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The Effects of Affirmative Action on Diversity and Student Quality

I. Introduction and Motivation

Affirmative action has been a controversial aspect of hiring and admissions decisions in America since the civil rights movement of the 1960s. Whether and to what extent minority students should be given preference in admissions decisions has been the source of much debate and legal action within the last decade. Given the lower average standardized test scores and lower grade point averages of minority students, many argue that some preferential action is necessary to achieve a proportionate representation of minority students in elite colleges.[1] The contentious question of when and how race can be considered in admissions decisions came up recently in the widely-publicized, contentious challenge to the University of Michigan's point-based affirmative action system in the US Supreme Court. President Bush argued that University of Michigan's policy amounted to a quota, and that though "our institutions of higher education should reflect our diversity… quota systems that use race to include or exclude people from higher education and the opportunities it offers are divisive, unfair and impossible to square with the Constitution" (White House Press Release, 2003). The Supreme Court's eventual ruling on this case provided limited support for race-sighted affirmative action policies, determining that the point-based system was illegal, but that race-sighted admissions polices were acceptable if correctly applied.

Despite the public debate, the effects of affirmative action policies on student quality and diversity are largely unknown. Chan and Eyster (2003) develop a model suggesting that eliminating race-sighted affirmative action policies reduces student quality and diversity. This paper will test that model empirically in the context of policy shifts at public universities in California, Florida, Georgia, Texas and Washington. Specifically, Texas, California, Florida, and Washington were barred from using race as a consideration for admissions in the late 1990s.

[1] The achievement gap between disadvantaged minorities (Blacks, Hispanics, Native Americans) and advantaged groups (Whites and Asians) is well documented. In 2003, the average GPA of White (Asian) SAT-takers was 3.37 (3.41), as compared to 2.95 for Blacks. A similar gap appears in SAT scores; the average score of White test-takers was 1063, whereas Black test-takers had an average score of 857. Hispanics and Native Americans also perform lower by these measures, though the gap between their qualifications and those of White applicants is slightly smaller (College Board News 2005).

Georgia and Michigan have had their affirmative action policies challenged in court over the past several years, culminating in a 2003 Supreme Court decision barring the University of Michigan from using race in a numerical formula for evaluating applicants. Each of these states provides a "natural experiment" to assess the impact of affirmative action programs on the qualifications and diversity of enrolled students.

This paper describes a model of admission decisions under both race-sighted and race-blind affirmative action policies. It then uses data on SAT scores and race of enrolled college freshman at public doctoral universities to analyze the effects of banning affirmative action in several states. A difference-in-differences and a trend-break model are both applied in an effort to identify a relevant counterfactual for each state. The empirical evidence provides limited support of the theoretical predictions that banning the consideration of race will decrease student diversity and quality, particularly at the nation's most selective public universities. Further research is necessary to draw definite confusions about these policies' effects, but much of the observed data suggests support for the proposed theoretical models of Chan and Eyster (2003) and Fryer, Loury and Yuret (2004).

II. Previous Research on Affirmative Action

Previous work regarding the effects of affirmative action policies on college admissions has been mostly theoretical, due to the lack of detailed data available to address this question. Chan and Eyster (2003) develop a model of admissions decisions based on a university's preferences for well-qualified applicants and diversity. They conclude that banning colleges from explicitly considering race, while maintaining their preference for student diversity, will cause the quality of admitted students to decrease. Fryer et al. (2004) further expand the model of admissions decisions by adding applicant competition with endogenous effort. They conclude that a color-blind admissions policy will decrease student qualifications among both minority and majority applicants, thus further contributing to the inefficiencies of race-blind admissions policies.

Empirical work on the subject has been very limited in its scope. Analyses by Freyer et al. (2004) and Long (2004) rely on simulated admissions decisions based on actual student data to test theoretical models. While this provides valuable empirical verification of theoretical results, it fails to test whether college admissions offices respond in the predicted manner to affirmative action policy changes in the real world. Thomas (2004), and Card and Kreuger

(2004) both analyze the impact of affirmative action policies on where students choose to apply to colleges. While this is an important dimension of affirmative action policy, it does not fully answer the question of what the college-level policy effects will be on diversity and student quality. Also, those papers only look at evidence from Texas and California. This analysis will take the significant step of incorporating data from a wider number of states, as well as looking at the effects of an affirmative action ban on student quality.

III. A Theoretical Model of Admissions Decisions

To appreciate the empirical test I will explore later, it is important to understand the theoretical model of admissions decisions analyzed in this paper. This model is developed in more detail in both Chan and Eyster (2003), and Fryer et al. (2004). The Fryer model takes student effort to be endogenous, and is thus a richer model. For the purposes of the empirical analysis that follows, this endogeneity consideration is not critical, and the following discussion is based largely on Chan and Eyster (2003). Following Fryer et al., it is instructive to use the model to compare the following admissions policies: a race-blind "laissez-faire" policy (LF) where there is no preference for student diversity; a race-sighted, traditional, affirmative action policy (RS) where the admissions committee can explicitly consider race; and a race-blind affirmative action policy (RB) where the admissions committee prefers diversity but cannot explicitly make decisions dependent on race.[2]

A. Terms and Assumptions

Consider a model where applicants belong to one of two racial groups, $R \in \{W, N\}$, and $\lambda \in (0,1)$ is the fraction belonging to group W. Group W is the (white) advantaged majority group, and group N is the (nonwhite) disadvantaged minority group.[3] There are many colleges at which the applicants could seek admission, and each college has a maximum acceptance rate $C \in (0,1)$. Each student's academic qualification level is represented by a number t, with $t \in (\underline{t}, \bar{t})$. Academic quality is distributed according to the density function $n(t)$ for nonwhite candidates and $w(t)$ for white candidates. Both functions are strictly positive over the

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[2] Specifically, the model developed here parallels closely the model in Fryer et al. (2004), omitting the consideration of endogenous effort. It is slightly simplified from the form Chan and Eyster (2003) present, which also takes effort as exogenous, but yields the same important results.

[3] To apply this model to the real world, consider Asians with Whites in the advantaged, majority group, since they have similar distributions of student qualification. Blacks, Hispanics and Native Americans usually comprise the disadvantaged minority.

interval $(\underline{t}, \bar{t})$. These functions are defined such that $\int_{\underline{t}}^{\bar{t}} w(t)dt = \lambda$, and similarly for nonwhites $\int_{\underline{t}}^{\bar{t}} n(t)dt = 1-\lambda$. The corresponding cumulative density functions are designated $W(t)$ and $N(t)$. Minority candidates tend to have lower levels of academic qualification than majority candidates. Thus, the higher observed level of student quality, the greater the likelihood that a candidate belongs to the majority group:

ASSUMPTION 1: $\frac{w(t)}{n(t)}$ *is continuously differentiable, and monotonically increasing for all* $t \in (\underline{t}, \bar{t})$.

In this model, all candidates apply to one college, and all admitted candidates enroll. The candidates make no decisions, and effort level, the school applied to, and matriculation are all exogenous.[4]

B. Laissez-Faire

Under a laissez-faire admissions policy, the committee will maximize student quality without any consideration of diversity. The admissions rule $a(t)$ is the probability a that a student with qualification t is admitted. In a laissez-faire environment, the admissions rule will not depend on the student's race. Thus, the admissions office's maximization problem is:

(1) $\max_{a \in A} \int_{\underline{t}}^{\bar{t}} t a(t)[w(t)+n(t)]dt$, subject to $\int_{\underline{t}}^{\bar{t}} a(t)[w(t)+n(t)]dt = C$

where A is the set of allowable admissions rules. The solution to this problem is an admissions rule $a^*(t) = 1$ if $t \geq t^*$, and $a^*(t) = 0$ if $t \leq t^*$, and $W(t^*) + N(t^*) = 1 - C$. This admissions rule is illustrated in Figure 1, with the shaded area representing admitted students. The total shaded area equals C, and the threshold is t^*, as marked. Thus, the admissions office sets a single threshold, above which it admits all students and below which it rejects all students. This rule does not depend on the student's race.

C. Race-Sighted Affirmative Action

A race-sighted affirmative action policy allows the admissions committee to establish two separate rules for minority and majority applicants. An admissions committee with the goal

[4] To see a model that makes student effort endogenous, cf. Fryer et al. (2004). Recent work by Thomas (2004), and Card and Kreuger (2004), explores the assumption made here that affirmative action policies do not affect the schools students choose to apply to. Card and Kreuger find no change in the proportion of highly-qualified black and Hispanic students applying to selective state universities in Texas and California after the elimination of race-sighted affirmative action.

of diversity prefers the racial makeup of their student body to be close to the racial makeup of the overall candidate population. The committee also maintains a preference for students with high academic qualifications. Specifically, given its beliefs about the distributions of student qualification by race, *n*(*t*) and *w*(*t*), the admissions committee can target a specific acceptance rate, r_N , for the minority applicants. This acceptance rate r_N is greater than r_N^* , the acceptance rate implied by a laissez-faire policy, but no greater than *C,* the rate required to achieve population parity. The extent to which an admissions office prefers diversity, and hence the level of $r_N \in (r_N^*, C)$, is taken as exogenous in this analysis. The targeted value r_N implies a value r_W , such that $\lambda r_W + (1-\lambda) r_N = C$. So, the admissions office's maximization problem under a RS regime is:

(2) $\max_{a\in A}\{\int_{\underline{t}}^{\bar{t}} t a_W(t) w(t) dt + \int_{\underline{t}}^{\bar{t}} t a_N(t) n(t) dt\}$ subject to $\int_{\underline{t}}^{\bar{t}} a_W(t) w(t) dt = r_W \lambda$ and $\int_{\underline{t}}^{\bar{t}} a_N(t) n(t) dt = r_N (1-\lambda)$

The problem can be solved separately for each group, yielding two separate threshold values, t_W^{RS} and t_N^{RS} , for each racial group. So, the solution is $\{a_W^{RS}(t) = 1, t \geq t_W^{RS}$ and $a_W^{RS}(t) = 0, t < t_W^{RS}\}$, and likewise for $a_N^{RS}(t)$. Furthermore, the threshold for whites will be as high as or higher than the threshold for nonwhites, i.e. $t_W^{RS} \geq t_N^{RS}$. This solution is illustrated in Figure 2, with the admissions rule set separately for each racial group.

C. Race-Blind Affirmative Action

Under a race-blind regime, the admissions office once again targets a specific admissions level for minority applicants, $r_N < C$, according to how strongly it values diversity. However, to be race-blind, the committee cannot explicitly consider race as a factor. Thus, for any given level of student quality $t \in (\underline{t}, \bar{t})$, $a_N(t) = a_W(t)$, i.e. the admissions rule must be the same for each racial group. Given their (accurate) beliefs about the distributions of student quality by race, *w*(*t*) and *n*(*t*), the admissions office maximization problem under a RB regime is:

(3a) $\max_{a\in A}\{\int_{\underline{t}}^{\bar{t}} t a(t)[w(t)+n(t)] dt\}$ subject to $\int_{\underline{t}}^{\bar{t}} a(t) w(t) dt = r_W \lambda$ and $\int_{\underline{t}}^{\bar{t}} a(t) n(t) dt = r_N (1-\lambda)$

Or equivalently,

(3b) $\max_{a \in A}\{\int_{\underline{t}}^{\bar{t}} t a(t)[w(t)+n(t)]dt\}$ subject to $\int_{\underline{t}}^{\bar{t}} a(t)[w(t)+n(t)]dt = C$ and

$\int_{\underline{t}}^{\bar{t}} a(t)[n(t)+w(t)]\xi(t)dt = r_N(1-\lambda)$

Where $\xi(t) = \frac{n(t)}{n(t)+w(t)}$ is the conditional probability of being nonwhite, given that the student has academic qualification level *t*. This problem is a linear program in infinite dimensional space, and can be solved using the infinite-dimensional analogue of the Kuhn-Tucker Theorem.[5] The solution can be characterized by the following property: for almost every *t*, $a^{RB}(t) = 1$ or $a^{RB}(t) = 0$. Also, since $r_N^* < r_N^{RB}$, i.e. is this RB admissions rule admits a higher proportion of nonwhite applicants than the laissez-faire rule, this cannot be a threshold policy; a threshold policy with nonwhite admissions rate r_N^{RB} would result in admitting more than fraction *C* of the applicants. Therefore, there exists levels of qualification *t* < *s*, such that $a^{RB}(t) = 1$ and $a^{RB}(s) = 0$ (Fryer et al. 2004). An example of a potential optimal RB solution is illustrated in Figure 3, with the shaded area representing admitted students.

The theoretical model in the RB regime provides a strong theoretical prediction which I will test empirically in a later section. Relative to a RS regime, a RB policy will have one of the following results: (a) a lower average level of student qualification if diversity level is held constant; (b) a lower level of diversity if student qualification is held constant; or (c) somewhat lower levels of both diversity and student qualification. The race-blind policy is inefficient because it fails to admit some better-qualified students in exchange for admitting lesser-qualified students *of the same race*. Thus, the school would be strictly better off it could substitute the lesser-qualified students with a better-qualified student from the same racial group. By instituting a threshold policy as in the race-sighted regime, the admissions office could admit higher quality students given the same level of diversity.

The solution form described above, which will reject some better-qualified student with a probability of one, while accepting a worse-qualified student, is considered implausible by Chan and Eyster (2003). They restrict the admissions rule to be weakly increasing in the student's qualification, *t*. Solving the optimization problem with this monotonicity constraint, we would find that the college's optimal acceptance policy is a step function with at most two points of

[5] For more details on the process of solving this system see Fryer et al. (2004).

discontinuity. This modification does not affect our previous conclusion that the optimal policy is not a threshold policy, and that for some $t < s$, $a^*(t) > 0$ and $a^*(s) < 1$. In other words, the admissions office uses a random rule to accept students over some range of qualification levels. The above conclusion that a RS rule could achieve a higher level of student qualification for a given level of diversity is unchanged. Furthermore, the monotonicity constraint provides us with another important conclusion that I will test empirically: the range of academic qualifications admitted under a RB policy will be greater than the range under a RS regime. Thus, the theoretical framework provides two important, testable hypotheses for the proceeding empirical study.

III. Data and History

A. State Affirmative Action Histories

This paper exploits changes in affirmative action policies in several states, both due to court rulings and state legislation. A summary of the legal action in each study state follows:

California: The University of California Board of Regents adopted a resolution in July 1995 eliminating the consideration of race in admissions decisions. Though the Regents eventually rescinded this resolution in May 2001, California voters had already amended the state constitution to ban RS policies with Proposition 209 (UCLA). Proposition 209 was passed on November 5, 1996, prohibiting discrimination and preferential treatment based on "race, sex, color, ethnicity, or national origin in the operation of public employment, public education, or public contracting" (State of California Constitution). This policy first affected the freshman class entering in 1998 (UCLA). California further amended its admissions policies in March, 1999, with a provision that all students in the top 4 percent of their graduating class would be guaranteed admission to one of California's state universities. This policy first affected the class entering in Fall 2002 (Olsen 2003).

Florida: Governor Jeb Bush and the state Cabinet elected to end race-sighted admissions policies in February, 2000. The state immediately replaced RS affirmative action with the "One Florida" plan, which guarantees a place at one of Florida's 10 state universities to any student graduating in the top 20 percent of his high school class who has completed a college preparatory curriculum. This policy went into effect for the undergraduate class entering in Fall 2000 (Olsen 2003).

Georgia: In August 2001, the US Court of Appeals for the 11th Circuit ruled that University of Georgia's point-based policy using race as a consideration for admission was unconstitutional. This resulted in a ban on using race as a factor in admissions decisions and the elimination of race-based scholarships at Georgia's state universities. The decision first affected the class of 2002. 11th Circuit Court decisions are also binding in Florida and Alabama, but because Florida already had a ban on race-sighted practices and Alabama was under court orders to desegregate, neither state was affected by the ruling (Christian Science Monitor).

Texas: A lawsuit brought against the University of Texas Law School resulted in the elimination of race as a consideration for admissions in 1996, after a decision by the US Court of Appeals in the 5th Circuit. 5th Circuit decisions also affect Mississippi and Louisiana, but both states were under court orders to desegregate, so the impact was limited. Effective Fall 1998, Texas adopted the 10% plan, which guarantees admission to students graduating in the top 10% of their high school class at *any* public university campus of their choice (Card and Kreuger 2004).

Washington: In 1998, Washington voters followed California's lead and passed Proposition 200, which banned race-sighted admissions policies at state universities. This law went into immediate effect, and the first class admitted under this policy enrolled in Fall 1999 (Western Washington University).

B. Data Description

I used data from the *US News and World Report*'s annual college guide, as well as the National Center for Education Statistics' Integrated Postsecondary Education Data System (IPEDS). From these two sources, available data has been collected on all public doctoral universities between 1992 and 2002. Specifically, the number of enrolled, first-time, full-time freshman in each race category (Caucasian, Asian, Hispanic, Black, Non-resident alien and other) is recorded for each college-year. Data on the average SAT/ACT scores, and the 25th-75th percentile scores was also collected. For the years 1994-2002, the average score is not available so it is estimated by a linear interpolation of the 50th percentile from the 25th and 75th. Also, all ACT scores were converted to their SAT equivalents, and all SAT scores reported between 1992 and 1995 were recentered to be comparable to scores reported after that period.[6] The overall acceptance rate was also tracked. Unfortunately, the IPEDS database does not have any

[6] The College Board recentered the SAT test in April 1995, and *US News and World Report* reports recentered scores beginning with its September 1996 issue. The equivalency tables for the ACT/SAT conversion and the SAT recentering were provided by the College Board.

observations from 1999, so all race/sex variables for that year are linearly interpolated from the 1998 and 2000 values.

Ideally, a more complete data set would include admissions data sorted by race, so that the academic qualifications and admissions rate could be tracked separately for students from each racial category. Also, it would be desirable to track academic qualifications of applied, admitted and enrolled students, instead of just enrolled students. Unfortunately, this data is proprietary and not available publicly. This imposes a major limitation on the analysis. However, the available data still allows us to see the effects of affirmative action bans on the academic qualifications and diversity of enrolled students. If we assume that these characteristics are a reasonable proxy for the qualifications and diversity of admitted students, then available data should be sufficient to test the key predictions of the empirical model presented earlier. Also, given the natural experiment set-up, there is an obvious limitation on the number and quality of "treatment" group schools which experienced a change in the legality of affirmative action. This could cause a problem of large standard errors in regression results, hindering causal inference.

Descriptive statistics are reported in Table I separately for each of the states that are eventually RB and all other states in the years 1992-1996, before any change in affirmative action policy. Georgia universities had both the highest average SAT scores (1182) and the highest average acceptance rate. RS states had the lowest average SAT scores (1080). Washington had the largest range of SAT scores (the 75th minus the 25th percentile scores) at 230 points, but all the groups are relatively closely clustered around 200. Texas had the highest percent of underrepresented minorities at 36.4%, although the largest proportion of blacks was at Georgia colleges (15.7%). There is a considerable amount of variation in the representation of Asians and Caucasians, with the fraction of whites ranging from 41 to 83 per cent.

Figures 4-6 illustrate time trends of the outcome variables at three schools of interest: University of California at Berkeley, University of Texas at Austin, and University of Washington at Seattle. Normalized year is defined so that zero is the first year of a policy change. Minority representation drops substantially at UC Berkeley and UT Austin in the first year of the policy. After that, the values gradually trend upwards as the admissions office adjusts to the new policy and percentage plans are implemented in both states. There is not as strong a pattern in SAT averages or score range. Average SAT scores actually increase slightly in the first year of the policy at UC Berkeley and Washington, though the change is small. It is even harder to discern a pattern in score range, since the values fluctuate quite a bit from year to year. Because the amount of data used to produce these graphs is small, there is a significant amount of noise, making it difficult to see trends in student quality. The regression analysis that follows allows the data to be pooled, making it easier to detect trends.

IV. Econometric Models

A. Fixed Effects Model

The analysis will use a differences-in-differences framework to analyze the impact of banning the use of race in college admissions. Treatment schools will be grouped by state and analyzed separately. All analyzed colleges are selected from the universe of public, doctoral universities (both extensive and intensive), as classified by the Carnegie Foundation. The first set of regressions employs data on each state's flagship university, here defined as the most selective college, i.e. the one with the highest average SAT scores over the analyzed period. These schools should experience the greatest impact of a ban on race-sighted admissions policies, since they have the most restrictive admissions rules. The second set of regressions expands the analysis to include all "selective" universities, defined as schools with an average admissions rate of less than 80% over the entire sample period. The last regressions include data from all public, doctoral universities in the state. It is possible that a RB policy would not have a great impact on less selective colleges, since those schools frequently admit all students who meet some minimum threshold requirement of successful completion of a college preparatory curriculum. Hence, the first two sets of regressions on flagship and selective universities may reveal a stronger effect of the RB policies.

A major challenge of this analysis is the lack of a clear counterfactual; we cannot directly observe what would have happened in each of the treatment states had they retained race-sighted admissions policies. The validity of any causal inference based on a fixed-effects regression depends on the identification of a control group which experiences the same time trend as the treatment group. I employ two different strategies to identify control states, and each of them can contribute to our understanding of the policy's overall effect. The first approach, reported in Panel A of Tables 2, 3, and 4, uses all states which maintained race-sighted admissions policies as the control group; states that were under court order to desegregate their post-secondary school system were omitted from the controls, because the admissions dynamics in these states may have differed significantly from the treatment states and other controls as a result of the desegregation policy.

The second approach uses propensity-score matching to identify the most appropriate control state. This strategy can eliminate the bias due to imbalances in observed covariates, thus reducing the selection bias in the fixed effects regressions (Rosenbaum and Rubin 1984). The propensity score model takes the form:

$$(4)\ \ reform_s = \alpha + \beta_i race\_pcts_{s,t} + \gamma_j selectivity\_vars_{s,t} + \varepsilon_{s,t}$$

The subscript *s* indexes each school; *t* indexes time. *Reform* is a dummy variable that equals one for a college that eventually implements a race-blind affirmative action policy. The *race_pcts* are a full set of variables indicating the fraction of students from each racial category. *Selectivity_vars* are a set of variables indicating the school's selectivity: average SAT score, admissions rate, and the SAT score range. Data from the pre-period (before any change in affirmative action policy) is pooled and collapsed to include only the mean values of the variables listed above for each state. Parameters estimated from the regression are used to construct predicted values of *reform* for each state. A control state is then selected based on the "nearest neighbor" rule, which chooses the state with the predicted value of *reform* which is closest to that of the treatment state. A further restriction is imposed that the nearest neighbor control must be within ±0.2 of the treatment state's predicted value to ensure a relevant match. The propensity-matching regression is run on three different samples, one for each set of analyzed schools: flagship, selective, and all state universities.

After identifying appropriate control states, I run a series of difference-in-differences regressions to identify the effects of reforms on (a) fraction of under-represented minority students enrolled, (b) average/midpoint SAT scores, and (c) range of SAT scores in admitted class (i.e. the 75th percentile score minus the 25th percentile score). Under-represented minorities are defined as Black, Hispanic and Native American. The last two sets of regressions rest on the assumption that SAT scores are a good proxy for the overall level of student qualification. While SAT scores do not give us a complete picture of the applicant profile available to an admissions committee (which also includes letters of recommendation, high school grades, extra-curricular activities, awards and honors, etc.), it does provide a reasonable, albeit noisy, estimate of an applicant's qualification level. These three regressions will take the following form:

$$(5)\ \ outcome_{s,t} = \alpha + \beta raceblind_{s,t} + \gamma_t year_t + \delta_s state_s + \phi_{s,t} admit + \upsilon_{s,t}$$

The *outcome* variable is one of the three variables listed above (minority enrolment, average SAT, SAT range). The independent variable *raceblind* is a dummy variable for whether a race-blind policy was in effect. The regression includes a full set of year fixed effects (*year*), state fixed effects (*state*), and a control for the overall admissions rate (*admit*). Also, each college-level observation is weighted by the total enrollment at that university. This regression can be given a causal interpretation as long as the control states provide a relevant counterfactual, and no other factors correlated both with being in the treatment group and with the outcome variable changed in the year of the reform.

Unfortunately, the exclusion restriction may not be completely valid, since there is evidence that schools changed their recruiting behavior after the imposition of race-blind admissions. For example, the University of Georgia (UGA) placed new recruitment officers in regions of the state with high minority populations after the affirmative action ban. In 2003, UGA also purchased a database of 12,000 minority high school sophomores and juniors with a GPA of at least 3.3 (CNN 2003). As a result of focusing larger recruiting efforts on minority students, the applicant pool may have changed significantly at UGA and other treatment schools. This would cause us an upward bias of the parameter β in regressions on minority enrolment. The direction of the bias in regressions on average SAT scores is also likely to be upward, and in regressions on the range of SAT scores, bias should be downward. If the applicant pool changes so there are more minority applicants, holding majority applicants and the distribution of test scores constant, then the admissions office can admit the same number of minorities as before while increasing the admissions standards.

B. Trend-Break Model

A trend-break model is also employed to test whether the time trend for a specific treatment state changes after the ban on race-sighted affirmative action. The regressions take the following form:

$$(6)\ \ outcome_{s,t} = \alpha + \beta time_t + \gamma_t time * raceblind_{s,t} + \delta admit_{s,t} + \upsilon_{s,t}$$

The *outcome* variables are the same as in the fixed effects model (percentage minority, SAT score, and SAT range). The trending variable *time* equals zero in 1992 and counts up. The coefficient γ_t gives the impact of a RB regime on the time trend. This regression will allow causal inference provided that there is no omitted factor correlated with both the outcome variable and the introduction of a race-blind policy. The model is analyzed separately for each of the three groups of schools (flagship, selective, and all state colleges) as before. Unfortunately, causal inference based on this model is vulnerable to the same source of bias described above, resulting from changes in recruiting practices.

V. Results

Table 2 reports regression results on a sample of flagship campuses, based on the fixed effects model with all control states (Panel A), the fixed effects model with a propensity-matched control (Panel B), and the trend-break model (Panel C). RB affirmative action policies caused a decline in minority enrollment in all states except Florida, when measured by the fixed effects model in panel A. This decline was statistically significant in California and Georgia, where the estimated drop in minority enrollment was as much as 7.6 percentage points. In most states, negative impact on minority representation surfaces in the propensity-matched fixed effects and trend break models as well. Florida saw a small increase in the percentage minority students enrolled, perhaps because of the implementation of their 20% "One Florida" plan, which coincided with the ban on race-sighted admissions. The average SAT score also declined in almost every state, in each estimated regression. The magnitude of the decline ranged between 20 and 60 points. Overall, this evidence supports the first implications of the theoretical model presented earlier. The implementation of a race-blind admissions policy is associated with a decline in minority enrollment and average SAT scores at most schools. The analysis of the SAT score range does not reveal as clear a picture. While some states saw the range rise, others saw a statistically significant decline, contrary to the theoretical prediction. It is possible that not all universities preferred an admissions rule that was weakly increasing in student quality, in which case the theoretical model does not predict that SAT range would increase. Alternatively, the 75th-25th percentile score may not provide a good measure of how admissions behavior changed. For example, it is possible that schools only adjusted enrollment policies for the lower quartile of their admitted class, in which case this measure would not reflect the policy's full impact.

Expanding the sample to all selective universities in Table 3 suggests some further, though weaker, support of the theoretical model. The effect of RB affirmative action on minority enrollment is no longer clear, as Florida and Texas show some evidence of a positive relationship. The positive correlation can probably be explained by the states' percentage plans, which tend to increase minority enrollment because of school segregation at the high school level. The effect of RB policies on the average SAT score is also not obvious; all states except Georgia show a decline in their average SAT scores, but this decline is only statistically significant in Florida at conventional levels. It is interesting to note that any state showing an increase in minority enrollment experienced a decrease in average SAT scores; in addition, Georgia's 55 point increase in average SAT scores was associated with a modest decrease in minority enrollment by about one or two percentage points. This is suggestive of the theory that the admissions offices make some tradeoff between diversity and student quality, and perhaps this evidence is illustrating how different universities prioritize these two goals. These regressions do not further clarify the effect of RB policies on SAT range, and these numbers continue to vary in sign and magnitude across states.

The last set of regressions on the entire universe of public, doctoral universities is reported in Table 4, and the results are similar to those in Table 3. Florida's minority enrollment increased by about 2 percentage points and their average SAT score dropped by 45 points, as estimated in panel A, with both results significantly different from zero at the 5% confidence level. Georgia, California and Washington experienced small declines in their minority enrollments, results which were statistically significant in Georgia (panel A) and Washington (Panel C). Several states report a significant decline in SAT range, contrary to the predictions of the theoretical model presented earlier.

Taken together, these tables provide some support for the theory that a ban on race-sighted affirmative action would be associated with a decline in minority representation and student quality at the most selective campuses. In general, schools seem to be forced to make some tradeoff between maintaining their diversity and maintaining student quality after the imposition of a RB regime. The results do not provide support for the prediction that a RB policy will cause an increase in the range of SAT scores among freshmen. Without more detailed data, it is impossible to make conclusive statements about the precise effects of banning the consideration of race in admissions decisions; however, taken together, the theoretical and empirical evidence suggest that there could be serious inefficiencies associated with imposing a race-blind policy.

A major limitation of this analysis is its inability to analyze the effects of affirmative action policy on the makeup of the applicant pool and the demographics of admitted (rather than enrolled) students. It is possible that RB policies will discourage minority applicants to prestigious universities, causing a decline in minority representation for reasons other than the university's changing optimal admissions rule modeled earlier. The impact on the applicant pool has been explored by Card and Kreuger (2004) and Thomas (2004) as discussed above; however, more research needs to be done in states beyond Texas and California to validate these results. Also, if a race-blind policy discourages accepted minorities from attending because they perceive a less hospitable environment, minority enrollment could be further reduced. Lastly, the empirical data employed in this study did not allow an analysis of student effort. As described by Fryer et al. (2004), students may realize that academic quality is not consistently rewarded under a RB regime, thus decreasing their incentive to exert high effort. In equilibrium, both minority and majority students may choose to exert less effort, and the achievement gap between the groups may also wide. The decline in student effort is a further inefficiency resulting from the race-blind policy. An empirical study of student effort could test the predictions of Fryer et al., though it would be difficult to find consistently-measured, long-term data on effort or academic quality. There is also potential for future research on the impact of affirmative action policies on the applicant pool and admitted students, should more detailed data become available.

VI. Conclusion

The theoretical model and empirical evidence presented in this paper suggest that there may be significant inefficiencies associated with a ban on race-sighted admissions. The theory predicts that as long as universities retain a preference for diversity, preventing them from considering race could decrease student quality and/or minority representation, while failing to strongly reward student effort. The empirical analysis provides some limited support for the theoretical model, particularly as it bears upon highly selective institutions. The flagship universities of Florida, Georgia and Washington showed statistically significant decreases in average SAT scores after a RB policy was in place. Minority enrollment also decreased significantly at California, Florida and Georgia's flagship campuses. When weighing race-blind policies, states should consider that the associated decreases in student quality and diversity could put them at a competitive disadvantage vis-à-vis private universities who can continue to use race in admissions decisions. This body of research on race-blind admissions could bring significant insight to the national debate on the role of affirmative action, since the public discourse frequently fails to differentiate between laissez-faire admissions and race-blind affirmative action. If states simply switched from a race-sighted to a laissez-faire policy after a legal ban on the consideration of race, then the theoretical model predicts that average SAT scores would increase. Empirical evidence to the contrary suggests that states retain a preference for diversity even when they cannot directly consider race. In sum, public decisions restricting the consideration of race in admissions could have a serious negative impact on our national university system, reducing schools' ability recruit and admit the best-qualified students and impairing their ability to achieve racial diversity.

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Table 1: Descriptive Statistics 1992-1995: Average values

Variable	CA	FL	GA	TX	WA	OTHER
average SAT	1148 (93)	1134 (56)	1182 (116)	1102 (89)	1082 (60)	1079 (210)
SAT range	225 (28)	197 (22)	188 (24)	221 (19)	228 (12.3)	213 (37)
accept rate	66.89 (15.94)	68.3 (8.4)	61.8 (7.4)	72.9 (8.13)	74.9 (15.01)	75.71 (13.82)
pct minority	20.36 (6.88)	28.13 (19.53)	18.40 (11.68)	36.36 (27.18)	7.60 (.72)	16.1 (17.1)
pct black	4.24 (2.36)	9.59 (2.62)	15.73 (10.96)	15.31 (24.00)	2.79 (.41)	11.29 (16.94)
pct hispanic	15.24 (4.73)	18.31 (18.39)	2.45 (1.21)	20.62 (23.44)	3.37 (.48)	3.85 (5.58)
pct native american	.89 (.36)	.23 (.16)	.21 (.16)	.44 (.34)	1.44 (.55)	.98 (1.95)
pct asian	33.33 (13.51)	4.77 (1.52)	6.88 (3.17)	7.25 (7.34)	13.81 (9.08)	5.51 (8.80)
pct white	41.31 (13.98)	64.88 (20.98)	72.40 (14.40)	53.63 (27.32)	75.43 (7.23)	75.78 (19.54)
freshman enrollment	2474 (716)	2438 (1416)	2341 (1151)	2171 (1945)	2988 (524)	2948 (1891)
ban year	1998	2000	2002	1997	1999	

Standard deviations reported in parentheses.

Table 2: Regression results, flagship schools

Outcome	California†	Florida	Georgia	Texas	Washington
A. Fixed Effects Model: All Race-Sighted States as Controls					
minorities	-.076***	.004**	-0.021***	-.013	-.0090
	(.010)	(.015)	(0.006)	(.032)	(.007)
mid SAT	-23.87	-28.74**	-15.98***	-54.84	-12.43
	(11.37)	(11.93)	(3.28)	(39.55)	(7.93)
SAT range	2.80	3.87	-13.09**	-6.61	-24.56**
	(12.37)	(7.76)	(4.66)	(13.01)	(9.42)
B. Fixed Effects Model: Propensity Score Matched Controls					
minorities		.021	-0.007	.005	-.023***
		(.014)	(0.004)	(.031)	(.004)
mid SAT		-19.82***	-30.78***	-62.27	21.59***
		(23.15)	(5.76)	(31.42)	(3.52)
SAT range		27.33**	65.08***	-4.55	-16.20**
		(9.80)	(8.09)	(6.68)	(9.36)
C. Trend-Break Model					
minorities	-.008*	-.0013	.0012*	-.0100	-.0028***
	(.004)	(.0023)	(.0006)	(.0108)	(.0007)
mid SAT	-0.54	-1.17	-.16	-16.12*	.19
	(1.05)	(3.13)	(.22)	(7.48)	(.46)
SAT range	-.86**	-.50	-.98	-2.66	-4.72***
	(1.14)	(1.39)	(.61)	(3.83)	(1.15)

†California did not have any propensity score matched control within ±0.2 of its predicted probability, so these regressions were omitted.
Heteroskedastic-consistent standard errors in parentheses.
*10% significance level. **5% significance level. ***1% significance level.
Fixed effects regressions include controls for state fixed effects and year fixed effects.
All regressions include a control for the admissions rate.
Minorities is measured as the fraction of underrepresented minorities in the freshman class.
Mid SAT and *SAT range* are measured in units of SAT points, which are reported on a scale from 400-1600, in ten point increments.

Table 3: Regression results, selective schools.

Outcome	California	Florida	Georgia	Texas	Washington
A. Fixed Effects Model: All Race-Sighted States as Controls					
Minorities	-.026 (.020)	.022** (.007)	-0.009** (0.004)	.013 (.007)	.000 (.008)
mid SAT	-7.09 (15.93)	-37.29* (15.87)	55.45*** (14.83)	-2.09 (8.29)	-.38 (8.80)
SAT range	-11.78 (11.92)	-8.09 (4.67)	-11.36*** (2.40)	3.80 (4.91)	-21.40 (8.68)
B. Fixed Effects Model: Propensity Score Matched Controls					
Minorities	.013 (.013)	.064** (.025)	-0.020** (0.007)	.087*** (.020)	.037** (.014)
mid SAT	-12.62 (19.28)	-49.83** (21.01)	60.08*** (12.37)	-14.17 (1532)	-3.13 (7.96)
SAT range	13.95 (14.71)	24.16* (10.99)	-11.65** (3.55)	20.61 (11.20)	5.88 (11.30)
C. Trend-Break Model					
Minorities	-.0034 (.0047)	-.0004 (.0091)	-.0080 (.0053)	-.0040 (.0099)	-.0028*** (.0007)
mid SAT	-2.37 (3.99)	-2.69 (3.23)	4.36 (7.51)	-.15 (9.22)	-.19 (.46)
SAT range	-3.74*** (1.39)	-.15 (1.13)	-1.69** (.63)	-3.36* (1.99)	-4.72** (1.15)

Heteroskedastic-consistent standard errors in parentheses.
*10% significance level. **5% significance level. ***1% significance level.
Fixed effects regressions include controls for state fixed effects and year fixed effects.
All regressions include a control for the admissions rate.
Minorities is measured as the fraction of underrepresented minorities in the freshman class.
Mid SAT and *SAT range* are measured in units of SAT points, which are reported on a scale from 400-1600, in ten point increments.

Table 4: Regression Results, all schools

Outcome	California	Florida	Georgia	Texas	Washington
A. Fixed Effects Model: All Race-Sighted States as Controls					
Minorities	-.003 (.023)	.019*** (.005)	-0.0135** (0.005)	.015** (.006)	-.0026 (.0035)
mid SAT	-25.75 (12.46)	-45.27** (14.46)	52.89*** (14.04)	-10.74 (11.58)	8.75 (6.98)
SAT range	-5.84 (13.99)	-4.70 (5.44)	-8.81*** (2.50)	.22 (5.18)	-11.11* (4.84)
B. Fixed Effects Model: Propensity Score Matched Controls					
Minorities	.025 (.016)	.064** (.025)	.005 (.004)	.089*** (.016)	-.010 (.006)
mid SAT	-12.96 (18.10)	-49.83** (21.01)	63.08*** (16.17)	-10.82 (15.74)	35.63 (25.78)
SAT range	15.45 (10.57)	24.16* (10.99)	-14.09** (4.94)	16.25 (9.71)	12.52 (7.71)
C. Trend-Break Model					
Minorities	-.0014 (.0040)	-.0004 (.0091)	-.0080 (.0053)	-.0061 (.0174)	-.0020*** (.0007)
mid SAT	-.40 (3.47)	-2.69 (3.23)	4.36 (7.51)	1.44 (8.45)	-1.81 (2.74)
SAT range	-3.519** (1.381)	-.15 (1.13)	-1.69** (.63)	-2.982* (1.755)	-3.04** (1.38)

Heteroskedastic-consistent standard errors in parentheses.
*10% significance level. **5% significance level. ***1% significance level.
Fixed effects regressions include controls for state fixed effects and year fixed effects.
All regressions include a control for the admissions rate.
Minorities is measured as the fraction of underrepresented minorities in the freshman class.
Mid SAT and *SAT range* are measured in units of SAT points, which are reported on a scale from 400-1600, in ten point increments.

Figure 1: Laissez-Faire Admissions Policy

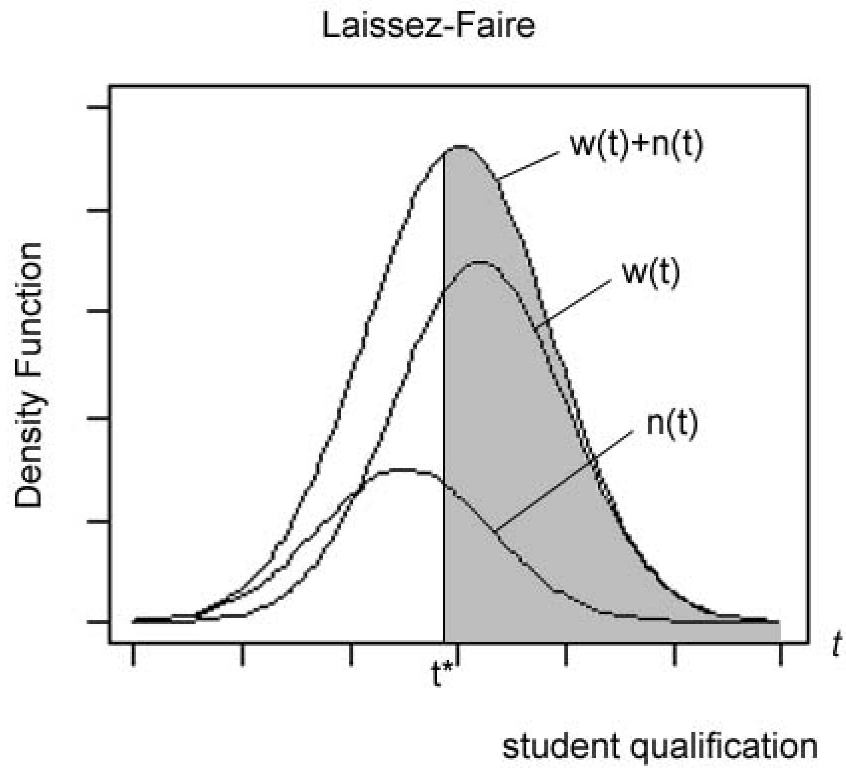


Figure 2: Race-Sighted Admissions Policy

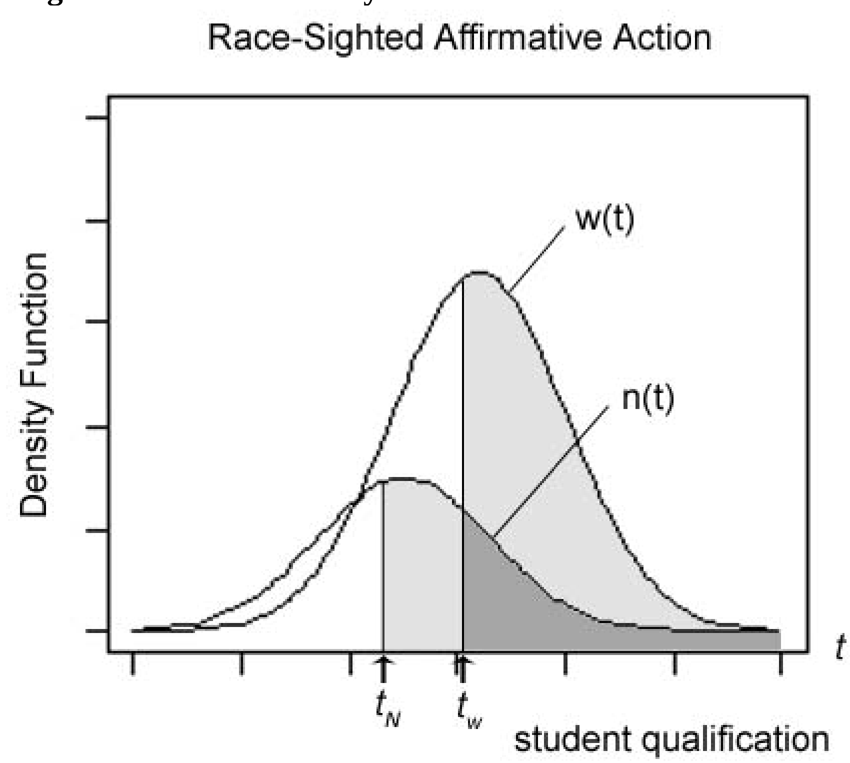


Figure 3: Race-Blind Admissions Policy

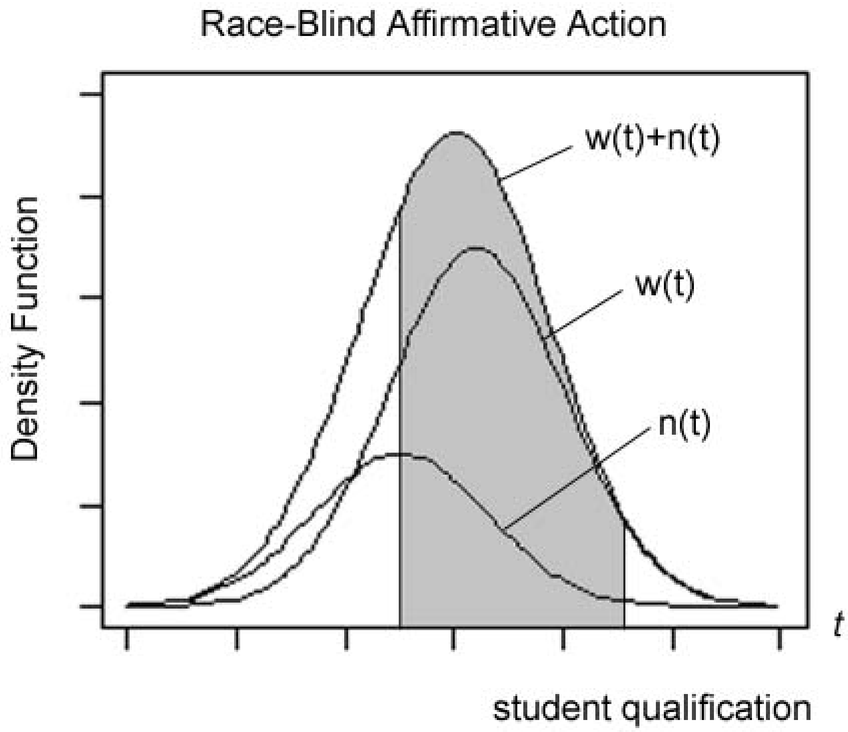
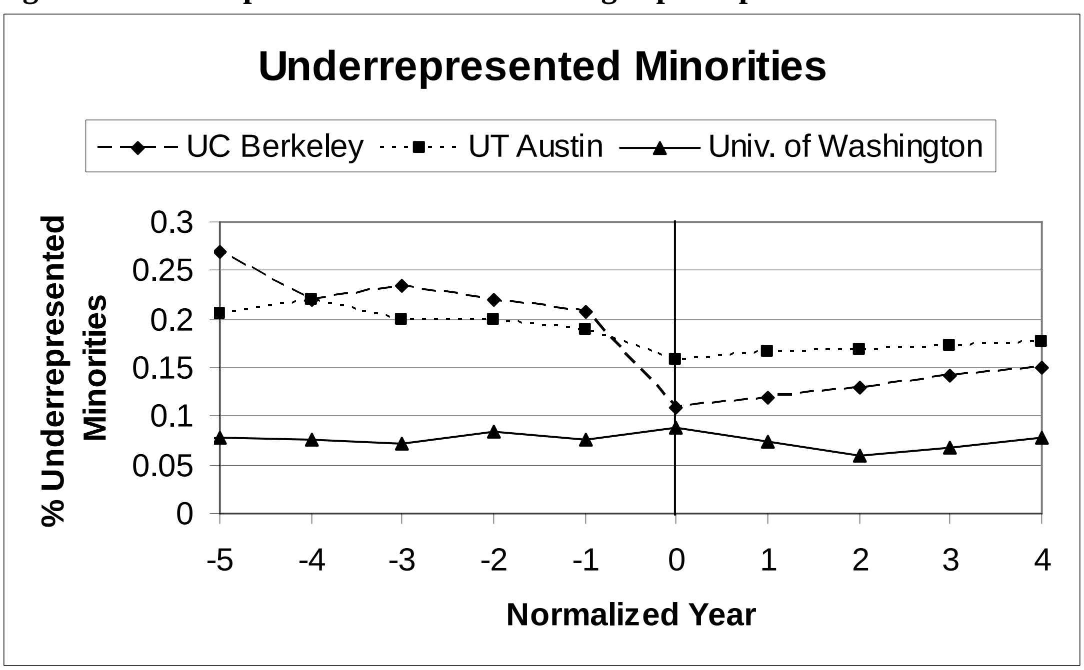
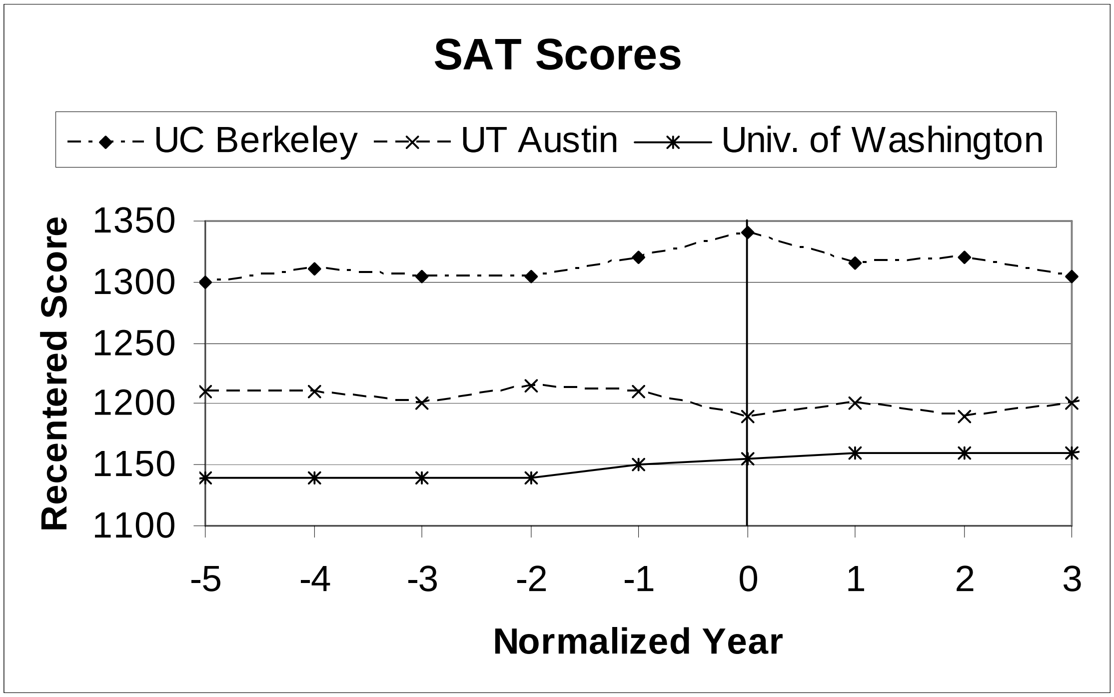


Figure 4: Underrepresented minorities at flagship campuses.



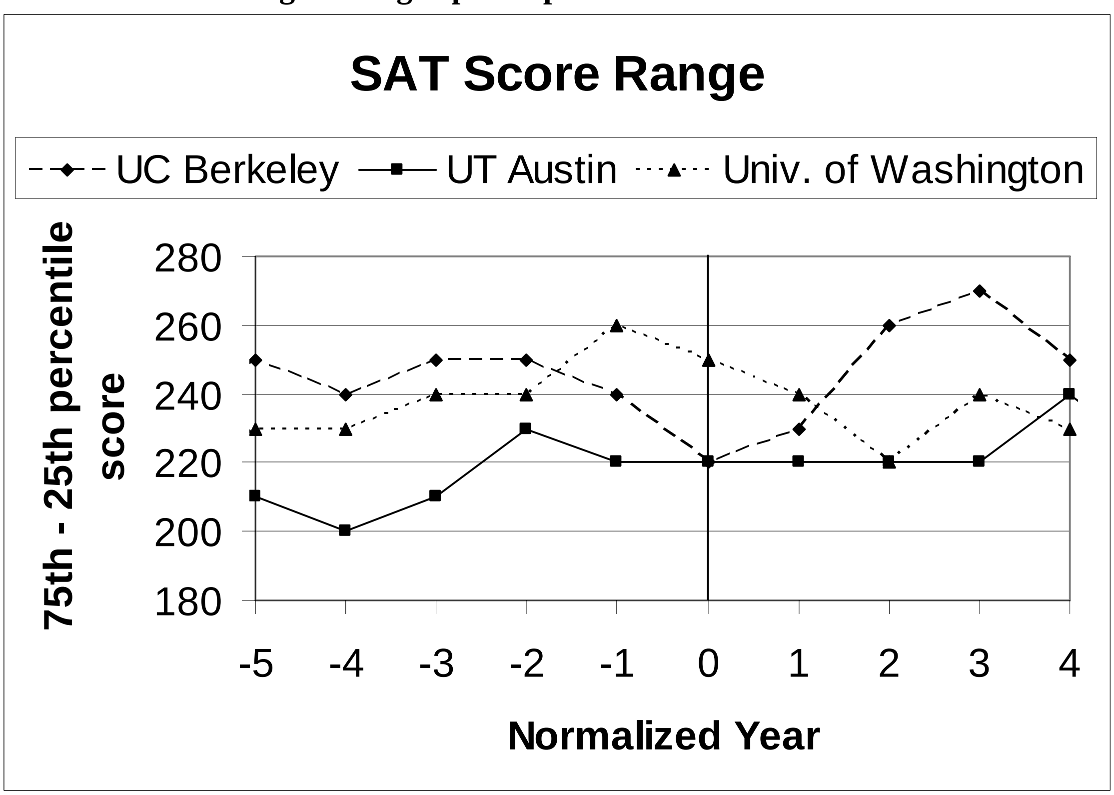
Year 0 is the year of a ban on race-sighted admissions policies.

Figure 5: SAT Scores at flagship campuses



Year 0 is the year of a ban on race-sighted admissions policies.

Figure 6: SAT Score Range at Flagship Campuses



Year 0 is the year of a ban on race-sighted admissions policies.