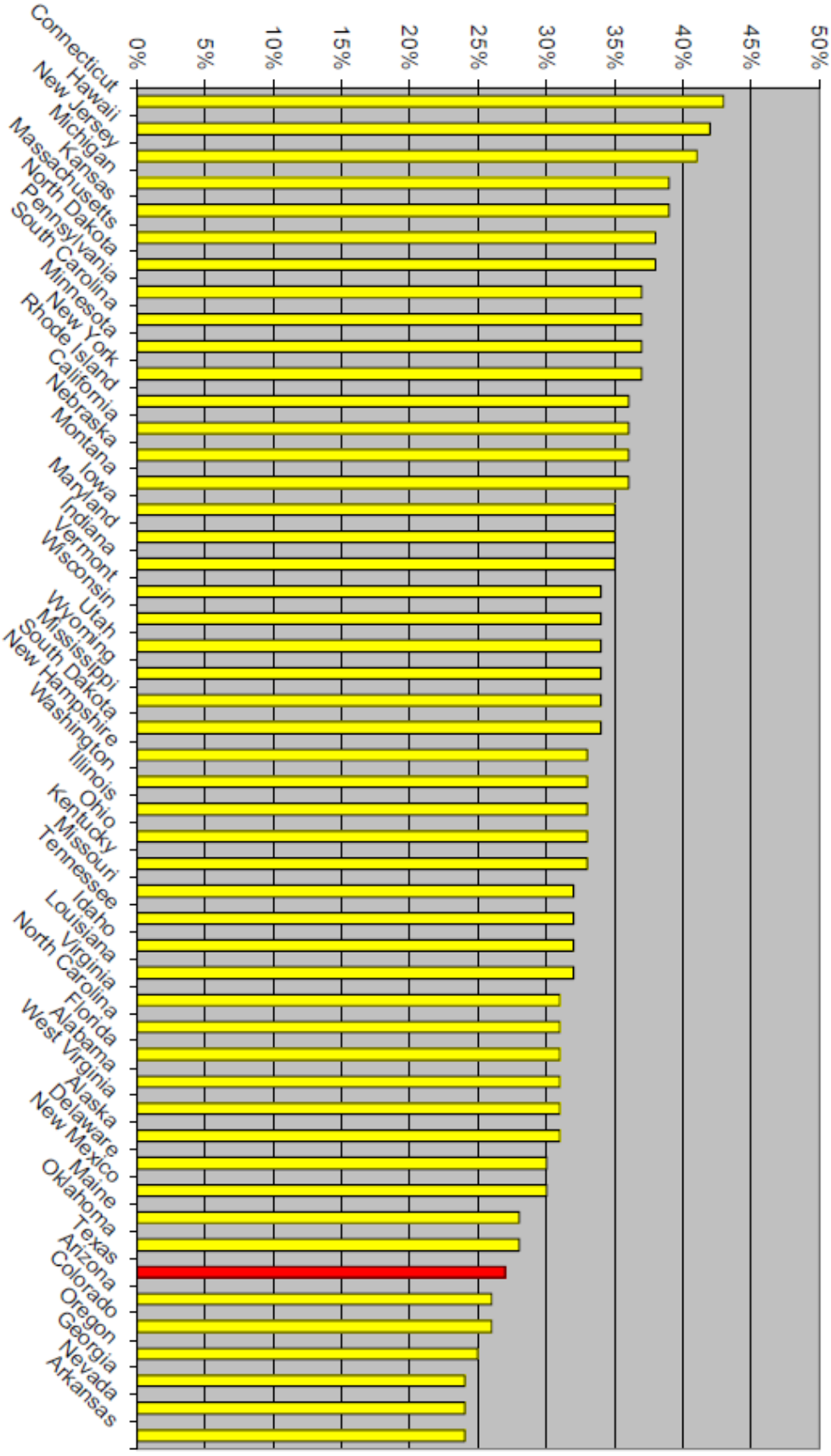

Figure 1: College Enrollment Rate (18-24 yr olds), by State 2002

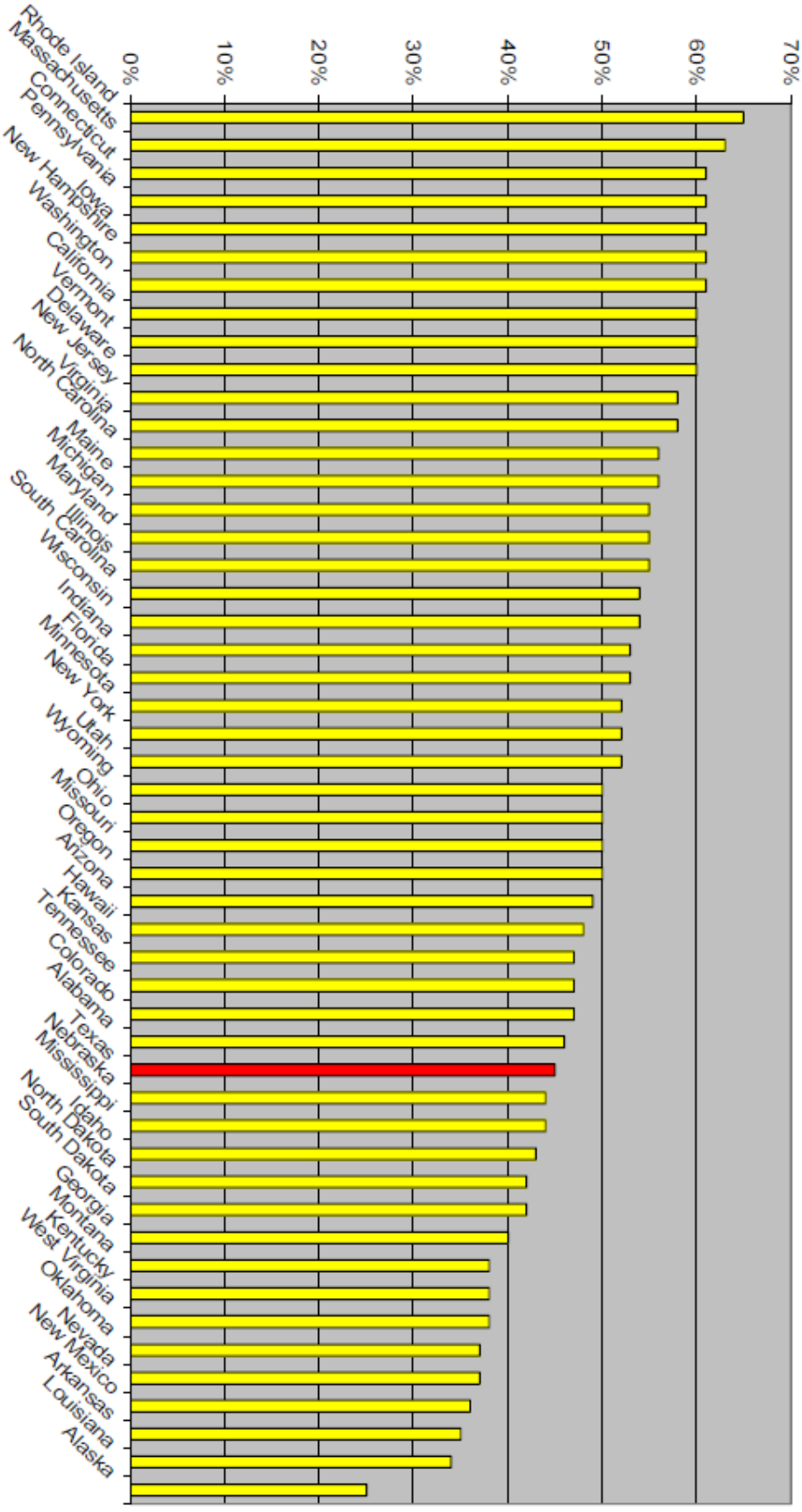

Figure 2: 6-Year College Completion Rate (College Enrollees), by State 2002

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Average Annual Income by Educational Attainment - U.S. Census Bureau, 2002

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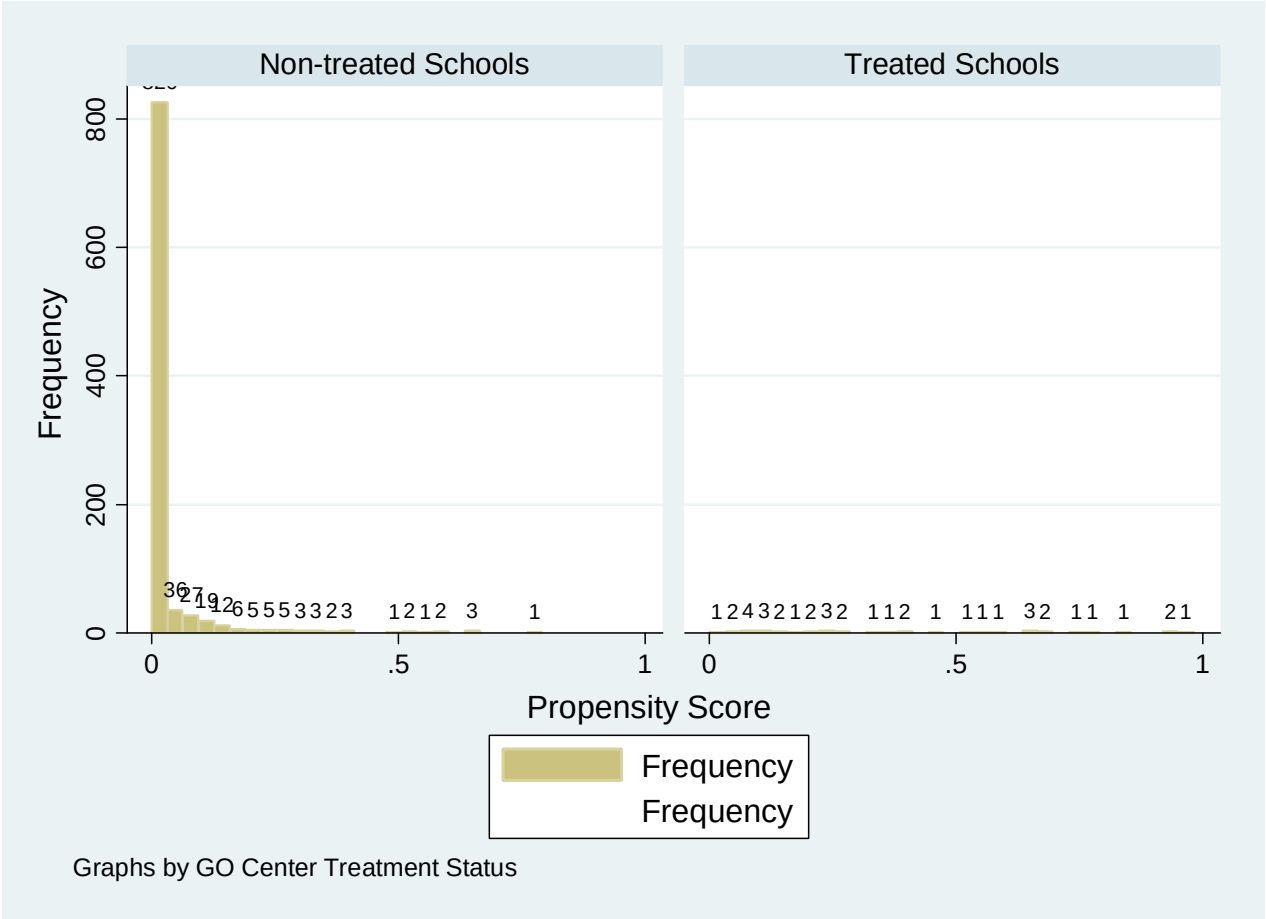
Non-treated Schools
Treated Schools
Frequency
0
200
400
600
800
36 27 19 12 6 5 5 5 3 3 2 3 1 2 1 2 3 1
1 2 4 3 2 1 2 3 2 1 1 2 1 1 1 3 2 1 1 1 2 1
0
.5
1
Propensity Score
Frequency
Frequency
Graphs by GO Center Treatment Status

Figure 5: Application Rates by Treatment Status, All Students in State (2000-2005)

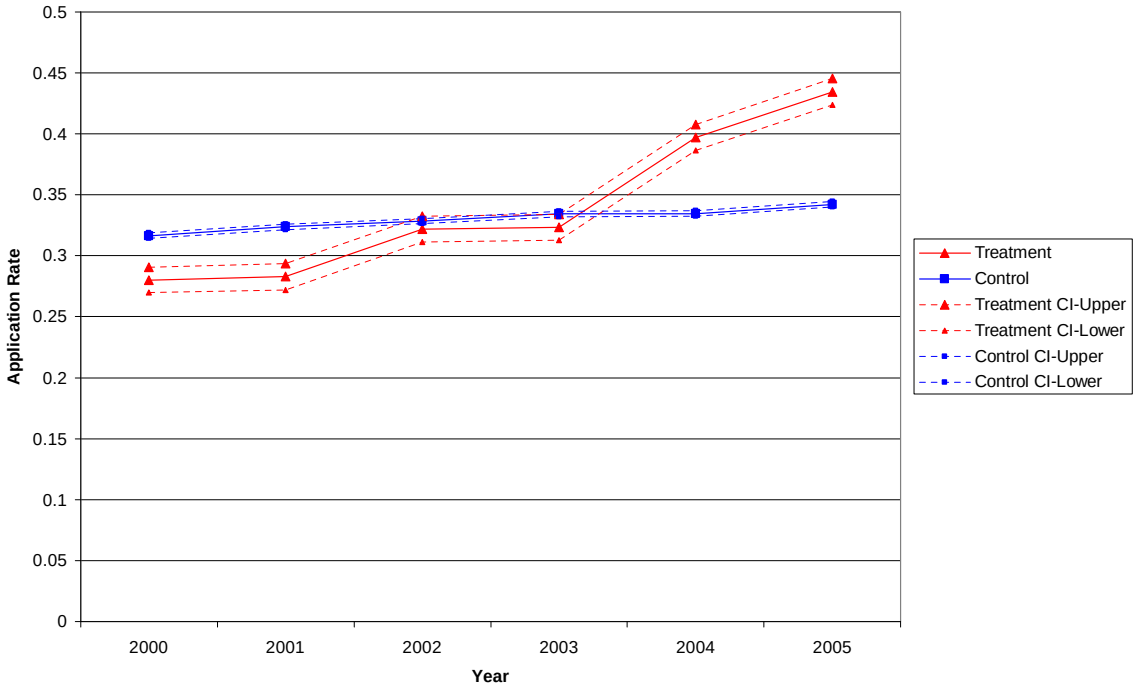

Figure 6: Application Rates by Treatment Status, All Students in 5NN-.005-Band Control Sample (2000-2005)

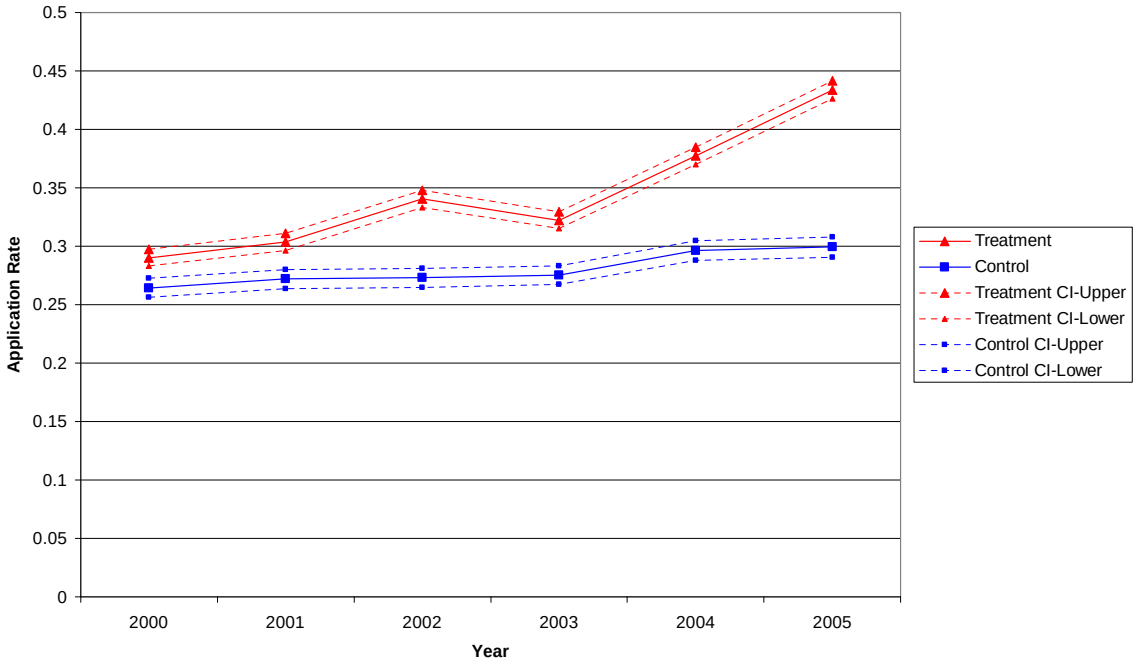

Figure 7: Application Rates by Treatment Status, Hispanic Students in 5NN-.005-Band Control Sample (2000-2005)

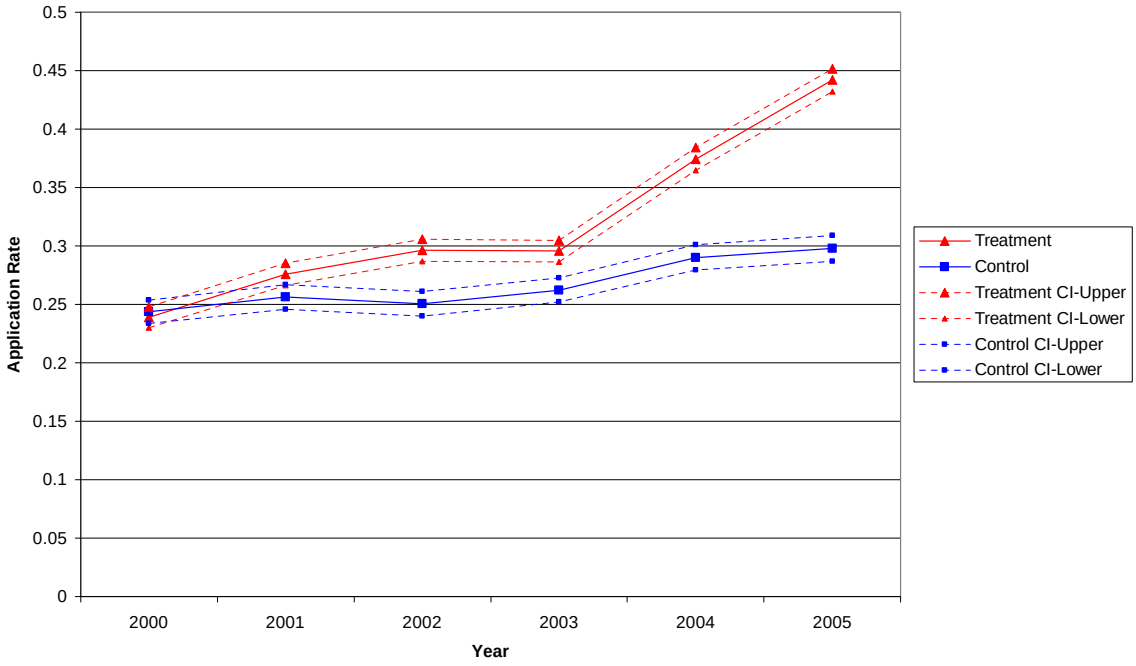

Figure 8: Application Rates by Treatment Status, Economically Disadvantaged Students in 5NN-.005-Band Control Sample (2000-2005)

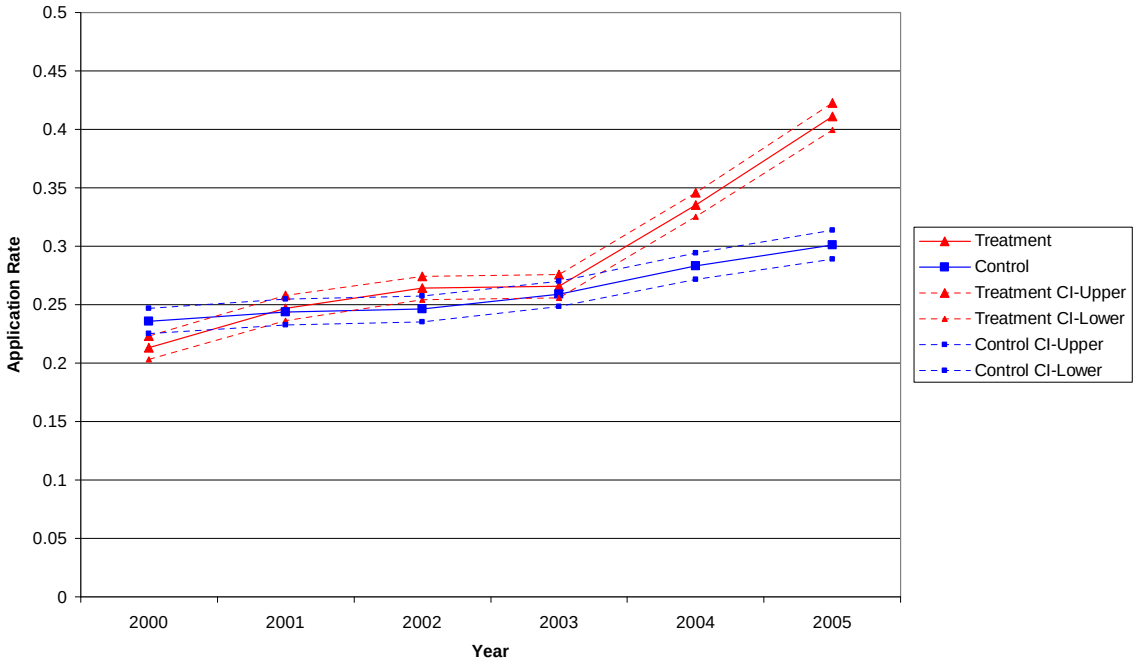

Figure 9: Application Rates by Treatment Status, Black Students in 5NN-.005-Band Control Sample (2000-2005)

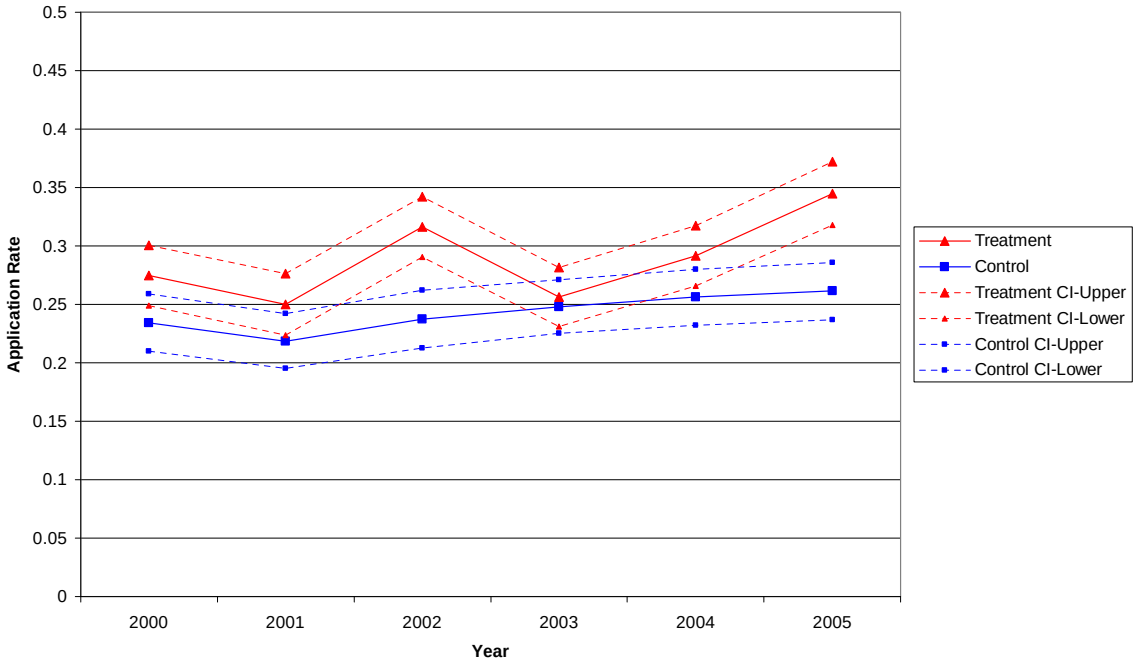

Figure 10: Application Rates by Treatment Status, White Students in 5NN-.005-Band Control Sample (2000-2005)

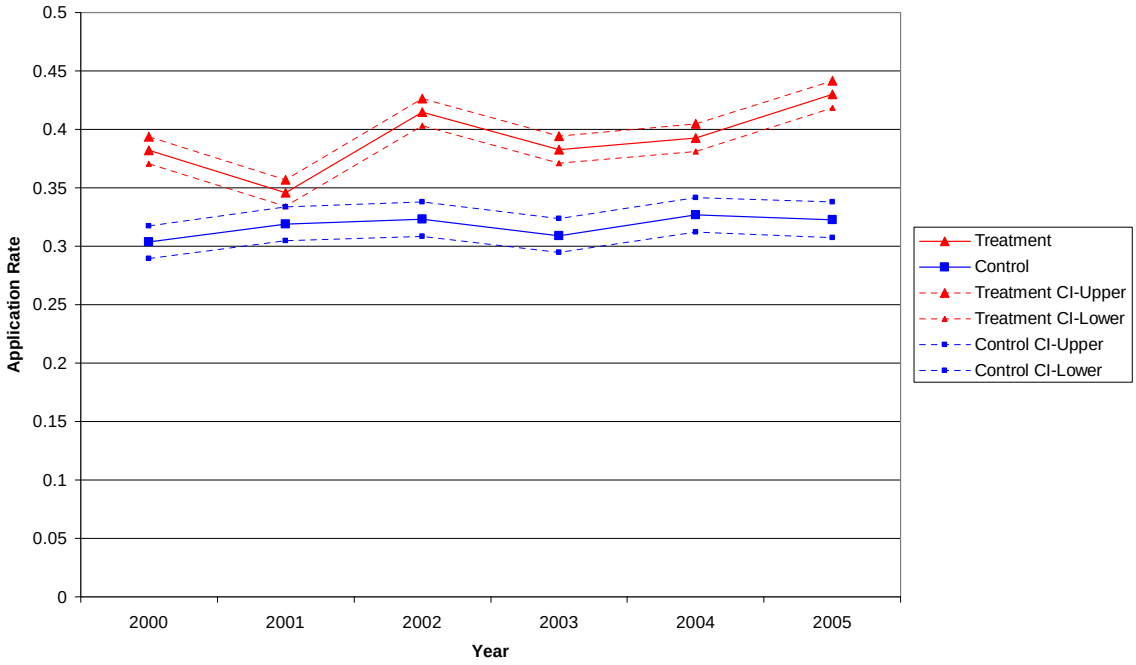

Figure 11: Application Rates by Treatment Status, Non - Economically Disadvantaged Students in 5NN-.005-Band Control Sample (2000-2005)