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Racial Diversity in the Medical Profession: The Impact of Affirmative Action Bans on Underrepresented Student of Color Matriculation in Medical Schools

Liliana M. Garces [Assistant Professor] and

Pennsylvania State University, College of Education, 400 Rackley Building, University Park, PA 16802, Phone: 814-865-9754

David Mickey-Pabello [Doctoral Student]

University of Michigan

Liliana M. Garces: garceslm@gmail.com; David Mickey-Pabello: dmhurdle@gmail.com

Abstract

This study examines the impact of affirmative action bans in six states (California, Washington, Florida, Texas, Michigan, and Nebraska) on the matriculation rates of historically underrepresented students of color in public medical schools in these states. Findings show that affirmative action bans have led to about a 17% decline (from 18.5% to 15.3%) in the first-time matriculation of medical school students who are underrepresented students of color. This decline is similar to drops in the enrollment of students of color that have taken place across other educational sectors, including the nation's most selective public undergraduate institutions, law schools, and various graduate fields of study, after bans on affirmative action were enacted in some of these states. The findings suggest that statewide laws banning the consideration of race in postsecondary admissions pose serious obstacles for the medical profession to address the health-care crisis facing the nation.

Keywords

Diversity; Affirmative Action; Access; Medical School

Introduction

The U.S. is facing a nationwide health crisis, with widely documented disparities in the quality and frequency of treatment received by racial and ethnic minorities (U.S. Department of Health and Human Services [DHHS], 2011a, 2011b). By providing greater access to health care for our increasingly diverse and underserved populations and more positive interactions between patients and health professionals (DHHS, 2006), a racially and ethnically diverse physician workforce can help address this crisis (Smedley, Butler, Bristow, 2006). Moreover, racial and ethnic diversity in medical education enhances the learning and cross-cultural competencies of all doctors (Guiton, Chang, & Wilkerson, 2007;

Correspondence to: Liliana M. Garces, garceslm@gmail.com.

Saha, Guiton, Wimmers, & Wilkerson, 2008; Whitla et al., 2003). Nevertheless, despite gains over the last few decades, Africans Americans, Latinos, and Native Americans remain underrepresented in the health professions relative to their proportion of the U.S. population.

Although 16 percent of the U.S. population is Latino and 14 percent is African American, these groups constituted only 9 percent and 7 percent, respectively, of the total U.S. medical school enrollment in 2012 (Association of American Medical Colleges [AAMC], 2012a). Racial and ethnic minorities are projected to make up 54 percent of the U.S. population by mid-century (U.S. Census Bureau, 2008), thus this enrollment disparity creates serious barriers to addressing the health needs of underserved communities and communities of color.

To address these concerns, medical schools have long defended the need for race-conscious admissions policies or the ability to consider race or ethnicity as one of many factors in admissions decisions (i.e., affirmative action) (e.g., Lee & Franks, 2010). While the U.S. Supreme Court most recently preserved the right of postsecondary institutions to carefully implement race-conscious admissions practices to achieve the educational benefits of a racially and ethnically diverse student body (*Fisher v. University of Texas*, 2013), laws in eight states—California, Washington, Florida, Michigan, Nebraska, Arizona, New Hampshire, and, most recently, Oklahoma—ban the practice. After bans on affirmative action were implemented in Texas, California, Washington, and Florida, researchers documented declines in these states in the admission and enrollment of students of color at selective undergraduate institutions (e.g., Backes, 2012; Hinrichs, 2012), in law schools (Kidder, 2003; Wightman, 1997), and in graduate fields of study (Garces, 2012, 2013).

The effects of affirmative action bans in the field of medicine, however, remain unknown. While the Association of American Medical Colleges (AAMC) has reported drops in minority enrollments following the implementation of such bans, no studies have examined their causal impact. As stakeholders continue to debate affirmative action policies, knowing whether these changes in policy have had a negative impact on the representation of historically marginalized students of color in the field of medicine is critical to understanding the long-term effects these policies will have on our nation's public health-care system. To our knowledge, this is the first study to document the causal impact of affirmative action bans on historically underrepresented populations in the important field of medicine.

In this study, we examine the implementation of the bans as exogenous policy changes in six states—California, Washington, Florida, Texas, Michigan, and Nebraska—in order to estimate their causal impact on the matriculation rates of underrepresented students of color at public medical schools in these states. We do not consider the impact of bans in Arizona, New Hampshire, and Oklahoma, as the implementation of the bans in these states is too recent (2010, 2011, 2012, respectively) to determine their impact. Because the overall matriculation of students changes over time, our outcome is the proportion (as opposed to the number) of first-time matriculant medical school students who are historically underrepresented students of color (e.g., Hinrichs, 2012; Howell, 2010). The definition of historically underrepresented students of color includes students whose self-reported race or

ethnicity is Black or African American, Latino or Hispanic, and/or Native American/Alaska Native, and who are not considered "foreign" students because the determination of race or ethnicity as a factor in admissions decisions presumably does not apply to students who are considered foreign, and application, admissions, and matriculation determinations for these students are different from those for domestic students. Our outcome measure captures the overall policy-relevant impact of the bans on applications, admissions, and matriculation, which may also reflect changes in outreach, recruitment, and financial aid support.

In the following sections, we first outline the literature to which this study contributes, then describe our research design and findings, which show that the affirmative action bans in these six states are associated with a 3.2 percentage-point decline in the proportion of historically underrepresented students of color among first-time matriculating medical school students than would otherwise be expected if no bans had been in place. These findings suggest that affirmative action bans impede the ability of postsecondary institutions to train a racially and ethnically diverse physician workforce and, as a result, to address the health crisis facing the nation. We conclude by outlining the policy implications of this work and suggesting areas for future research.

Literature Review and Background

Studies on the Effect of Affirmative Action Bans in Graduate and Professional Fields

Most research on the impact of affirmative action bans has focused on the undergraduate level. Recent studies supporting causal inferences have found that affirmative action bans have led to reductions in the first-year enrollment of students of color at public selective colleges and universities throughout the nation (see, e.g., Backes, 2012; Hinrichs, 2012; Espenshade & Chung, 2005). Hinrichs (2012), for example, found that bans on affirmative action in California, Florida, Texas, and Washington have led to a 1.74 percentage-point decline in the enrollment of African American students and a 2.03 percentage-point decline in the enrollment of Latino students at the most selective public institutions in the nation. These declines represent about a 30% and a 27.5% overall drop in the percentage of African American and Latino students, respectively, enrolled at selective institutions. These are significant declines, given the already low percentages of African Americans (5.79%) and Latinos (7.38%) enrolled at the most selective institutions. In a separate analysis of the bans in these same four states, Backes (2012) found a 29% overall decline (from 5.6% to 4%) in the percentage of African American students enrolled at these states' most selective public colleges and universities and a 20% drop (from 14.2% to 11.3%) for Latino students.

More recent studies that have examined the impact of these policies on graduate public education other than law and medicine and that support causal inferences have documented similar declines. In graduate studies overall, the bans in Texas, California, Washington, and Florida have led to about a 12.2% decline (from 9.9% to 8.7%) in the average proportion of graduate students who are students of color at public institutions in these states (Garces, 2012). A more fine-grained analysis of the impact of bans within specific fields shows that the greatest decline occurred in science-related fields. Garces (2013), for instance, found that the bans in these states have led to a 26% drop in the percentage of engineering graduate students who are Latino, African American, or Native American (from 6.2% to 4.6%), a

19% decline in the natural sciences (from 7.8% to 6.3%), and a 15.7% drop in the social sciences (from 12.1% to 10.2%). In the humanities, the bans have contributed to an 11.8% decline (from 10.2% to 9%).

Although it is critical to understand the impact of affirmative action bans in the professions of law and medicine, the few other studies that have examined the topic have been primarily descriptive. In medicine, for example, they have shown a decline in the enrollment of underrepresented students of color after the implementation of affirmative action bans. In a comparison of Black and Chicano students who were admitted to the University of California medical schools between 1996 and 1997, after Proposition 209 banned affirmative action in California, Karabel (1998) found that the number of enrollees dropped by 38% and 29%, respectively (from 76 to 62 African Americans, and from 134 to 117 Chicanos). Using data from the AAMC, Carlisle, Gardner, and Liu (1998) speculated that bans on affirmative action were beginning to reverse gains in matriculation made by students of color, particularly at private institutions, and they in fact documented a 5% decline (from 2,010 to 1,906 students) from 1995 to 1996. Steinecke and Terrell (2008) showed that, from 1993 to 1997, the proportion of minority applicants among students who matriculated in medical schools in California decreased by 8.7% (from 23.1% of the student body to 14.3%).

These descriptive studies track similar findings in law. In a study of the enrollment rates at five selective public law schools in California, Texas, and Washington, for example, Kidder (2003) documented a drop of about four percentage points, or nearly two-thirds, in the enrollment rates of African Americans (from 6.5% to 2.25%) and more than one-third for Latinos (from 11.8% to 7.4%) after the implementation of affirmative action bans in these states. These studies followed simulation studies that had predicted declines in enrollment among students of color when race or ethnicity ceased to be considered in graduate admissions decisions (Cross & Slater, 1997; Dugan, Baydar, Grady, & Johnson, 1996; Wightman, 1997).

Race-Conscious Admissions Policies in Medical School Admissions

Implementing race-conscious admissions policies in an effort to address racial and ethnic inequities in access to medical schools culminated in the landmark 1978 U.S. Supreme Court decision in *Regents of the University of California v. Bakke*. The case examined the constitutionality of an admissions policy at the University of California, Davis, medical school, which had implemented a policy that reserved 16 of its 100 places for disadvantaged minority students to help address the effects of past discriminatory admissions practices. Allan Bakke, a White medical school student who had been denied admission to the medical school twice, challenged the medical school's policy on the grounds that it violated the Equal Protection Clause of the 14th Amendment. In *Bakke*, the Court struck down the medical school's policy as unconstitutional on the grounds that it operated as a quota, but the Court did allow the use of race as a factor in admissions under limited circumstances. In a controlling opinion by Justice Powell, the Court prevented institutions from using race-conscious policies to remedy the effects of past discrimination in the absence of de jure

segregation, and instead permitted the use of race in admissions to achieve a diverse student body that would further the institution's educational mission.

Although the *Bakke* decision legitimized considering race as one of many factors in admissions to help attain the educational benefits of diversity, racial and ethnic inequities in access to medical schools persisted (Cohen, 2003). In the early 1990s, concerned about ongoing inequities, the AAMC reinvigorated medical school admissions programs with Project 3000 by 2000, which aimed, as the name indicates, to increase the number of underrepresented minority students to 3,000 by the year 2000. While the project had some initial success, it did not reach its goal (Terrell & Beaudreau, 2003). Other organizations, such as the Institute of Medicine (Smedley, Butler, & Bristow 2004) and the Sullivan Commission (Sullivan, 2004) also have advocated for racial and ethnic diversity in the medical profession to help institutions serve a multicultural society more effectively.

The Societal Value and Educational Benefits of Racial and Ethnic Diversity in Medical Schools

The efforts of medical schools to enroll a racially and ethnically diverse student body are grounded in the societal and educational benefits a diverse student body provides. Racial and ethnic diversity in the medical profession leads to improved public health by providing more positive interactions between patients and health professionals and greater access to care for underserved populations (DHHS, 2006). Empirical research has shown that minority patients strongly prefer to receive medical care from physicians with the same racial or ethnic background (Saha, Taggart, Komaromy, & Bindman 2000), and they rate the quality of their visit higher when they are treated by physicians with the same racial or ethnic background (Saha, Komaromy, Koepsell, & Bindman, 1999).

Racial and ethnic diversity in medical school also prepares all students, not just students of color, to become better doctors, as it helps them be more aware of other cultures, languages, and perspectives. All students, irrespective of their individual background, must learn about the vast array of belief systems, cultural biases, family structures, historical realities, and a host of other cultural factors that influence the way individuals experience illness and respond to advice and treatment (Cohen, 2003). Experience with patients of color, having informal instructional interactions with people of diverse backgrounds, and having a diverse group of friends all have been shown to have a positive impact on a medical school student's attitude toward diversity (Guiton et al., 2007) and enhance classroom discussions that improve cross-cultural competencies (Whitla et al., 2003). Indeed, graduates of highly diverse medical schools rate their preparation for treating patients from various backgrounds more highly than those who attended the least diverse medical schools, which they attribute to their interactions with peers from diverse backgrounds, as it enhanced their ability to appreciate the perspectives of others (Saha et al., 2008).

Being exposed to a range of unique perspectives also helps students approach intellectual and research puzzles in the medical community more successfully. Disparities in access and health status among minorities are prime examples of problems for which solutions appear particularly elusive (Cohen, 2003). Achieving greater racial and ethnic diversity among those who research these problems will bring a much needed perspective to many of the

unsolved health problems that confront all Americans, particularly those rooted in social, cultural, and behavioral factors.

Admissions Practices in Medical Schools and Hypotheses

The push to increase racial and ethnic diversity in medicine has led to an admissions culture in which both traditional academic measures, such as grade point averages (GPAs) and standardized test scores (the MCAT), are considered along with skills such as leadership, overcoming adversity, participation in service-oriented extracurricular activities, and strong communications skills (Cohen, 2003). Data from the AAMC (2012b) indicates that the average MCAT scores and GPAs of applicants who are Latino, Black, or American Indian are lower than those of their White and Asian American peers. However, these differences are not necessarily indicative of innate intelligence or achievement potential: research indicates that students from the highest socioeconomic backgrounds, which includes fewer underrepresented students of color, are likely to score highest on standardized tests (Fadem, Schuchman, & Simring, 1995). Moreover, factors such as “stereotype threat”—that is, the anxiety or stress triggered by the fear that one might fulfill a negative stereotype—can also contribute to African American and Latino students’ underperformance on standardized tests (Steele, 1997). Since relying on standardized tests in admissions may disproportionately undermine students of color’s chances of being admitted, considering these other skills as part of the admissions process allows medical schools to select students of color who have the greatest capacity to complete medical school and to positively affect the medical education of their peers (Cohen 2003; Garrison, Mikesell, & Matthew, 2007).

Having noted the documented decline in the enrollment of students of color at public graduate and professional schools (Daye, Panter, Allen, & Wightman, 2010; Garces, 2012, 2013), we hypothesize that the bans across the states addressed in this analysis have resulted in a decline in the matriculation rates of underrepresented students of color at public medical schools. However, it is possible that, because of the holistic admissions policies in some medical schools, the impact affirmative action bans have had on the matriculation of underrepresented students of color may differ from the impact documented in other areas. It is also possible that the impact of the bans at public institutions is mitigated by students’ choices to apply or matriculate at private institutions not governed by the bans. For these reasons, in our analysis, we consider the impact of the bans on underrepresented student of color matriculation at private institutions. This analysis is important for understanding the broader policy implications of our findings.

Affirmative Action Bans Considered in this Study

In this study, we examine the impact of the affirmative action ban that was implemented in Texas in 1997 as a result of the *Hopwood v. University of Texas* (1996), a court opinion that remained in place until 2003, when *Grutter v. Bollinger* overruled it. In 1997, the Texas attorney general interpreted the decision as applying to both public and private institutions in the state, and to include decisions about admissions, financial aid, scholarships, and recruitment and retention practices. Thus, we consider all of the medical schools in Texas as having been affected by the ban.

We also investigate the impact of the affirmative action ban in California. The path toward banning affirmative action in California dates back to 1995, when the California Board of Regents first voted to pass Special Policy 1 (SP-1), which barred the consideration of race in admissions across the University of California system. SP-1 was amended in the fall of 1997 to apply to professional and graduate school admissions (Douglass, 1998), thus we consider the ban on affirmative action in California as having started in 1997.

Finally, we consider the affirmative action bans in Washington (Initiative 200), Florida (One Florida Initiative), Michigan (Proposal 2), and Nebraska (Initiative 424), which were implemented, respectively, in 1999, 2001, 2007, and 2009. It is worth noting that, unlike the bans on other states, the One Florida Initiative explicitly allowed institutions to make targeted efforts aimed at inclusion, including in areas of funding, recruitment, and retention. Moreover, while the ban was in effect, Florida's higher education system underwent changes in governance that might have allowed medical schools in Florida to operate under greater autonomy than medical schools in other states with bans. Therefore, we conduct sensitivity analyses that exclude Florida.

In our analysis, we also examine the impact of the bans on the first-time matriculation rates of underrepresented students of color at private institutions across the states in our sample. We do so for two main reasons. First, it is possible that students may have chosen to apply or matriculate at private institutions in the states with bans, thereby mitigating the impact of the bans across the states with bans in our sample. Second, it is also possible that underrepresented students of color may perceive institutions in states with bans as "unwelcoming" because of the state where they are located, regardless of whether the ban on affirmative action applies to them; they may also misunderstand that public and private institutions operate differently under the law. For these reasons, the private institutions in the states with bans can be considered as affected by the bans even though, under the law, they may continue to consider race as a factor in admissions (except in Texas). By examining the impact of the bans at both public and private institutions, we can thus better understand the policy implications of our findings.

Research Design and Analytic Framework

Conceptual Analytic Strategy: Difference-in-Differences

We use a difference-in-differences strategy to estimate the impact of affirmative action bans on the matriculation rates of students of color in the six target states that have banned the practice. This estimation strategy has been used in a number of important research studies that examine the impact of policy changes on education outcomes (Dynarski, 2004; Long, 2004) and is well-suited for estimating the impact affirmative action bans have on the matriculation rates of underrepresented minorities in medical school. Using this strategy, the "first difference" compares matriculation rates before and after the affirmative action bans were put in place, which captures whether changes in matriculation were associated with the start of the bans. If the affirmative action bans did have an impact on the matriculation rates of students of color, we would see a decline in those rates after the policies went into effect. However, because matriculation rates may differ from year to year for other reasons (e.g., changes in demographics or labor market conditions), this "first difference" may also

contain the impact of these other changes. Thus we use a "second difference" to capture these external trends, which takes advantage of a comparison group of first-time medical school students who lived in states where affirmative action bans were not implemented in the same period. Because they were in states that did not prohibit affirmative action, we attribute changes in the matriculation rates of students of color over the same period to general underlying trends rather than to the affirmative action bans. After subtracting the second difference from the first, the causal impact of affirmative action bans remains.

As a quasi-experimental method, this analytic strategy has limited ability to support causal claims, thus plausible alternative explanations for the findings must be considered and ruled out (Shadish, Cook, & Campbell, 2002). A true scientific experiment would be nearly impossible, however, due to the ethical implications for students whose educational opportunities could be inequitably altered if they participate. As we explain below, we implemented the difference-in-differences estimation strategy in a multilevel regression framework, with a combination of fixed and random effects to account for the hierarchical nature of the data (observations nested within institutions over time, nested within states) (Murnane & Willett, 2011).

Datasets

We analyzed institutional-level matriculant data from the AAMC, by race and ethnicity, from 1993 to 2011. We consider the impact of the bans on the first-time matriculation of students who identify as Black or African American, Latino or Hispanic, or Native American. It is worth noting important differences in the ways the AAMC collected data on race and ethnicity during this period. Until 2001, the AAMC used the categories Black/African American, Hispanic/Latino, Native American, Asian, and White; the Hispanic/Latino category included the subcategories of Mexican American, Puerto Rican, and Other Hispanic. Starting in 2002, the AAMC collected data using new race and ethnicity questions that allowed for multiple responses, and included additional subcategories for individuals who identified as Hispanic and non-Hispanic Asian. Latinos were allowed to choose an additional separate sub-category for Cuban; subcategories were also added for the Asian group (Asian Indian, Chinese, Filipino, Japanese, Korean, Pakistani, Vietnamese, and Other Asian). For the years 2002 and 2003, the AAMC also allowed the selection of "Other" (Association of American Medical Colleges, 2011 and 2012b). To allow for comparisons across time periods, we aggregated the racial/ethnic subcategories used from 2002 to 2011 into the broader categories employed in previous time periods (1993 to 2001).

For these reasons, in our analysis we are not able to capture a more nuanced understanding of how affirmative action bans affected the representation of students of color, particularly Asian American students, in medical schools. This fine-grained analysis is important, because studies have documented different patterns in access to medical school for racial group subcategories (McManus, Richards, Winder, Sproston, & Styles, 1995; Saha et al., 2008). Our analysis nevertheless provides an important point of departure for understanding the impact of the bans for groups that have been historically underrepresented in medical schools and the medical profession. This analysis is particularly important in light of the need to increase the participation of underrepresented groups in medicine (Le & Franks,

2010), We have merged these data with information on state demographics and labor market conditions from the U.S. Census Bureau, Center for Disease Control, and Bureau of Labor Statistics.

Sample and Measures

We limited our sample to public and private Liaison Committee on Medical Education (LCME) accredited U.S. medical schools, excluding those classified as Historically Black Colleges and Universities and those located in Puerto Rico; although these institutions have important medical school programs, they may not have responded to affirmative action bans in a way similar to other institutions in the sample because they generally enroll high percentages of students of color. From that subset, we excluded institutions whose reported first-time matriculation values were missing for students of all races across all years of the analytic window (1993–2011), or across a pre-ban or post-ban period for a respective state. In addition, some separate medical schools in our sample merged into one during the period of investigation. In these instances, we combined the schools into one during the period of analysis.

For the comparison group, we chose all 32 U.S. states (and D.C) that have public and private medical schools without affirmative action bans. Across all analyses, we excluded seven southern states (Alabama, Georgia, Louisiana, Mississippi, Tennessee, Kentucky, and South Carolina) because the public institutions in these states faced desegregation litigation during the period of investigation and therefore may not provide an untainted view of the general underlying trends in medical school matriculation. After imposing these limitations, we were left with 105 medical schools in the sample: 27 in the six target states that provided estimates for the first difference (Texas, California, Washington, Florida, Michigan, and Nebraska), and 78 medical schools in the comparison group that provided the required second difference.

In Table 1, we present descriptive statistics on selected institutional and state characteristics for the sample. First, in the left columns, we provide the number of public and private medical schools, in total and by *U.S. News & World Report* rankings (i.e., whether the medical school is ranked as “research” or “primary care”). As we show, 12 out of 29 (41.4%) public medical schools that are research ranked in our sample are present in states with affirmative action bans, and nearly one-third are primary care ranked. By contrast, there are only six private institutions in the states with bans (and one of these, in Texas, was covered by the ban), limiting our ability to generalize findings to these institutions. In the right columns, we present summary statistics on selected state characteristics. Overall, the states are comparable on the selected factors, except where the percentage of the White, African American, or Latino population is substantially higher or lower than the states in the target group. However, we included covariates that controlled for these demographic differences in our statistical analysis.

An important assumption of the difference-in-differences approach is that the underrepresented student of color matriculation trend in each of the target states before the introduction of the affirmative action bans is sufficiently similar to the trend over the same period in the comparison states during the respective pre-affirmative action ban years. In

Figure 1, we display the raw percent of first-time matriculated students of color in each of the states that ultimately implemented an affirmative action ban and the raw average percent in the 42 states in the comparison group during the years of investigation in the study. The trend for public medical schools is designated with the darker lines and the trend for private institutions is designated with the lighter line. Overall, the trend in the percent of matriculated underrepresented students of color at public and private institutions in each of the target states (except for Florida) before the implementation of bans is fairly similar to the trend for each respective sector in the comparison group. The trend in Florida is different from the trend in the comparison group, with an increase in some pre-ban years that is not present in the comparison states.

The number of observations in our dataset—that is, each observed proportion of first-time historically underrepresented students of color among all medical school students who are first-time matriculants at a particular institution—across each of the years in our main analytic window, 1993 to 2011, is n=1,029 (public) and n=723 (private institutions). By choosing a time period (i.e., analytic window) that included data from all years between 1993 and 2011, we captured at least four years of data before the implementation of the first ban in Texas, and three years of data since the ban in Nebraska. Our analysis captured the same number of years before and after ban for each state in the sample with an affirmative action ban (except for Nebraska). This time period allowed us to maximize the number of observations in the analytic sample while staying close to either side of the policy disruptions (Murnane & Willett, 2011). In sensitivity analyses, we narrow this window.

To increase the precision of the impact estimates, we used control variables to represent selected time-varying state characteristics, such as racial demographics (percentage of the population by race/ethnicity), educational attainment (percentage of the population 25 years and over with a bachelor's, master's, or doctoral degree), and economic indicators (unemployment rate for 25- to 34-year-olds and per-capita income).

Analytic Strategy

Statistical model specification—What is the impact of eliminating the consideration of race in admissions on the first-time matriculation rate of historically underrepresented students of color at public and private medical institutions in Texas, California, Washington, Florida, Michigan, and Nebraska? To answer this question, we fitted the following multilevel ordinary least squares regression model, separately for public and private institutions:

$$SoCENRL_{jt}=\beta_0+\beta_1(BAN_{st})+\beta_2 X_{jt}+\beta_3 W_t+\delta' S_s+\alpha' Z_y+(\varepsilon_{jt}+u_j) \quad (1)$$

where $SoCENRL_{jt}$ indicates the proportion of students of color enrolled at a given institution (j) in a given year (t); BAN_{st} is a dichotomous variable indicating whether a state (s) had an affirmative action ban in place in year (t); X_{jt} represents selected time-varying institutional characteristics, such as total first-time matriculation size and *U.S. News & World Report* classification (research ranked or primary care ranked); W_t represents a set of vectors of selected time-varying state characteristics, such as state-level racial demographics (percentage of population that is White, Black, Latino, Native American, and other), state-

level educational attainment (the percentage of the population 25 years and older with a bachelor's degree), and state-level economic indicators, such as the unemployment rate of the population that was eligible for graduate study (25- to 34-year-olds); *S* indicates a set of vectors to distinguish among the states' dichotomies and to control for all time-invariant differences, both observed and unobserved, among the states (state fixed effects); Z_y represents a set of vectors for year dichotomies to distinguish among the chronological years to which the summaries apply and to account for average differences in the outcome among the chronological years spanned in the data (year fixed effects), which include the years between 1993 and 2011; and $\varepsilon_{jt} + u_j$ represents the sum of a hypothesized time-level and an institutional-level population residual. Because of the presence of the state and year fixed effects, β_1 provides the required difference-in-differences estimate of the impact affirmative action bans had on the matriculation rates of students of color in medical school.

We also fitted augmented versions of this basic statistical model, replacing the year fixed effects (*Z*) with state-specific time trends (*cyear*) to allow trends in enrollment over time to differ by state. The model specification for this augmented model was:

$$SoCENRL_{jt}=\beta_0+\beta_1(BAN_{st})+\beta_2 X_{jt}+\beta_3 W_{\mathrm{t}}+\beta_4 cyear+\delta' S_s+n_s Scyear+(\varepsilon_{jt}+u_j) \quad (2)$$

where *cyear* represents a continuous-year variable (coded so that 1993=1, 1994=2, 1995=3, etc.); and *Scyear* represents a full set of two-way interactions between each state dummy and a continuous predictor representing the linear effect of year.

Weighting

In our analysis, we incorporated a weight to account for the aggregate-level nature of our data at the institutional level, and for the fact that medical school matriculation differed at various institutions. This type of sampling weight ensured that medical schools with a larger number of first-time matriculated students were weighted more heavily in the model fitting than those with a smaller number of first-time matriculated students (e.g., Afifi, Clark, & May, 2004). For our purposes the weights were equal to the total number of first-time matriculated students at a given institution in a given year.

Sensitivity Analyses

In each phase of our analysis, we conducted sensitivity analyses to test whether the results would be the same under a variety of conditions (i.e., different composition of target states, comparison groups, and analytic windows). In a first set of sensitivity analyses, we examined whether our main findings were robust to the inclusion of Florida in our target states, which was important to consider because, unlike the bans on other states, the One Florida Initiative explicitly allowed institutions to conduct targeted, inclusion-oriented outreach and recruitment. In addition, while the ban was in effect, the Florida higher education system underwent changes in governance that might have allowed medical schools in Florida to operate under greater autonomy than medical schools in other states with bans.

In a second set of sensitivity analyses, we modified the analytic window around the year of the bans, within which we fitted our statistical models (1993–2011). For a narrow analytic

window, we selected the years 1996 to 2009 to allow for at least one year before the first affirmative action ban was implemented in Texas and California and one year after the last affirmative action ban was implemented in Nebraska. This sensitivity analysis helped us to determine whether the impact of the bans may have been more immediate than anticipated under our main analytic window.

In a third and final set of sensitivity analyses, we tested whether the results were robust to different compositions of the comparison group of states by refitting our principal statistical models with two different sets of comparison states. We chose a narrower set of comparison states based on the possibility that state-to-state student mobility into neighboring states may have influenced matriculation in the chosen group of comparison states. It is possible that, because of an affirmative action ban in a particular state, students may have chosen to matriculate at institutions in nearby states without a ban, thereby elevating enrollments artificially in the chosen comparison group. If so, we assumed that students may have chosen to matriculate at institutions in nearby states. Thus, we selected a subset of the 32 comparison states in the main analysis, including only 15 states that were not as close as those in the main comparison group (Arkansas, Colorado, Connecticut, Hawaii, Maryland, Massachusetts, Minnesota, New Jersey, New York, North Carolina, North Dakota, Vermont, Virginia, West Virginia, Wisconsin). Because this selection of a narrower set of comparison states introduced the possibility that states far away may not be similar to the target states, we also selected another narrower set of comparison states that were closest in demographic characteristics to the target states in our sample (Ohio, Colorado, Illinois, Indiana, New York, North Carolina).

Findings

Overall, we estimated that the affirmative action bans in these six states are associated with a decline in the proportion of first-time matriculating medical school students who are historically underrepresented students of color at public institutions. Based on our final fitted model, we attribute an estimated drop of about 3.2 percentage. We obtained this final estimate by fitting a series of OLS regression models and abstracting the difference-in-differences estimate (the regression parameter associated with predictor BAN), which we display in Table 2, under a variety of methods of estimation. In the columns on the left (Models 1 and 2), we present the results of fitting the statistical model in Equation 1, our basic statistical model that did not include state-specific time trends, separately for private and public institutions. In the right-hand columns (Models 3 and 4), we show the statistical model in Equation 2, an augmented model that did permit time trends in matriculation to differ by state, assuming a linear trend, fitted separately for private and public institutions. In Panel A of the table, we provide results from the unweighted analyses, and in Panel B we provide results from the weighted analyses. Below we discuss how we arrived at these final estimates, which we then convert into overall percent decline to convey the magnitude of the decline more intuitively.

Public Medical Schools

As all the fitted models in Table 2 illustrate, at public institutions, there is a statistically significant decline in the percentage of first-time matriculant medical school students who

are underrepresented students of color than would otherwise be expected if no bans had been in place—a decline of about three percentage points. The unweighted estimates in Panel A and weighted estimates in Panel B when there is no state-specific year trend (Model 1) display about a three percentage point drop in underrepresented student of color matriculation. When year fixed effects are replaced by state-specific time trends to allow trends in matriculation over time to differ by state (Model 3), the estimated drop in the matriculation of historically underrepresented students of color due to the bans is also about three percentage points (unweighted and weighted). The impact of the bans remains statistically significant across all models.

As we noted previously, the weighted analysis allows the effect at institutions with larger enrollments to count more heavily in the overall estimates. Because of the importance of adjusting for the differences in the size of institutions, we regard the estimates in Panel B as the best estimate of the effect of the affirmative action bans on the matriculation of underrepresented students of color in medical schools, across all states that implemented such bans. In addition, we prefer the estimated effect from Model 3—about 3.2 percentage points—than Model 1 (Panel B) because the former is the most parsimonious and best-fitting model.

Private Institutions

As all the fitted models in Table 2 illustrate, at private institutions, the impact of the bans on the matriculation of underrepresented students of color is similar in magnitude across all models (a decline of about three to four percentage points), though the result is not statistically significant when the model specification includes a state-specific year trend. The unweighted estimates in Panel A and weighted estimates in Panel B, when there is no state-specific year trend (Model 2), display about a four percentage point drop in underrepresented student of color first-time matriculation at private medical schools after the bans on affirmative action. When year fixed effects are replaced by state-specific time trends to allow trends in matriculation over time to differ by state (Model 4), the estimated drop in the matriculation of underrepresented students of color due to the bans remains consistently negative, drops in magnitude by about one percentage point, and is no longer statistically significant (unweighted and weighted). This change is not surprising in light of observed trends in California and Nebraska. As we illustrate in Figure 1, private medical schools in California and Nebraska experienced steady declines in the matriculation of underrepresented students of color before bans were implemented. Once we account for these trends by allowing them to vary by state (assuming a linear trend), there is no predicted deviation from them than would otherwise be expected if no bans had been in place.

As we note in the analysis for public institutions, because of the importance of adjusting for the differences in the size of institutions, we regard the estimates in Panel B as the best estimate of the effect of the affirmative action bans on the first-time matriculation of underrepresented students of color in private medical schools, across all states that implemented such bans. In addition, we prefer the estimated effect from Model 4 than Model 2 (Panel B) because the former is the most parsimonious and best-fitting.

Sensitivity Analyses

In Table 3, we present the results of the different sensitivity analyses of our preferred Models 3 and 4 for public and private institutions, respectively. For ease of comparison, in Panel A of this table we summarize the final results of the main analysis, which employed a time period from 1993 to 2011 and used all 32 selected comparison states. Across all robustness checks, the results for private institutions remain not statistically significant (see Model 2 for Panels A-D). For the sake of simplicity, we focus our discussion below on the findings of the sensitivity analyses for public institutions (Model 1).

In Panel B we display results that exclude Florida from our target states. Here, the results remain robust to an analysis that includes Florida. The main results, moreover, are robust to a different composition of the comparison group (Panel C), with the estimates of the impact of the ban on the matriculation rates of underrepresented students of color substantially the same in the main group and the narrower subsets of comparison states (1) states that are geographically distant, and 2) those that are most comparable to our target states in terms of demographic characteristics). These results suggest that the 32 states in our comparison group reflect national trends in medical school matriculation.

Finally, the main results are robust to the choice of a narrow window, 1996–2009, which covered at least one year before the first affirmative action bans took effect (in Texas and California) and one year after the last ban (in Nebraska). Here, the estimated effect of the bans remains negative, though of higher magnitude (−0.039 compared to −0.032), which suggests that the negative impact of affirmative action bans was larger during early years of implementation.

Understanding Magnitude of These Declines

To understand these findings more fully, we convert the estimated 3.2 percentage point decline into an overall percentage decline. This calculation is based on the observed percentage of all first-time matriculated medical school students who are underrepresented students of color, at public institutions in all target states in the sample, during the pre-ban years in our analysis (1993 to 1996 in Texas and California, 1995 to 1998 in Washington, 1997 to 2000 in Florida, 2003 to 2006 in Michigan, and 2005 to 2008 in Nebraska). For instance, before the bans the observed four year average percentage of matriculated medical school students who were underrepresented students of color in public medical schools in our six ban states was about 18.5% If one begins with this baseline, then a 3.2 percentage-point decline in that proportion would represent a decline to 15.3% in first-time matriculated students of color. Expressed as a fraction of the initial value, this figure represents about a 17.2% overall decline in the proportion of medical school students who are underrepresented students of color.

Conclusion and Implications

Previous studies that support causal inferences have documented declines in the enrollment rates of underrepresented students of color at public selective undergraduate institutions and in graduate fields of study at public universities as a result of affirmative action bans. This

study builds on this prior work by examining the impact of affirmative action bans in six states (Texas while *Hopwood* was in effect, California, Florida, Washington, Michigan, and Nebraska) on the matriculation rates of underrepresented students of color in the field of medicine. This is an important field to consider, given that increasing the participation of underrepresented minorities in medicine remains critical to addressing the nation's health crisis.

Results show that bans on affirmative action have reduced the first-time matriculation of medical school students who are historically underrepresented students of color by about 17.2% (from about 18.5% to about 15.3%) across public medical schools in these six states. This decline is similar to declines in the enrollment of underrepresented students of color at some of the nation's most selective public undergraduate institutions in four of the six states included in this study; that is, about 20% and 29%, respectively, for Latino and African American students (Backes, 2012). The decline is also similar to drops that have taken place in specific fields of graduate study at public institutions, such as the natural sciences, which experienced a 19% drop in the enrollment of underrepresented students of color across four of the six states in this analysis, and the social sciences, where there was 15.7% decline (Garces, 2013). Underrepresented students of color in public medical schools generally had a slightly smaller decline in their share of the student body than students of color studying law (Kidder, 2003), or those in the graduate field of engineering (Garces, 2013).

In addition, there is no evidence to suggest that underrepresented students of color switched to private institutions from public ones in states with bans, potentially mitigating the impact of the bans at public medical schools in these states. Further, as we illustrate in Figure 1, the trend of observed matriculation of underrepresented students of color at private institutions in our comparison states (those without bans) is relatively constant. As such, there is no observed increase in the matriculation of underrepresented students of color at private institutions in states that do not have bans after other states implemented them. The results of this analysis, however, should also be treated with caution, as there are only a total of five private institutions in the states with bans we include in our sample (not including the one private institution in Texas affected by the decision in *Hopwood*), limiting our ability to generalize our findings to this sector.

The declines of underrepresented students of color at public medical schools have important consequences in light of the demographics and institutional characteristics of states with affirmative action bans. As we show in Table 1, about 41% of the public medical schools in the target and comparison states that are research-ranked and about 31% that are primary-care ranked are located in states with affirmative action bans. Given the already low levels of racial and ethnic diversity in the medical profession, a 17.2% decline of matriculated underrepresented students of color across the states that host a substantial portion of the country's medical schools poses significant barriers to the medical profession's efforts to train all doctors to address the health-care needs of patients of color more effectively (Guiton et al., 2007; Saha et al., 2008).

These declines also have serious long-term consequences for the health-care needs of the nation. The Department of Health and Human Services (2011a, 2011b) has documented that

patients of color suffer disproportionately from numerous health conditions and are underserved in terms of quality and frequency of care. Indeed, even when controlling for income, communities with high proportions of African American and Latino residents are much more likely to experience physician shortages than communities with lower concentrations of these residents (Weissman, Campbell, Gokhale, & Blumenthal, 2001). A decline in the racial and ethnic diversity of the student body at medical schools will exacerbate these disparities, as a racially diverse student body has been shown to produce more culturally competent physicians, and physicians who are from underrepresented minority groups are more likely than their non-minority peers to serve minority populations and provide care to other medically underserved populations, such as socioeconomically disadvantaged individuals (DHHS, 2006). These disparities will only worsen, given the increasing number of underrepresented minorities in the country. The AAMC (2010) predicts that, by 2015, there will be a shortage of 62,900 physicians in the United States, which is estimated to increase to 130,600 by 2025.

The results of this study further demonstrate that a holistic admissions process—which considers leadership skills, overcoming adversity, participating in service-oriented extracurricular activities, having strong communication skills, and evidencing strong standardized test scores— is not enough to mitigate the decline in racial and ethnic student body diversity caused by affirmative action bans. Even with this holistic approach, which seeks to supplement a sole reliance on test scores—a factor shown to disproportionately disadvantage students of color in the admissions process—we still see a decline in the racial and ethnic diversity of the student bodies in medical schools when the institutions are prohibited from considering race as a factor in admissions. Studies that employ qualitative methods could help explain why these declines have taken place despite holistic medical admissions policies, and shed light on institutional responses that could help mitigate declines in racial diversity.

The findings from this study are particularly timely, as the U.S. Supreme Court is currently considering the constitutionality of Michigan's affirmative action ban, Proposal 2 (*Schuette v. Coalition to Defend Affirmative Action* (No. 12–682). One of the issues before the Court includes a determination of whether racially focused constraints on admissions, like bans on affirmative action, impose undue burdens on racial minorities. The findings from this study should inform the case, given the detrimental effects these bans have had on the matriculation of underrepresented students of color in medical school and, consequently, on the medical profession's ability to address the nation's health-care needs, particularly in minority communities.

This study also suggests a number of areas of further research. Should the Court uphold the constitutionality of the ban in Michigan, future studies could investigate the impact of bans recently implemented, such as those in Arizona, New Hampshire, and Oklahoma. These studies could provide a fine-grained analysis of the impact these bans have on subcategories of racial and ethnic groups, using data the AAMC began collecting in 2002 and addressing important questions with respect to subcategories of Asian American students. Future studies can also examine the impact of the bans at various stages, including application, admission, and matriculation. Conversely, should the Court lift the ban in Michigan,

researchers could document the impact that decision might have on the enrollment of underrepresented students of color in the state's medical schools.

In the meantime, though, leaders and professionals in the medical community will need to compensate for the impact of these affirmative action bans, developing and adopting new outreach, recruitment, and admissions strategies. Our nation's health depends upon it.

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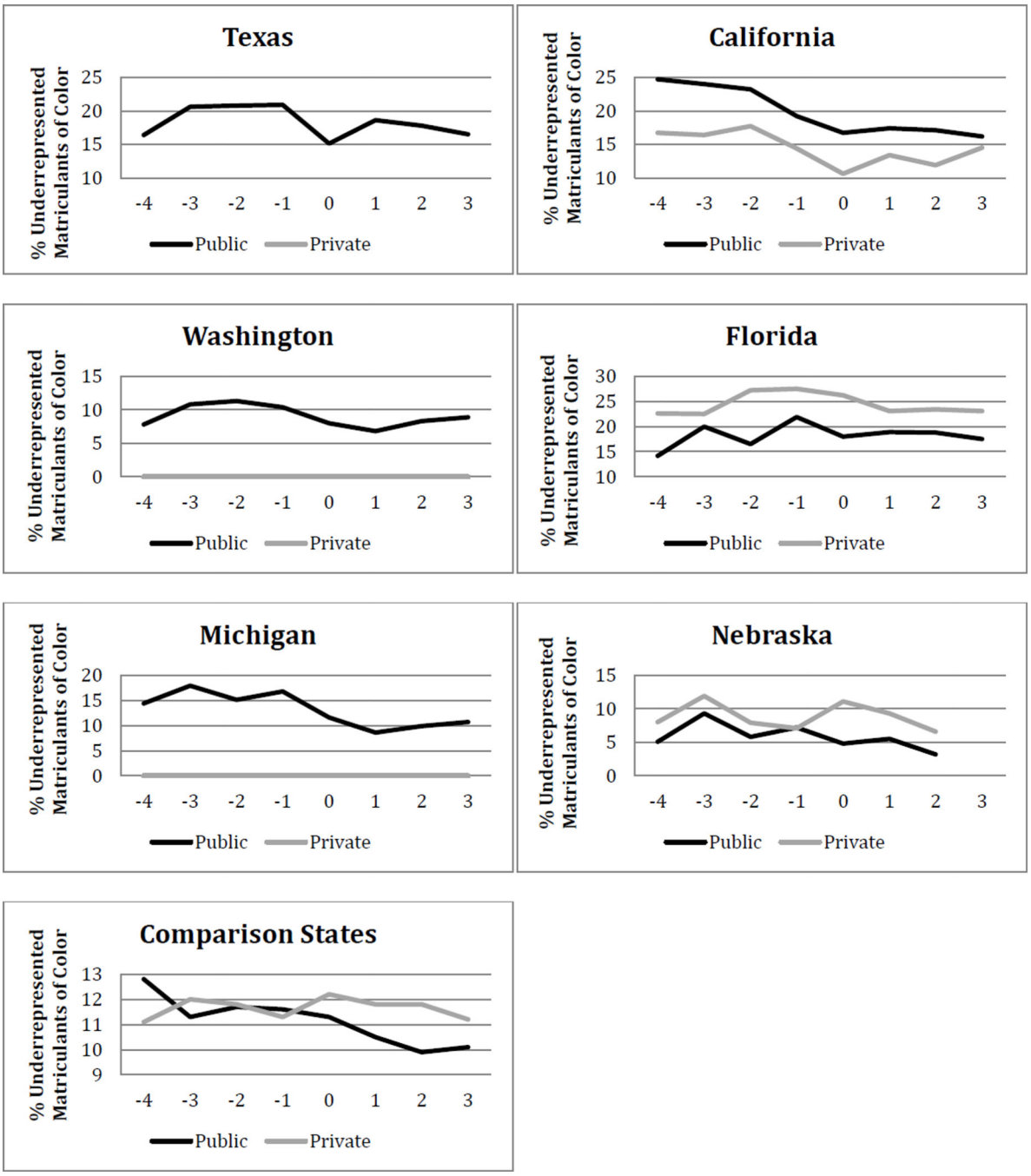

Figure 1.

Raw percent of first-time matriculated underrepresented students of color in each of the six states included in our sample with an affirmative action ban and the average percent of first-time matriculated underrepresented students of color in each of the 32 states selected as the comparison group, for the years of investigation in the study, for public and private institutions.

Table 1

Selected characteristics of public and private institutions in the sample and selected state characteristics, for year 2010.

	Public Institutions			Private Institutions			State Characteristics					
	Total No. Public	Research Ranked	Primary Care Ranked	*Total No. Private*	Research Ranked	Primary Care Ranked	*Percent White*	*Percent Latino*	*Percent Black*	*Percent Native American*	*Percent 25 yrs+ with Bachelor's degree*	*Unemployment rate for 25–34 yr olds*
United States	76	34	35	44	31	22	72.4	16.3	12.6	0.9	19.4	10.1
Sample	63	29	29	42	31	21	64.0	18.2	11.1	0.8	N/A	N/A
States with Bans												
California	7	5	4	3	2	0	41.5	37.7	6.3	0.6	20.5	10.0
Florida	3	1	0	1	1	0	58.8	22.6	15.7	0.3	20.9	9.2
Michigan	3	1	2	0	0	0	77.5	4.4	14.7	0.7	22.5	7.7
Nebraska	1	0	1	1	0	0	82.9	9.2	5.0	0.9	20.1	3.9
Texas	6	4	2	1	1	1	46.0	37.7	11.8	0.4	19.4	6.9
Washington	1	1	1	0	0	0	74.5	11.3	4.2	1.6	23.2	8.7
Total No.	21	12	10	6	4	1	54.6	29.2	10.1	0.5	N/A	N/A
Comparison States												
Arizona	1	0	1	0	0	0	58.7	29.7	4.2	4.2	23.7	8.6
Arkansas	1	0	1	0	0	0	75.5	6.4	15.8	0.8	17.6	9.4
Colorado	1	1	1	0	0	0	71.1	20.7	4.3	0.7	29.5	4.9
Connecticut	1	0	0	1	1	0	72.2	13.5	10.0	0.3	28.9	7.7
DC	0	0	0	2	2	0	35.4	9.1	51.2	0.2	37.1	6.6
Hawaii	1	0	1	0	0	0	26.4	8.9	2.2	0.2	21.8	6.5
Illinois	2	1	0	5	2	2	64.3	15.6	14.8	0.2	27.0	7.8
Indiana	1	1	0	0	0	0	82.3	6.0	9.6	0.3	19.8	8.2
Iowa	1	1	1	0	0	0	89.4	5.0	3.4	0.3	26.7	3.8
Kansas	1	0	1	0	0	0	79.4	10.6	6.4	1.0	29.0	5.5
Maryland	1	1	1	2	1	1	55.6	8.2	29.9	0.3	26.3	7.5
Massachusetts	1	1	1	3	3	3	77.7	9.6	6.8	0.2	31.2	6.4

	Public Institutions			Private Institutions			State Characteristics					
	Total No. Public	Research Ranked	Primary Care Ranked	*Total No. Private*	Research Ranked	Primary Care Ranked	*Percent White*	*Percent Latino*	*Percent Black*	*Percent Native American*	*Percent 25 yrs+ with Bachelor's degree*	*Unemployment rate for 25–34 yr olds*
Minnesota	1	1	1	1	1	1	84.1	4.7	5.7	1.2	31.5	5.0
Missouri	2	0	1	2	1	1	82.0	3.6	12.1	0.5	18.7	8.5
Nevada	1	0	0	0	0	0	55.5	26.6	8.5	1.0	17.2	11.6
New Hampshire	0	0	0	1	1	0	93.2	2.7	1.2	0.2	29.6	6.9
New Jersey	2	0	0	0	0	0	60.1	17.8	13.3	0.2	29.1	8.7
New Mexico	1	0	1	0	0	0	42.3	46.4	2.0	8.8	18.9	6.9
New York	4	2	0	8	6	4	59.1	17.7	15.1	0.4	29.2	7.3
North Carolina	2	1	2	2	2	2	66.1	8.4	21.9	1.2	20.4	9.0
North Dakota	1	0	0	0	0	0	89.8	2.0	1.4	5.6	23.9	6.8
Ohio	5	2	1	1	1	1	82.0	3.1	12.8	0.2	17.8	8.6
Oklahoma	1	0	0	0	0	0	71.5	8.9	8.1	9.4	17.8	6.5
Oregon	1	1	1	0	0	0	80.2	11.8	2.2	1.3	28.5	6.2
Pennsylvania	0	0	0	6	4	3	80.2	5.6	11.0	0.1	29.1	6.5
Rhode Island	0	0	0	1	1	1	77.8	12.4	6.0	0.4	26.9	8.9
South Dakota	1	0	1	0	0	0	85.6	2.7	1.6	9.0	22.9	5.5
Utah	1	1	0	0	0	0	81.5	13.0	1.2	1.1	18.6	5.2
Vermont	1	1	0	0	0	0	95.5	1.5	1.3	0.4	31.3	7.7
Virginia	3	1	1	0	0	0	65.9	7.9	19.8	0.3	30.0	4.5
West Virginia	2	0	1	0	0	0	94.1	1.2	3.8	0.2	15.2	11.6
Wisconsin	1	1	1	1	1	1	84.0	5.9	6.6	0.9	28.3	4.6
Total No.	42	17	19	36	27	20	71.00	11.50	11.70	1.00	N/A	N/A

Sources: Association of American Medical Colleges; Center for Disease Control and Prevention Bridged-Race Resident Population Estimates: United States, State and County for the years 1990 – 2012 (CDC); U.S. World and News Report Best Graduate Schools: Medical; U.S. Census Bureau Current Population Survey Basic and Education Supplement (CPS).

Notes: Total number of public and private institutions and selected institutional characteristics include institutions that reported data to the AAMC across all states (we excluded some institutions, and hence states, for several reasons outlined in the text). According to the 2012 U.S. World and News Report medical school rankings, the research rankings factor in research activity and admissions criteria (MCAT, GPA, acceptance rate, and student selectivity) more strongly than the primary care rankings. The state-level calculations for total population, percent White, percent Latino, percent Black, and percent Native America are the authors own, using the CDC bridged-race data. The U.S. level data is reported from 2010 U.S. Census data. The source of the percentage of people 25 years and older with a bachelor's degree is the CPS and the unemployment rate for 25–34 year olds comes from the Bureau of Labor Statistics.

Table 2

Main Findings

Average effect of affirmative action bans on the average first-time matriculation of medical school students who are underrepresented students of color, for the main analytic window (1993–2011) and all comparison states

	Medical School First-Time Matriculation			
	No State-Specific Year Trend		State-Specific Year Trend	
	Public (1)	Private (2)	Public (3)	Private (4)
A. Unweighted				
BAN	−0.032***	−0.037**	−0.033***	−0.026
	(0.006)	(0.012)	(0.008)	(0.022)
B. Weighted				
BAN	−0.030***	−0.041***	−0.032***	−0.028
	(0.006)	(0.012)	(0.007)	(0.022)
No. of obs.	1029	723	1029	723
No. of institutions	64	42	64	42

~p<.10.

* p<.05.

** p<.01.

*** p<.001. Standard errors in parentheses

Note: All models include state fixed effects and a full set of institutional- and state-level covariates; institutional-level covariates include whether institution is research ranked (vs. primary care ranked); state-level covariates include percentage of population by race (White, Black, Native American, Latino, Other), percentage of population with a bachelor's degree, and percentage of 25–34 year olds unemployed. Models without a state-specific year trend include year fixed effects; Models with a state-specific year trend do not include year fixed effects to avoid collinearity. All models account for the clustering of observations within institution over time (with institutional random effects) and within state (with state fixed effects).

Table 3

Sensitivity Analyses

Average effect of affirmative action bans on the average first-time matriculation of underrepresented medical school students of color.

	Public (1)	Private (2)
A. Main Results—Analytic Window 1993–2011 and all Comparison States		
BAN	−0.032***	−0.028
	(0.007)	(0.022)
No. of obs.	1029	723
No. of institutions	64	42
B. Florida Excluded from Target States		
BAN	−0.033***	−0.028
	(0.007)	(0.025)
No. of obs.	1005	715
No. of institutions	61	41
C. Narrower Subset of Comparison States		
1. Geographically Distant States		
BAN	−0.031***	−0.029
	(0.007)	(0.022)
No. of obs.	649	552
No. of institutions	44	33
2. Six Most Comparable States		
BAN	−0.031***	−0.028
	(0.008)	(0.019)
No. of obs.	516	343
No. of institutions	37	21
D. Narrower Time Period (1996–2009)		
BAN	−0.039**	−0.024
	(0.008)	(0.022)
No. of obs.	757	532
No. of institutions	64	42

Note: All models include state fixed effects and a full set of institutional- and state-level covariates; institutional-level covariates include whether the medical school is research ranked (vs. primary care ranked); state-level covariates include percentage of population by race (White, Black, Native American, Latino, other), percentage of population with a bachelor's degree, and percentage of 25–34 year olds unemployed. Models do not include year fixed effects to avoid collinearity with state-specific year trend. All models account for the clustering of observations within institution over time (with institutional random effects) and within state (with state fixed effects).