

Were Minority Students Discouraged From Applying to University of California Campuses After the Affirmative Action Ban?

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Abstract

This paper uses student-level data to investigate how the college application behavior of underrepresented minorities (URMs) changed in response to the 1998 end of affirmative action in admissions at the University of California (UC). We show that all URMs experienced a drop in their probability of admission to at least one UC campus. However, the relative decline in URM SAT score-sending rates – our proxy for application rates – was small and concentrated at Berkeley and UCLA among URMs who experienced the largest relative drop in their predicted probability of admission. In addition, we find some evidence of a shift towards less selective UCs rather than out of the UC system. Overall, our paper highlights the stability of URM application behavior in the face of substantial declines in their admission rates.

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1 Introduction

Affirmative action in college admissions continues to be a central issue in American higher education. Although the debate is often focused on abstract principles (for example, should past inequities be corrected by differential treatment?), several empirical questions are prominent in the discussion. For example, it is often argued that the abolition of racial preferences sends a message of institutional hostility to potential minority students, discouraging applications and further lowering the already depressed college graduation rates of blacks and Hispanics.¹ Indeed, later this year, the Supreme Court will hear *Fisher v. University of Texas* in which the University of Texas is defending the reintroduction of explicit racial preferences partly on the rationale that bans on affirmative action dissuade minority students from applying.²

In this paper, we explore the effect of California’s statewide ban on racial preferences (also known as Prop 209) on the application rates of underrepresented minorities (URMs) to each of the eight campuses enrolling undergraduates that made up University of California system at the time the ban went into effect.³ The simultaneous removal of racial preferences from the different UC campuses (which varied widely in their admissions selectivity and demographics) and the extensive publicity that accompanied this shift provide an excellent setting in which to study the effect of affirmative action bans on the application behavior of minority students. Using administrative data from the University of California on every first-year fall semester applicant to the University of California, we document the effect of the end of racial preferences in admission on URMs’ relative chances

¹ “[UC Regent William] Bagley said [...] that many qualified minority students do not apply to the UC system because of some students’ perception of its ‘anti-affirmative action’ stance” (2000, April 6). Minority admissions rise in U. of California. *The Harvard Crimson*.

²*Fisher v. University of Texas at Austin* (2011): “UT was keenly aware that by sending a message that people of all stripes can succeed at UT, the University would attract promising applicants from once-insulated communities, over time narrowing the credentials gap between minority and non-minority applicants. After Hopwood [Texas’ affirmative action ban], such applicants were dissuaded from applying to UT.”

³Since UC San Francisco enrolls only graduate students and UC Merced did not open until 2005, neither is included in this analysis.

of admission to each campus, and highlight how these changes depended on students' academic credentials. Then, using data from the College Board, we relate these changes in the probability of admission to changes in SAT score-sending behavior (our proxy for application behavior) to schools both inside and outside the UC System.⁴

Like us, Long (2004) examines the effect of affirmative action bans on SAT score-sending behavior and finds that changes in the probability of admission predict changes in score-sending. The paper argues that the affirmative action bans in California and Texas caused URMs to send scores to lower quality colleges and non-URMs to send scores to higher quality colleges. A weakness of Long's work, however, is that he uses data from the National Education Longitudinal Study (NELS) to generate a student's predicted probability of admission to different schools. However, the NELS reports admissions outcomes only for students' top two college choices, which are likely to reflect students' beliefs about their chances of admission. In contrast, we have data on every campus to which applicants to the UC system applied. Thus, we are able to more precisely gauge the change in the likelihood that students with different academic credentials were admitted to the various UC campuses. A second limitation of Long's analysis is that, rather than having data on score-sending to specific institutions, Long's data divide universities into quintiles based on academic quality. In contrast, our data on SAT score-sending contain institution names, allowing us to look at the change in score-sending rates to each UC campus. This turns out to be important because the effects of the ban on affirmative action varied considerably by campus.

Card and Krueger (2005) also investigate the effect of California's ban on the use of racial preferences on the SAT score-sending behavior of URMs.⁵ They find no evidence

⁴Card and Krueger (2005), discussed below, also use SAT score-sending rates as a proxy for application rates. In their paper, they investigate how well score-sending rates predict application rates by comparing the number of score-senders with the number of applicants in race-SAT-campus-year bins. They show that the number of score-senders in a bin is highly correlated with the number of applicants. Since we also have data on race, SAT scores, applications, and score-sending, we were able to conduct our own parallel analysis; our findings are similar, although the correlation decreases as the number of bins increases.

⁵Their study also examines Texas' ban on affirmative action.

that minority students with SAT scores above 1150 or GPA above A reduced the rate at which URMs sent scores to at least one of the three most selective UC schools (Berkeley, UCLA and UC San Diego). One drawback of their analysis, however, is that Card and Krueger did not have access to detailed information on how the end of affirmative action affected URMs' chances of admission. Thus, while their paper provides strong evidence that highly qualified students were not discouraged from applying to the most selective UC campuses after the end of affirmative action, it is able to present only a partial picture of the changes brought about by the end of affirmative action. A major contribution of this paper is to link the relative changes in URMs' predicted probability of admission at each of the eight UC campuses to their changes in score-sending. We also expand upon Card and Krueger by extensively exploring treatment heterogeneity: we show that the applicants whose score-sending to selective UCs dropped the most were the ones with the largest falls in admissions probability.

In addition to Long (2004) and Card and Krueger (2005), several other papers examine the effect of bans on affirmative action in college admission on other aspects of the college admission process. Backes (2012) and Hinrichs (2012) find that the enrollment shares of URMs at selective universities fall in the wake of affirmative action bans, but find little evidence of a change in the URM share of the total college-going population. Long and Tienda (2008) show how the removal of racial preferences in Texas affected URMs' relative admissions probabilities, with a focus on how university admissions offices re-weighted applicant characteristics to favor URMs. Arcidiacono et al. (2011) examine the effect of Prop 209 on the share of URMs enrolled in different types of colleges and URM graduation rates, and find evidence that URM graduation rates (the fraction of enrolled students who graduate) increased at the UC after Prop 209. Finally, Antonovics and Sander (2012) examine the likelihood that URMs enroll in UC schools conditional on being accepted and find evidence that URM enrollment rates increased after the end of affirmative action.

There are several ways in which this analysis adds to the previous literature. First,

we use both admissions and score-sending data to contrast the relative changes in each following an affirmative action ban. Since admissions probabilities play an important role in the application decision, it is natural to motivate changes in score-sending by first tracing out changes in admissions probabilities. Second, we extensively explore treatment heterogeneity across both applicant quality and university selectivity. Each of these turn out to be highly salient and have been largely overlooked by previous studies, which have focused on highly qualified applicants to selective universities.

Our approach yields three important findings. First, we show that all URMs, regardless of their academic credentials, were affected by the ban on affirmative action. Relative to whites, even the most highly qualified URMs experienced a substantial fall in their chances of admission to the most selective UC schools (i.e. Berkeley and UCLA), while less qualified URMs became relatively less likely to gain admission to the least selective UC schools (i.e. UC Santa Cruz and UC Riverside). Second, the relative decline in URM score-sending rates after the end of affirmative action was small and concentrated at Berkeley and UCLA among URMs who experienced the largest relative drop in their predicted probability of admission. Third, for the group of URMs with the largest relative drop in their score-sending rates to Berkeley and UCLA, we find some evidence of a relative increase in the number scores URMs sent to less selective UCs, though the magnitude of this shift appears to have been small. Overall, our paper highlights the stability of URM application behavior in the face of substantial declines in their admission rates.

This paper proceeds as follows. Section 2 discusses institutional background in California and the details of the affirmative action ban. Section 3 presents our theoretical model, and Section 4 our empirical specification. Section 5 discusses our data sets. Section 6 shows results for both admissions rates and score-sending. Finally, Section 7 concludes.

2 Background on the Affirmative Action Ban

The University of California is one of the largest public university systems in the world, and with several campuses that do well in world rankings, it is unique in its combination of quality and scale. In the mid-1990s – the period this paper focuses upon – the UC system matriculated about 24,000 freshmen per year across eight campuses. Since California graduates more than 10 times that many students from high school each year, admission into the UC system has long been quite competitive.

Since at least the 1970s, the University has been concerned about increasing racial diversity on the campuses, but the system's structure made those concerns play out in an unusual way. Under the California Master Plan for Higher Education, which was adopted in the early 1960s and has been only slightly modified since, the University of California is supposed to guarantee admission at some campus to all California high school graduates who are among the top eighth in their statewide cohort (as measured by a combination of grades and test scores). The Cal State system is supposed to provide a similar guarantee to the top third, and community colleges enroll other students who meet basic thresholds of college qualifications. The top eighth rule put a significant constraint, long before the ban on affirmative action, on UC's ability to admit large numbers of black and Hispanic students with low academic credentials. Although the university instituted special admissions to qualify more minorities for the UC-eligible pool, in the years before the affirmative action ban both blacks and Hispanics were underrepresented among UC freshmen – compared to the pool of high school graduates – by half or more. Thus, in 1996 blacks made up just over 4 percent of UC freshmen, while they made up over 8 percent of Stanford's freshmen.

If the University of California as a whole was constrained in admitting URMs even before the ban on affirmative action, the individual campuses were fairly unconstrained in competing for the modest number of URMs who made it into the eligible pool. The ironic result was that around half of all the blacks and Hispanics who matriculated at UC schools

in the mid-1990s entered the two most elite and competitive campuses, Berkeley and UCLA. Blacks, for example, made up about 8 percent of the new freshmen at Berkeley, but only 2 percent of the new freshmen at UC Irvine, a less elite campus.

The first threat to affirmative action in California was in July 1995, when the Board of Regents of the University of California passed a resolution (SP-1) which stipulated that UCs would discontinue considering race in admissions by the beginning of 1997. In November 1996, Proposition 209 (Prop 209), which banned the use of racial preferences in university admissions, was passed by voters. Prop 209 underwent legal challenges until the Supreme Court denied further appeals in November 1997. Thus, the incoming class of 1998 was the first to be admitted under the statewide ban on affirmative action.

It is important to recognize that in an effort to minimize the effects of Prop 209 on minority enrollment, UC campuses increased minority outreach efforts.⁶ However, these efforts were widely viewed as ineffective, at least initially.⁷ Part of the reason for lack of effective programs was that in the immediate aftermath of Prop 209, there were concerns about whether race-specific outreach (as opposed to, for example, targeting low income areas) was permitted after Prop 209. In addition, outreach programs focusing on elementary and middle schools would not have an effect until those students reached college age. To the extent that increased outreach had an effect, our measured effects of Prop 209 will be the net effect of the ban and the change in outreach efforts.

In 2001, the UC implemented Eligibility in a Local Context (ELC), guaranteeing admission to the top four percent of students in each California high school (conditional on completing specified coursework). The new policy was designed to attract students from

⁶For example, “In an attempt to improve minority access to UC without the help of affirmative action, the university’s investment in kindergarten-through-12th-grade outreach has rocketed from about \$60 million in 1995 to \$180 million last year and a planned \$250 million this year” (2000, January 21). UC Regents Urged to Step Up Minority Outreach at Schools. *The San Francisco Chronicle*.

⁷ “[In the last five years] minority admissions have dropped significantly and outreach expenditures have almost quadrupled to nearly \$300 million with minimal results” (2000, June 8). Effects of minority outreach may take time for U. California system. *The Daily Bruin*.

high schools which did not typically send many students to UCs, giving the UC a way to potentially increase URM enrollment. Since this policy implemented a new admissions rule for UC campuses, we do not use any data later than 2000 in an effort to isolate the effects wrought by Prop 209.

3 The Theoretical Effects of the Ban

Conceptually, Prop 209 could have affected application rates to the UC through two primary channels. First, by directly lowering URMs' chances of admission, Prop 209 is likely to have affected the expected benefit of sending applications to UC schools. Second, Prop 209 also may have changed the utility URMs expected to receive from attending a UC schools because of, for example, the change in the racial composition of the student body. Ideally, we would like to be able to use the relative changes in URMs' application rates after Prop 209 to say something about latter channel because, as mentioned earlier, there has been considerable debate about whether bans on affirmative action lessen URMs' interest in attending the schools directly affected by the bans. Our ability to do this, however, is complicated by the fact that it's not clear how changes in admission rates should influence application rates.

In a model in which the likelihood of admission falls at a single school, it is clear that the expected benefit of an application to that school will fall, so that application rates should also fall. In a model where admissions rates fall for an entire *set* of schools, however, Long (2005), shows that the optimal number of applications sent to schools within that set could *increase*. The intuition is that if students place a relatively high value on attending the set of schools at which their admissions chances fall, then they may send more applications to those schools in an effort to avoid being pushed into less attractive alternatives. Thus, we cannot take our finding that URM application rates remained stable after Prop 209 as evidence that Prop 209 did not negatively affect the utility URMs' expected to receive from attending UC schools. Rather, the stability of URM application

rates may partially reflect URMs’ response to the fall in their likelihood of admission to UC schools. This is particularly problematic in our setting since we find that all URMs, regardless of their academic credentials, experienced a relative fall in their probability of admissions to at least several UC schools.

As we show below, Prop 209 generally had a larger effect on admission rates at more selective UC schools than at less selective UC schools (though this pattern varies somewhat depending on URMs’ academic credentials). Thus, Prop 209 may not only have altered the total number of applications sent to UC schools (as Long’s model suggests), but also the rate at which URMs applied to the different UC campuses. In particular, we might expect Prop 209 to shift URMs’ applications away from more selective UCs (where admissions rates fell considerably) and toward less selective UCs (where admission rates were relatively stable). In our empirical analysis, we focus on application rates to individual campuses, but we also examine the total number of applications sent to UC schools.

4 Empirical Specification

We begin by using administrative data from the UC Office of the President (UCOP) to document how the end of affirmative action affected admission rates for URMs relative to other racial groups. We then use data from the College Board to relate these changes in admission rates to changes in SAT score-sending patterns.

Throughout the paper, we employ a simple differences-in-differences (DD) specification, which compares the minority-white gap after the implementation of Prop 209 to the gap before the implementation of Prop 209. For admissions, a basic equation for individual i applying to campus c in year t can be written as:

$$\begin{aligned} \text{Admitted}_{ict} = & \alpha_c + \delta_c X_i + \beta_{0c} \text{URM}_i + \beta_{1c} \text{Ban}_t + \beta_{2c} X_i \text{Ban}_t \\ & + \theta_c \text{URM}_i \text{Ban}_t + \epsilon_{ict} \end{aligned} \tag{1}$$

In this specification, Ban is equal to one for the 1998-2000 cohorts and equal to zero for the 1995-1997 cohorts. For each campus, the regression sample is restricted to those who applied to the campus. The coefficient of interest, θ_c , is intended to capture the effect of the ban on the URM-white admission gap at campus c . The X_i term consists of controls for an applicant’s SAT, GPA, parental income, and parental education. In response to Prop 209, universities may have changed the weight placed on demographic characteristics in the admissions process in an effort to partially undo the fall in URM admission rates (the authors are currently working on a paper further exploring this issue). As a result, we control for the interaction of demographic characteristics and the affirmative action ban.⁸ For SAT score-sending, we use the same specification above, but use Sent_{ict} , a dummy indicating whether individual i sends SAT scores to campus c in year t as the left-hand side variable. Finally, we use robust standard errors in all regressions.

As discussed below, the administrative data we use only allow us to identify the three-year window in which a student applied (1995-1997 vs. 1998-2000). By design, the break in the time periods corresponds to the implementation of Prop 209. Nonetheless, one drawback of our data is that it does not allow us to include time trends in our analysis. On the other hand, the fact that our data are grouped by the three-year period before and the three-year period after the implementation of Prop 209 alleviates concerns about the impact of serial correlation in our outcome variable on our ability to make valid statistical inference.⁹

5 Data

We draw on two datasets for our analysis: a dataset obtained from the University of California Office of the President (UCOP) and a dataset produced by the College Board

⁸In general, results are not sensitive to whether these interaction terms are included. When they are sensitive, we provide regression results with and without the interaction terms.

⁹See Bertrand et al. (2004).

(CB) and provided to us, with the College Board’s permission, by David Card.¹⁰ The two datasets each contain individual-level data on hundreds of thousands of students, cover periods both before and after the implementation of Prop 209 in California, and fill in an important weakness of the other.

5.1 UCOP

Our UCOP data include all applicants who applied for freshman admission to any of the UC’s eight undergraduate campuses from 1995 through 2000.¹¹ The data contain individual-level information on students’ race, adjusted high school GPA, SAT scores, parental income, and parental education. In addition, the data report the campuses to which each student applied, the campuses that accepted the applicant, and the campus at which the student enrolled, if any.¹²

Despite its strengths, the UCOP data has some significant drawbacks, most of which are related to its release as a publicly accessible dataset. In an effort to protect student privacy, UCOP collapsed many important descriptive categories.¹³ Thus, for example, SAT scores and high school grades are reported in categories rather than discrete units and year of application and enrollment is grouped into three-year cohorts (1995-1997 and 1998-2000). As mentioned above, by design, the second-period cohort begins the year the ban on racial preferences was implemented. Race is also collapsed, from 10 categories into four: white, Asian, URM and other/unknown. The URM category includes American Indians, blacks, Chicanos and Latinos; these are the primary groups who received

¹⁰This dataset was used by David Card and Alan Krueger in the 2005 paper we build upon here.

¹¹The eight UC campuses are Berkeley, Los Angeles, San Diego, Santa Barbara, Davis, Irvine, Santa Cruz and Riverside.

¹²Additional information about this rich, publicly available dataset can be found in Antonovics and Sander (2012).

¹³Public institutions releasing individual-level data are generally cautioned to suppress or combine data cells containing fewer than five observations (where cells are represented by combinations of information that can be established from public sources other than the database). UCOP generally combined data cells containing fewer than one hundred observations – a very cautious stance.

preferential treatment based on race before Prop 209. The other/unknown category includes both students who indicate that their race falls outside the categories used by the university, as well as students who choose not to reveal their race (a group that grew substantially after Prop 209 went into effect). In our empirical analysis, we compare admissions rates of URMs with the combined set of white and other/unknown, but our results are not sensitive to the choice of dropping the other/unknown group or including them with whites.¹⁴ In addition, throughout the paper, we use whites rather than Asians as our primary control group because the application patterns of Asians differ substantially from those of both whites and URMs (Asians apply at very high rates to UC schools).

Since our UCOP data contain every applicant to the UC system along with information on the campuses to which they were accepted, we use these data to estimate the change in the admission rate of URMs relative to non-URMs after Prop 209. One potential issue with this approach is that to the extent that the composition of applicants changed in unobservable ways after Prop 209, this could affect our estimates of the change in URMs' relative chances of admission. As we discuss in greater detail below, however, our results suggest that the relative drop in URM application rates was small. In addition, to the extent that Prop 209 led to an increase in the relative quality of URM applicants (along dimensions that are observable to admissions officers but not to us), then this will lead us to understate the true drop in the admission rate of URMs relative to non-URMs. Given the magnitude of our estimates of the decline in applications rates, however, we would expect the size of this bias to be quite small.

5.2 College Board

The College Board data include every California and Texas high school student who took the SAT I as part of the cohorts that graduated from high school between 1995 and 2000,

¹⁴The magnitude of the change in admissions probability for URMs is so large that it shows up no matter how the excluded group is defined.

inclusive.¹⁵ It also includes all blacks and Hispanics who took the SAT elsewhere in the United States as part of the 1995-2000 cohorts, and a 25 percent sample of all other SAT-takers who were part of those cohorts, but were neither black nor Hispanic nor residents of California or Texas. Demographic information comes from a background questionnaire that students fill out when they apply to take the SAT I. Students report their high school grades, their parents' income and education level, their race or ethnicity, their high school coursework and activities, and their academic and career aspirations. The College Board adds to these data information on student performance on SAT I and SAT II exams.

Students tell the College Board to which schools they would like their SAT scores sent, and although the UC has a centralized admission process, if students wish to apply to more than one UC campus, they must send their SAT scores to each of those campuses. During the registration process for the SAT (before students know their scores), students are allowed to send their scores to up to four schools for free. If students elect to send scores to more than four schools or if they choose to send scores after the registration process is over, then there is an additional fee for each score sent (currently, the fee is \$10.50 per score sent). Although the fee to send additional scores is seemingly small, work by Pallais (2009) suggests that students' score-sending behavior is sensitive to small changes in price. Thus, students are likely to focus their score-sending on schools to which they are likely to apply. Indeed, as mentioned above, like Card and Krueger (2005), we find a strong correlation between SAT score-sending rates and application rates for various race-SAT-year bins.¹⁶ Thus, we use the set of schools to which students send their scores as a proxy for student interest in a particular college and whether the student will eventually apply. In our data, the College Board reports up to 30 schools to which students send their SAT scores, though only 10 percent of students send to 10 or more schools. In order to

¹⁵In other words, a student taking the SAT in May 1994 as a high school junior would be part of a cohort that generally finished high school in 1995 and was reported by College Board as part of the 1995 cohort.

¹⁶Results available upon request.

capture the population of students interested in attending college, in our main analysis we restrict our sample to Californians who send their scores to at least one school.

Race information in the College Board data is more detailed than that in the UCOP data, with race being divided into the categories American Indian, Asian, black, Hispanic, white, other, and missing. To maintain consistency with the UCOP data, we condense the race categories into the following three groups: URM, Asian, and white (which, as with in UCOP data, includes the categories other and missing). As mentioned above, we do not group together Asians and whites in our control group because the score-sending patterns of Asians differ substantially from those of whites and URMs.

One advantage of using the College Board sample is that nearly all of the SAT takers are interested in going to college, so they should be the ones most readily affected by the affirmative action ban. On the other hand, a potential problem with using the College Board is that a student's decision about whether to take the SAT could be affected by Prop 209, leading to possible sample selection bias. Indeed, Dickson (2006) finds that removal of affirmative action in Texas led to a decline in the share of minority students taking either the ACT or SAT. If Prop 209 led to a similar drop in the fraction of URMs who took the SAT, then to the extent that these students would have applied to the UC, this could lead us to understate the true drop in the relative score-sending rate of URMs. To address this issue, we examine the trend in the number of SAT takers from California as a fraction of the number of California public high school graduates from 1995-2000 using data from the 1997-2002 *Digest of Education Statistics*.¹⁷ We find no evidence of a trend break for either URMs or non-URMs around the implementation of Prop 209. Indeed, it seems unlikely that students on the margin of taking the SAT would have been affected by a policy change that primarily affected the most selective UC campuses. Finally, Furstenberg (2010) shows that the demographic characteristics of SAT takers are generally uncorrelated with the introduction of the bans in California and Texas. Thus, it seems unlikely that our results

¹⁷Published by the National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC. Available at <http://nces.ed.gov/programs/digest/>; Accessed: 05/18/2012

are affected by a change in the composition of SAT takers brought about by Prop 209.

5.2.1 College Board Data and the Timing of Prop 209

Defining the pre and post periods in the UCOP data is straightforward, since by construction there are only two time periods which fall on either side of the change in the admissions regime. Defining the pre and post period in the College Board data, however, is more complicated since the timing of when students took the SAT and sent out their SAT scores will affect whether their observed score-sending choices should best be thought of as occurring before or after the end of the use of racial preferences. Table 1 shows a timeline of important events in the passage of Prop 209. Because Prop 209 began receiving media attention in the summer of 1996 and then was passed by voters in November 1996, it is difficult to know whether students in the 1997 cohort, who likely took the SAT between Spring 1996 and Fall 1996, should be counted in the pre or post Prop 209 period.¹⁸ Thus, we drop all observations from the 1997 cohort.¹⁹ Whether or not 1997 is included does not change our main conclusions – most of the effects on score-sending are concentrated in 1999 and 2000 – but including the 1997 cohort muddies the interpretation of our estimates. We include the 1998 cohort with the treatment (post-Prop 209) group since their SAT score-sending decisions were likely to have been made after passage of Prop 209, and while most students in the 1998 cohort are likely to have taken the SAT (and made their score-sending decisions) during the period in which Prop 209 was still being challenged in court, a sampling of news articles from this time suggests that it was believed Prop 209 would eventually be upheld.²⁰

¹⁸Searching the LexisNexis article database gives the first mention of Prop 209 in July (1996, July 22). UC Regent Blasts Special Graduations: Connerly questions ceremonies sponsored by some ethnic groups. *The San Francisco Chronicle*.

¹⁹A portion of the 1996 cohort made score-sending decisions after the passage of SP-1. Our main results are similar when dropping the 1996 cohort, although dropping 1996 leaves 1995 as the only pre-policy change year.

²⁰When dropping 1998, score-sending effect sizes generally become larger. We add further discussion below.

6 Results

We first document changes in admissions probability for URMs relative to whites, and then show how score-sending patterns changed after Prop 209.

6.1 Changes in the Probability of Admission (UCOP Data)

Summary statistics for UC applicants are shown in Table 2. Relative to whites, minority applicants tend to have lower SAT scores, lower GPAs, and are more likely to come from disadvantaged backgrounds. Our UCOP data do not provide continuous measures of parental income and education; for example, the given income measure is a set of 10 income intervals. Rather than showing the percentage of our sample falling into each of the 10 intervals of parental income, we collapse these intervals into the three categories shown in Table 2. For education, we use a dummy variable for whether an applicant has a college-educated parent.²¹ The definitions of these categories have little impact on the predicted effects of Prop 209.

To better understand the predictors of admission to UC campuses, Table 3 shows basic difference-in-difference regression coefficients for each campus and the UC system as a whole. Going from left to right, the campuses are ordered from most selective – defined by the average math SAT score of incoming freshman – to least selective. Relative to whites, URMs were significantly less likely to gain admission to the top schools after Prop 209. At Berkeley and UCLA, the likelihood of admission fell by 30 and 25 percentage points, respectively, for URMs compared to whites. Given that about 50 percent of URM applicants were accepted to Berkeley and UCLA before Prop 209 (authors’ calculation), these declines are substantial. Relative to Berkeley and UCLA, there is a somewhat smaller fall in the relative admission rates of URMs at UCSD and UC Davis. Then, at the the remaining four campuses, the effect of Prop 209 on URMs’ relative probability of admission is smaller still. Thus, the relative fall in URMs’ chances of admission was the

²¹Categorizing education in this way is natural since many schools give an admissions preference to first-generation college students.

largest at the most selective UC schools.

Interestingly, at the top six campuses, the coefficient on Ban*URM is significantly smaller in magnitude than the coefficient on URM, suggesting that even though Prop 209 significantly reduced the admissions advantage enjoyed by minority applicants, it did not eliminate it entirely. Of course, this continued admissions advantage may have been indirect. For example, the campuses may have given admissions advantages to students with characteristics that are correlated with race but that are not available in our data (such as whether the student is from a single-parent family). Indeed, although not shown in Table 3, we find that parental income and parental education are negatively correlated with the likelihood of admission, suggesting that admissions preferences are given to students from disadvantaged backgrounds. Finally, the coefficient on URM tends to be the largest at the most selective schools, suggesting that before Prop 209 the extent of racial preferences was the highest at the most selective UC schools.

While having higher test scores and a higher GPA is positively related to the likelihood of admission (coefficients not displayed but available from authors), the relationship between the change in URMs' relative likelihood of admission after Prop 209 is likely to be non-monotonically related to their academic credentials. Students with sufficiently high or low academic credentials would have been unaffected by the end of racial preferences if they would have been accepted (high credentials) or rejected (low credentials) under either regime.

To better understand which students bore the brunt of the change in admissions regime, we use their index score, which is a weighted average of high school GPA (40 percent) and SAT scores (30 percent each for math and verbal). The index score variable was created for us by the UC Office of the President, where the weights were determined by regressing students' first-year UC GPA on high school GPA and SAT scores. Thus, by construction, the index score is designed to predict students' performance in college. From our standpoint, a primary reason for using the index score is that it provides a nice summary of students' academic credentials (as measured by high school GPA and SAT test

scores). In addition, the index is calculated from students' *actual* high school GPA and *actual* SAT scores (rather than the discretized versions of those variables available in the rest of the data). Thus, it is the only continuous measure of academic credentials available to us.

To characterize the effect of Prop 209 at various points of the academic credential distribution, we divide URM applicants to the UC into percentiles based on their index score. We then categorize non-URMs into corresponding bins based on their index scores. Thus, for example, we can compare URM applicants at a given index score percentile with non-URM applicants whose index score falls in a similar range. For a summary of average SAT and GPA within each percentile, see Figure 1a. Note that since whites tend to have higher GPA and SAT scores, there are relatively more whites at the higher end of the URM distribution. Figure 1b shows the share of white applicants who fall into each decile of the URM distribution; about 30% of white applicants have index scores that would place them in the top decile of the minority distribution.

An overview of how Prop 209 affected the admissions rates of applicants at various points of the credential distribution is shown in Figure 2a, which plots average admissions rates to Berkeley (conditional on applying) for URMs and non-URMs at each index percentile. Prior to Prop 209, URMs at nearly every point of the credential distribution were more likely than whites to gain admission to Berkeley, and this advantage was the largest for applicants in the middle of the distribution. After Prop 209, much of the gap in admission rates between URMs and whites was closed, although conditional on index, URMs remained more likely to be admitted.

To get a sense of how Prop 209 affected URMs' relative chances of admission at different points of the credential distribution, Figure 3 plots the coefficient on $\text{Ban} \times \text{URM}$ (using the same basic specification outlined in Equation 4) at each percentile of the URM credential distribution for each of the eight UC campuses. The figure is generated using a three-step process. First, coefficient estimates are obtained for each percentile of the index distribution. Second, the set of point estimates is smoothed using local polynomial

smoothing. Finally, standard errors are obtained using a bootstrap method. The resulting plot shows the change in admissions probability for URM students relative to whites at different percentiles of the academic credential distribution.

Figure 3 indicates that even for students at the top of the URM credential distribution, there was a large and statistically significant drop in URM students' relative chances of admission to Berkeley, though at both Berkeley and UCLA the largest relative drop in URM students' chances of admission occurred for those in the middle of the URM credential distribution. At UC San Diego and UC Davis, the largest relative drop in URM students' likelihood of admission occurred for students in the 30th-60th percentiles of the URM credential distribution. At UC San Diego, for example, students at the 60th percentile of the URM credential distribution saw their predicted probability of admission fall by close to 50 percentage points (relative to a pre Prop 209 admission probability of about 60 percent). At the bottom four campuses, URM students in the lowest deciles experienced a significant relative drop in their chances of admission. At UC Santa Cruz, for example, URM students in the bottom 10 percent of the credential distribution experienced a 20 percentage point drop in their probability of admission relative to similarly qualified whites. Thus, due to the wide range of selectivity of the various UC campuses, all URM students, regardless of their academic credentials, were affected in some way by Prop 209. URM students at the top of the credential distribution saw their relative chances of admission fall at the most selective UCs, while those at the bottom of the credential distribution saw their relative chances of admission fall at the least selective UCs. In addition, the fact that different groups of students were affected differently at each campus suggests that URM students may have responded to Prop 209 by shifting applications away from some schools and towards others. The next section investigates these changes in score-sending patterns.

6.2 Changes in SAT Score-Sending (College Board Data)

We now turn to the effect of the ban on affirmative action on the SAT score-sending behavior of URM students using data from the College Board. As with the UCOP data, we begin

by reviewing summary statistics, showing predictors of score-sending, and finally breaking students into credential groups.

Summary statistics by race and time period are shown in Table 4 and show similar patterns as the UCOP data. The main difference is that in the College Board dataset, we are able to differentiate between race, so we show blacks and Hispanics separately.

Table 4 helps explain why we do not group Asians with whites as part of our control group; their overall score-sending rates are much higher than those of other groups. In addition, in the 1990s, there was a general increase in Asian interest in UC campuses which began before Prop 209 and continued afterwards (the starkest example is at UC Irvine). Plotting score-sending rates shows a steady upward climb in the Asian score-sending rate, rather than a break from trend around the time of Prop 209, and this pattern holds after controlling for student-level characteristics.²² As a result, we drop Asians from the remainder of our score-sending analysis. When Asians are added to the excluded category, there is little change in the estimates for the most selective schools, where Asian score-sending rates were relatively stable. However, at schools such as Irvine, where Asian score-sending increased dramatically, URM score-sending estimates become smaller.

Since students can send their SAT scores to up to four schools for free, one possible explanation for the stability of URM score-sending rates after Prop 209 is that most students send scores to exactly four schools. Of course, even if this is true, students can still change the set of schools to which they send scores, and our data allow us to capture this. In addition, as Table 4 shows, approximately 50 percent of SAT takers sent their SAT scores to more than four schools both before and after Prop 209.

Table 5 shows the estimation results of our basic difference-in-difference specification. We see that after the ban on affirmative action, blacks and Hispanics experienced the largest relative declines in score-sending rates at the most selective UC campuses, and the

²²As a formal check, we run a ‘placebo’ test, comparing score-sending in 1995 to those in 1996, both pre policy change years. Non-significant coefficients would be evidence of similar trends before the passage of Prop 209. While coefficients for URMs are generally not significant, many campuses have significant coefficients for Asians, further evidence of pre-existing differential trends between Asians and whites. Results available from authors.

relative declines in score-sending rates were generally smaller at the other UC campuses. At UC Riverside the score-sending rates of blacks and Hispanics actually increased by about 1.5 percentage points relative to whites. This increase likely reflects the fact that URM students responded to the end of racial preferences by shifting their applications towards the less selective UCs. We discuss this phenomenon in greater detail below.

6.3 Magnitude of Findings

The declines in score-sending rates for blacks and Hispanics reported in Table 5 are small relative to the drop in their admissions rates reported in Table 3. At Berkeley, for example, the admission rate of URM students fell by 30 percentage points relative to whites, while the relative score-sending rate fell by only 2 percentage points for blacks and 1 percentage point for Hispanics. When grouping blacks and Hispanics together to form one URM category, the estimated drop in score-sending is 1.3 percentage points (author's calculation). Of course, this may just reflect a small elasticity of score-sending rates with respect to admission rates, but the relationship between score-sending rates and admissions rates in the cross section does not support this. For example, a 30 percentage point fall in URM students' chances of admission to UC Berkeley is roughly equivalent to moving from the 60th to the 20th percentile of the URM index score distribution prior to Prop 209 (see Figure 2a). Given that the gap in URM score-sending rates between these two percentiles is about 15 percentage points (see Figure 2b), the 1.3 percentage point fall in the score-sending rates of URM students relative to whites at Berkeley after Prop 209 is comparatively small.

Interestingly, the relative decline in score-sending rates to Berkeley and UCLA is also small relative to URM students' initial higher tendency to send their SAT scores to those schools. For example, Row 1 of Table 5 suggests that prior to Prop 209, the black score-sending rate to Berkeley was 17 percentage points higher than that of whites (conditional on observables), and after Prop 209 this gap fell by only 2 percentage points, suggesting that Prop 209 only closed 11 percent of the gap in score-sending rates. In contrast, Prop 209 greatly reduced the gap in admissions rates. Table 3 shows that, prior to Prop 209, URM

were 42 percentage points more likely to be admitted to Berkeley than were whites with similar observable characteristics. After Prop 209 this gap fell by 30 percentage points, suggesting Prop 209 closed almost 71 percent of the gap in admissions rates.

Another way to gauge the size of the effect of Prop 209 on score-sending rates is to assume that the change in URMs' score-sending rate equals the change in their application rate and then determine the annual fall in the number of URMs who would have been admitted due to this change in application behavior. A rough estimate of the yearly change in the number of students admitted to Berkeley due to changes in application behavior is given by:

$$\begin{aligned}\Delta\text{Admitted URMs} &= \Delta\text{URM Application Rate} * \text{Number of URM Applicants} \\ & * \text{URM Admission Rate} \\ &= -.013 * 4604 * 0.24 \\ &= -14\end{aligned}$$

In the above calculation, all of the values are taken at their post Prop 209 levels. It is important to recognize that this calculation is likely to overstate the fall in the number of URMs who were admitted into Berkeley because, as we discuss below, the fall in score-sending rates after Prop 209 occurred primarily for those who experienced the largest drop in their probability of admission, suggesting that the post Prop 209 admission rate for this group is likely to be lower than the average post Prop 209 admission rate for URMs who actually applied.

Nonetheless, we can compare the above number to the yearly fall in the number of admitted URMs due to the fall in the admission rate after Prop 209:

$$\begin{aligned}\Delta\text{Admitted URMs} &= \Delta\text{URM admission rate} * \text{Number of URM applicants} \\ &= -.30 * 4604 \\ &= -1382\end{aligned}$$

To obtain the change in eventual enrollment, we then multiply the numbers obtained above by the enrollment rate (the fraction of admitted students who eventually enroll), which was approximately 0.41 for URMs in the post period. Doing so implies that 6 fewer URMs went to Berkeley because of changes in application behavior and 567 fewer URMs went to Berkeley because of changes in the admissions rate. These estimates ignore potential selection effects (for example, those who were no longer admitted may have been more likely to enroll, conditional on acceptance), but regardless of how the calculation is performed, it appears that Prop 209’s effect on URM enrollment came largely through admissions probabilities rather than application rates.

6.4 Effects Over Time

The coefficients shown in Table 5 represent the average change in score-sending rates for URMs relative to whites over all three post-policy-change years. It is possible, however, that the effects vary over time. Thus, in Table 6, we show the relative change in score-sending rates for each year in the post-policy-change period. The coefficients represent the change in score-sending rates for URMs relative to whites between the pre-policy-change period and each year in the post-policy-change period. For both blacks and Hispanics, there is evidence that the relative fall in score-sending rates after Prop 209 was concentrated in 1999 and 2000. For example, relative to whites, blacks did not send significantly fewer scores to Berkeley in 1998 compared to the pre-policy-change period, but their relative score-sending rate was 2.3 percentage points lower in 1999 and 2.9 percentage points lower in 2000. Similarly, the relative decline in Hispanic score-sending-rates to Berkeley was the largest in 1999, though the difference between 1998 and 2000 is not statistically significant.

Unfortunately, we are unable to identify the mechanism behind this trend. One possibility is that it took time for potential applicants to learn about the effect of Prop 209 on admission rates. Alternatively, to the extent that potential applicants care about their own-race enrollment shares, it would have taken time for the full-effects of Prop 209 on

URM enrollment shares to play out since Prop 209 only affected newly admitted students. Regardless of the explanation, however, the effects in later years are still extremely small relative to the changes in admissions probabilities. In Section 6.3's rough calculations of the change in the number of admitted students, even a doubling of the score-sending effect would result in very few URMs displaced from Berkeley due to application decisions.

6.5 Effects by Academic Credentials

To get a sense of how Prop 209 affected the average score-sending rate of students with different levels of academic preparation, Figure 2b shows the average score-sending rate to Berkeley for URMs and whites both and after Prop 209 by index score percentile. As with admissions probabilities (see Figure 2a), there was a large gap in score-sending rates between URMs and whites before Prop 209, and this gap narrowed after Prop 209, especially for students in the middle of the index score distribution (though again we see that the narrowing is much smaller for score-sending rates than admissions rates).

To more fully explore the heterogeneity in the response of application behavior across the range of student quality, we repeat our score-sending analysis for the index percentiles used in Figure 3. Since the response of blacks and Hispanics shown in Table 5 is similar, we combine them into one URM group. This simplifies our results and has the added benefit of easing comparison with our estimates of the changes in admission rates obtained from the UCOP data where blacks and Hispanics could not be separately identified. In general, the effects of Prop 209 are similar for blacks and Hispanics, but any changes that did occur were more pronounced for blacks.

Figure 4 plots the coefficient on Ban*URM (using the basic specification outlined in Equation 4) at each percentile of the URM index distribution for each of the eight UC campuses. Consistent with the findings in Table 5, Figure 4 suggests that Prop 209 may have led URMs to shift their applications away from the most selective UC schools (like Berkeley) towards the less selective UC schools (like Riverside). In addition, at Berkeley and UCLA (the only two schools at which we find a statistically significant drop in URMs'

relative score-sending rates for a large part of the credential distribution), the fall in score-sending rates is the largest for URMs who experienced the largest relative drop in admission rates – those in the middle of the credential distribution. Nonetheless, even for this group, the fall in score-sending rates is small, never exceeding 3 percentage points. Overall, Figure 4 suggests that Prop 209 had the largest impact on URMs who experienced the largest drop in their chances of admission to UCLA and Berkeley.

We next investigate further the nature of the changes in score-sending patterns by academic credentials. To simplify our analysis, we combine students into three groups: students in the top 40 percent of the URM credential distribution, those in the middle 40 percent (where the relative decline in URMs' score-sending rates to Berkeley and UCLA was concentrated), and those the bottom 20 percent.

The top panel of Table 7 shows how the average number of SAT scores sent to Berkeley and UCLA changed for URMs relative to whites after the ban on affirmative action. Since some of the results are sensitive to whether we control for Ban*Demographics, we display the results both ways. For the middle 40 percent of the academic credential distribution, we find a statistically significant drop in the number of scores sent to Berkeley and UCLA, though the size of the point estimate is extremely small and suggests that URMs reduced the number of scores sent to Berkeley and UCLA by at most 0.05, relative to a mean of 0.39 scores sent. We also find evidence of a small relative drop in the number of scores sent to Berkeley and UCLA for URMs in the bottom 20 percent of the academic credential distribution, but we find no relative change in the number of scores for those in the top 40 percent.

In Panel 2, we find some evidence that the relative fall in the number of scores sent to Berkeley and UCLA by URMs in the middle of the credential distribution was offset by a relative increase in the number of scores sent to the other UC campuses, though this increase only statistically different from zero when we do not control for Ban*Demographics.²³ For URMs in the top 40 percent and bottom 20 percent of the

²³As discussed below, when using actual application data, we find a relative increase in

credential distribution, we find no relative change in the number of scores sent to other UCs.

A direct implication of the fact that students sent fewer scores to Berkeley and UCLA and no fewer scores to other UCs is that the average quality of the set of UC schools to which URMs sent their scores must have declined. To examine this, the bottom panel of Table 7 uses the average SAT score of incoming freshmen at the schools to which students sent their SAT scores as the outcome variable (for example, 1344 at Berkeley and 1111 at Riverside). This allows us to gauge the extent to which there was a fall in the average quality of the schools to which URMs sent their SAT scores after the end of affirmative action. Not surprisingly, we find that there was a relative decline in the average SAT score of the schools to which URMs applied after Prop 209, and this relative drop was the largest in the middle credential group, though the magnitude is still extremely small; for students in the middle 40 percent of the academic credential distribution, the average combined math and verbal SAT scores at the UC schools to which URMs sent their scores fell by only 5 points relative to whites after Prop 209.²⁴

We test whether the basic patterns revealed in Table 7 by our score sending data from the College Board – that URMs in the middle of the credential distribution shifted applications away from the top tier towards the remaining UCs – also appear in our application data from the UCOP. This helps reassure us that changes in application behavior are reflected in score-sending patterns. Note, however, that while Table 6 focusses on Californians who sent their SAT scores to at least one school, our analysis of the UCOP data focusses on Californians who applied to at least one UC school (because those are the only individuals in the UCOP data). Results are shown in Table 8. Unlike Table 7, results

the number of applications URMs sent to other UCs regardless of specification.

²⁴Another avenue by which students gain entrance into UCs is by initially attending another college and then transferring; this would not be captured by our score-sending data. StatFinder releases data on the number of transfer students by year and race (available at statfinder.ucop.edu). A visual inspection of a plot of transfer students by race over time reveals no obvious trend break after Prop 209, with the possible exception of an increase for whites at UCLA.

are not sensitive to including Ban*Demographic interactions, so we only display our results with these interaction terms included. While the magnitude of the findings is somewhat larger for our UCOP data than our College Board data, the basic patterns hold: relative to similarly qualified whites, URMs in the middle of the credential distribution had a small but statistically significant drop in the number of applications sent to Berkeley and UCLA, and a statistically significant increase in the number of applications sent to the remaining UCs.²⁵ Consistent with the College Board data, the UCOP data also show that the most highly qualified URM applicants did not send fewer applications (relative to whites) to Berkeley and UCLA after Prop 209. Like the College Board data, Table 8 also shows a small drop (less than 7 points) in the average combined SAT score at the schools to which URMs applied. Unlike the College Board data, however, the UCOP data show that for the most highly qualified applicants, there was a marginally significant, small relative increase in the number of applications URMs sent to the remaining UCs and in the number of applications URMs sent to UC schools in general.

Nonetheless, on balance, the changes in application patterns in the UCOP data tell a similar story to the changes in score-sending patterns in the College Board data. That is, it appears that URMs, especially those in the middle of the index score distribution where the relative drop in URMs' probability of admission to Berkeley and UCLA was the largest, shifted their applications toward less selective UC schools, though the magnitude of this shift is extremely small.

6.6 Other Schools

This section explores whether there were changes in score-sending patterns to the most popular UC alternatives.

²⁵The results of Table 7 remain relatively stable when restricting the sample to UC score-senders. Thus, it is likely that the difference between Tables 7 and 8 is due to differences between the application and score-sending data, rather than sample selection.

6.6.1 Number of Scores to non-UCs

To assess whether URMs changed their score-sending patterns to schools outside the UC, we count the total number of scores sent to non-UC campuses.²⁶ Results for the total number of scores sent outside the UC system are shown in Panel 1 of Table 9. For these regressions, we show blacks and Hispanics separately since their results are quite different. Blacks in all credential groups and Hispanics in the bottom group increased the number of scores sent outside the UC system. To further investigate, Figure 5 plots the residuals from a regression of score sending on student background characteristics (excluding race) and their interactions with the Ban dummy. For blacks in the bottom two groups and Hispanics in the bottom group, it appears that the results in Panel 1 of Table 9 are driven by an upward trend in scores sent that pre-dated Prop 209.²⁷ Thus, it is unclear what to make of these results.

6.6.2 Less Selective non-UCs

We also examine the number of scores sent to the 23 campuses in the California State University (CSU) system, since these schools form the overwhelming majority of non-UC schools to which low-credential URMs (those in the bottom 20 percent of the academic credential distribution) sent SAT scores. It is worth noting that the CSU system was also affected by the statewide ban on affirmative action. Interestingly, however, at the time the ban went into effect (1998) virtually none of the CSU campuses were selective; 21 out of the 23 were able to admit every student above a given threshold of academic credentials. Of the two schools that did have selective admissions, Cal Poly San Luis Obispo and Sonoma State, the only discernible break in enrollment numbers for URMs occurred at Cal Poly San Luis Obispo, suggesting that the ban on affirmative action had very little *de facto*

²⁶We exclude score-sending to scholarship organizations.

²⁷While it would be possible to add race-specific time trends to these regressions, the limited number of years causes standard errors to be quite large.

effect on the CSU system.²⁸ For the CSU system, Table 9 reports that there is no statistically significant relative change in the number of scores sent by URMs to schools in the CSU system, except for an increase for URMs in the bottom 20 percent of the credential distribution.

6.7 Score-sending Relative to the Rest of the Country

Thus far, our analysis has focussed on describing the effects of Prop 209 on URMs relative to whites in California. However, some of the effects of Prop 209 – such as lower levels of diversity – could readily affect both URMs and non-URMs. To the extent that whites cannot be considered a valid control group, our estimates simply capture the change in the racial gap in admissions rates and score-sending rates. In this case, we can strengthen our analysis of score-sending rates by using data from the College Board on score-sending patterns in other states to control for nationwide trends in the racial gap in score-sending rates. Unfortunately, we cannot make a similar adjustment to our analysis of admission rates since we lack information on admissions rates outside the UC.

In order to conduct as valid a comparison as possible, we focus on score-sending rates to Berkeley compared to score-sending rates to other flagship public universities that also have an enrollment of at least 2500, average SAT math scores of at least 700, and a URM enrollment share of at least 10 percent. These restrictions yield a comparison group consisting of the top public universities in Illinois, Maryland, Michigan, North Carolina, and Virginia. We then estimate score-sending DDD regressions for SAT-takers who reside in one of these states and who send their SAT scores to at least one school.

Results are shown in Table 10. The coefficients on $\text{Black}^*\text{Ban}^*\text{CA}$ and $\text{Hispanic}^*\text{Ban}^*\text{CA}$ capture the change after Prop 209 in the racial gap in score-sending rates to Berkeley relative to the change in the gap at the other flagship universities in our sample. For Hispanics, we find no statistically significant change in the racial gap in

²⁸The CSU system has become much more selective over time, so the ban on affirmative action is likely to bite at many schools in the CSU system now.

score-sending rates to Berkeley relative to the change in the gap at the other flagship universities in our sample after Prop 209. On the other hand, the coefficient on Black*Ban*CA suggests that the relative score-sending rate of blacks fell by approximately 6 percentage points at Berkeley compared to the other flagship universities in our sample. Note that this is three times larger than the 2 percentage point relative drop implied by Table 5. As the coefficient on Black*Ban in Table 10 suggests, this finding is driven by a relative increase in black score-sending rates to the other flagship universities in our sample after Prop 209. Since this increase was not present in California, the relative drop in black score-sending rates shown in Table 10 is larger than the DD coefficient in Table 5.

In terms of the imputed change in enrollment calculated in Section 6.3, even if one were to use the DDD results to calculate the fall in URM enrollment, the magnitude of the change still would be extremely small. A tripling of the estimated change in score-sending would lead to an estimated 42 URMs being displaced from Berkeley's admitted student pool per year, rather than 14. Compared to the estimated fall of nearly 1,400 URM admits per year due to the drop in admissions probability, it appears that changes in score-sending patterns explain a very small portion of the fall in URM enrollment after Prop 209 – the importance of score-sending changes remains at least an order of magnitude less important than admissions rate changes. However, it appears that blacks' relative score-sending rates to Berkeley failed to keep pace with blacks' relative score-sending rates to similar flagship universities in other parts of the country.

7 Conclusion

Our analysis of admission rates and SAT score-sending patterns reveals a number of interesting findings. First, all URMs, regardless of their academic credentials, experienced a substantial relative drop in their chances of admission to at least one UC school. Second, the relative decline in URM score-sending rates after the end of affirmative action was concentrated at Berkeley and UCLA among students who experienced the largest drops in

their predicted probability of admission to those schools, but the fall in score-sending rates for these students was still small relative to the drop in their predicted probability of admission. Third, for the group of students for whom URMs' relative score-sending rates to Berkeley and UCLA fell the most, we find some evidence that, relative to whites, URMs increased the number of scores they sent to less selective UCs. This had the effect of lowering the average quality of the set of UC schools to which URMs sent their SAT scores (relative to non-URMs), though the magnitude of this drop was extremely small.

An important issue in the debate surrounding Prop 209 (and bans on affirmative action more generally) is whether the end of affirmative action lowered the value URMs placed on attending UC schools. For example, URMs may have become less interested in applying to UC schools after the ban because they feared they would have fewer same-race peers if they were admitted. Unfortunately, our results do not allow us to make definitive conclusions about this kind of "chilling effect" because all URMs experienced a fall in their probability of admission to at least one UC school, and in theory this fall could have either increased or decreased URMs' incentives to apply to UC schools (even holding constant the value they placed on attending UC schools). Thus, URM application rates to the UC could have remained high even if the value URMs placed on attending the UC fell after Prop 209. Nonetheless, regardless of the mechanism, our paper highlights the stability of URM application behavior in the face of substantial declines in their admission rates.

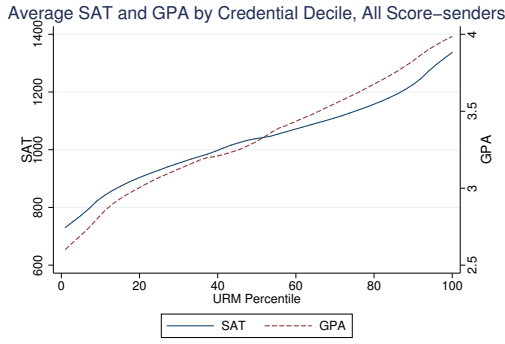
In terms of evaluating why the total enrollment numbers of URMs fell dramatically at schools like Berkeley and UCLA after the end of racial preferences, the results of this paper suggest that this fall was brought about by the direct effect of the drop in URMs' chances of admission and not because URMs were discouraged from applying. Conditional on observables, URMs were more likely than whites to apply to UC schools both before and after the ban on affirmative action.

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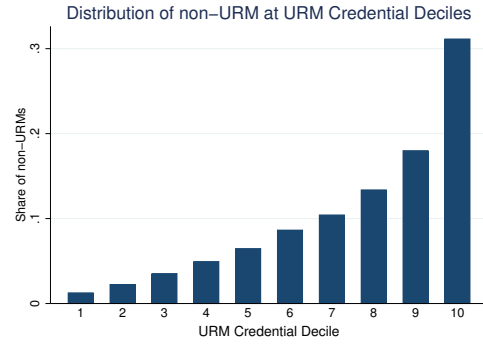
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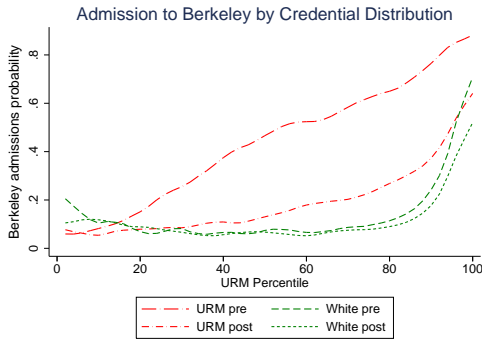


(a) Description of Deciles

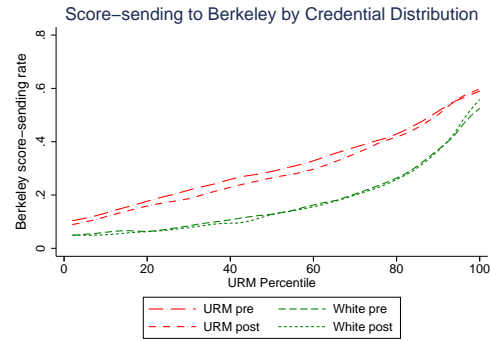


(b) Relative Distributions of URMs and non-URMs

Figure 1: Index generated by weighted average of SAT (30% each for verbal and math) and GPA (40%). URM Percentile axis consists of percentile of distribution of URM UC applicants.



(a) Average Admissions to Berkeley



(b) Average Score-sending to Berkeley

Figure 2: Index generated by weighted average of SAT (30% each for verbal and math) and GPA (40%). URM Percentile axis consists of percentile of distribution of URM UC applicants.

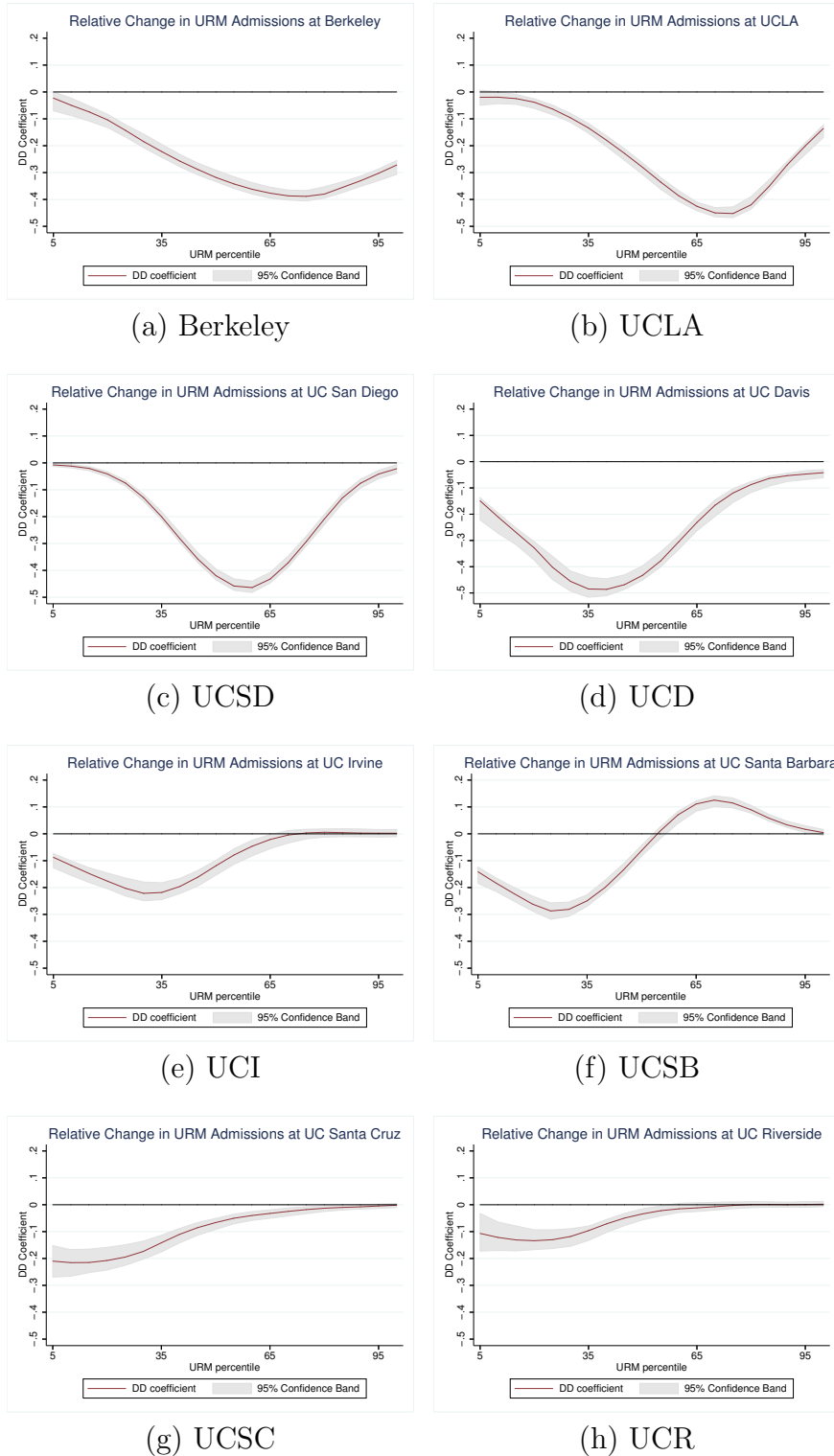


Figure 3: The dependent variable is a binary indicator of whether the student was accepted to a given school conditional on applying to that school. Each point shows OLS coefficient estimate on the interaction between post Prop 209 and URM for a decile of the academic credential distribution of URM UC applicants. Each estimate also includes controls for SAT math and verbal scores, high school GPA, parental income and education, and their interactions with the Ban dummy. The excluded race category includes white and other/unknown. Sample includes 1995-1997 (pre Prop 209) and 1998-2000 (post Prop 209). Plots smoothed with local polynomial regressions; bootstrapped standard errors displayed.

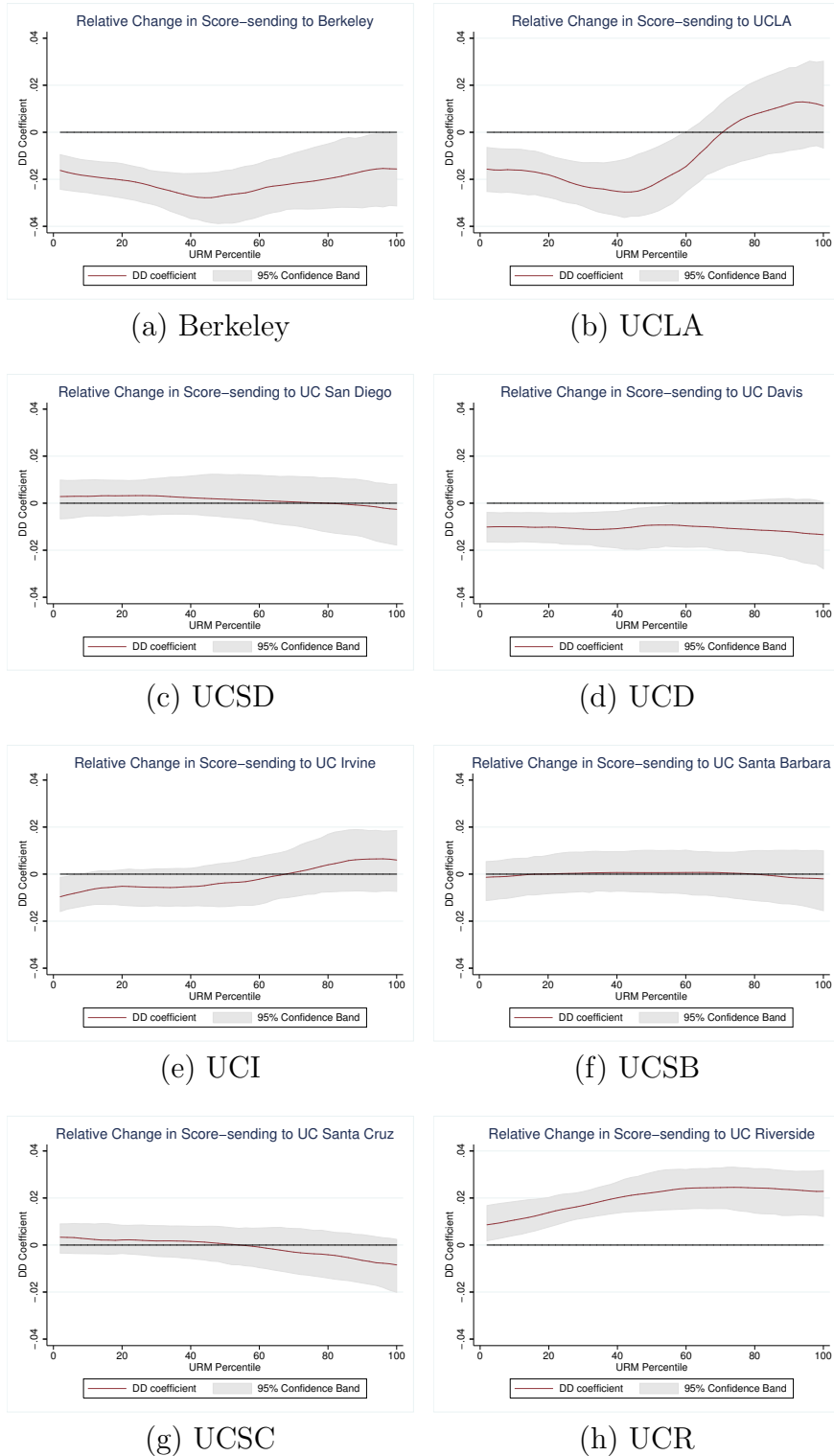


Figure 4: The dependent variable is a binary indicator of whether the student sent their SAT scores to a given school. Each point shows OLS coefficient estimate on the interaction between post Prop 209 and URM for a percentile of the academic credential distribution of URM UC applicants. Each estimate also includes controls for SAT math and verbal scores, high school GPA, parental income and education, and their interactions with the Ban dummy. The excluded race category includes white and other/unknown. Sample includes 1995-1996 (pre Prop 209) and 1998-2000 (post Prop 209). Plots smoothed with local polynomial regressions; bootstrapped standard errors displayed.

Score-sending Residuals

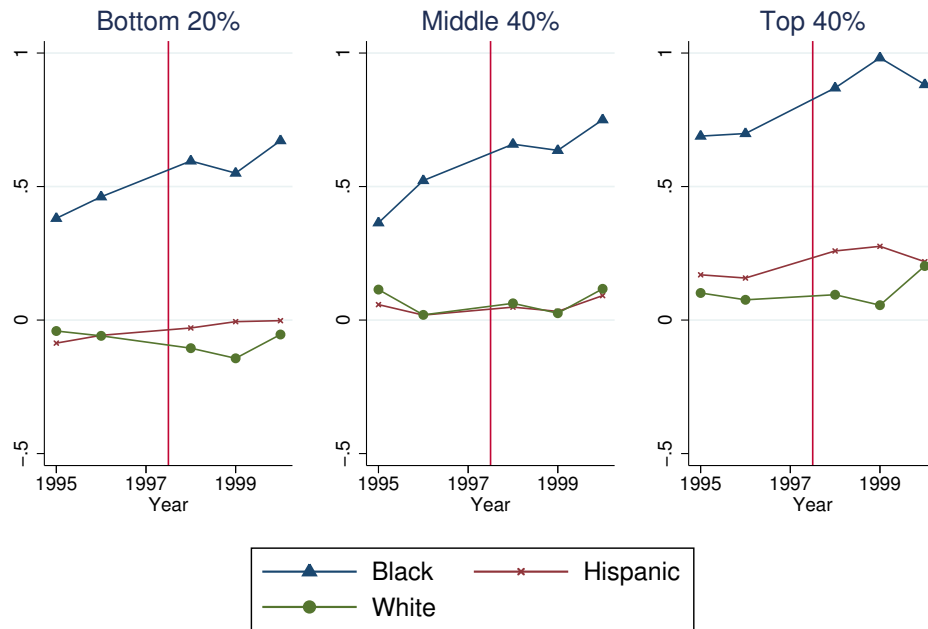


Figure 5: Score-sending residuals to non-UC schools. The residuals were obtained from regressing number of scores sent on the demographic characteristics shown in Table 2: SAT math and verbal scores, high school GPA, and parental income and education, and their interactions with the Ban dummy. The figure divides students into groups based on the academic credentials of URM applicants to the UC; see text for description.

Table 1: Proposition 209 Timeline

Date	Event
July 1995	SP-1
Spring 1996	1997 cohort begins taking SAT
July 1996	First mention of Prop 209 in media
Summer 1996	Prop 209 reported as being likely to pass
November 1996	Prop 209 passed by voters
Fall 1996	End of observation period for 1997 cohort
Spring-Fall 1997	1998 cohort takes SAT
November 1997	Supreme Court denies appeals, Prop 209 becomes law
Fall 1998	First affected cohort (1998) enrolls

Notes: See text for description.

Table 2: UCOP Summary Statistics

	All		White		URM		Asian	
	Before	After	Before	After	Before	After	Before	After
SAT Math	597 (.94)	602 (.93)	608 (.82)	612 (.82)	528 (.93)	534 (.93)	622 (.90)	625 (.91)
SAT Verbal	569 (.97)	572 (.96)	597 (.85)	597 (.86)	525 (.93)	527 (.93)	558 (.102)	562 (.100)
Adj HS GPA	3.6 (.5)	3.6 (.49)	3.6 (.5)	3.7 (.49)	3.4 (.48)	3.5 (.49)	3.7 (.5)	3.7 (.49)
Parent Income <40,000	.33	.29	.19	.17	.54	.49	.39	.36
Parent Income 40,000-99,999	.43	.42	.48	.44	.37	.38	.42	.4
Parent Income >100,000	.24	.29	.33	.39	.098	.13	.19	.24
Parent Educ: At Least 4 Year College	.66	.65	.79	.77	.37	.36	.65	.64
Total UC applications	2.9 (1.4)	3.2 (1.5)	2.6 (1.4)	2.9 (1.5)	2.7 (1.2)	3 (1.3)	3.3 (1.6)	3.6 (1.6)
Observations	136766	149305	63258	70448	26694	27707	46814	51150

Notes: Standard deviations in parentheses. Before includes years 1995-1997; after includes 1998-2000. White includes white and other/unknown, while URM includes blacks, Hispanics, and American Indians.

Table 3: Probability of Admission Difference-in-Difference

	Berkeley	UCLA	UCSD	UCD	UCI	UCSB	UCSC	UCR
URM	0.42*** (0.01)	0.37*** (0.00)	0.27*** (0.00)	0.28*** (0.01)	0.09*** (0.01)	0.14*** (0.00)	0.07*** (0.01)	0.02** (0.01)
Asian	-0.00 (0.00)	0.02*** (0.00)	0.03*** (0.00)	-0.04*** (0.00)	-0.03*** (0.00)	0.01*** (0.00)	-0.02*** (0.01)	-0.02*** (0.01)
URM*Ban	-0.30*** (0.01)	-0.25*** (0.01)	-0.20*** (0.01)	-0.21*** (0.01)	-0.05*** (0.01)	-0.02*** (0.01)	-0.06*** (0.01)	-0.04*** (0.01)
Asian*Ban	0.01 (0.01)	0.01** (0.00)	0.00 (0.00)	0.02*** (0.01)	-0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)	-0.00 (0.01)
R2	0.27	0.38	0.50	0.36	0.40	0.39	0.18	0.17
Obs	133589	152268	134536	101649	97102	112949	65976	63985
Non-URM mean	0.30	0.34	0.49	0.68	0.67	0.64	0.83	0.85
URM mean	0.38	0.36	0.42	0.72	0.59	0.64	0.80	0.79

Notes: Robust standard errors in parentheses. The dependent variable is a binary indicator of whether the student was accepted to a given school conditional on applying to that school. The excluded race category includes white and other/unknown. Controls include SAT math and verbal scores, high school GPA, parental income and education, and their interactions with the Ban dummy. The sample includes data from 1995-1997 (pre Prop 209) and 1998-2000 (post Prop 209).

*** p<0.01, ** p<0.05, * p<0.1

Table 4: College Board Summary Statistics

	All		White		Black		Hispanic		Asian	
	Before	After	Before	After	Before	After	Before	After	Before	After
SAT Math	520 (114)	527 (116)	543 (102)	553 (102)	428 (100)	436 (103)	456 (102)	459 (103)	554 (117)	560 (120)
SAT Verbal	502 (115)	507 (115)	538 (102)	543 (102)	437 (103)	441 (104)	450 (105)	450 (104)	490 (123)	498 (121)
Adj HS GPA	3.3 (.63)	3.3 (.61)	3.4 (.6)	3.4 (.58)	2.9 (.62)	3 (.62)	3.1 (.62)	3.2 (.62)	3.4 (.61)	3.4 (.59)
Parent Income <40,000	.45	.39	.28	.22	.62	.57	.68	.63	.54	.49
Parent Income 40,000-99,999	.4	.39	.5	.47	.31	.32	.26	.28	.35	.35
Parent Income > 100k	.11	.14	.17	.22	.038	.055	.033	.044	.082	.1
Parent Educ: At Least 4 Year College	.57	.56	.7	.7	.47	.47	.28	.26	.59	.57
Number of Schools to Which Sent Scores	5.6 (2.8)	5.7 (2.9)	5.6 (2.9)	5.6 (3)	5.2 (2.6)	5.5 (2.8)	5.1 (2.3)	5.2 (2.4)	6.3 (2.9)	6.2 (2.9)
Sent to UC	.67	.68	.62	.65	.52	.52	.64	.64	.83	.84
Number of UCs to Which Sent Scores	1.8 (1.8)	2 (1.9)	1.5 (1.6)	1.7 (1.8)	1.1 (1.4)	1.2 (1.5)	1.5 (1.5)	1.5 (1.6)	2.7 (2)	3 (2)
Sent to More Than 4 Schools	.54	.55	.52	.54	.46	.5	.45	.47	.66	.67
Observations	196,405	314,308	95,645	152,306	14,006	20,907	38,749	63,276	45,624	74,966

Notes: Standard deviations in parentheses. Sample includes Californians who sent their SAT scores to at least one school. Before includes years 1995-1996; after includes 1998-2000. White category includes white and other/unknown.

Table 5: Score-Sending Difference-in-Difference

	Berkeley	UCLA	UCSD	UCD	UCI	UCSB	UCSC	UCR
Black	0.174*** (0.004)	0.179*** (0.004)	-0.002 (0.003)	0.009** (0.003)	0.014*** (0.003)	-0.087*** (0.003)	-0.053*** (0.002)	0.009*** (0.003)
Hispanic	0.116*** (0.003)	0.172*** (0.003)	0.054*** (0.003)	0.002 (0.002)	0.064*** (0.002)	0.001 (0.003)	0.009*** (0.002)	0.043*** (0.002)
Ban*Black	-0.019*** (0.005)	-0.007 (0.005)	0.004 (0.004)	-0.010* (0.004)	-0.005 (0.004)	0.001 (0.004)	-0.002 (0.003)	0.017*** (0.003)
Ban*Hispanic	-0.010** (0.003)	-0.004 (0.004)	-0.000 (0.004)	-0.015*** (0.003)	-0.004 (0.003)	-0.006 (0.004)	-0.006* (0.003)	0.014*** (0.003)
R2	0.14	0.10	0.09	0.07	0.02	0.06	0.02	0.01
Observations	384889	384889	384889	384889	384889	384889	384889	384889
Non-URM mean	0.23	0.27	0.29	0.23	0.13	0.29	0.15	0.08
URM mean	0.21	0.32	0.21	0.13	0.15	0.17	0.10	0.12

Notes: Robust standard errors in parentheses. The dependent variable is a binary indicator of whether the student was sent a score to a given school. The excluded race category includes white and other/unknown, while URM includes blacks and Hispanics. Controls include SAT math and verbal scores, high school GPA, parental income and education, and their interactions with the Ban dummy. Sample includes Californians who sent a score to at least one school and includes data from 1995-1996 (pre Prop 209) and 1998-2000 (post Prop 209).

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Score-Sending Difference-in-Difference by Year

	Berkeley	UCLA	UCSD	UCD	UCI	UCSB	UCSC	UCR
Black	0.174*** (0.004)	0.179*** (0.004)	-0.002 (0.003)	0.009** (0.003)	0.014*** (0.003)	-0.087*** (0.003)	-0.053*** (0.002)	0.009*** (0.003)
Hispanic	0.116*** (0.003)	0.172*** (0.003)	0.054*** (0.003)	0.002 (0.002)	0.064*** (0.002)	0.001 (0.003)	0.009*** (0.002)	0.043*** (0.002)
Black*1998	-0.005 (0.007)	0.006 (0.007)	0.008 (0.006)	-0.004 (0.006)	-0.001 (0.005)	0.021*** (0.005)	-0.000 (0.004)	0.013** (0.005)
Black*1999	-0.023*** (0.006)	-0.015* (0.007)	0.003 (0.006)	-0.011* (0.005)	-0.004 (0.005)	-0.003 (0.005)	-0.004 (0.004)	0.020*** (0.005)
Black*2000	-0.029*** (0.006)	-0.011 (0.007)	0.002 (0.006)	-0.015** (0.005)	-0.011* (0.005)	-0.013* (0.005)	-0.003 (0.004)	0.019*** (0.005)
Hispanic*1998	-0.007 (0.004)	0.006 (0.005)	-0.002 (0.005)	-0.012** (0.004)	0.001 (0.004)	0.006 (0.005)	-0.001 (0.004)	0.009* (0.003)
Hispanic*1999	-0.016*** (0.004)	-0.011* (0.005)	-0.000 (0.005)	-0.016*** (0.004)	-0.003 (0.004)	-0.010* (0.004)	-0.012*** (0.004)	0.015*** (0.003)
Hispanic*2000	-0.008* (0.004)	-0.006 (0.005)	0.001 (0.005)	-0.018*** (0.004)	-0.009* (0.004)	-0.012** (0.004)	-0.004 (0.004)	0.018*** (0.003)
R2	0.14	0.10	0.09	0.07	0.02	0.06	0.02	0.01
Observations	384889	384889	384889	384889	384889	384889	384889	384889
Non-URM mean	0.23	0.27	0.29	0.23	0.13	0.29	0.15	0.08
URM mean	0.21	0.32	0.21	0.13	0.15	0.17	0.10	0.12

Notes: Robust standard errors in parentheses. The dependent variable is a binary indicator of whether the student was sent a score to a given school. The excluded race category includes white and other/unknown, while URM includes blacks and Hispanics. Controls include SAT math and verbal scores, high school GPA, parental income and education, and their interactions with the Ban dummy. Sample includes Californians who sent a score to at least one school and includes data from 1995-1996 (pre Prop 209) and 1998-2000 (post Prop 209).

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Score-Sending Difference-in-Difference Coefficients by Academic Credentials

	Bottom 20%	Middle 40%	Top 40%	Bottom 20%	Middle 40%	Top 40%
<i>Panel 1: Number of scores to Berkeley and UCLA</i>						
URM	0.179*** (0.005)	0.337*** (0.007)	0.347*** (0.009)	0.184*** (0.005)	0.347*** (0.007)	0.342*** (0.009)
Ban*URM	-0.018** (0.006)	-0.037*** (0.008)	-0.019 (0.011)	-0.026*** (0.007)	-0.053*** (0.009)	-0.012 (0.011)
Dep var mean	0.26	0.39	0.78	0.26	0.39	0.78
<i>Panel 2: Number of scores to UC other than BER/UCLA</i>						
URM	0.121*** (0.008)	0.162*** (0.012)	-0.019 (0.014)	0.132*** (0.009)	0.183*** (0.012)	-0.019 (0.015)
Ban*URM	-0.003 (0.011)	0.049** (0.015)	-0.005 (0.018)	-0.023 (0.012)	0.014 (0.016)	-0.003 (0.019)
Dep var mean	0.52	1.02	1.52	0.52	1.02	1.52
<i>Panel 3: UC senders – average SAT of UCs sent to</i>						
URM	12.192*** (0.983)	16.102*** (0.688)	13.550*** (0.595)	11.827*** (1.042)	16.331*** (0.732)	13.837*** (0.617)
Ban*URM	-1.186 (1.234)	-4.940*** (0.843)	-1.905** (0.722)	-0.578 (1.371)	-5.322*** (0.938)	-2.378** (0.764)
Dep var mean	1245	1241	1259	1245	1241	1259
Ban*Demographics				x	x	x

Notes: Robust standard errors in parentheses. Each set of estimates shows OLS coefficient estimate on the URM constant term and interaction between post Prop 209 and URM. Each estimate also includes the controls used in Table 2: SAT math and verbal scores, high school GPA, parental income and education, and their interactions with the Ban dummy. The excluded race category includes white and other/unknown, while URM includes blacks and Hispanics. Sample includes Californians who sent a score to at least one school and includes data from 1995-1996 (pre Prop 209) and 1998-2000 (post Prop 209). Groups are created by using the academic credential distribution of URM UC applicants. Bottom panel restricted to students who sent to at least one UC.

*** p<0.01, ** p<0.05, * p<0.1

Table 8: Application Difference-in-Difference Coefficients by Academic Credentials

	Bottom 20%	Middle 40%	Top 40%
<i>Panel 1: Applications to Berkeley and UCLA</i>			
URM	0.25*** (0.01)	0.27*** (0.01)	0.09*** (0.01)
Ban*URM	-0.06** (0.02)	-0.07*** (0.01)	0.01 (0.01)
Dep var mean	0.34	0.71	1.17
<i>Panel 2: Applications to UC other than BER/UCLA</i>			
URM	-0.24*** (0.03)	-0.34*** (0.02)	-0.30*** (0.01)
Ban*URM	0.07 (0.04)	0.11*** (0.02)	0.04* (0.02)
Dep var mean	2.12	2.30	1.88
<i>Panel 3: Average SAT of UCs applied to</i>			
URM	11.59*** (1.12)	14.10*** (0.57)	7.72*** (0.47)
Ban*URM	-5.80*** (1.60)	-6.63*** (0.80)	-2.80*** (0.64)
Dep var mean	1221	1229	1266

Notes: Conditional on applying to at least 1 UC. See notes from Table 7.

*** p<0.01, ** p<0.05, * p<0.1

Table 9: Score-Sending to Non-UCs, Difference-in-Difference Coefficients

	Bottom 20%	Middle 40%	Top 40%
<i>Panel 1: Number of scores sent to non-UC</i>			
Black	0.513*** (0.027)	0.383*** (0.042)	0.615*** (0.068)
Hisp	-0.012 (0.020)	-0.049* (0.024)	0.058 (0.031)
Ban*Black	0.226*** (0.037)	0.243*** (0.055)	0.175* (0.087)
Ban*Hisp	0.113*** (0.027)	0.034 (0.030)	0.065 (0.039)
Dep var mean	3.64	3.66	3.89
<i>Panel 2: Number of scores sent to Cal State system</i>			
URM	0.116*** (0.014)	-0.102*** (0.013)	-0.186*** (0.011)
Ban*URM	0.050** (0.019)	0.007 (0.017)	-0.000 (0.014)
Dep var mean	1.62	1.38	0.77

Notes: Robust standard errors in parentheses. Each set of estimates shows OLS coefficient estimate on the URM constant term and interaction between post Prop 209 and URM. Controls include SAT math and verbal scores, high school GPA, parental income and education, and their interactions with the Ban dummy. The excluded race category includes white and other/unknown, while URM includes blacks and Hispanics. Sample includes Californians who sent a score to at least one school and includes data from 1995-1996 (pre Prop 209) and 1998-2000 (post Prop 209). Groups are created by using the academic credential distribution of URM UC applicants.

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Change in the Racial Gap in Score-Sending Rates, Berkeley vs. Other Flagships

	Flagship
CA	-0.212*** (0.023)
CA*Ban	0.015 (0.009)
Black	0.046* (0.018)
Hisp	0.102* (0.039)
CA*Black	0.130** (0.022)
CA*Hisp	0.015 (0.048)
Black*Ban	0.040* (0.013)
Hisp*Ban	0.004 (0.013)
Black*Ban*CA	-0.061** (0.010)
Hisp*Ban*CA	-0.014 (0.011)
R2	0.15
Observations	591101
Dep var mean	0.32
Dep var mean, CA	0.22
Dep var mean, non-CA	0.40

Notes: Score sending to flagship universities in California, Illinois, Virginia, Michigan, Maryland, and North Carolina. Control group of flagship universities defined to be public universities with average SAT math scores at least 700, enrollment at least 2500, and blacks and Hispanics comprising at least 10% of enrollment. The outcome variable is a dummy variable indicating whether the individual sent a score to the home state flagship university. Controls include SAT math and verbal scores, high school GPA, parental income and education, and their interactions with the Ban dummy. The excluded race category includes white and other/unknown. Sample includes students who sent a score to at least one school and includes data from 1995-1996 (pre Prop 209) and 1998-2000 (post Prop 209).

*** p<0.01, ** p<0.05, * p<0.1