

College Enrollment and Completion Among Nationally Recognized High-Achieving Hispanic Students

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ABSTRACT

Hispanic high school graduates have lower college completion rates than academically similar white students. As Hispanic students have been theorized to be more constrained in the college search and selection process, one potential policy lever is to increase the set of colleges to which these students apply and attend. In this paper, we investigate the impacts of the College Board's National Hispanic Recognition Program (NHRP), which recognizes the highest scoring 11th grade Hispanic students on the PSAT/NMSQT, as a mechanism of improving college choice and completion. The program not only informs students about their relative ability, but it also enables colleges to identify, recruit and offer enrollment incentives. Overall, we find that the program has strong effects on college attendance patterns, shifting students from two-year to four-year institutions, as well as to colleges that are out of state and public flagships, all areas where Hispanic attendance has lagged. NHRP shifts the geographic distribution of where students earn their degree, and increases overall bachelor's completion among Hispanic students who traditionally have had lower rates of success. These results demonstrate that college outreach can have significant impacts on the enrollment choices of Hispanic students. College outreach may also serve as an important policy lever for colleges or states looking to draw academically talented students.

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Abstract: Hispanic high school graduates have lower college completion rates than academically similar white students. As Hispanic students have been theorized to be more constrained in the college search and selection process, one potential policy lever is to increase the set of colleges to which these students apply and attend. In this paper, we investigate the impacts of the College Board’s National Hispanic Recognition Program (NHRP), which recognizes the highest scoring 11th grade Hispanic students on the PSAT/NMSQT, as a mechanism of improving college choice and completion. The program not only informs students about their relative ability, but it also enables colleges to identify, recruit and offer enrollment incentives. Overall, we find that the program has strong effects on college attendance patterns, shifting students from two-year to four-year institutions, as well as to colleges that are out of state and public flagships, all areas where Hispanic attendance has lagged. NHRP shifts the geographic distribution of where students earn their degree, and increases overall bachelor’s completion among Hispanic students who traditionally have had lower rates of success. These results demonstrate that college outreach can have significant impacts on the enrollment choices of Hispanic students. College outreach may also serve as an important policy lever for colleges or states looking to draw academically talented students.

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Introduction

College completion among Hispanics remains persistently lower than both whites and other minority groups, even as their high school graduation and college attendance rates have risen over the past decade (Kena et al., 2015; Murnane, 2013). Although Hispanic students graduate from high school with lower levels of academic preparation, they are consistently less likely to earn a Bachelor's degree even conditional on conventional measures of academic preparation.¹ Improving degree completion for Hispanic students is particularly important as they are the largest minority group in the United States, increasing in population almost six-fold from 1970 to 2014 (Krogstad & Lopez, 2015).

The match between student and college has increasingly become an area for policy interventions (e.g., Hoxby and Turner (2013)), as college sector and quality have been shown to have causal impacts on degree attainment (Black & Smith, 2004; Cohodes & Goodman, 2014; Goodman, Hurwitz, & Smith, 2015; Smith, Pender, & Howell, 2013). If shifts in Hispanics' college preferences are required to change enrollment and completion rates, any such interventions addressing these issues may require strategies that account for the specific challenges faced by these youth. The literature suggests that, on average, Hispanic students approach the college selection process differently than the typical high school senior. As one example, Hispanic students may have stronger preferences for colleges close to home or they may seek institutions perceived to have a more supportive social structure (Desmond & Turley, 2009; McDonough, 1999; Perna, 2000; Perna & Titus, 2005), which does not necessarily coincide with the college best suited to promote completion. Hispanic students have also been identified as having fewer educational opportunities in high school, such as access to fewer AP

¹ Using national data on all SAT takers, we find that conditional on SAT Hispanic students are less likely to earn a degree in four or six years, and this holds at every point on the SAT distribution.

exams (C. K. Jackson, 2010), with these effects particularly strong among English language learners (Carlson & Knowles, 2016; Kanno & Kangas, 2014; Umansky, 2016). The collective research suggests that improving Hispanic students' transition into and through college may require innovative strategies uniquely tailored to their needs.

In this paper, we test whether the college enrollment of high-achieving Hispanic students can be influenced by offering a simple and straightforward piece of information of relative academic ability to both Hispanic students and a set of interested colleges. We estimate the causal impacts of the National Hispanic Recognition Program (NHRP), a College Board-created initiative that recognizes top-performing students based on their 11th grade Preliminary SAT / National Merit Scholarship Qualify Test (PSAT/NMSQT, henceforth PSAT), using a regression discontinuity (RD) design that compares students who are barely eligible for this recognition to academically similar but unrecognized students. This program is similar in spirit to the National Merit Scholarship program, which was the focus of what is commonly credited as the first paper to employ a RD design (Thistlethwaite & Campbell, 1960).

In its role as a student-facing intervention, NHRP has similar qualities to many “low-touch” interventions, as high-performing students and their high school counselors receive a clear and straightforward piece of information – in this case, related to their relative academic performance.² Several low-touch interventions have produced positive effects on student performance through targeted information on structural barriers in the college application or enrollment process (Castleman & Page, 2015; Castleman, Page, & Schooley, 2014; Hoxby & Turner, 2013). The provision of more simplistic information on relative academic performance has produced mixed results ranging from positive (e.g. Papay, Murnane, and Willett (2015)) to

² Given the amount of work in this area, we avoid a lengthy discussion of specific interventions but point the reader to Page and Scott-Clayton (2015), who provide a synthesis of educational interventions and their impacts.

null (Foote, Schulkind, & Shapiro, 2015; J. S. Jackson, 2015). We do not find evidence that this aspect of the intervention – providing information to a student on their relative academic ability – has any meaningful impact on academic preparation in high school, yet it does induce students in some regions of the country to target and attend more elite institutions, suggesting that low-cost provision of certain types of information to Hispanic students can potentially improve their transition into and through college.

Yet NHRP plays an alternate role as a college-facing intervention, as a small number of four-year colleges have historically licensed lists of NHRP students in order to engage in targeted outreach. Rather than waiting for students to initiate outreach through college visits or applications, this information is provided to these recruiting colleges during the summer before a high school student's senior year. By improving the timeliness of the information and simplifying the cost of gathering data, NHRP allows colleges to identify the supply of high-performing Hispanic students, and NHRP recipients are five percentage points (almost 16 percent) more likely to attend NHRP recruiting colleges. Thus, a “light-touch” between the student and the College Board produces a “higher-touch” and more traditional downstream interaction between students and colleges, who recruit students through direct contact and often entice students with generous financial aid packages.

Overall, NHRP recipients are 1.5 percentage points more likely to enroll at a four-year institution. There are also significant effects on the type of four-year institution attended, as NHRP qualification increases attendance at out-of-state colleges and at public flagship institutions, by roughly five and three percentage points, respectively. We find that nearly all of the main effects documented in this paper are driven by students residing in the West and

Southwest regions of the nation, which have the highest concentration of Hispanic students. In other geographic regions, we find no observable effects on college choice.

In addition to shifting where students enroll, NHRP also alters the geographic distribution of the Bachelor's degrees earned, as recognized scholars are three percentage points more likely to earn their degree out of state. Although we cannot observe where students settle after graduating from college, outreach efforts like the ones documented in this paper may be an additional tool for states looking to improve the skills and diversity of their labor force. Overall effects on bachelor's degree completion are generally positive though statistically insignificant, but these relatively muted overall effects hide substantial group differences. In particular, we find sizeable increases in bachelor's completion among students who otherwise were at the highest risk for dropping out, including: students with the lowest SAT scores; those whose parents did not complete high school; and those attending high schools with the highest concentration of Hispanic students. Taken as a whole, this research demonstrates that high-achieving Hispanic students' college choices can be influenced late in their high school careers and that with the proper information and incentives these students can be convinced to attend and graduate from colleges that they ordinarily might not have considered.

National Hispanic Recognition Program

The National Hispanic Recognition Program (NHRP) was initiated in 1983 by the College Board, and identifies the top 2.5% of Hispanic scholars based on the 11th grade PSAT. The PSAT is taken by over 3 million high school students per year, as both a practice exam for the SAT and as a means for qualification for the highly prestigious National Merit Scholarship program. For the students examined in the paper, the PSAT consisted of three sections: Math,

Critical Reading, and Writing. Each section is scored from 20 to 80 points, producing a maximum score of 240. Each student receives a PSAT Score Report that contains feedback on their performance, including scale scores for each section and the number of questions answered correctly across a range of skills. Students are also provided with their national percentile rank, though this is in small text with language that suggest students can “compare your performance with college-bound juniors.”

In order to identify cutoffs for NHRP eligibility, the College Board rank orders PSAT performance among Hispanic scholars separately within each of six geographic regions that are associated with College Board regional offices. The award recognizes the top 2.5% within each region, which identifies approximately 5,000 NHRP scholars per year. As seen in Appendix Table 1, the Western and Southwestern regions contain almost 31% of all junior PSAT takers, but 60% of all Hispanic junior PSAT takers. Within these two regions, Texas and California contain almost 90% of all Hispanic PSAT takers.

To be eligible for NHRP, students must take the PSAT in October of their 11th grade year. NHRP eligibility cutoffs range from the low 180s to the mid-190s, depending on region and year, out of a possible 240 on the three section exam. The Western and Southwestern regions typically have the lowest cutoffs.³ Initial notification of eligibility, based on administrative PSAT scores, arrives in February or March. In order to qualify, the self-identified Hispanic students must first verify that they are one-quarter Hispanic and the high school must document that their junior year cumulative GPA is 3.5 or above by June 15th.⁴ In practice, we find that almost all

³ Cutoffs for National Merit Semifinalists or Commended students generally range from 200 to 220 points, and these students mostly lie outside our primary specification of 15 point bandwidths. We choose to leave these students in our analysis, though results are robust to shorter bandwidths and eliminating all students scoring 200 points or more, as shown in Appendix Table 4.

⁴ Students must have had at least one grandparent with origins in Puerto Rico, Cuba, the Dominican Republic, or either Central or South America.

self-identified Hispanic students above the PSAT cutoff are able to satisfy both the ethnic and GPA requirements.⁵ Although the NHRP cutoff represents the top 2.5% of Hispanic PSAT takers, the eligibility cutoff lies somewhere between the 85th and 95th percentile in the national distribution during 2007 to 2009, depending on the year and region.

The NHRP does not provide any direct financial reward to students, but does provide them with a number of signals that might impact their subsequent college preparation during their senior year. The College Board sends a letter directly to students that congratulates them and invites them to participate in the program and, conditional on earning the award, encourages them to use the recognition on college, scholarship, internship, and job applications. Historically, school counselors were contacted to help students complete the necessary paperwork, counseled to encourage these students to apply to top universities, and asked to honor these awardees through some type of school recognition. Finally, by notifying Hispanic students that they are academically in the top 2.5% of ethnically similar students nationwide, NHRP provides an additional, perhaps surprising, recognition of academic ability.

The last relevant detail that is made salient to students is that the College Board shares NHRP data with a set of “subscribing four-year postsecondary institutions that are interested in communicating with academically exceptional Hispanic/Latino students”. We have data for the set of recruiting institutions for three high school graduating cohorts: 2006-07 through 2008-09. There are approximately 200 institutions that license the list per year, though 323 unique institutions appear across three years combined. The first set of columns in Appendix Table 2 compares recruiting to non-recruiting institutions, and shows that recruiting institutions are, on average, of higher quality, as measured by their Barron’s ranking, graduation rate, and average

⁵ Preliminary matching between the national sample of PSAT records and lists of recognized scholars, based simply on full name, birth state, and state of residence – without taking into account errors in spelling or other potential problems – led to match rates in the range of 90%.

SAT scores. Recruiting institutions are also slightly larger and more expensive, though have percentages of enrolled students identifying as Hispanic are comparable between these two types of colleges. These recruiting institutions were also popular among Hispanic students, as at least one student within 15 points of the NHRP threshold attended 88% (293 of 323) of these schools. The last column of Appendix Table 2 describes seven core recruiting institutions, which we later show are particularly attractive to NHRP recognized scholars. These core institutions are discussed in more detail later in the paper.

For recruiting colleges, the benefit of this list is that it provides an easy opportunity to engage in direct outreach to high-performing Hispanic students. In addition, a number of these schools offer financial awards to NHRP scholars, which range from relatively modest sums to, in some cases, four years of full tuition plus an annual stipend. Some colleges make these awards conditional on available resources or other requirements, such as a minimum SAT or ACT scores.

Data

We first construct a national sample of all Hispanic 11th grade PSAT takers from the graduating high school cohorts of 2004 to 2010, removing students residing in U.S. territories or abroad. (We use a similar sample of non-Hispanic students as both a comparison group for understanding characteristics of high-performing Hispanic students and as a robustness check for causal estimates of the program). We link these individual-level records to a number of auxiliary data sources. The first are records on all College Board related activities, which includes an individual's history of SAT attempts, the institutions to which they sent their SAT scores (Score Sends), and any Advanced Placement test-taking, along with high school attended and basic

demographics. The second source of data is the National Student Clearinghouse (NSC). As of 2015, over 3,600 postsecondary institutions participate in NSC, which collects postsecondary enrollment information on most students enrolled in public and private colleges within the United States. Our NSC match allows us to track the graduating classes of 2004 through 2008 for six years, with the classes of 2009 and 2010 tracked for five and four years, respectively. The third matched data source is the Common Core of Data (CCD) and Private School Survey (PSS) from the National Center for Education Statistics, which contains information about school size, demographics, and geographic location. These data are linked to the high school attended when each student took the PSAT.⁶ The fourth data source includes characteristics of the postsecondary institutions, derived from Integrated Postsecondary Education Data System (IPEDS), and linked to the initial postsecondary institution attended by sampled students. The final data source contains the official list of NHRP scholars and recruiting institutions. These data are only available for the high school graduating cohorts of 2007 through 2009.

Although NHRP student and recruiting lists are unattainable for earlier or later cohorts, we can reconstruct these cutoffs for four additional graduating cohorts – 2004 through 2006 and 2010 – provided we restrict our analyses to students from the two largest regions, the West and Southwest. As we show later in the paper, NHRP induces large shifts in students choosing to attend college out of state, particularly at institutions that have licensed NHRP data. Using this information, we re-construct the eligibility thresholds for these four additional cohorts as follows. First, we construct a variable which identifies seven specific institutions, all located outside of Texas and California, that absorb the majority of the out of state shifts.⁷ Using the Texas and California samples, we run simple regression discontinuity specifications at placebo

⁶ 3.6% of students' high schools were not matched to CCD or PSS. As PSS is only available in even years, we interpolate the data in the odd years for time varying variables.

⁷ For privacy reasons, we cannot identify these institutions, though they are discussed in detail below and in Table 5.

thresholds within 10 points of the 2007 discontinuities. Finally, we select the threshold with the highest R-squared, and apply this value to all states within the appropriate region. We are able to verify the accuracy of this methodology in the Western and Southwestern regions by “re-identifying” the cutoffs in the three years for which we have available data.⁸ In the other four regions we were generally unable to re-identify the known cutoffs in 2007 through 2009. This occurred for two reasons: the magnitude of the shift toward out-of-state licensing colleges is smaller in these regions, and each region individually is about one-half to one-quarter as large as either the West or Southwest. As a result, we cannot reliably use this process to estimate NHRP effects for these regions using additional cohorts. Although we can only reconstruct cutoffs for these two regions, combined they account for approximately 60% of all NHRP scholars in a given year. None of our key results are changed when we focus only on the classes of 2007 through 2009 (as shown in Appendix Table 6), but the use of these additional cohorts increases our precision and allows us to highlight heterogeneous effects across students and regions.

Estimation Strategy

We use a regression discontinuity (RD) design to estimate the causal impact of NHRP.

We estimate the following equation:

$$(1) Y_{irt} = \beta_0 + \beta_1 * f(score_{irt}) + \beta_2 * NHRP_{irt} + \beta_3 * NHRP_{irt} * f(score_{irt}) + \theta_{st} + X_{irt} + \varepsilon_{irt}$$

Y_{irt} is our outcome of interest (e.g., college enrollment) for student i in region r in year t , and $f(score_{irt})$ is a flexible function that indicates an individual’s distance from the year- and region-specific threshold centered at the eligibility cutoff. In practice, we rely on linear specifications

⁸ Appendix Figure 1 illustrates the clarity by which the correct threshold is identified. The top panel shows the R-squared for one region in 2010, and correctly identifies the threshold for NHRP eligibility as 182 points. The bottom panel provides a similar figure but for 2005, and identifies the cutoff as being one point lower.

with rectangular kernels, though alternate forms produce similar results. All regressions include state-by-year fixed effects (θ_{st}) to account for the time- and region-varying cutoffs. In addition to subsuming the region-by-year fixed effects that are required for identification, these state-by-year effects account for unobserved heterogeneity in high school and college policies, such as state spending on higher education, changes in high school curricula, and the relative competitiveness in the postsecondary market in a given year, among others. X_{irt} is a vector of baseline observable characteristics that we only include in robustness checks, and includes student sex, parental education, income level, whether a student took the PSAT in 10th grade and their previous score, dummies for whether a student listed themselves as Mexican, Cuban, or other Hispanic, and controls for high school affiliation (public or private), type (e.g., city, suburban, rural), size, and Hispanic concentration. $NHRP_{irt}$ is a variable that equals one if a student is NHRP-eligible in region r in year t ; as stated above, we present reduced form results as almost all students qualify for the program. Optimal bandwidth was calculated by the ``rdwselect'` procedure in Stata (Calonico, Cattaneo, & Titiunik, 2014); as the IK and CCT methods suggest optimal bandwidths of 15 to 20 points, we present all results at the 15 point bandwidth throughout the paper. Although it is common practice to cluster standard errors by the running variable when it is discrete (Lee & Card, 2008), we find that robust standard errors are generally larger than clustered standard errors and thus more conservative, and we present these throughout. Estimates using triangular kernels, alternate bandwidths, covariates, or clustered standard errors produce identical results, and are presented in appendix tables.

Our main focus in equation (1) is then the intent-to-treat parameter, β_2 , which identifies the causal impact of the program. Specifically, β_2 is the magnitude of the difference between recognized and non-recognized scholars, though we can only interpret our estimate as local to

students in the vicinity of the threshold. There are strong theoretical reasons for the validity of the empirical strategy. The cutoffs vary by year and are unknown ex ante, and students only have one opportunity to take the test in their junior year, the only year in which the PSAT contributes to NHRP recognition, which prevents any gaming related to re-taking the exam. Although our theoretical foundation is strong, we test whether there is manipulation near the threshold that would render our analyses invalid. First, we look for evidence that students can manipulate their treatment assignment. In the case of discrete running variables, we construct a histogram of all possible values and search for evidence of bunching near the threshold. Figure 1 provides a plot of the density of observations near the centered cutoff score. Visually, there is no evidence of manipulation or a jump in any of the bins at any point in the distribution. (This figure also makes clear that extending bandwidths beyond twenty points provides little benefit, as there are few treatment students who score at this level.) The second RD requirement is that all other covariates that may be related to potential outcomes are smooth in the vicinity of the threshold. To test this assumption, we fit a series of regression models similar to that of equation (1) above, but placing our covariates X_{irt} on the left-hand side of the equation. If our NHRP threshold is exogenously defined we should see no evidence of breaks in continuity, meaning that our estimate of β_2 should be null. We provide these results in Appendix Table 3 for a variety of characteristics, and see no evidence of manipulation related to sex, subgroups of Hispanic ethnicity, previous PSAT scores, or other high school characteristics based on CCD data. Graphical results for covariate balance are shown in Figure 2.

Results

Characteristics of High-Performing Hispanic Students

As stated above, PSAT scores range from 60 to 240, and NHRP eligibility cutoffs range from the low 180s to the mid-190s, depending on year and region. Restricting to students within a 15 point bandwidth of the NHRP cutoff produces a dataset of approximately 58,000 students combined across all years, or 33,000 students when restricting to only the 2007 through 2009 cohorts for which we have exact information on recruiting institutions and scholar recipients. Summary statistics for these two groups are presented in the first two columns of Table 1. The third column presents summary statistics for white students with PSAT scores within the same bandwidth as our high-performing Hispanic students sample; for ease of comparability to the national sample, we focus on 2007 through 2009. The fourth column provides summary statistics for an alternate sample of what we define as “lower-performing” Hispanic students. Specifically, this group includes all students between 70 to 90 PSAT points below the NHRP cutoff, which corresponds to the 25th percentile Hispanic student, on average.

Although previous research on NHRP scholars describes them as having somewhat similar educational backgrounds to similarly performing white peers (Clewel & Joy, 1988), our results suggest a number of key differences between these groups. Hispanic students are more likely to live in cities rather than in suburbs or more rural areas, and attend larger high schools with significantly more low-income and Hispanic students. They are also about four times as likely to be in a family with income below \$50,000 or have parents who did not graduate from high schools. Compared to similarly achieving White students, sampled Hispanic students have taken and passed fewer Advanced Placement (AP) exams by the time they graduate from high school. Each of these differences may help contribute to the lower attendance at four-year, private, or out of state colleges also seen in Table 1. Attending a private college or one out-of-state is generally more expensive than attending an in-state alternative due to tuition, room and

board, and transportation costs, all of which may contribute to Hispanic students remaining close to home.

High-performing Hispanic students are actually more likely to attend selective institutions than their white peers, and are almost twice as likely (18% compared to 10%) to attend a school classified as Most Competitive by Barron's, the highest possible ranking. Although their SAT scores are slightly lower than their white peers, they send their SAT scores to more institutions with a higher average SAT of enrolled students.⁹ Perhaps surprisingly, high-performing Hispanic students are almost equally likely to send their SAT scores out of state (61% compared to 64%), implying that Hispanic students are, in fact, considering colleges far-from-home at the outset of their college searches.

We also compare high-performing and low-performing Hispanic students to better understand differences between these two populations. In most ways these differences mirror differences between high-performing Hispanic and white students, with low-performing Hispanic students again more likely to live in cities, attend high schools with high concentrations of low-income and Hispanic students, and come from families with lower incomes and educational attainment. We also estimate that the rate of non-public high school attendance is higher for high-performing than for low-performing Hispanic students (25% compared to 11%).

Geographically, the maps in Figure 3 show the concentration of NHRP students from the 2007-2009 cohorts, for whom we have national coverage, and the fraction of all students that meet the NHRP guidelines. As the first map shows, NHRP recipients are primarily concentrated in Southern California, the Atlantic coast of Florida, metro New York, and the greater metropolitan areas of Dallas, Houston and Phoenix. In fact, just 25 US counties were home to

⁹ The "average SAT score" is the midpoint of the 25th and 75th percentiles of SAT and converted ACT scores taken from the IPEDS.

approximately half of the NHRP scholars between 2007 and 2009. Despite the tendency of NHRP scholars tend to reside in urban centers, there are also fairly rural areas that boast large numbers of NHRP scholars, such as the Rio Grande Valley of Texas and Eastern Washington. Compared to their more urban counterparts, high-achieving students in rural areas may not have the knowledge or support systems to navigate the college application process and they likely have limited contact with colleges, potentially making direct outreach to these individuals relatively impactful.

From the perspective of colleges, efficient recruiting might entail a targeting of the geographic regions with the highest density of high-achieving students. The second panel of Figure 3 shows that higher-achieving counties are fairly dispersed across the nation with zones of higher achievement similar to those identified by Hoxby and Avery (2013), traversing a central belt near the Mississippi river and also the Boston through Washington megalopolis. While some geographic regions, such as the New York metro, contain large numbers of Hispanic scholars and also have high concentrations of high-achieving students, other areas with large numbers of NHRP scholars such as the Rio Grande Valley are among the lowest in the nation in terms of density of high achieving-students. Overall, we find that high-achieving Hispanic students are somewhat more geographically dispersed compared to the typical high-achieving student. The top decile of US counties, defined in terms of fraction of junior PSAT-takers meeting NHRP guidelines, contain more than 45 percent of all students across the nation meeting these NHRP criteria, but only 36 percent of Hispanic students meeting these criteria.

Enrollment Results - National Sample

Table 2 provides the results on the impact of NHRP on college attendance patterns across all regions, focusing on the initial institution attended, with a full set of robustness checks provided in Appendix Table 4. The first column shows that NHRP dramatically alters college attendance patterns, as students are five percentage points (almost 16 percent) more likely to attend NHRP recruiting colleges, and almost six percentage points at what we label “core” recruiting institutions, described below.¹⁰ This shifting influences the sector of college attendance, as students are approximately 1.5 percentage points more likely to enroll at a four-year institution, with about two-thirds of this effect driven by movement away from the two-year sector. There are also significant effects on the type of four-year institution attended, as NHRP qualification increases attendance at out of state and at state flagship institutions by roughly five and three percentage points, respectively. These results are shown graphically in Figure 4.

We find no detectable impacts on attendance at private institutions or at the Most Competitive Barron’s institutions. Instead, the impacts seem to be driven by attendance at less selective colleges that we label “Less Competitive”; these include all four-year schools that rank below Barron’s Most or Highly Competitive categories or have no Barron’s ranking. Other than inducing students to travel farther from home, there are no statistically significant aggregate impacts on many relevant college characteristics, including average SAT, graduation rate in 150 percent time (four-year colleges only), expenditures per FTE, or sticker price tuition. (We omit these results here for brevity, but discuss them in more detail when we discuss regional variation in Table 4). The only relevant change appears to be ethnic composition, as NHRP shifts students

¹⁰ This estimate may be calculated with some noise as we only have the list of purchasing institutions for 2007 through 2009, but results restricted to these three years identifies a nearly identical 4.8 percentage point increase.

to colleges that enroll fewer Hispanic students, with total Hispanic composition about 0.8 percentage points (5 percent) lower than comparable students who were not recognized.¹¹

The fourth through sixth columns of Table 2 attempt to distinguish the contributions of recruiting and non-recruiting institutions to the observed college choice shifts. In the third column we estimate impacts on the full sample using the same set of outcomes as Table 2, but interact the outcome variables with a dummy for recruiting schools. We then implement the same approach in the fifth column, with separate regressions that interact the outcome with a dummy for non-recruiting institutions. The sum of the coefficients in Columns 3 and 5 are equivalent to the corresponding coefficients in column 1.

Although the NHRP increased overall four-year college enrollment by 1.5 percentage points, there was a substantial shifting of students within the four-year sector. Students are 5.3 percentage points more likely to attend recruiting institutions and 3.8 percentage points less likely to attend non-recruiting four-year institutions. Students are almost six percentage points more likely to attend NHRP recruiting institutions out of state, and these recruiting colleges actually tend to draw high-performing Hispanic scholars away from both in-state and alternative out of state colleges.

Further investigation reveals that seven “core” colleges account for virtually all of the shifting towards NHRP recruiting institutions.¹² NHRP scholars were 5.8 percentage points more likely to attend these schools (Figure 5); given the baseline value of 4.1 percentage points, this means students were about 140% more likely to attend one of these seven core recruiting

¹¹ Appendix Table 5 reproduces key elements from Table 2 but for a comparable sample of White students from 2007 to 2009. As self-identified White students were ineligible for the program, we both expect and find consistently small and null results.

¹² We identify these colleges by: choosing the 100 largest institutions attended by students within 15 points of the threshold; calculating RD estimates separately for each college; and keeping all schools whose coefficient is at the $p < 0.05$ level. Appendix Figure 2 shows t-stats for these colleges. An eighth colleges is an extremely small, private liberal arts college that is not listed as a recruiting institution, and its inclusion does not change our estimates.

institutions as a result of the program. Although we cannot identify these schools by name, we can provide a few key details, which are also detailed in Appendix Table 2. All seven are large, public institutions located outside of California and Texas, the two states that contribute the highest number of NHRP scholars. Whereas the full list of recruiting institutions contains a number of private and Most Competitive Barron's ranked schools, three of the seven are listed as Barron's Highly Competitive, and the remaining four as Less Competitive. Four serve as state flagships, even though flagships make up only a small portion of the full set of recruiting institutions. Although there is no exhaustive list of the methods by which recruiting institutions engage students, all seven institutions offer substantial financial aid for NHRP scholars, and this information is easily available on these colleges' websites. Five of the seven institutions currently offer students a full four years of out of state tuition, with some including additional cash scholarships. Nonetheless, there are other recruiting institutions that are known to offer financial awards that do not draw students in similar numbers, suggesting that financial aid appears to be a necessary but not sufficient condition for enrolling these scholars.

Given that students shift almost completely toward recruiting institutions, the primary mechanism appears to be a combination of direct college outreach and financial aid. An alternate, or perhaps complementary, mechanism is that NHRP induces students to improve their academic preparation in high school, making them more attractive candidates to these colleges. We investigate this possibility in Table 3. We find no evidence that NHRP scholars improve their academic performance, as measured by participation and performance in other College Board services. NHRP recognized scholars do not take or pass more AP exams, score higher on the SAT, or re-take the SAT more often. We find similarly null results when we examine other possible SAT outcomes, such as initial score or total score on the 2400 point scale, but omit

these results for brevity. There is evidence that students alter their behavior by sending SAT scores to more institutions, confirming that NHRP induces students to target and attend schools that were previously outside of their college choice set. Of course, we cannot rule out unobserved changes in student preparation, such as improvements in GPA, changes in course transcripts that do not impact AP taking, or participation in extra-curricular activities that might make a student a more attractive.

Regional Variation

Given the national sample of Hispanic scholars and variation in high school environments, college quality, state policies, and proximity of core recruiting colleges, we should expect a range of responses to the NHRP award, depending on where students reside. We find strong regional differences in the effect of NHRP status, with students in the Western and Southwestern regions entirely driving the results documented above (Table 4, Columns 1 and 3).¹³ There are almost no impacts on attendance patterns for students in the other four regions, with the exception of a 2.4 percentage point increase in the likelihood of attending one of the core recruiting institutions (Table 4, Column 3), over a base of 0.2 percent, which indicates the strong effects of the recruitment even in the presence of distance. The general lack of results is not simply due to statistical power, as the coefficients are much smaller than for the other regions. We reserve a discussion of why we see weaker effects in these regions for the conclusion.

Focusing on the two heavily Hispanic West and Southwest regions, we observe significant differences in student responses to the NHRP at the college application stage.

¹³ Results that only use West and Southwest students from 2007 to 2009 produce similar results and are shown in Appendix Table 6.

Students from the West appear to have increased the academic range of colleges in their application set, with more total score sends and an emphasis on reach colleges, whereas Southwest students do not alter their total score sends but shift their interest towards institutions with weaker peers (see Table 4 and Figure 6). For example, across all colleges to which students sent SAT scores in the West, the NHRP induced students to upwardly adjust their highest reach college by 9 SAT points, while students from the Southwest downwardly adjusted their highest reach by 7 SAT points. Students from the West sent more scores to colleges in the Most Competitive category as well as to colleges in the Less Competitive category as a result of NHRP. In the Southwest, the NHRP induced students to primarily send more SAT scores to colleges in the Less Competitive category. These results are meaningful changes given that only a small fraction of students – perhaps as many as ten percent at a maximum – appear to change attendance behavior as a result of the NHRP award. This suggests that the true impact on compliers is to shift scores sends to colleges with average SATs as much as 100 points up or down, which is close to a full standard deviation in college average SAT within the NHRP sample.

Differences in score send patterns are reflected in subsequent enrollment, with students from the West more likely to shift into colleges with academically stronger students and higher educational expenditures per FTE student. For example, Table 4 shows that students from the West are three percentage points more likely to attend private and Barron's Most Competitive colleges, with no significant increase in enrollment at Less Competitive colleges. In the Southwest, we find evidence of a decline in these measures as a result of the NHRP, as students are four percentage points less likely to attend private colleges and three percentage points more likely to enroll at Less Competitive colleges. Despite these differences, students increase

enrollment at core institutions in both regions, by almost five and ten percentage points in the West and Southwest, respectively. Although we focus on the West and Southwest regions, results that restrict the sample to students from just California and Texas, which constitute 75% and 91% of all Hispanic PSAT takers in those regions, produce similar but stronger results.

Completion Results

In Table 5 we investigate whether the NHRP impacts the likelihood that students earn a Bachelor's (BA) degree within four years (six year results are provided in Appendix Table 7). Our overall results are positive though statistically insignificant, with NHRP increasing BA completion increasing by 1.3 percentage points. Perhaps surprisingly, given the cross-regional differences in enrollment patterns, the BA increase is relatively equal across regions, measuring 1.1, 1.4, and 1.6 percentage points in the West, Southwest, and other regions, respectively. These positive but imprecisely estimated completion impacts suggest that high-performing Hispanic students are not harmed by enrolling at colleges that they may not have ordinarily considered. Our ability to detect impacts of NHRP on bachelor's degree completion are limited by the number of students whose actual college choices are affected by the recognition program. Results on college-going and college-choice suggest that no more than 10 percent of students are altering enrollment decisions as a result of NHRP, and that many students are shifting between institutions with comparable completion rates. Nevertheless, there exists room for improvement on this metric as even among high-performing Hispanic students, the four and six year graduation rates for non-recognized control students at the threshold are 46% and 66%.

The fairly small changes in bachelor's completion impacts conceal much larger changes in where recipients earned their bachelor's degrees. The fraction of students earning bachelor's

degrees in four years at recruiting institutions increased by 4 percentage points and at core recruiting institutions by 3.3 percentage points. Moreover, the NHRP increases the share of students who earn bachelor's degrees out-of-state by 2.8 percentage points, or 16 percent, suggesting that the NHRP serves as a lever to geographically disperse high achieving Hispanic students. Considered together with the college enrollment parameters in Tables 2 and 4, the completion point estimates in Table 5, reveal that induced students are succeeding at the colleges they would not ordinarily have attended. For example, we show that the NHRP increases out-of-state college enrollment by 4.7 percentage points (Table 2). Considered together with the increase in out-of-state bachelor's completion (2.8 percentage points), we estimate that nearly 60 percent of Hispanic students induced to attend out-of-state colleges ultimately earned bachelor's degrees in four years. When the time frame is extended to six years the percentage jumps to nearly 80 percent. This evidence casts doubt on the prevailing sentiment that high-performing Hispanic students may struggle to flourish in unfamiliar or uncomfortable postsecondary environments, or when separated from immediate family structures.

Table 5 also suggests potential changes in the quality of degree earned (as measured by average SAT score of matriculating students) that correspond exactly with the regional shifts observed in Table 4. Overall, students are 1.2 percentage points more likely to earn a degree from a Less Competitive institution, with the largest impacts in the Southwest region. In contrast, students in the West are 1.7 percentage points more likely to earn a degree from a Most Competitive institution, compared to a 1.1 point decline in the Southwest, although both results are statistically insignificant.

Finally, we examine the NHRP program for evidence of heterogeneous effects by student type (Table 6). Each row is associated with a different subgroup and each column is associated

with a different outcome, resulting in separate regressions for each cell. We first examine differences between students attending private versus public high schools, and find that our effects are driven entirely by public school students, where the base rates of the positive outcomes are much lower than in private schools. Although private school students are only a small portion of our overall sample, the results suggest this is not simply an issue of power, as almost all the coefficients are small, at about one percentage point or smaller. As such, we focus only on public school students in the remaining rows in Table 6, noting that the inclusion of private school students would slightly diminish the magnitude of the results presented here.

Overall, Table 6 shows significant impacts on sector of college attendance across all categories, but the strongest effects are found among students whose parents have lower levels of education or attend high schools that have the highest concentrations of Hispanic students and are located in more rural environments. These students tend to experience the largest increases in four-year college enrollment and out-of-state college enrollment, as well as experiencing a two to six percentage point increase in the probability of attending a postsecondary institution in the Most Competitive category. We also find sizeable increases in four-year bachelor's completion that range from four to eight percentage points among these disadvantaged students, who typically face the lowest completion rates. Six-year completion rates are generally smaller than the four-year results, though these results are still meaningfully large, but less imprecise as we lose the most recent two cohorts that do not have six-year outcomes.

We also attempt to examine differences in program impacts based on student academic performance. We utilize the fact that NHRP recognition does not impact any SAT measures in our previous analysis (see Table 3), and treat SAT score as exogenous. We use the sum of the Critical Reading and Mathematics subtests on students' first SAT attempt, as this is both

consistent across years and least subject to manipulation from subsequent re-taking. Although the PSAT and initial SAT are highly correlated, there are still substantial differences. The median initial SAT score for students within five points of the cutoff is 1230, and dividing the sample into equally sized terciles in this region indicates that the 33rd and 67th percentiles are 1190 and 1260, respectively. The bottom three rows of Table 6 show results by SAT tercile, and suggest that lower scoring students exhibit the largest responses to NHRP. For example, shifts towards four-year, recruiting, and Most Competitive colleges increased by four, ten, and four percentage points, respectively, for students in the bottom tercile. By contrast, the impacts for students in the highest tercile were either considerably smaller in magnitude or indistinguishable from zero. We also find that four-year bachelor degree completion rates for this lowest tercile group increased by almost four percentage points (10 percent). This finding is particularly noteworthy because these students have traditionally been most at risk for not completing.

Discussion

The National Hispanic Recognition Program is an intervention that provides high achieving Hispanic students positive information about their academic preparation for college, and provides colleges with an efficient method for identifying and recruiting a national sample of high-skilled minority students. The award seems to primarily serve as a tool for targeted outreach from colleges which these students otherwise would not have considered, namely four-year institutions both out of state and at state flagships, though the award induces some students in particular areas to target and attend more selective, private institutions. Shifts in college choice appear to be strongest among students from predominantly Hispanic high schools, in rural areas, and among students with lower SAT scores. These results show that some colleges actively seek

and are successful in enticing high-performing Hispanic students, which is consistent with a mission of creating a diverse and academically strong student body.

Even though there is relatively little effort in calculating NHRP eligibility and imparting this information to students and colleges, we do not think this intervention shows all of the typical characteristics of achieving the “low-touch” designation. In fact, providing a signal of relative “within ethnicity” ability produces no measurable change in short-term academic performance, the most proximate area where we would expect to see changes in student behavior. Rather, our results suggest that increasing opportunities for communication between colleges and students can produce large shifts in college choice. This is partially because the low-touch connection towards students paves the path for higher-touch efforts on the part of colleges, such as increased interaction and generous financial aid. Consistent with other research (e.g. Papay et al, 2015), these forms of support are shown to be particularly important for students and high schools with traditionally fewer resources, and that more effort to contact and communicate these opportunities towards those students may be fruitful in increasing postsecondary success.

Although increases in bachelor’s completion do not always rise to the traditional levels of statistical significance, the coefficients suggest that, at the very least, the NHRP has no adverse impact on ultimate bachelor’s completion. Based on the prevailing narrative on acclimation to college climate, students from predominately Hispanic high schools might be expected to suffer the largest culture shocks from attending colleges with comparatively small shares of Hispanic students. We find the opposite: students from predominately Hispanic high schools actually experience large increases in four-year bachelor’s completion of four percentage points. These findings challenge the narrative that unique cultural circumstances and intense family and

community ties shared by Hispanic students might impede success at colleges far from home. Of course, family and community ties may still exert an influence on degree completion for Hispanic (or other) students, and our completion results may be muted if altering college attendance patterns has a disruptive effect without appropriate supports in place.

There are a number of straight-forward lessons to be taken from the NHRP program. First, inducing students to attend out-of-state colleges likely requires large financial incentives, given that all of the observed out-of-state shifting in this study is driven by colleges known to provide large grant aid packages. Second, this program allows colleges to effectively recruit Hispanic students attending a wide variety of high schools. The consistency of effects suggests that this program may serve as an alternative to traditional college outreach efforts, like deploying college admissions counselors to high schools and college fairs, and that direct outreach by colleges may be a more effective tool than policies that rely on individuals to proactively adopt a new set of behaviors. Our findings are consistent with those of other authors, such as Hoxby and Turner (2013), who find that direct outreach can be an efficacious way to impact student decision-making. In this case, we cannot be certain whether students exploit the information directly or indirectly through parents or counselors, who in turn advise students. Third, student responses are regionally specific, emphasizing the role of the higher education marketplace and local options in selecting which colleges to attend. Unfortunately, there is no convincing method by which we can identify what mechanisms lead to these regional differences. For example, impacts may be moderated by the relative distance of recruiting colleges, the availability of suitable in-state substitutes, or other state-based postsecondary policies such as merit aid, affirmative action, or guaranteed admission policies. Although we cannot causally explain the different choices across geographies, exploring differences in

postsecondary decision-making across regions is worthy of future research and may shed light on some of these mechanisms.

The results in this study highlight that research needs to focus not just on completion impacts, but how interventions affect degree experience and quality. NHRP shifts the geographic distribution of degree completion, increasing the likelihood that West and Southwest students earn their Bachelor degree out of state by approximately 25 percent. We cannot estimate whether this alters long-term residential mobility, and available evidence suggest effects might be small (Fitzpatrick & Jones, 2012; Groen, 2004). Nonetheless, these results could be meaningful for states looking to increase their stock of college-educated workers (Groen & White, 2004), particularly college-educated ethnic minorities. As most attendance is shifted towards public universities with generous financial aid, the states subsidizing these efforts might view these results as initial evidence of the strategy's efficacy. Shifting the type of institution where students earn their degree could have further educational or labor force implications, if graduate schools or employers treat students differently based on the quality of the institution attended. Combined with the large financial aid packages offered by some colleges, students may also be completing with lower debt levels, which could have longer-term impacts on degree attainment or employment decisions (Field, 2009; Rothstein & Rouse, 2011). Finally, NHRP scholars may have a substantially different college experience and worldview as a result of their college choice, based on the student-institution "fit" that may have been altered as a result of this program. Unobserved benefits to students, as well as to states that might retain these high-performing high school graduates, may be the biggest impact of all.

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Figure 1. Density of 11th Grade PSAT Scores, Hispanic Students, 2007 to 2009

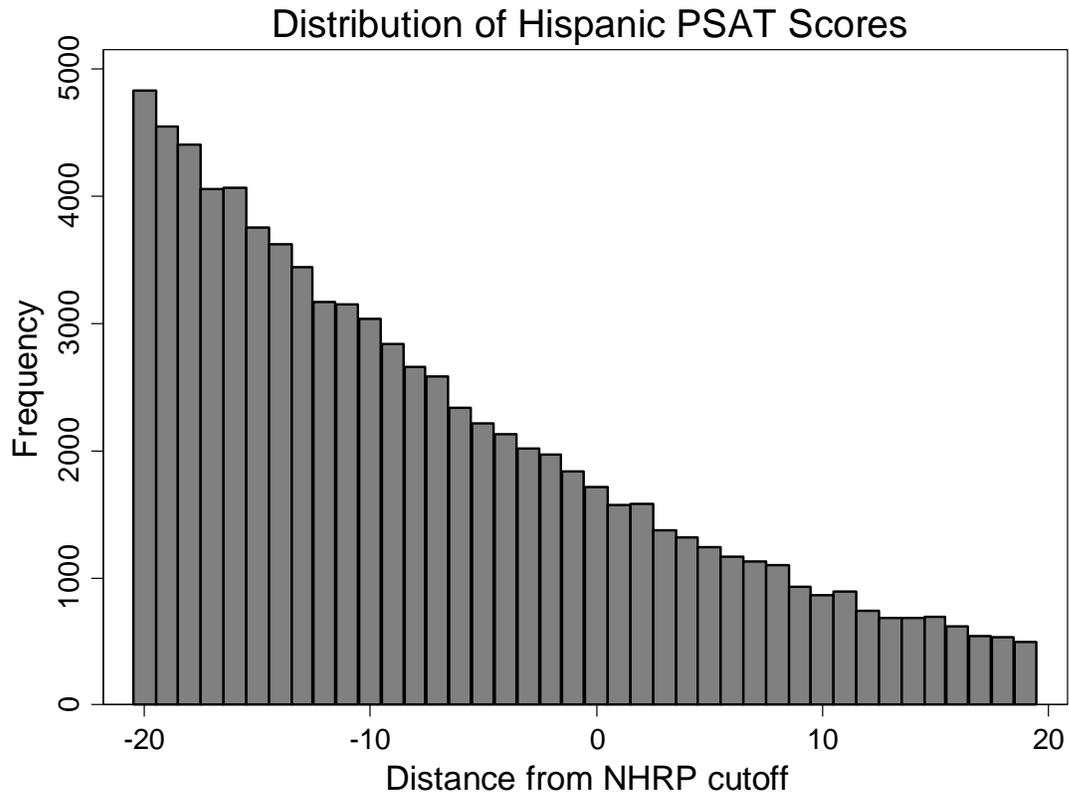


Figure 2. Covariate Balance (Bin size = 2 points)

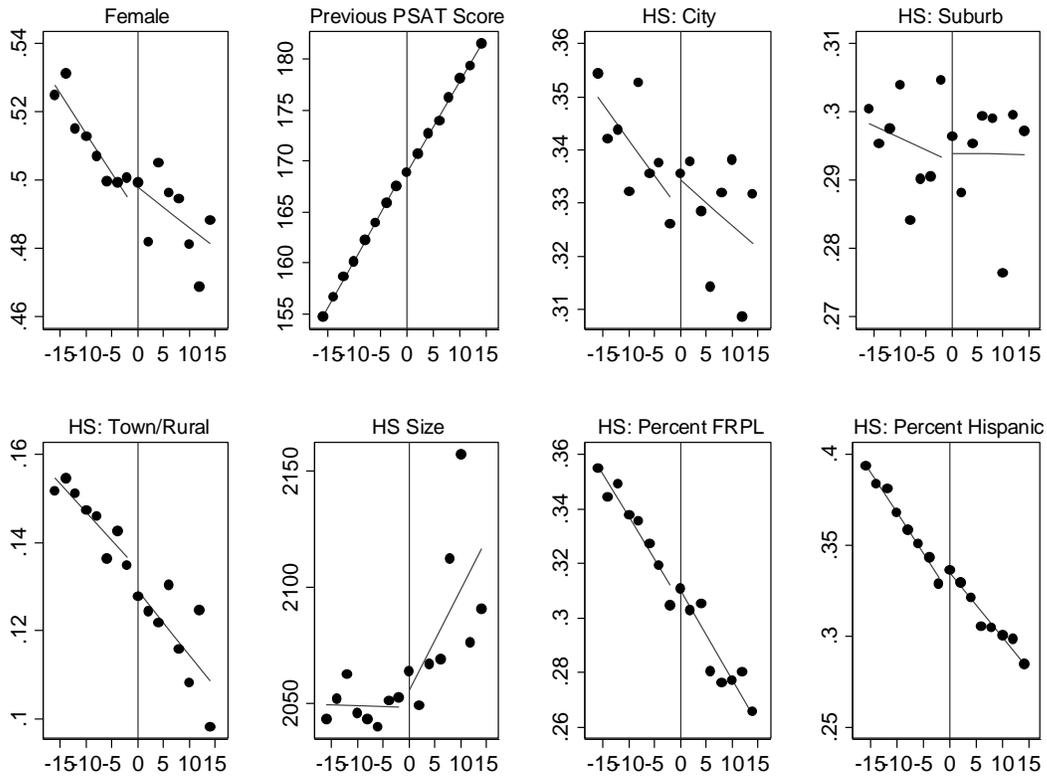


Figure 3. Number of NHRP Recipients from the 2007-2009 cohorts, and concentration of all students meeting NHRP criteria

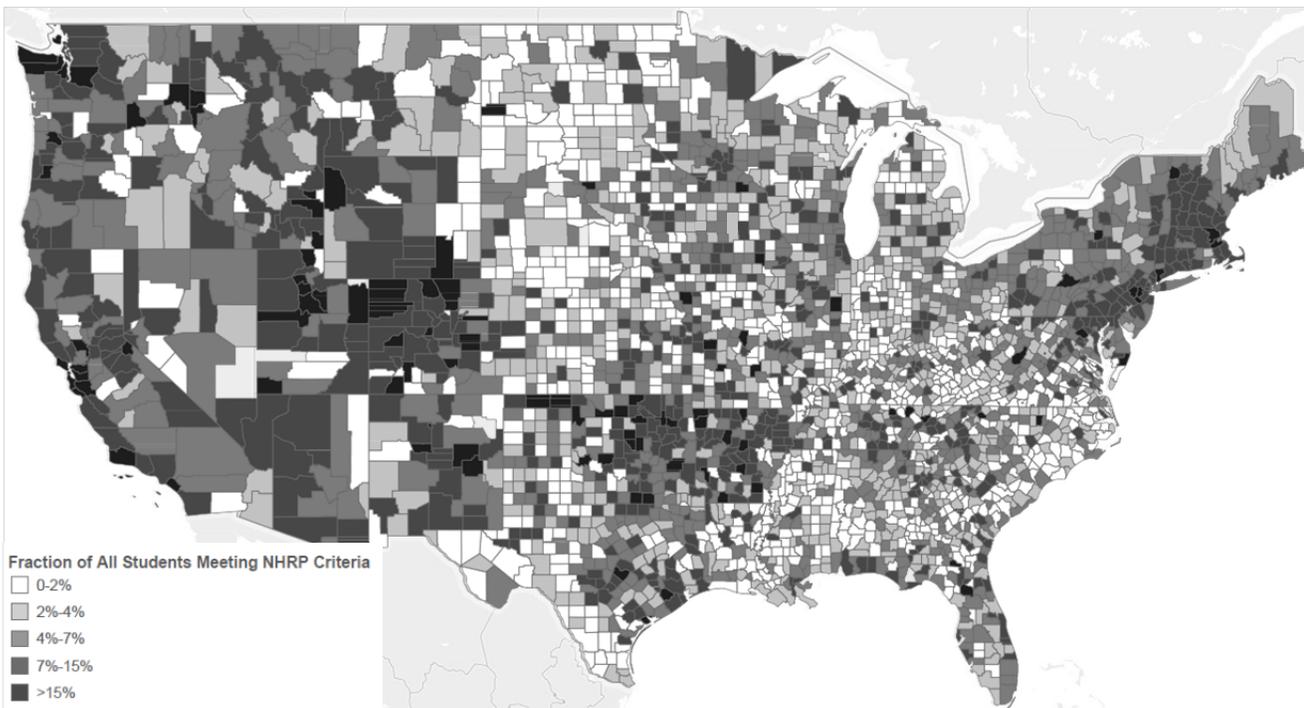
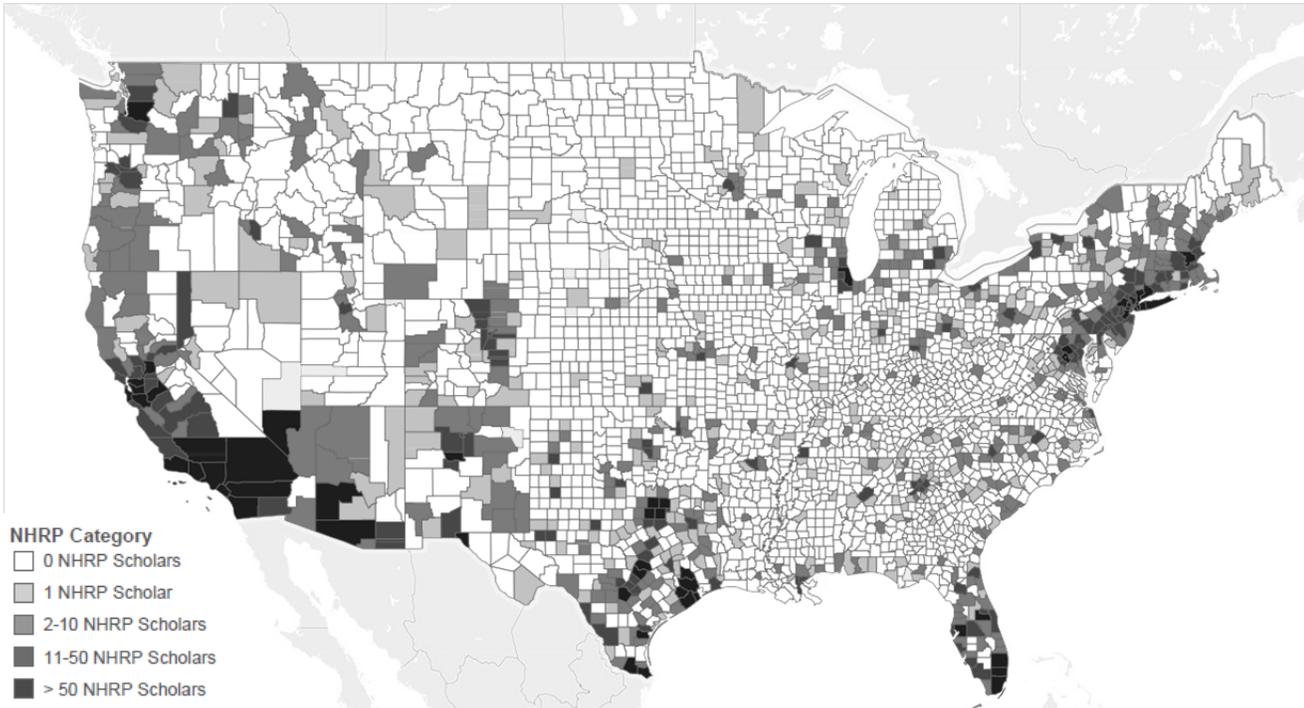


Figure 4. Impacts of NHRP on College-Attendance Patterns (Bin size = 2 points)

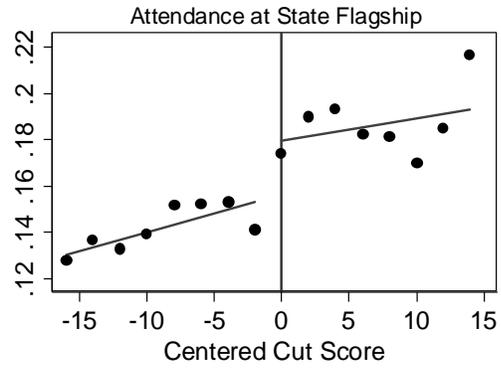
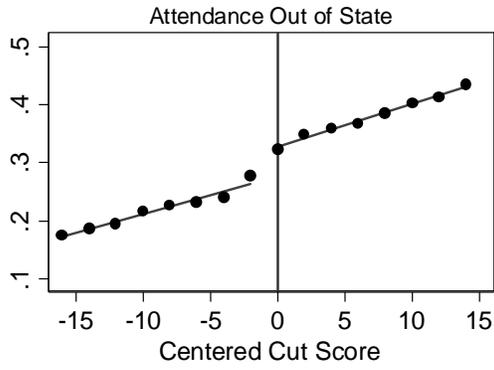
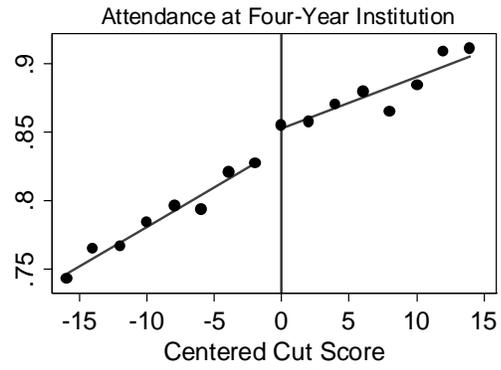
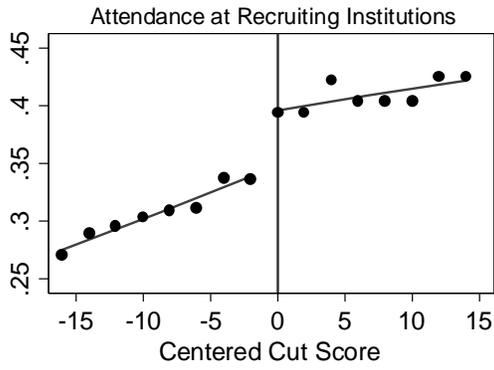


Figure 5. Attendance at Core NHRP Recruiting Institutions (Bin size = 2 points)

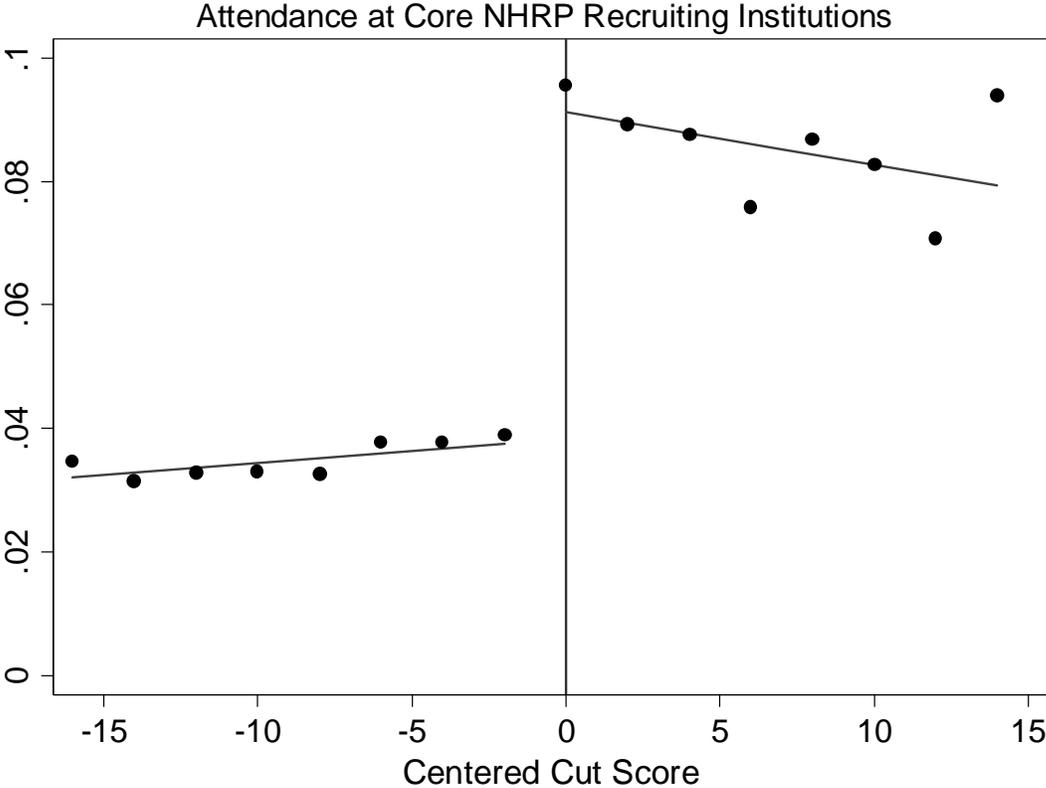
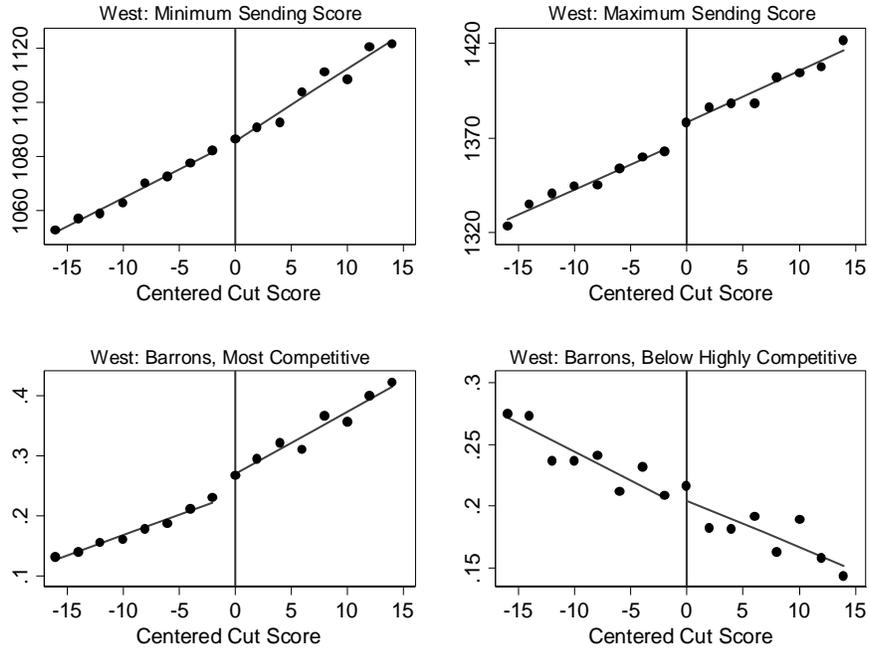


Figure 6. Score Sends and College Attendance, by Region (Bin size = 2 points)

Panel A. Western Region



Panel B: Southwestern Region

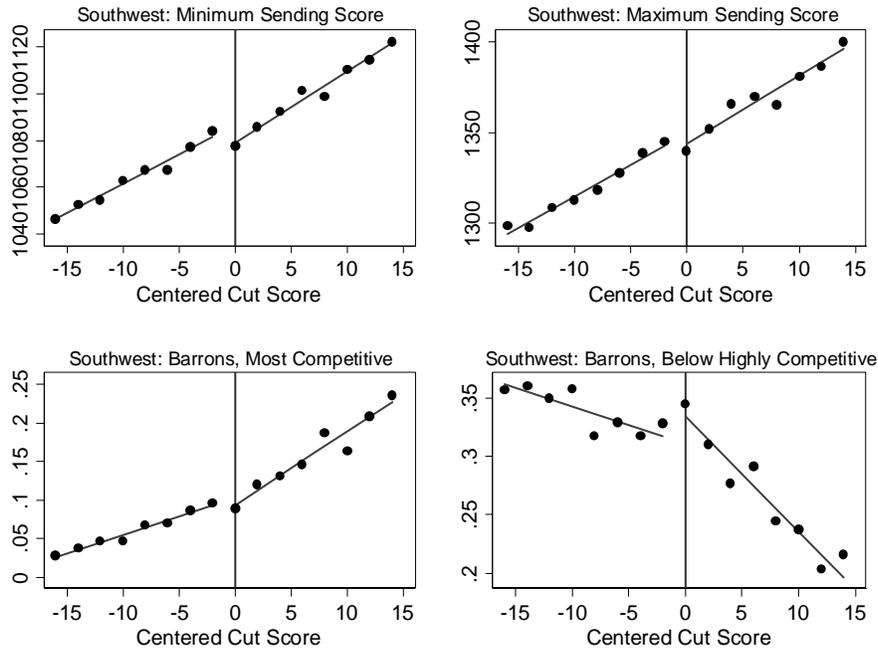


Table 1. Summary Statistics, Hispanic and White Students

	Higher-Performing Hispanic		Higher-Performing Hispanic		Higher-Performing White		Lower-Performing Hispanic	
	All Years		2007-2009		2007-2009		2007-2009	
	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Female	50.6%	0.50	50.8%	0.50	51.2%	0.50	56.8%	0.50
No CCD data	23.4%	0.42	25.0%	0.43	28.3%	0.45	10.9%	0.31
Location: City	33.8%	0.47	30.8%	0.46	18.0%	0.38	48.8%	0.50
Location: Suburb	29.5%	0.46	30.4%	0.46	35.6%	0.48	26.0%	0.44
Location: Town/Rural	13.9%	0.35	14.4%	0.35	23.0%	0.42	16.5%	0.37
HS: School size	2057	930	2030	945	1611	808	1900	1053
HS: Percent free/reduced price lunch	32.3%	0.23	30.7%	0.22	19.0%	0.16	53.4%	0.25
HS: Hispanic concentration	35.1%	0.29	31.8%	0.28	8.5%	0.11	52.7%	0.31
Only students below cutoff								
Parent education less than high school	19.6%	0.40	17.8%	0.38	4.3%	0.20	44.4%	0.50
Income less than \$50K	31.4%	0.46	28.3%	0.45	8.4%	0.28	45.1%	0.50
Number of AP exams taken	3.3	2.9	3.4	2.9	4.7	8.6	0.3	0.9
Number of AP exams passed	2.1	2.3	2.3	2.4	4.0	8.6	0.1	0.3
Took SAT	85.7%	0.35	85.8%	0.35	78.0%	0.41	40.8%	0.49
Attended two-year college	14.3%	0.35	12.8%	0.33	8.2%	0.27	42.7%	0.49
Attended four-year college	78.5%	0.41	80.4%	0.40	86.4%	0.34	19.3%	0.39
Attended out of state college	21.4%	0.41	24.9%	0.43	32.9%	0.47	5.3%	0.22
Attended barrons most competitive	15.4%	0.36	18.1%	0.39	10.0%	0.30	0.1%	0.03
Attended barrons most or highly competitive	52.4%	0.50	56.5%	0.50	61.0%	0.49	2.5%	0.16
Average SAT of college	1174	138	1186	138	1174	109	994	97
Four-year bachelor degree completion	40.6%	0.49	43.9%	0.50	56.1%	0.50	2.9%	0.17
Six-year bachelor degree completion	60.8%	0.49	63.9%	0.48	76.0%	0.43	8.5%	0.28
Only students below cutoff who took SAT								
Maximum SAT score	1210	92	1220	93	1247	86	760	102
Number of score sends	5.5	3.8	5.6	3.9	4.8	3.7	2.2	2.6
Score send: Average SAT	1211	101	1218	102	1198	92	1070	92
Score send: Maximum SAT	1340	130	1347	127	1308	119	1174	138
Applied to barrons most competitive	58.9%	0.49	61.9%	0.49	45.9%	0.50	13.5%	0.34
Applied to barrons most or highly competitive	85.8%	0.35	86.5%	0.34	80.1%	0.40	41.4%	0.49
Sent score to out of state college	56.8%	0.50	61.1%	0.49	63.5%	0.48	17.3%	0.38
N	57,722		33,277		497,317		147,794	

Notes. High-performing hispanic students includes all students within 15 points of NHRP eligibility threshold. Low-Performing identifies students 70 to 90 PSAT points below the threshold. Variables that might be impacted by NHRP recognition, including data collected from College Board forms that only occur after the PSAT is taken, only focus on control students below the NHRP eligibility threshold

Table 2. College Results, Hispanic PSAT Takers

	All Colleges		Recruiting Colleges		Non-Recruiting Colleges	
	Effect	Control Mean	Effect	Control Mean	Effect	Control Mean
College Sector						
Attend College	0.005 (0.004)	93.4%				
Two-year college	-0.010+ (0.005)	10.1%				
Recruiting Institution	0.053** (0.008)	33.8%				
Core recruiting instituions	0.058** (0.004)	4.1%				
Other non-core recruiting institutions	-0.005 (0.008)	29.6%				
Four-year college	0.015* (0.006)	83.3%	0.053** (0.008)	33.8%	-0.038** (0.008)	49.5%
Out of state college	0.047** (0.008)	29.2%	0.058** (0.006)	10.0%	-0.011+ (0.006)	19.2%
Flagship	0.029** (0.006)	14.9%	0.028** (0.005)	8.1%	0.001 (0.004)	6.8%
Private	-0.002 (0.008)	35.0%	0.003 (0.006)	12.2%	-0.005 (0.007)	22.8%
Barrons: Most competitive	0.005 (0.007)	23.0%	-0.001 (0.004)	6.8%	0.006 (0.006)	16.2%
Barrons: Highly Competitive Plus	-0.005 (0.007)	19.8%	0.002 (0.006)	12.0%	-0.007 (0.004)	7.8%
Barrons: Highly Competitive	-0.001 (0.007)	18.0%	0.013** (0.005)	6.5%	-0.014** (0.005)	11.6%
Barrons: Less Competitive	0.016* (0.007)	22.4%	0.039** (0.005)	8.6%	-0.023** (0.006)	13.8%
N		57722		57722		57722

Notes. Results based on linear regressions with rectangular kernels that include state by year fixed effects . Robust standard errors in parentheses (+ p<=0.10, * p<=0.05, ** p<=0.01).

Table 3. High School Preparation, Hispanic PSAT Takers

	Effect	Control Mean
AP exams taken in 12th grade	0.042 (0.030)	1.97
AP exams passed in 12th grade	0.024 (0.025)	1.41
SAT		
Took SAT	0.007 (0.005)	87.6%
Maximum score (1600 point scale)	-0.832 (1.492)	1264.17
Total SAT attempts	0.005 (0.013)	1.83
Score Sends		
Total	0.207** (0.071)	6.76
College SAT: Average	-1.413 (1.851)	1239
College SAT: Minimum	-4.318* (2.077)	1099
College SAT: Maximum	2.464 (2.308)	1369
Barrons: Most Competitive	0.064 (0.050)	2.40
Barrons: Highly Competitive Plus	0.024 (0.025)	1.41
Barrons: Highly Competitive	0.037 (0.024)	1.24
Barrons: Less Competitive	0.131** (0.024)	0.97

N

57722

Notes. Results based on linear regressions with rectangular kernels that include state by year fixed effects . Robust standard errors in parentheses (+ p<=0.10, * p<=0.05, ** p<=0.01).

Table 4. College Results, Hispanic PSAT Takers, by Region

	WEST		SOUTHWEST		ALL OTHER REGIONS	
	Effect	Control Mean	Effect	Control Mean	Effect	Control Mean
Score Sends						
Total	0.302* (0.118)	1236	0.059 (0.104)	1219	0.285+ (0.156)	1273
College SAT: Minimum	-0.760 (3.178)	1090	-7.389* (3.426)	1086	-5.706 (4.538)	1132
College SAT: Maximum	8.945* (3.683)	1370	-7.512+ (4.102)	1346	6.924+ (4.044)	1397
Barrons: Most Competitive	0.139+ (0.083)	2.7	-0.086 (0.069)	1.6	0.160 (0.121)	3.0
Barrons: Highly Competitive Plus	0.060 (0.037)	1.2	-0.014 (0.039)	1.5	0.029 (0.060)	1.6
Barrons: Highly Competitive	0.074+ (0.044)	1.6	0.042 (0.035)	1.0	-0.026 (0.045)	1.1
Barrons: Less Competitive	0.092* (0.040)	1.0	0.217** (0.041)	1.1	0.061 (0.045)	0.8
College Sector						
Two-year college	-0.020* (0.009)	14.0%	-0.001 (0.009)	9.6%	-0.009 (0.007)	4.7%
Four-year college	0.019+ (0.011)	80.3%	0.013 (0.011)	83.9%	0.013 (0.011)	87.1%
Recruiting institution	0.054** (0.012)	25.0%	0.075** (0.014)	47.0%	0.017 (0.016)	28.7%
Core recruiting institution	0.044** (0.006)	6.5%	0.094** (0.007)	4.3%	0.024** (0.005)	0.2%
Four-year college: Non-Recruiting	-0.035** (0.013)	55.3%	-0.062** (0.013)	36.9%	-0.003 (0.017)	58.4%
Out of state college	0.049** (0.012)	27.1%	0.069** (0.012)	22.0%	0.008 (0.017)	43.1%
Flagship	0.024** (0.009)	12.0%	0.039** (0.011)	16.0%	0.024+ (0.014)	18.0%
Private	0.026* (0.013)	32.9%	-0.040** (0.013)	27.7%	0.012 (0.017)	49.1%
Barrons: Most competitive	0.030* (0.012)	24.9%	-0.012 (0.009)	10.6%	-0.012 (0.017)	38.0%
Barrons: Highly Competitive Plus	-0.002 (0.009)	12.1%	-0.013 (0.013)	27.5%	0.005 (0.015)	21.1%
Barrons: Highly Competitive	-0.014 (0.012)	23.9%	0.007 (0.010)	12.9%	0.012 (0.013)	16.0%
Barrons: Less Competitive	0.006 (0.011)	19.4%	0.031* (0.013)	32.8%	0.008 (0.012)	12.0%
College Characteristics (IPEDS)						
Mean SAT	6.762 (4.218)	1211	-4.315 (4.297)	1155	-2.287 (4.921)	1262
Graduation rate	0.412 (0.490)	73.4	-0.011 (0.625)	61.8	-0.712 (0.592)	77.3
Expenditures per FTE	3429.375* (1658.354)	\$40,478	-5302.866** (1734.603)	\$41,993	90.125 (988.301)	\$30,411
Tuition	900.172* (394.313)	\$15,150	-1437.762** (362.955)	\$13,645	-192.834 (521.801)	\$22,003
Percent Hispanic	-0.008** (0.003)	15.0%	-0.010 (0.006)	22.7%	-0.005 (0.004)	9.9%
Range of NHRP Cut Scores	183-185		179-183		184-195	
N	22921		21605		13196	

Notes. Results based on linear regressions with rectangular kernels that include state by year fixed effects . Robust standard errors in parentheses (+ p<=0.10, * p<=0.05, ** p<=0.01).

Table 5. Four-Year Bachelor Degree Completion, Hispanic PSAT Takers, by Region

	ALL REGIONS		WEST		SOUTHWEST		ALL OTHER REGIONS	
	Effect	Control Mean	Effect	Control Mean	Effect	Control Mean	Effect	Control Mean
All Students	0.013 (0.009)	45.7%	0.011 (0.014)	45.3%	0.014 (0.014)	38.6%	0.016 (0.018)	56.7%
Recruiting institution	0.040** (0.007)	16.8%	0.037** (0.010)	13.2%	0.055** (0.012)	20.1%	0.020 (0.014)	18.0%
Core recruiting institution	0.033** (0.003)	1.3%	0.029** (0.005)	2.3%	0.049** (0.005)	0.9%	0.013** (0.004)	0.0%
Non-recruiting institution	-0.026** (0.008)	28.8%	-0.026* (0.013)	32.0%	-0.041** (0.010)	18.5%	-0.003 (0.017)	38.7%
Out of state	0.028** (0.007)	18.1%	0.038** (0.010)	16.8%	0.033** (0.010)	12.5%	0.003 (0.016)	28.7%
In state	-0.014+ (0.008)	27.5%	-0.027* (0.013)	28.5%	-0.018 (0.013)	26.1%	0.013 (0.016)	28.0%
Mean SAT of College	-3.893 (3.385)	1243	2.768 (5.385)	1245	-9.996 (6.403)	1197	-5.698 (5.809)	1285
Barrons: Most Competitive	0.001 (0.006)	16.5%	0.017 (0.011)	16.4%	-0.011 (0.007)	8.5%	-0.008 (0.016)	28.4%
Barrons: Highly Competitive Plus	-0.000 (0.006)	11.2%	-0.001 (0.007)	7.7%	-0.002 (0.010)	13.4%	0.005 (0.012)	13.6%
Barrons: Highly Competitive	0.001 (0.005)	9.2%	-0.012 (0.009)	13.2%	0.007 (0.007)	5.2%	0.016 (0.010)	8.7%
Barrons: Less Competitive	0.012* (0.005)	7.7%	0.009 (0.007)	6.5%	0.021* (0.009)	10.8%	0.006 (0.009)	5.3%
N	57722		22921		21605		13196	

Notes. Results based on linear regressions with rectangular kernels that include state by year fixed effects . Robust standard errors in parentheses (+ p<=0.10, * p<=0.05, ** p<=0.01).

Table 6. Heterogeneous Impacts, Hispanic PSAT Takers

	N	Four Year	Recruiting Institution	Out of State	Barrons: Most Competitive	Bachelor in Four Years	Bachelor in Six Years
Private high school	5655	-0.007 (0.017) 88.1%	0.038 (0.026) 38.7%	-0.012 (0.026) 37.6%	-0.012 (0.024) 26.3%	-0.009 (0.027) 49.0%	0.004 (0.028) 67.6%
Public High School	44207	0.023** (0.008) 81.5%	0.058** (0.009) 33.2%	0.062** (0.009) 25.4%	0.012 (0.008) 20.3%	0.018+ (0.010) 44.7%	0.013 (0.012) 65.0%
<i>Public high school: Location</i>							
City	19349	0.022+ (0.012) 81.4%	0.060** (0.014) 38.1%	0.047** (0.013) 22.7%	0.017 (0.011) 18.3%	0.005 (0.015) 41.0%	-0.005 (0.018) 63.7%
Suburb	16890	0.031** (0.012) 82.4%	0.053** (0.014) 27.1%	0.061** (0.014) 28.5%	0.000 (0.013) 25.1%	0.022 (0.016) 47.8%	0.026 (0.018) 65.6%
Town-Rural	7968	0.009 (0.018) 79.8%	0.070** (0.023) 35.5%	0.109** (0.021) 24.8%	0.026 (0.017) 14.0%	0.050* (0.024) 46.3%	0.033 (0.029) 66.5%
<i>Public high school: Hispanic concentration</i>							
Bottom 50th percentile	18285	0.010 (0.011) 83.4%	0.060** (0.014) 34.7%	0.064** (0.014) 29.8%	-0.007 (0.011) 16.4%	0.008 (0.015) 46.1%	0.021 (0.018) 65.4%
50th to 75th percentile	11978	0.026+ (0.015) 78.0%	0.073** (0.017) 31.3%	0.061** (0.016) 22.0%	0.007 (0.014) 23.8%	0.007 (0.019) 46.1%	-0.007 (0.022) 67.2%
75th to 100th percentile	11115	0.040** (0.014) 82.2%	0.046** (0.017) 32.4%	0.067** (0.016) 21.4%	0.046** (0.016) 23.5%	0.043* (0.018) 40.8%	0.019 (0.022) 62.7%
<i>Parental Education</i>							
Bachelor or higher	18985	0.025** (0.009) 87.5%	0.060** (0.014) 35.7%	0.064** (0.013) 31.1%	-0.005 (0.012) 23.5%	-0.009 (0.015) 54.8%	-0.008 (0.016) 73.9%
High school graduate	9017	0.037* (0.017) 80.0%	0.061** (0.021) 34.0%	0.090** (0.019) 16.8%	0.020 (0.017) 17.5%	0.039+ (0.022) 37.2%	0.038 (0.027) 59.0%
High school dropout	7595	0.022 (0.021) 83.6%	0.049* (0.023) 33.3%	0.036+ (0.020) 24.3%	0.057** (0.021) 26.5%	0.081** (0.025) 43.9%	0.058+ (0.031) 66.1%
<i>SAT Tercile</i>							
Highest Tercile	9996	-0.006 (0.012) 89.0%	0.022 (0.018) 33.2%	0.032+ (0.017) 32.9%	-0.007 (0.017) 31.4%	-0.001 (0.019) 54.1%	-0.006 (0.022) 74.3%
Middle Tercile	10519	0.049** (0.013) 82.7%	0.047** (0.017) 33.2%	0.075** (0.017) 24.9%	0.003 (0.015) 22.2%	0.005 (0.019) 49.0%	0.019 (0.022) 69.1%
Lowest Tercile	17532	0.041** (0.015) 82.7%	0.098** (0.018) 35.6%	0.089** (0.016) 21.4%	0.036** (0.013) 14.0%	0.041* (0.019) 41.5%	0.018 (0.022) 63.1%

Notes. Results based on linear regressions with rectangular kernels that include state by year fixed effects. All regressions below the second row utilize only public school students. Results for earning a Bachelor degree in six years utilize only five of the seven cohorts and sample sizes are correspondingly smaller. Robust standard errors in parentheses (+ p<=0.10, * p<=0.05, ** p<=0.01).

Appendix Table 1. PSAT/NMSQT Regions and Description, 2007 to 2009

Region	States	National PSAT Takers	Hispanic PSAT Takers
Western	AK, AZ, CA, CO, HI, ID, MT, NV, OR, UT, WA, WY	848,655 (18.9%)	180,628 (31.3%)
Southwestern	AR, NM, OK, TX	532,680 (11.9%)	165,330 (28.6%)
Southern	AL, FL, GA, KY, LA, NC, SC, TN, VA, MS	830,585 (18.5%)	65,844 (11.4%)
New England	CT, MA, ME, NH, RI, VT	359,879 (8.0%)	25,150 (4.4%)
Middle States	DC, DE, MD, NJ, NY, PA	1,062,447 (23.6%)	107,016 (18.5%)
Midwestern	IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI, WV	861,353 (19.2%)	33,428 (5.8%)
Total		N=4,495,599	N=577,396

Appendix Table 2. Summary Statistics of Postsecondary Institutions, 2007

	Non-Recruiting Institutions		Recruiting Institutions		Core Recruiting Institutions	
	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Flagship	2.4%	15.3%	6.5%	24.7%	57.1%	53.5%
Private	64.8%	47.8%	61.9%	48.6%	0.0%	0.0%
Barrons: Most competitive	3.1%	17.4%	8.7%	28.2%	0.0%	0.0%
Barrons: Highly Competitive Plus	4.0%	19.7%	15.5%	36.2%	0.0%	0.0%
Barrons: Highly Competitive	15.7%	36.4%	26.6%	44.3%	42.9%	53.5%
Barrons: Less Competitive	77.1%	42.0%	49.2%	50.1%	57.1%	53.5%
Total Enrollment	4,580	5,740	7,380	8,443	24,016	8,604
Average SAT	1046	124	1120	138	1113	35
Grad Rate within 150%	50.8%	18.1%	60.8%	17.6%	57.9%	7.1%
Expenditures per FTE	\$16,961	\$15,673	\$20,332	\$13,775	\$14,273	\$3,075
Tuition	\$15,543	\$9,304	\$18,518	\$11,227	\$5,404	\$570
Percentage Hispanic	7.1%	13.6%	7.5%	10.2%	10.5%	12.1%
Number of Institutions	1,215		323		7	

Notes. Data include only four-year institutions.

Appendix Table 3. Covariate Balance, Hispanic PSAT Takers

	Effect	Control Mean
Female	0.010 (0.009)	50.5%
Mexican-American	0.003 (0.008)	49.2%
Puerto Rican	-0.000 (0.004)	6.5%
Other hispanic	-0.003 (0.008)	44.3%
Previously took PSAT	0.007 (0.008)	66.4%
Previous PSAT Score	-0.477+ (0.244)	167.9
Location: City	0.006 (0.008)	32.2%
Location: Suburb	0.002 (0.008)	30.7%
Location: Town/Rural	-0.005 (0.006)	13.3%
HS: School size	-3.204 (17.429)	2017
HS: Percent free/reduced price lunch	0.003 (0.004)	29.8%
HS: Hispanic concentration	0.007 (0.005)	32.1%
N		57722

Notes. Results based on linear regressions with rectangular kernels that include state by year fixed effects . Robust standard errors in parentheses (+ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$).

Appendix Table 4. Robustness Checks, Hispanic PSAT Takers

	20	15	10	15	20	10	15	15	15	15	15	15, PSAT<200
Kernel	Tri	Tri	Tri	Tri	Rect							
Functional Form	Linear	Quad	Linear	Quad	Linear	Linear						
Covar	N	N	N	N	N	N	N	N	Y	Y	Y	N
Standard Errors	Robust	Robust	Robust	Clustered	Robust	Robust	Clustered	Robust	Robust	Robust	Robust	Robust
Fixed Effect (By Year)	State	School	State									
Recruiting Institution	0.052** (0.008)	0.054** (0.009)	0.049** (0.011)	0.054** (0.009)	0.052** (0.007)	0.055** (0.010)	0.053** (0.008)	0.056** (0.012)	0.053** (0.008)	0.056** (0.012)	0.050** (0.009)	0.050** (0.009)
Two-Year	-0.012* (0.005)	-0.011+ (0.006)	-0.011 (0.007)	-0.011* (0.005)	-0.010* (0.005)	-0.014* (0.006)	-0.010+ (0.005)	-0.012 (0.008)	-0.010+ (0.005)	-0.011 (0.008)	-0.012* (0.006)	-0.012* (0.006)
Four-Year	0.016** (0.006)	0.017* (0.007)	0.016+ (0.009)	0.017* (0.007)	0.013* (0.006)	0.021** (0.008)	0.015* (0.007)	0.020* (0.010)	0.015* (0.006)	0.019* (0.009)	0.015* (0.007)	0.015* (0.007)
Out of State	0.049** (0.007)	0.044** (0.008)	0.036** (0.010)	0.044** (0.008)	0.055** (0.007)	0.048** (0.009)	0.047** (0.008)	0.041** (0.011)	0.047** (0.008)	0.041** (0.011)	0.050** (0.008)	0.051** (0.008)
Flagship	0.027** (0.006)	0.032** (0.007)	0.035** (0.008)	0.032** (0.006)	0.023** (0.006)	0.033** (0.008)	0.029** (0.006)	0.038** (0.009)	0.029** (0.006)	0.037** (0.009)	0.030** (0.007)	0.029** (0.007)
Private	0.001 (0.008)	0.002 (0.009)	0.001 (0.011)	0.002 (0.009)	0.000 (0.007)	0.004 (0.010)	-0.002 (0.008)	0.007 (0.012)	-0.002 (0.008)	0.007 (0.012)	-0.005 (0.008)	-0.004 (0.009)
Barrons: Most Competi	0.005 (0.007)	0.001 (0.008)	-0.004 (0.009)	0.001 (0.007)	0.010 (0.006)	-0.003 (0.008)	0.005 (0.007)	-0.004 (0.010)	0.004 (0.007)	-0.007 (0.010)	0.006 (0.007)	0.006 (0.007)
Barrons: Less Competit	0.017* (0.007)	0.017* (0.008)	0.019+ (0.010)	0.017* (0.007)	0.014* (0.006)	0.019* (0.009)	0.016* (0.007)	0.017 (0.011)	0.016* (0.007)	0.017 (0.011)	0.017* (0.008)	0.018* (0.008)

Notes. Results based on regressions that include state by year fixed effects (+ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$). School or state fixed effects are interacted with each cohort year. Covariates included a dummy for being female and various parental education and income levels; previous PSAT score for those who took the exam in 10th grade; dummies for various Hispanic ethnicities; and dummies to control for high school status (public or private), type (city, suburban, town/rural), size, and Hispanic concentration. The final column removes all students scoring 200 or more on the PSAT, to eliminate any potential effects from National Merit Commended status.

Appendix Table 5. College Results, White PSAT Takers

	Effect	Control Mean
College Sector		
Recruiting Institution	0.001 (0.002)	26.8%
Two-year college	0.001 (0.001)	6.4%
Four-year college	-0.001 (0.001)	88.3%
Out of state college	0.004 (0.003)	35.8%
Flagship	-0.008** (0.002)	21.9%
Private	0.000 (0.002)	13.6%
Barrons: Most competitive	0.003 (0.002)	15.2%
Barrons: Highly Competitive Plus	0.000 (0.002)	23.4%
Barrons: Highly Competitive	-0.007** (0.002)	28.9%
Barrons: Less Competitive	0.003 (0.002)	20.7%
College Characteristics (IPEDS)		
Mean SAT	-0.159 (0.672)	1197
Graduate Rate in 150%	-0.216 (0.146)	70.0
Expenditures per FTE	-145.346 (149.867)	21,442
Tuition	-97.361 (113.574)	15,933
Percent Hispanic	0.000 (0.000)	7.6%

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Notes. Results based on linear regressions with rectangular kernels that include state by year fixed effects . Robust standard errors in parentheses (+ p<=0.10, * p<=0.05, ** p<=0.01).

Appendix Table 6. College Results, Hispanic PSAT Takers, by Region, 2007 to 2009

	ALL		WEST		SOUTHWEST		ALL OTHER REGIONS	
	Effect	Control Mean	Effect	Control Mean	Effect	Control Mean	Effect	Control Mean
Score Sends								
Total	0.252** (0.095)	1246	0.263 (0.175)	1235	0.195 (0.157)	1215	0.285+ (0.156)	1273
College SAT: Minimum	-6.215* (2.762)	1103	-3.806 (4.653)	1084	-9.771+ (5.192)	1077	-5.706 (4.538)	1132
College SAT: Maximum	0.327 (2.912)	1376	2.510 (5.360)	1373	-11.339+ (6.088)	1345	6.924+ (4.044)	1397
Barrons: Most Competitive	0.041 (0.069)	2.6	0.004 (0.124)	2.9	-0.093 (0.103)	1.7	0.160 (0.121)	3.0
Barrons: Highly Competitive Plus	0.027 (0.034)	1.5	0.085 (0.056)	1.2	-0.038 (0.058)	1.6	0.029 (0.060)	1.6
Barrons: Highly Competitive	0.046 (0.032)	1.2	0.088 (0.064)	1.7	0.110* (0.056)	1.0	-0.026 (0.045)	1.1
Barrons: Less Competitive	0.152** (0.032)	0.9	0.153* (0.061)	1.0	0.280** (0.063)	1.2	0.061 (0.045)	0.8
College Sector								
Two-year college	-0.009 (0.006)	8.9%	-0.011 (0.014)	13.7%	-0.008 (0.012)	10.0%	-0.009 (0.007)	4.7%
Four-year college	0.014+ (0.008)	84.3%	0.013 (0.016)	80.5%	0.018 (0.015)	84.3%	0.013 (0.011)	87.1%
Recruiting institution	0.048** (0.010)	29.0%	0.068** (0.016)	16.8%	0.071** (0.021)	43.8%	0.017 (0.016)	28.7%
Core eight recruiting institution	0.051** (0.005)	3.4%	0.055** (0.010)	6.1%	0.084** (0.010)	5.3%	0.024** (0.005)	0.2%
Four-year college: Non-Recruiting	-0.034** (0.011)	55.3%	-0.055** (0.020)	63.7%	-0.053** (0.020)	40.6%	-0.003 (0.017)	58.4%
Out of state college	0.047** (0.010)	33.0%	0.080** (0.018)	28.4%	0.067** (0.018)	22.1%	0.008 (0.017)	43.1%
Flagship	0.023** (0.008)	16.1%	0.030* (0.013)	11.9%	0.013 (0.016)	18.1%	0.024+ (0.014)	18.0%
Private	-0.001 (0.011)	38.9%	0.029 (0.019)	32.0%	-0.050** (0.019)	30.6%	0.012 (0.017)	49.1%
Barrons: Most competitive	-0.001 (0.009)	26.9%	0.019 (0.018)	25.0%	-0.009 (0.013)	11.4%	-0.012 (0.017)	38.0%
Barrons: Highly Competitive Plus	-0.005 (0.009)	19.8%	-0.005 (0.013)	12.2%	-0.019 (0.019)	26.7%	0.005 (0.015)	21.1%
Barrons: Highly Competitive	0.005 (0.009)	18.0%	-0.008 (0.017)	25.0%	0.011 (0.015)	13.2%	0.012 (0.013)	16.0%
All other four-year institutions	0.016+ (0.009)	19.5%	0.007 (0.017)	18.3%	0.036+ (0.020)	33.1%	0.008 (0.012)	12.0%
College Characteristics (IPEDS)								
Mean SAT	-1.959 (3.298)	1218.7	2.576 (6.276)	1211	-5.942 (6.250)	1155	-2.287 (4.921)	1262
Graduation rate	-0.625 (0.421)	72.5	-0.421 (0.720)	74.5	-0.667 (0.928)	62.1	-0.712 (0.592)	77.3
Expenditures per FTE	-631.487 (578.482)	\$28,298	569.510 (856.401)	\$25,880	-3187.384** (1149.605)	\$27,782	90.125 (988.301)	\$30,411
Tuition	-236.277 (325.503)	\$18,140	934.104 (605.105)	\$15,612	-1678.245** (556.891)	\$14,746	-192.834 (521.801)	\$22,003
Percent hispanic	-0.007* (0.003)	15.4%	-0.006 (0.004)	15.3%	-0.010 (0.009)	24.1%	-0.005 (0.004)	9.9%
N	33277		10349		9732		13196	

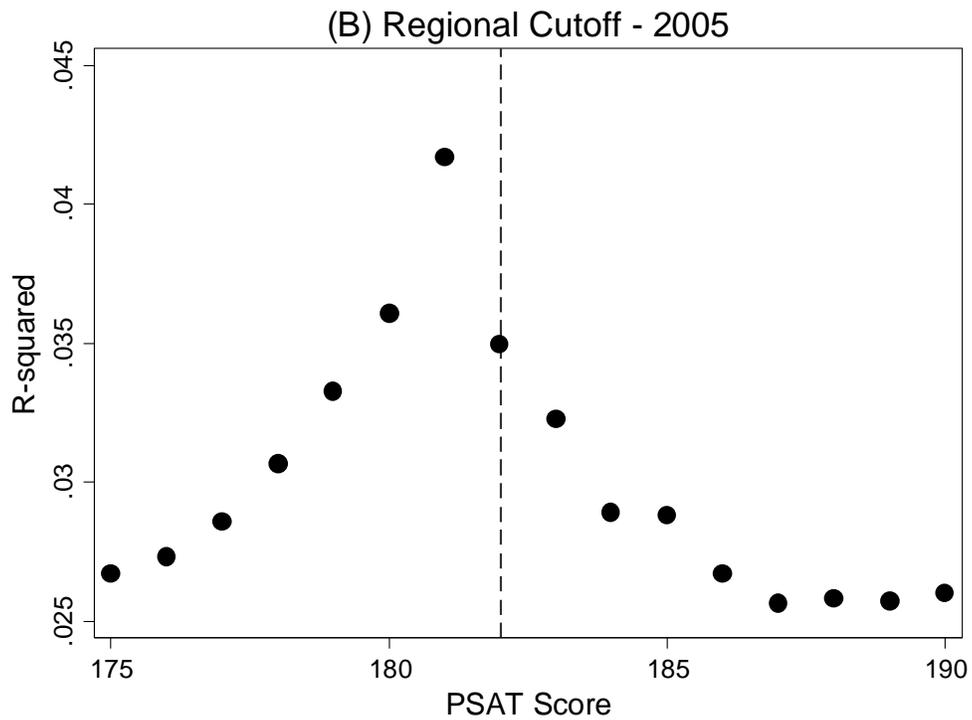
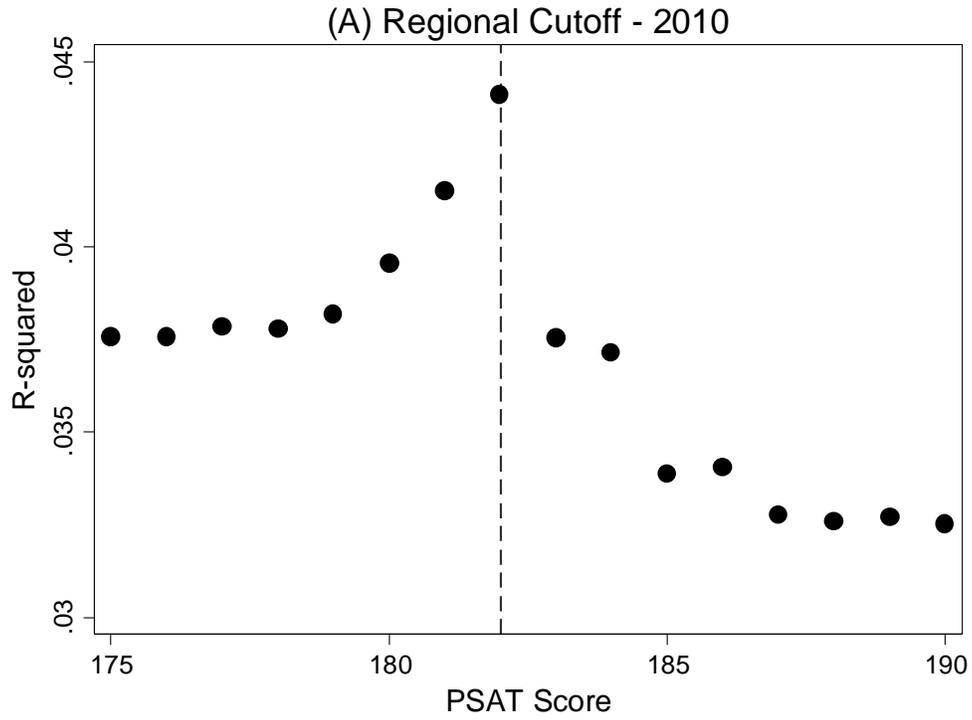
Notes. Results based on linear regressions with rectangular kernels that include state by year fixed effects. Robust standard errors in parentheses (+ p<=0.10, * p<=0.05, ** p<=0.01).

Appendix Table 7. Six-Year Bachelor Degree Completion, Hispanic PSAT Takers, by Region

	ALL REGIONS		WEST		SOUTHWEST		ALL OTHER REGIONS	
	Effect	Control Mean	Effect	Control Mean	Effect	Control Mean	Effect	Control Mean
All Students	0.012 (0.010)	65.9%	0.017 (0.016)	65.7%	-0.009 (0.017)	63.6%	0.038+ (0.020)	69.6%
Recruiting institution	0.037** (0.009)	26.2%	0.046** (0.013)	18.9%	0.040* (0.017)	38.0%	0.015 (0.019)	21.1%
Core recruiting institution	0.040** (0.004)	2.9%	0.033** (0.007)	4.3%	0.065** (0.007)	3.4%	0.011* (0.005)	0.0%
Non-recruiting institution	-0.025** (0.010)	39.7%	-0.029+ (0.016)	46.9%	-0.048** (0.014)	25.6%	0.023 (0.022)	48.5%
Out of state	0.038** (0.009)	21.6%	0.037** (0.013)	20.3%	0.048** (0.013)	15.5%	0.019 (0.021)	32.7%
In state	-0.026* (0.010)	44.3%	-0.020 (0.016)	45.5%	-0.057** (0.017)	48.1%	0.019 (0.021)	37.0%
Degree quality	-2.047 (3.483)	1217	3.093 (5.562)	1229	-0.562 (6.129)	1161	-11.923+ (6.427)	1271
Barrons: Most Competitive	0.003 (0.008)	19.4%	0.020 (0.014)	21.7%	-0.007 (0.010)	8.1%	-0.012 (0.021)	32.3%
Barrons: Highly Competitive Plus	-0.008 (0.008)	16.0%	-0.006 (0.010)	10.4%	-0.015 (0.014)	22.5%	0.002 (0.017)	15.8%
Barrons: Highly Competitive	0.001 (0.007)	13.9%	-0.004 (0.013)	18.5%	-0.008 (0.010)	9.7%	0.028+ (0.015)	12.2%
Barrons: Less Competitive	0.017* (0.007)	13.9%	0.012 (0.011)	11.0%	0.019 (0.013)	20.9%	0.021+ (0.013)	8.3%
N		39340		15900		14889		8551

Notes. Results based on linear regressions with rectangular kernels that include state by year fixed effects . Robust standard errors in parentheses (+ p<=0.10, * p<=0.05, ** p<=0.01).

Appendix Figure 1. R-Squared for NHRP Thresholds



Appendix Figure 2. Distribution of T-Statistics for Individual Colleges

