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**Affirmative Action and  
Racial Segregation**

Peter Hinrichs



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## Affirmative Action and Racial Segregation

Peter Hinrichs

A number of states have recently prohibited the use of affirmative action in admissions to public universities statewide. A growing body of research suggests that these affirmative action bans reduce minority enrollment at selective colleges while leaving overall minority college enrollment rates unchanged. The effect of these bans on racial segregation across colleges has not yet been estimated directly and is theoretically ambiguous due to a U-shaped relationship between minority enrollment and college selectivity. This paper uses variation in the timing of affirmative action bans across states to estimate their effects on racial segregation, as measured by exposure and dissimilarity indexes. The results suggest that affirmative action bans have in some cases increased segregation across colleges but in others cases may have actually reduced it. In particular, early affirmative action bans in states with highly selective public universities appear to be associated with more segregation, whereas other affirmative action bans appear to be associated with less segregation.

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## I. Introduction

Affirmative action went into widespread use at American colleges and universities in the 1960s and 1970s in an effort to raise minority enrollment.<sup>1</sup> However, in recent years, several states have discontinued affirmative action in admissions to public universities. These affirmative action bans have come through direct decisions of voters in Arizona, California, Michigan, Nebraska, Oklahoma, and Washington state; executive order in Florida; legislative action in New Hampshire; and, for a time, a federal court ruling in Texas. The growing body of research on affirmative action bans finds that that affirmative action bans reduce minority enrollment at selective colleges (Arcidiacono 2005, Arcidiacono et al. 2014, Backes 2012, Hinrichs 2012, Howell 2010, Long 2004b).<sup>2</sup>

Meanwhile, the Supreme Court has considered the issue of whether affirmative action in college admissions is constitutional, as well as the related issue of whether it is constitutional for the voters of a state to ban affirmative action.<sup>3</sup> The Supreme Court's rulings thus far have held that it is permissible to ban affirmative action but also that it is permissible to practice affirmative action on the grounds that there are educational benefits to racial diversity.<sup>4</sup> The Supreme Court decisions are focused on the academic freedom and First Amendment rights of particular universities, and the Supreme Court has deferred to the judgment of particular

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<sup>1</sup> For more on the history of affirmative action, see Bowen and Bok (1998) or Stulberg and Chen (2011).

<sup>2</sup> See Arcidiacono and Lovenheim (2016) and Arcidiacono, Lovenheim, and Zhu (2015) for two recent reviews of research on affirmative action.

<sup>3</sup> The key cases on the constitutionality of affirmative action are *Regents of the University of California v. Bakke* (1978), *Gratz v. Bollinger* (2003), *Grutter v. Bollinger* (2003), *Fisher v. University of Texas* (2013), and *Fisher v. University of Texas* (2016). The case on the constitutionality of affirmative action bans by voters is *Schuette v. Coalition to Defend Affirmative Action* (2014).

<sup>4</sup> Justice Sandra Day O'Connor's majority opinion from 2003 in the *Grutter v. Bollinger* case cites some evidence in support of this claim. However, the evidence from economics on the effects of diversity at the institution level is more mixed (Arcidiacono and Vigdor 2010; Daniel, Black, and Smith 2001; Hinrichs 2011). Studies by economists based on randomly assigned roommates or peer groups generally find positive effects of cross-racial interaction (Baker, Mayer, and Puller 2011; Boisjoly et al. 2006; Camargo, Stinebrickner, and Stinebrickner 2010; Carrell, Hoekstra, and West 2016), although it is unclear whether this result has external validity for predicting the effects of changing the level of diversity of an entire student body.

universities such as UC Davis and the University of Michigan that the students at these institutions will benefit from racial diversity. However, the Supreme Court has also referred to benefits of diversity to particular individuals or externalities for society as a whole. For example, in reference to benefits from diversity, Justice O'Connor's majority opinion in *Grutter v. Bollinger* states, "These benefits are not theoretical but real, as major American businesses have made clear that the skills needed in today's increasingly global marketplace can only be developed through exposure to widely diverse people, cultures, ideas, and viewpoints."

From the point of view of social welfare, though, what is arguably more important than the extent to which benefits of diversity are occurring at one particular university is the extent to which these benefits are occurring across all universities. An increase in diversity at one institution may result in a decrease at another institution. Apart from any issue involving the Supreme Court, this issue is also relevant for any state that has banned, or is considering banning, affirmative action.

A more fundamental question for affirmative action policy than whether there are benefits to diversity then is whether there will actually be more interaction between members of different racial groups with affirmative action than without it. One issue, which has been highlighted by Arcidiacono et al. (2013) and Arcidiacono, Khan, and Vigdor (2011), is that students may be more likely to interact with college peers who have an academic background that is similar to their own.<sup>5</sup> If affirmative action leads to a wider disparity in academic backgrounds between white students and minority students within colleges, then the use of affirmative action may actually result in less interaction between students of different races.

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<sup>5</sup> Also see Carrell, Hoekstra, and West (2016), who find that white male students at the U.S. Air Force Academy are more likely to be roommates with black students in the future when the black students in their squadron score higher on an academic composite index.

A second issue related to interaction between members of different racial groups is that the effect of affirmative action on racial segregation across colleges is theoretically ambiguous. From the vantage point of an individual college that is selective in its admissions and holding the behavior of other colleges fixed, it seems likely that the college will have higher minority representation if it uses affirmative action than if it does not.<sup>6</sup> However, if the practice of affirmative action were suddenly prohibited for all colleges in a state, there could be complex interactions and responses by students and colleges. One possibility is that affirmative action bans could lead to an increase in segregation across colleges as a result of minority students being displaced from selective institutions. A second possibility, though, is that minority students who are displaced as a result of affirmative action bans may cascade down to institutions that would have had very low minority representation if affirmative action were in place, resulting in a reduction in racial segregation. This second possibility is plausible given the U-shaped relationship between measures of college selectivity and the share of students who are members of underrepresented minority groups found by Arcidiacono, Khan, and Vigdor (2011); Arcidiacono, Aucejo, and Hotz (2016); and Reardon, Baker, and Klasik (2012).

This U shape can also be seen in Figure 1, which depicts the relationship between SAT scores and percentage of students who are black across institutions using data from the Integrated Postsecondary Education Data System (IPEDS) in 2014.<sup>7</sup> This figure shows the average SAT score and percent black by ventile of SAT score, along with a quadratic fit. The overall U shape is clear when viewing the fitted curve. Furthermore, the top ventile of schools by SAT score

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<sup>6</sup> One complication is that affirmative action bans may lead to behavioral responses from students that impact the number of applications colleges receive or colleges' yields on admissions. Research on affirmative action and application behavior finds mixed results (Antonovics and Backes 2013, Card and Krueger 2005, Long 2004a). On the issue of yields, Antonovics and Sander (2013) actually find that California's affirmative action ban actually increased the yield rate for minority students.

<sup>7</sup> IPEDS gives information on the 25th and 75th percentiles of scores for each of the three sections of the test. I take the average of the 25th and 75th percentiles within each section and then sum together.

have a higher share of black students than the next ventile, which in turn have a higher share than the next ventile after that.

In light of this U shape, the effect of affirmative action bans on racial segregation is theoretically ambiguous. Depending on the exact way students would be matched to colleges with and without an affirmative action ban, an affirmative action ban could increase, decrease, or have no net effect on racial segregation across colleges. Moreover, no research has yet examined the effects of affirmative action bans on racial segregation across colleges. The existing research on the enrollment effects of affirmative action bans by broad selectivity tier, such as Backes (2012) and Hinrichs (2012), is insufficient for determining the effects on segregation because it does not provide information on the reshuffling of students between particular universities within a broad selectivity tier.

This paper is the first paper to directly estimate the impacts of affirmative action bans on racial segregation. I measure segregation using standard exposure and dissimilarity indexes at the state level. The exposure indexes measure potential exposure of the average member of one group to those of another group across an entire state rather than at one particular college, and the dissimilarity index measures how unevenly members of two groups are distributed across colleges. These segregation indexes can take into account the fact that a gain in diversity at one college may come at the expense of diversity at another. I use these segregation indexes to estimate generalized difference-in-differences models that exploit variation in the timing of affirmative action bans across states.

I also estimate the effects separately for states that banned affirmative action earlier and more recently. Early affirmative action bans have been studied in prior work, such as Backes (2012) and Hinrichs (2012), whereas more recent affirmative action bans have not yet been the

subject of much study. Moreover, unlike more recent affirmative action bans, earlier affirmative action bans occurred in states like California and Texas that are home to highly selective public universities. Estimating effects separately for earlier and more recent bans allows for comparison to earlier work while also providing new estimates of the effects of more recent affirmative action bans. I find that the more recent affirmative action bans are associated with greater segregation across colleges on average. On the other hand, regression results suggest that affirmative action bans are associated with less racial segregation in the earlier time period.

Section II of this paper discusses the data, including the construction of the segregation indexes, and provides a simple stylized example showing why the effect of affirmative action bans on racial segregation is theoretically ambiguous. Section III outlines the empirical methods used in the paper. Section IV briefly discusses the impact of more recent affirmative action bans on the overall demographic composition of universities, and then Section V presents the main empirical results on affirmative action and racial segregation. Section VI concludes.

## **II. Data**

The main data in this study come from the Integrated Postsecondary Education Data System (IPEDS), a college-level data set compiled every year by the United States Department of Education's National Center for Education Statistics. Institutions that participate in federal financial aid programs are required to complete IPEDS surveys, providing information on program offerings, enrollment, cost of attendance, institutional finances, staff, and other institutional characteristics. Most importantly for the purposes of this study, IPEDS contains information on enrollment by race. Although many of the estimations include only a subset of the years and institutions, I utilize data for four-year colleges on the number of full-time, first-



time, degree-seeking undergraduates by race in the fall of each year between 1995 and 2014. I use these data to construct segregation indexes at the state-by-year level.

I use three standard segregation indexes: the index of white exposure to blacks, the index of black exposure to whites, and the black-white dissimilarity index. Exposure measures of potential interaction between members of different racial groups: white exposure to blacks measures the percentage of students at the average white student's institution who are black, and black exposure to whites measures the percentage of students at the average black student's institution who are white. Dissimilarity is a measure of unevenness that calculates the percentage of students of one race who would need to be reassigned to a different institution in order for institutions to have the same racial composition as each other. These segregation indexes provide a useful means of summarizing the potential for cross-racial interaction, as well as how unevenly different groups are distributed, across all colleges rather than at a particular college.

To define the three segregation indexes mathematically, use  $N$  to denote the total number of colleges,  $W$  to denote the combined number of white students across these colleges, and  $B$  to denote the total number of black students across these colleges. Further, suppose that college  $i$  enrolls  $w_i$  white students,  $b_i$  black students,  $h_i$  Hispanic students,  $a_i$  Asian students, and  $n_i$  Native American students. Then the exposure index of whites to blacks is calculated as

$$100 \times \frac{1}{W} \sum_{i=1}^N w_i \frac{b_i}{w_i + b_i + h_i + a_i + n_i},$$

the exposure index of blacks to whites is calculated as

$$100 \times \frac{1}{B} \sum_{i=1}^N b_i \frac{w_i}{w_i + b_i + h_i + a_i + n_i},$$

and the white-black dissimilarity index is calculated as

$$100 \times \frac{1}{2} \sum_{i=1}^N \left| \frac{b_i}{B} - \frac{w_i}{W} \right|.$$

The exposure indexes use the count of members of all races in the

denominator. However, although not shown in this paper, the general pattern of results is unchanged when limiting the denominator to whites and blacks.

Table 1 shows a simple stylized example illustrating the theoretically ambiguous effects of affirmative action bans on racial segregation. The example consists of three colleges that enroll black students and white students. The first column shows a hypothetical initial distribution of students to colleges, along with the values of the segregation indexes that are associated with this distribution. The second column shows a hypothetical alternative distribution of students to colleges under an affirmative action ban. This situation could come about as a result of the exchange of 50 black students for 50 white students between College 1 and College 2, as well as a similar exchange of students between College 2 and College 3. As a result of this redistribution, the black-white dissimilarity index rises and the exposure indexes both fall, all of which points to more segregation. The third column depicts an alternative scenario under which an affirmative action ban results in College 1 exchanging 50 black students for 50 white students with College 2 but where no corresponding exchange occurs between College 2 and College 3. As a result of this redistribution the black-white dissimilarity indexes falls and the exposure indexes both rise relative to the initial distribution, all pointing to less segregation across colleges as a result of the affirmative action ban. Thus, the effects of affirmative action bans on segregation are theoretically ambiguous, and the direction and magnitude of the effect are both empirical questions.

Consistent with earlier work, such as Antman and Duncan (2015), I code the timing of affirmative action bans based on the year an affirmative action ban first applied to public universities statewide. Table 2 shows the timing of these bans. I drop observations from Alabama, Georgia, Louisiana, and Mississippi. These states do not have outright affirmative

action bans but have been subject to important affirmative action litigation, resulting in an uncertain legal situation surrounding affirmative action.<sup>8</sup>

### III. Methods

I estimate regression models of the following form:

$$segregation_{st} = ban_{st}\alpha + \mu_s + \delta_t + \eta_s t + \varepsilon_{st}.$$

Here  $segregation_{st}$  is a segregation index for state  $s$  in year  $t$ ,  $ban_{st}$  is a dummy variable for whether state  $s$  has an affirmative action ban in effect in year  $t$ ,  $\mu_s$  refers to a full set of state dummies,  $\delta_t$  refers to a full set of time dummies,  $\eta_s t$  denotes a full set of state-specific linear time trends,  $\varepsilon_{st}$  is the error term, and  $\alpha$  is the parameter of interest. All standard errors I use are robust to clustering at the state level. The regressions for white exposure to blacks are weighted by the number of whites, the regressions for black exposure to whites are weighted by the number of blacks, and the regressions for black-white dissimilarity are weighted by the sum of white enrollment and black enrollment.

Before estimating the models for segregation at the state level, I estimate models of the effects of affirmative action bans on enrollment shares by race at universities of varying selectivity levels. These are similar to models estimated by Hinrichs (2012), which uses data for 1995-2003. Here I use data only from 2004-2014 to estimate the effects of more recent bans.

The models I estimate take the form

$$enrollmentshare_{ist} = ban_{st}\alpha + \mu_i + \delta_t + \eta_s t + \varepsilon_{ist}.$$

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<sup>8</sup> There are also some cases of particular universities voluntarily discontinuing affirmative action before a statewide affirmative action ban went into place. For example, Florida State University discontinued affirmative action one year before the University of Florida did, and Texas A&M University discontinued affirmative action one year before the University of Texas did. The results are robust to changing the timing of the bans in Florida and Texas.

Here  $enrollmentshare_{ist}$  denotes the percentage of students at institution  $i$  in state  $s$  in year  $t$  who are of a particular race (such as Asian, black, or white),  $\mu_i$  refers to institution dummies, and the rest of the notation is similar to before. These regressions are weighted by total enrollment, and I show standard errors that are robust to clustering at the state level.

A number of papers have estimated difference-in-differences models similar to the ones in this paper in order to study the effects of affirmative action bans, including Antman and Duncan (2015), Backes (2012), Blume and Long (2014), Hill (2016), and Hinrichs (2012, 2014). The identifying assumption for these models when including state-specific time trends is that segregation levels in treated states and control states would follow a common time path in the absence of the treatment after accounting for state-specific linear time trends. This assumption is not directly verifiable, but some earlier papers on affirmative action have provided indirect tests of this assumption.<sup>9</sup> These earlier tests generally support the exogeneity of affirmative action bans.

#### **IV. Effects of Recent Affirmative Action Bans on Demographic Compositions of Universities**

A large portion of the research on affirmative action bans has focused on California, Florida, Texas, and Washington, which are all large states that were early to ban affirmative action. However, several other states have banned affirmative action in college admissions more recently. Before turning to the main results on racial segregation in the next section, this section

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<sup>9</sup> Blume and Long (2014) find that the SAT/ACT and National Assessment of Educational Progress (NAEP) test score gaps between underrepresented minority students and others evolve similarly in ban states and non-ban states. Backes (2012) finds that bans coming several years in the future are not predictive of minority enrollment at public universities, especially when time trends are included. Antman and Duncan (2015) also generally find that future affirmative action bans are not predictive of the outcomes they consider.

briefly considers the impact of these more recent bans on the demographic composition of universities in the relevant states.

Table 3 shows summary statistics. This table shows that more selective institutions have higher Asian representation than less selective institutions. For other racial groups, however, the results generally point to a U-shaped relationship between selectivity and representation. For example, the percentage of students at all four-year colleges in the sample who are black is roughly 11.8%. The percentage at the subset of 115 institutions in the top two tiers of the 1995 *U.S. News & World Report* college rankings who are black is roughly 5.7%, but the percentage in the smaller subset in the top 50 of the 1995 *U.S. News* rankings is 6.2%. When confining attention solely to public institutions, this pattern does not appear for blacks and there is instead slightly lower representation in the top 50 than in the 115 institutions in the top two tiers, although this could potentially be an effect of affirmative action bans. For Native Americans, the pattern is the same as for blacks. For Hispanics, the U shape is present both when considering all institutions and also when confining attention to public universities. For whites, the pattern is an inverted U shape: white representation is higher at the subset of 115 institutions in the top two tiers of the *U.S. News* rankings than in the more selective top 50, regardless of whether public and private universities are considered together or attention is confined to publics. Finally, in most of the samples somewhere between 20% and 35% of students are attending institutions in states with an affirmative action ban, but when considering the public universities in the top 50 of the *U.S. News* rankings over half of the students attending these institutions are in a state that has an affirmative action ban. However, most of these bans were already in place before the sample period began.

Table 4 shows regression results. The results in the first four columns show little impact of the affirmative action bans overall. The results in the final two columns do suggest an impact at institutions that were rated in the top 50 of the 1995 *U.S. News & World Report* college rankings. The results in the final column, for example, suggest that affirmative action bans are associated with a decrease in black representation of about 1.1 percentage points, a decrease in Hispanic representation of about .84 percentage points, a decrease in Native American representation of about .40 percentage points, and an increase in white representation of about 3.0 percentage points at public universities in the top 50 of the *U.S. News* rankings. However, there are only two states that had an affirmative action ban first go into effect between 2004 and 2014 that had a university in the top 50 of the 1995 *U.S. News* rankings: New Hampshire (Dartmouth College, which is a private college that was not covered by New Hampshire's ban) and Michigan (University of Michigan).

## **V. Effects on Racial Segregation**

Table 5 shows summary statistics for the samples used in the racial segregation regressions. The observations are at the state-by-year level, and the sample size differs across columns due to the fact that not every state contains universities that are rated highly in the *U.S. News* rankings. The summary statistics, like the later regressions, are shown for the entire sample period and are also broken down by the earlier and later parts of this time period. There are at least three reasons for breaking down the results in this manner. First, the earlier period is the focus of earlier work that examined other outcomes, and it may be useful to compare results across different outcomes over a common time period. Second, some might interpret the Supreme Court cases of 2003 as having changed or clarified the permissible behavior in the

control states that do not have an affirmative action ban. Third, when comparing the results in Section IV of this paper to results of earlier papers studying an earlier time period, it seems that the earlier affirmative action bans may have more potential to affect segregation across colleges. In any case, Table 5 shows that the exposure of whites to blacks is lower in the “top two tiers” samples than in the “top 50” samples, while the opposite is true for black exposure to whites. This is somewhat consistent with the U-shaped relationship found earlier. Moreover, black-white dissimilarity is lower in the samples that are limited to more selective institutions, but it is worth noting that these samples cover fewer institutions.

Table 6 shows regression results for the impact of affirmative action bans on segregation across colleges. The top panel shows results for the full time period, the middle panel shows results in the earlier part of the sample, and the bottom panel shows results in the later part of the sample. For completeness, I show results in the four rightmost columns that limit the sample to selective institutions. However, these results are difficult to interpret in light of the fact that research such as Hinrichs (2012) and the results in Section IV of this paper show that there can be selection into these samples by whites and selection out of these samples by underrepresented minority students as a result of affirmative action bans. Thus, I focus on the leftmost two columns of Table 6, as Hinrichs (2012) and the results of Section IV show that affirmative action bans generally do not affect the demographic composition of universities overall.

The two leftmost columns of the top panel of Table 6 suggest that there is not much of an effect of affirmative action bans on average. However, the middle and bottom panels in Table 6 suggest that there are effects but that these effects were different for the bans going into effect in the two different time periods. The middle panel, which shows results for 1995-2003, suggests that affirmative action bans are associated with an increase in black exposure to whites of about

3.8 percentage points, which means that there is a decline in segregation. The results for black-white dissimilarity also point to a decline in segregation. In the 2004-2014 time period, however, which is shown in the bottom panel, the results for black exposure to whites and black-white dissimilarity are the opposite of the 1995-2003 period. In this period affirmative action bans are associated with lower exposure of blacks to white and higher black-white dissimilarity, both of which point to higher segregation.

To further study this issue, Figures 2 and 3 plot black exposure to whites and black-white dissimilarity across California universities over a long time period. Both of these graphs show a notable change in 1998, the first year of California's affirmative action ban. Moreover, Table 7 shows summary statistics and Table 8 shows regression results for Hispanic-white segregation. The regression results are broadly similar to the results in Table 6 for black-white segregation.

How could affirmative action bans lead to less segregation across colleges? Two results from recent research papers may provide an explanation for this finding. First, research on the enrollment effects of affirmative action bans, including Hinrichs (2012), finds that affirmative action bans redistribute blacks from the most selective colleges to slightly less selective ones. Second, Arcidiacono, Khan, and Vigdor (2011) show that there is a U-shaped relationship across colleges between average SAT score and percent black, with the minimum black share coming at an SAT score of 1090 out of 1600. Arcidiacono, Aucejo, and Hotz (2016) show there is a U-shaped relationship between percent minority and a measure of academic preparation that depends on SAT scores and high school grade point averages across campuses of the University of California system. Reardon, Baker, and Klasik (2012) find a similar U shape for both blacks



and Hispanics when using Barron's rankings rather than SAT scores.<sup>10</sup> Furthermore, Figure 1 of this paper shows a similar result for SAT scores and percent black in 2014. In light of these two results, it is plausible that an affirmative action ban could decrease measured racial segregation as this U shape is flattened.

This possibility is supported by Figures 4 and 5, which show the percentage white and the percentage black at California public universities in 1997 and 1998. These are plotted against a test score measure derived from the College Board's Annual Survey of Colleges.<sup>11</sup> Figures 4 and 5 plot the raw data as well as a quadratic fit. Consistent with earlier work, there is a clear U-shaped relationship between percentage black and the test score measure. Moreover, there is an inverted U-shaped relationship between percentage white and the test score measure. However, both of these relationships are flatter in 1998, the first year of the affirmative action ban, than in 1997. A flattening of these relationships is consistent with lower black-white segregation.

But what is the reason for the U-shaped relationship between college quality and minority share to begin with? One possibility is that affirmative action used by the most selective institutions takes away minority students from moderately selective institutions, and the spaces at moderately selective institutions are not filled by students from less selective institutions. This could be either because moderately selective institutions do not want to admit minority students who would have otherwise attended less selective institutions or because the students may not want to attend such institutions. As pointed out by Arcidiacono and Lovenheim (2016), students from less selective institutions may not consider moderately selective institutions due to a lack of

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<sup>10</sup> It is also interesting to note that this U shape between percent minority and average SAT score exists despite the fact that a higher minority share may mechanically pull down the average SAT score at the places with the highest average SAT score.

<sup>11</sup> The data set provides the 25<sup>th</sup> and 75<sup>th</sup> percentiles of SAT verbal scores, as well as the 25<sup>th</sup> and 75<sup>th</sup> percentiles of SAT math scores. I take the average of the 25<sup>th</sup> and 75<sup>th</sup> percentiles within each section and then take the sum.

information about these schools being a good fit.<sup>12</sup> Students may also believe, and perhaps incorrectly, that moderately selective institutions are more expensive to attend than less selective institutions.<sup>13</sup> Another possibility pointed out by Arcidiacono and Lovenheim (2016) is that moderately selective institutions may have low minority shares because they do not use affirmative action very heavily. This may be because the top institutions have taken such a large share of well-qualified minority students that would be successful at moderately selective institutions that moderately selective institutions feel as though they do not have any to choose from or would have to reach too far, or it could be that they are not under as much pressure as highly selective institutions to use affirmative action. Whatever the reason may be for low minority shares at moderately selective institutions, low minority shares at these schools may then compound if future minority students are further deterred from attending by the already low minority shares at these schools.<sup>14</sup>

It is difficult to know the reason for the U-shaped relationship between percent minority and college quality. However, one piece of evidence that may provide support to certain potential explanations or cast doubt on others is how the within-institution test score gap between blacks and whites varies across the college quality spectrum. Data breaking down standardized test scores by race for students at particular institutions are difficult to come by, although the limited evidence that exists suggests that the racial test score gap is smaller at the most selective

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<sup>12</sup> See Hoxby and Avery (2013) on the general topic of college choices of high-achieving, low-income students.

<sup>13</sup> See Table 1 of Hoxby and Avery (2013) for information on out-of-pocket costs for students at the 20th percentile of family income at colleges of varying levels of selectivity.

<sup>14</sup> This overrepresentation of minority students at the very top compared to the middle could occur to some extent even with an affirmative action ban in place if, for example, there is either imperfect compliance with the affirmative action bans or efforts to circumvent them. For example, policies in place in some states that result in automatic admission for students at the top of their high school class not result in as much minority representation at highly selective schools as with explicit race-based affirmative action, but there is likely higher minority representation at highly selective schools with these policies than without them. Moreover, Antonovics and Backes (2014) also present evidence suggesting that campuses of the University of California changed the weight given in admissions decisions to various characteristics of applicants in a way that increased minority admissions rates relative to what they would have been otherwise, and Luppino (2013) and Yagan (2016) find that admissions advantages for minority students did not disappear at the University of California after the affirmative action ban.

institutions than at slightly less selective institutions.<sup>15</sup> One scenario this is consistent with is the most selective institutions admitting a disproportionate share of minority students and then slightly less selective institutions reaching further and further in order to attract minority students, although may be other scenarios that are consistent with this evidence as well.

## **VI. Conclusion**

Earlier research finds that affirmative action bans lead to lower minority enrollment at selective colleges, but there is a question of what happens to students who are displaced from particular colleges due to affirmative action bans. These students may cascade down to institutions that already have very high minority enrollment, or they may cascade down to institutions that would have otherwise had very low minority enrollment. These two scenarios have very different implications for the impact of affirmative action bans on segregation.

This paper provides the first estimates of the impact of affirmative action bans on racial segregation across colleges. The results suggest that the affirmative action bans could actually reduce racial segregation. I have given a possible explanation for this finding having to do with the U-shaped relationship between measures of college quality and the percentage of the student body that is black at colleges, and I have discussed some evidence that bolsters this interpretation. These results for segregation across colleges are in line with the results of Arcidiacono et al. (2013) and Arcidiacono, Khan, and Vigdor (2011) for interaction within

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<sup>15</sup> Herrnstein and Murray (1994) report data from the Consortium on Financing Higher Education, a consortium of selective institutions, showing SAT score gaps between blacks and whites for 24 selective private institutions for the entering classes of 1991 and 1992. The test score gap is generally lower at the most selective institutions on this list. For example, the lowest gap is at Harvard. Institutions such as MIT, Princeton, and the University of Pennsylvania also have relatively low gaps. The highest gaps are at institutions such as Rice, Rochester, Wesleyan, and Oberlin. Arcidiacono et al. (2014) show an academic index by race at the campuses of the University of California, and there the gap is the highest at the most selective and the least selective campuses. Arcidiacono, Khan, and Vigdor (2011, Table 2) find a slightly higher SAT gap at the relatively less selective institutions in the College and Beyond Database, which includes a small set of selective institutions.

colleges in finding that affirmative action will not necessarily lead to more interaction between people of different races. However, I have also found that in some cases affirmative action bans do seem to be associated with greater segregation across colleges.

A full cost-benefit analysis of affirmative action is beyond the scope of this paper. But the results of this paper have shown that, even if there are benefits to diversity, this alone is not necessarily a point in favor of affirmative action in a cost-benefit analysis because one college's gain in diversity may be another college's loss. What is needed is to know the impacts of diversity as well as the impact of affirmative action on diversity across colleges, which can be measured by segregation indexes. One caveat, though, is that if the beneficial effects of diversity are even larger at more selective colleges, this in itself could be a point in favor of affirmative action. This could be true if, for example, selective institutions are a training ground for future leaders and it is especially important to expose such individuals to a diverse group of peers while in college. However, I know of no existing evidence on the interaction between diversity and college quality.<sup>16</sup>

There are a number of other considerations that would need to be taken into account in a full cost-benefit analysis. One additional consideration is that affirmative action bans displace minorities from highly selective universities, and there is evidence suggesting that the return to attending a selective college is higher for members of minority groups (e.g., Daniel, Black, and Smith 2001 or Dale and Krueger 2014). If this is true, it may be socially valuable to ration the scarce slots in selective colleges in favor of minority groups. Other important issues to consider

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<sup>16</sup> There are large challenges even in estimating the main effect of diversity at the college level. Arcidiacono and Vigdor (2010); Daniel, Black, and Smith (2001); and Hinrichs (2011) have all done so and have found mixed results, although there may be concern about selection bias. Affirmative action bans may be useful for estimating the effects of diversity, but they likely also change the ability level of the student body and so cannot necessarily be used to estimate the effects of diversity net of ability. Studies based on random roommate assignments have strong internal validity for estimating the effects of roommates, but do not necessarily have strong external validity for estimating the effects of changing the diversity level of an entire college.

include the effects of affirmative action on minority enrollment (Arcidiacono 2005, Arcidiacono et al. 2014, Hinrichs 2012, Howell 2010, Long 2004b), pre-college human capital investment (Antonovics and Backes 2014b, Hickman 2013), major choice (Arcidiacono, Aucejo, and Hotz 2016; Arcidiacono, Aucejo, and Spenner 2012; Hill 2016), longer-run outcomes such as educational attainment and earnings (Arcidiacono 2005, Arcidiacono, Aucejo, and Hotz 2016; Arcidiacono et al. 2014, Hinrichs 2014), and cross-racial interaction (Arcidiacono et al. 2013 and Arcidiacono, Khan, and Vigdor 2011). Also relevant are the effects of cross-racial interaction on attitudes and on friendship groups (Baker, Mayer, and Puller 2011; Boisjoly et al. 2006; Camargo, Stinebrickner, and Stinebrickner 2010; Carrell, Hoekstra, and West 2016).<sup>17</sup>

Finally, even if banning affirmative action can reduce racial segregation, this is not to say that this would be the preferred means of doing so. If there is a goal to reduce segregation across colleges, arguably a better way to do this is to reduce the overrepresentation of minority students at the bottom of the college quality spectrum rather than, as affirmative action bans sometimes seem to do, moving minority students down from the top of the college quality spectrum. But banning affirmative action is a policy that a number of states have already implemented, and it is conceivable that there may be more affirmative action bans in the future. The results of this paper suggest that the effects of doing so are not always as they may initially seem.

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<sup>17</sup> Additional areas of research that are relevant to the affirmative action debate include the more general bodies of research on college quality (Black and Smith 2004, 2006; Dale and Krueger 2002, 2011; Hoekstra 2009; Long 2008, 2010) and on peer effects in college (Foster 2006; Sacerdote 2001; Stinebrickner and Stinebrickner 2006; Zimmerman 2003).

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Table 1: Hypothetical Example Showing Ambiguous Effects of Affirmative Action Bans

		Before Ban	After Ban Scenario 1	After Ban Scenario 2
College 1	Number of Black Students	200	150	150
	Number of White Students	800	850	850
College 2	Number of Black Students	100	100	150
	Number of White Students	900	900	850
College 3	Number of Black Students	200	250	200
	Number of White Students	800	750	800
Black-White Dissimilarity		16	20	8
White Exposure to Black		16.4	16.2	16.6
Black Exposure to White		82	81	83

Table 2: Timing of Affirmative Action Bans

State	First Year Ban in Place for Fall Admissions Cycle
Texas	1997 (last year: 2004)
California	1998
Washington	1999
Florida	2001
Michigan	2007
Nebraska	2009
Arizona	2011
New Hampshire	2012
Oklahoma	2013

Table 3: Summary Statistics for Racial Composition Regressions, 2004-2014

<i>Variable</i>	<i>Type of Institution</i>					
	Four-Year	Public	<i>U.S. News</i>	Public	<i>U.S. News</i>	Public
		Four-Year	<i>U.S. News</i>	Top Two Tiers	<i>U.S. News</i>	Top 50
% Asian	7.208	7.866	14.56	14.39	22.62	24.95
% Black	11.80	10.86	5.739	5.560	6.215	5.410
% Hispanic	11.94	12.89	9.892	9.758	10.78	11.00
% Native American	0.863	0.925	0.437	0.411	0.463	0.388
% White	68.19	67.45	69.37	69.88	59.92	58.25
Affirmative Action Ban	0.208	0.234	0.234	0.278	0.348	0.513
N	24463	6183	1209	605	517	165

Notes: The table shows means at the college level that are weighted by total enrollment.

Table 4: Effects of Affirmative Action Bans on Representation by Race, 2004-2014

<i>Racial Group</i>	<i>Type of Institution</i>					
	Four-Year	Public		Public		Public
		Four-Year	<i>U.S. News</i>	<i>U.S. News</i>	<i>U.S. News</i>	<i>U.S. News</i>
		Top Two Tiers	Top Two Tiers	Top 50	Top 50	
% Asian	-0.4799** (0.2139)	-0.1493** (0.0612)	0.1885 (0.5578)	0.1918 (0.4853)	-1.1514*** (0.3665)	-0.6730 (0.7703)
% Black	0.0965 (0.4727)	-0.0897 (0.4097)	-0.2684 (0.2482)	-0.3644 (0.2418)	-0.7458** (0.2858)	-1.0512** (0.4021)
% Hispanic	0.0724 (0.6389)	0.3378 (0.3031)	-0.2061 (0.1302)	-0.1894 (0.1735)	-1.0181** (0.3981)	-0.8399 (0.4748)
% Native American	-0.0756 (0.0962)	-0.0391 (0.1001)	-0.0370 (0.0869)	-0.0210 (0.0923)	-0.3762*** (0.0454)	-0.3967*** (0.0957)
% White	0.3865 (0.5211)	-0.0598 (0.3040)	0.3231 (0.9269)	0.3830 (0.8691)	3.2916*** (0.3192)	2.9608** (0.9525)
N	24,463	6,183	1,209	605	517	165

Notes: Regressions are weighted by total enrollment. Standard errors that are robust to clustering at the state level are in parentheses. A single asterisk denotes statistical significance at the 10% level, a double asterisk denotes statistical significance at the 5% level, and a triple asterisk denotes statistical significance at the 1% level.

Table 5: Summary Statistics for Effects of Affirmative Action Bans on Black-White Segregation

<i>Time Period</i>	<i>Variable</i>	<i>Type of Institution</i>					
		Four-Year	Public Four-Year	<i>U.S. News</i> Top Two Tiers	Public <i>U.S. News</i> Top Two Tiers	<i>U.S. News</i> Top 50	Public <i>U.S. News</i> Top 50
<i>A. 1995-2014</i>							
	W Exposure to B	7.668	7.468	5.703	5.710	6.459	6.128
	B Exposure to W	49.28	50.00	70.71	72.39	64.39	64.85
	B-W Dissimilarity	40.69	35.49	13.11	9.14	9.21	3.81
	Affirmative Action Ban	0.1371	0.1492	0.1531	0.1721	0.2031	0.3005
	N	940	940	640	580	440	200
<i>B. 1995-2003</i>							
	W Exposure to B	6.596	6.771	5.734	5.837	6.519	6.538
	B Exposure to W	50.11	50.82	73.47	74.84	67.81	67.71
	B-W Dissimilarity	40.59	36.34	13.45	9.74	9.45	5.61
	Affirmative Action Ban	0.0951	0.1024	0.1215	0.1267	0.1283	0.1772
	N	423	423	288	261	198	90
<i>C. 2004-2014</i>							
	W Exposure to B	8.447	7.973	5.678	5.610	6.409	5.806
	B Exposure to W	48.83	49.51	68.64	70.51	61.79	62.51
	B-W Dissimilarity	40.77	34.88	12.85	8.67	9.02	2.40
	Affirmative Action Ban	0.1665	0.1822	0.1780	0.2077	0.2640	0.3977
	N	517	517	352	319	242	110

Notes: The table shows means at the state level. The means for white exposure to blacks are weighted by the number of whites, the means for black exposure to whites are weighted by the number of blacks, and the other variables are weighted by the sum of black enrollment and white enrollment. The variable measuring white exposure to blacks has one fewer observation in the 1995-2014 and 2004-2014 public four-year samples than the other variables due to there being no whites who were full-time, first-time, degree-seeking undergraduates in public universities in the District of Columbia in 2010.

Table 6: Effects of Affirmative Action Bans on Black-White Segregation

<i>Time Period</i>	<i>Variable</i>	<i>Type of Institution</i>					
		Four-Year	Public Four-Year	<i>U.S. News</i> Top Two Tiers	Public <i>U.S. News</i> Top Two Tiers	<i>U.S. News</i> Top 50	Public <i>U.S. News</i> Top 50
<i>A. 1995-2014</i>							
	W Exposure to B	-0.5413 (0.4902)	-0.1724 (0.1203)	-0.4427 (0.2812)	-0.4988 (0.3546)	-0.5159 (0.3107)	-0.7908 (0.4567)
	B Exposure to W	0.1530 (0.9576)	-0.1945 (1.4332)	1.8369** (0.8165)	1.2176 (1.0334)	2.7271** (1.1505)	1.7765 (1.1029)
	B-W Dissimilarity	0.5953 (0.9624)	0.7230 (1.1813)	1.9851** (0.9535)	0.9658 (1.3479)	0.2823 (0.6250)	-1.5848 (1.6259)
	N	940	940	640	580	440	200
<i>B. 1995-2003</i>							
	W Exposure to B	-0.1251 (0.0992)	-0.4068** (0.1702)	-1.0050*** (0.3360)	-1.2419*** (0.3476)	-1.7558* (0.9823)	-2.0408* (1.0834)
	B Exposure to W	3.8154** (1.5136)	3.1614** (1.3980)	2.3232*** (0.7465)	1.9684*** (0.4075)	4.8717*** (0.2815)	3.7478*** (1.0320)
	B-W Dissimilarity	-3.2161*** (1.0316)	-2.5886** (0.9664)	2.1835 (3.9948)	-0.5438 (3.8118)	-3.9752* (2.0660)	-3.7749 (2.9158)
	N	423	423	288	261	198	90
<i>C. 2004-2014</i>							
	W Exposure to B	-0.3576 (0.4627)	-0.1145 (0.2595)	-0.2702 (0.2432)	-0.3754 (0.2354)	-0.7295** (0.2819)	-1.0714** (0.4667)
	B Exposure to W	-3.6570*** (1.0039)	-5.0689*** (0.9542)	1.1014 (0.8553)	0.8679 (0.7225)	3.4904*** (0.3028)	2.5692 (1.4103)
	B-W Dissimilarity	4.0951*** (0.8497)	4.1286*** (1.5323)	-0.5496 (0.7273)	-1.4207 (0.8833)	0.1606 (1.0585)	2.0171 (1.8552)
	N	517	517	352	319	242	110

Notes: The regressions for white exposure to blacks are weighted by the number of whites, the regressions for black exposure to whites are weighted by the number of blacks, and the regressions for black-white dissimilarity are weighted by the sum of black enrollment and white enrollment. Standard errors that are robust to clustering at the state level are in parentheses. A single asterisk denotes statistical significance at the 10% level, a double asterisk denotes statistical significance at the 5% level, and a triple asterisk denotes statistical significance at the 1% level. Regressions involving white exposure to blacks have one fewer observation in the 1995-2014 and 2004-2014 public four-year samples than the other regressions in those samples due to there being no whites who were full-time, first-time, degree-seeking undergraduates in public universities in the District of Columbia in 2010.



Table 7: Summary Statistics for Effects of Affirmative Action Bans on Hispanic-White Segregation

<i>Time Period</i>	<i>Variable</i>	<i>Type of Institution</i>					
		Four-Year	Public Four-Year	<i>U.S. News</i> Top Two Tiers	Public <i>U.S. News</i> Top Two Tiers	<i>U.S. News</i> Top 50	Public <i>U.S. News</i> Top 50
<i>A. 1995-2014</i>							
	W Exposure to H	6.946	7.032	7.143	6.741	8.111	7.932
	H Exposure to W	49.57	46.65	61.37	59.72	55.26	51.13
	H-W Dissimilarity	29.73	26.06	14.46	8.62	9.56	3.52
	Affirmative Action Ban	0.1618	0.1806	0.1733	0.1974	0.2293	0.3384
	N	940	940	640	580	440	200
<i>B. 1995-2003</i>							
	W Exposure to H	5.039	4.971	5.517	5.132	6.367	6.275
	H Exposure to W	54.76	52.35	66.20	65.23	59.84	55.92
	H-W Dissimilarity	31.35	27.07	15.70	9.12	10.62	3.78
	Affirmative Action Ban	0.1115	0.1224	0.1352	0.1436	0.1426	0.1982
	N	423	423	288	261	198	90
<i>C. 2004-2014</i>							
	W Exposure to H	8.332	8.525	8.432	8.001	9.541	9.234
	H Exposure to W	47.59	44.60	59.13	57.29	53.05	48.90
	H-W Dissimilarity	28.63	25.39	13.52	8.24	8.74	3.32
	Affirmative Action Ban	0.1958	0.2193	0.2019	0.2372	0.2959	0.4415
	N	517	517	352	319	242	110

Notes: The table shows means at the state level. The means for white exposure to Hispanics are weighted by the number of whites, the means for Hispanic exposure to whites are weighted by the number of Hispanics, and the other variables are weighted by the sum of Hispanic enrollment and white enrollment. The variable measuring white exposure to Hispanics has one fewer observation in the 1995-2014 and 2004-2014 public four-year samples than the other variables due to there being no whites who were full-time, first-time, degree-seeking undergraduates in public universities in the District of Columbia in 2010.

Table 8: Effects of Affirmative Action Bans on Hispanic-White Segregation

<i>Time Period</i>	<i>Variable</i>	<i>Type of Institution</i>					
		Four-Year	Public Four-Year	<i>U.S. News</i> Top Two Tiers	Public <i>U.S. News</i> Top Two Tiers	<i>U.S. News</i> Top 50	Public <i>U.S. News</i> Top 50
<i>A. 1995-2014</i>							
	W Exposure to H	-0.8537 (0.6478)	-1.2667* (0.6314)	-1.5328** (0.5862)	-1.6945** (0.7728)	-2.5615*** (0.7872)	-2.9754** (1.0391)
	H Exposure to W	-0.2283 (1.9172)	-1.4471 (2.4678)	1.1227 (1.0408)	0.3709 (1.2232)	2.2339* (1.1849)	1.5530 (1.3042)
	H-W Dissimilarity	0.8046 (1.3326)	2.4561 (2.2055)	-2.5579 (2.6393)	-1.5022 (2.7638)	-3.8494 (2.7246)	-2.8503 (2.4099)
	N	940	940	640	580	440	200
<i>B. 1995-2003</i>							
	W Exposure to H	-0.6654 (0.4844)	-0.6583 (0.5600)	-0.9501 (0.7285)	-1.1244 (0.9215)	-1.4480** (0.6157)	-1.6609* (0.8508)
	H Exposure to W	1.0430 (0.9647)	0.5595 (1.3724)	1.8443*** (0.2149)	1.4825** (0.5700)	3.5699*** (0.5499)	2.8715** (0.8898)
	H-W Dissimilarity	-0.7034 (1.0684)	-0.1138 (1.6077)	-2.0356 (1.9201)	-0.7892 (2.4620)	-2.2285 (1.5342)	-1.3982 (1.3855)
	N	423	423	288	261	198	90
<i>C. 2004-2014</i>							
	W Exposure to H	0.3408 (0.2806)	0.1178 (0.1405)	-0.0697 (0.1347)	-0.0933 (0.1555)	-1.0792*** (0.3352)	-1.1676** (0.4917)
	H Exposure to W	0.5714 (0.7503)	0.7606** (0.3238)	-0.3002 (1.2421)	-0.5003 (1.2735)	3.2576*** (0.2057)	2.8321** (1.0350)
	H-W Dissimilarity	-0.9336* (0.5419)	-1.0781 (1.1312)	-3.5588*** (1.1726)	-2.6607 (1.6060)	0.4113 (1.0178)	0.0088 (0.8565)
	N	517	517	352	319	242	110

Notes: The regressions for white exposure to Hispanics are weighted by the number of whites, the regressions for Hispanic exposure to whites are weighted by the number of Hispanics, and the regressions for Hispanic-white dissimilarity are weighted by the sum of white enrollment and Hispanic enrollment. Standard errors that are robust to clustering at the state level are in parentheses. A single asterisk denotes statistical significance at the 10% level, a double asterisk denotes statistical significance at the 5% level, and a triple asterisk denotes statistical significance at the 1% level. Regressions involving white exposure to Hispanics have one fewer observation in the 1995-2014 and 2004-2014 public four-year samples than the other regressions in those samples due to there being no whites who were full-time, first-time, degree-seeking undergraduates in public universities in the District of Columbia in 2010.

Figure 1: % Black at Universities in 2014  
by Ventile of SAT Score and with Quadratic Fit

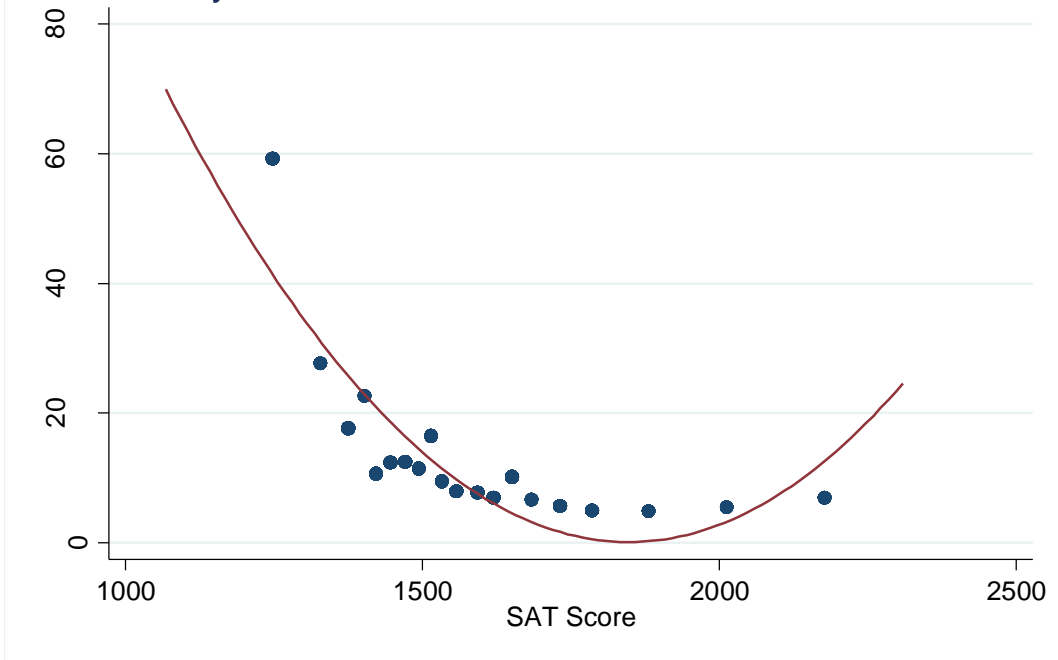


Figure 2: Black Exposure to Whites for California Universities

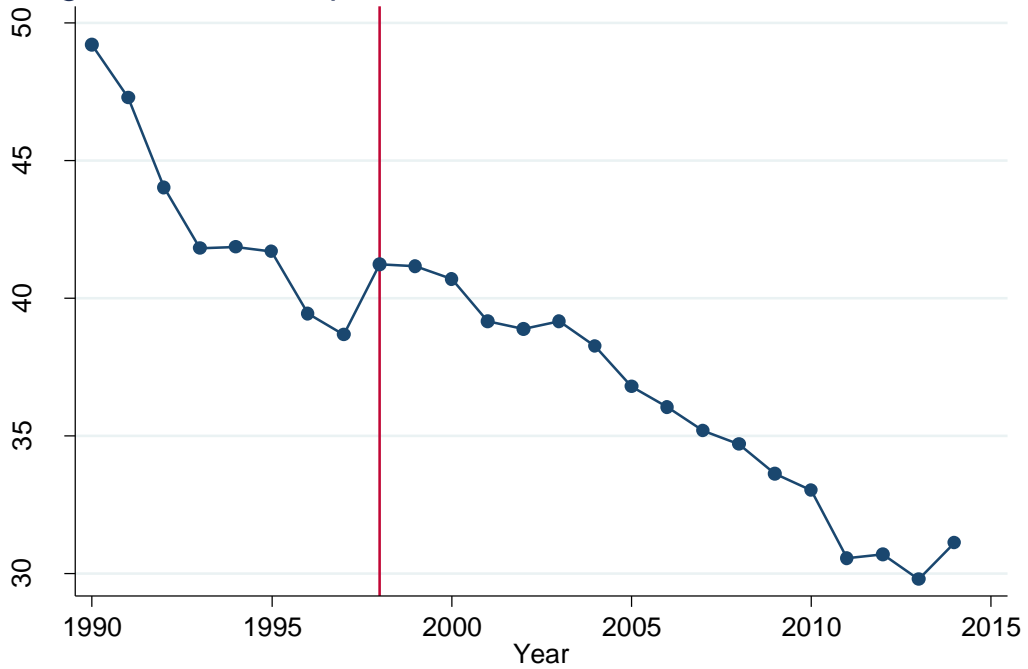


Figure 3: Black-White Dissimilarity for California Universities

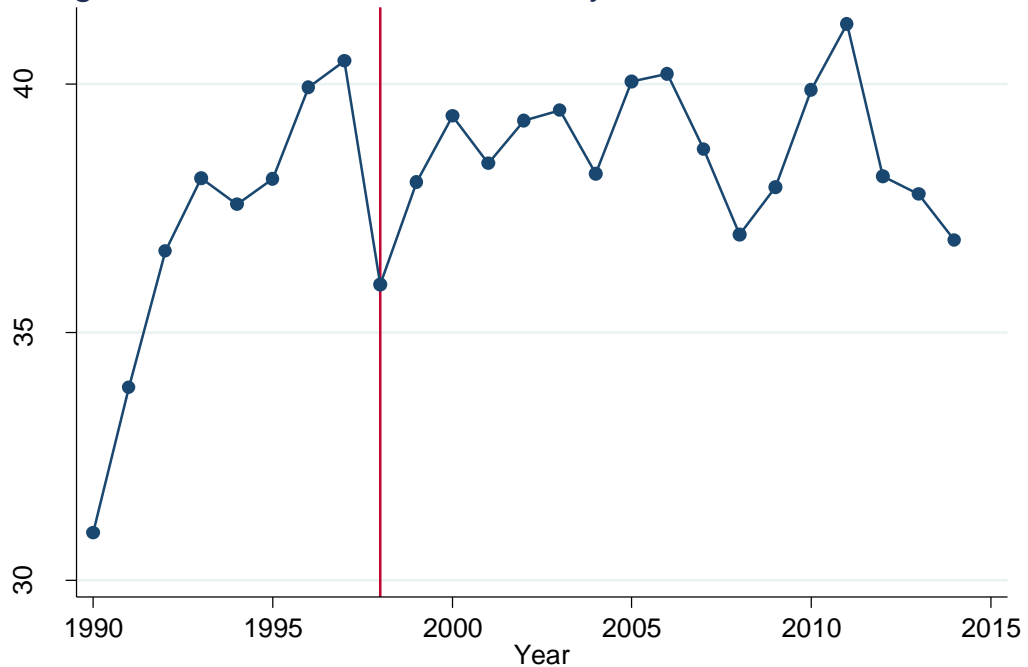


Figure 4: % White at California Public Universities

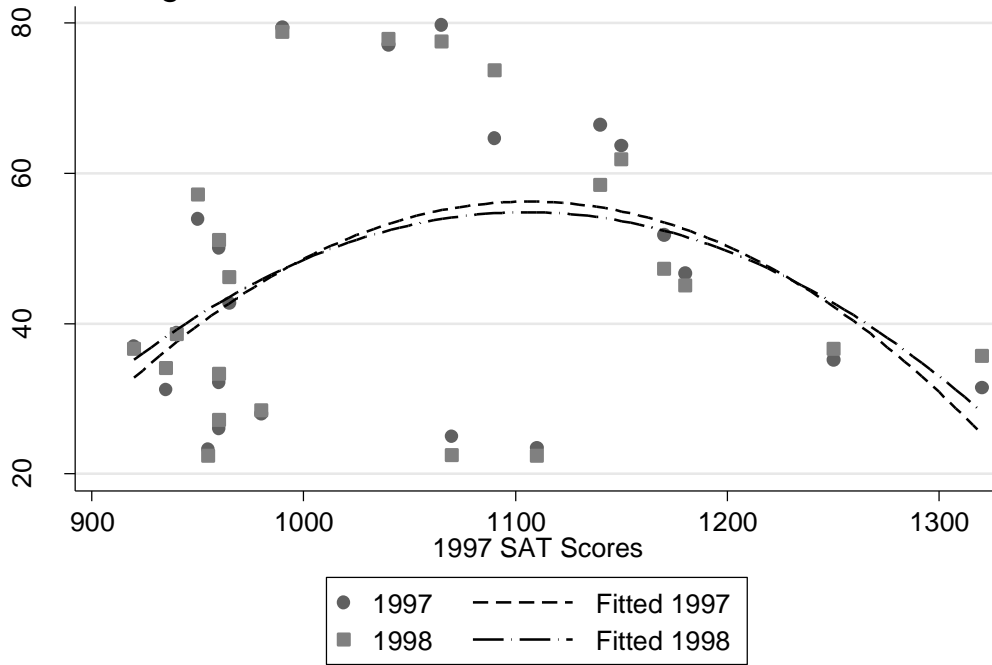


Figure 5: % Black at California Public Universities

