The Effects of Affirmative Action Bans on Postsecondary Education

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Abstract

Since 1965, affirmative action programs have required public universities to give extra consideration to underrepresented minority applicants. I estimate the impact of eight states banning affirmative action on postsecondary school enrollments and graduation rates using an event study methodology. I also employ a generalized difference in differences strategy that applies the event study analysis and adds nonselective universities in treated states as a control group. These identification strategies improve on the existing affirmative action literature by only using ever-treated states as controls. Estimates suggest that banning affirmative action significantly decreases minority enrollments, especially at selective universities. These estimates are large in magnitude — enrollment at selective universities dropped by over 20% for minority students. While less conclusive, results suggest that graduation rates were essentially unaffected. Falsification tests show that private universities and community colleges, which should not be directly affected by affirmative action bans, were not similarly affected.

1 Introduction

In the fall of 1965, Lyndon B. Johnson signed Executive Order 11246, which mandated that all government contracting agencies

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> ...will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin.

Two years later executive order 11375 added sex to the list of characteristics on which contractors could not discriminate, however this paper will focus on racial affirmative action[1]. Johnson's order was the origin of modern day affirmative action programs that require government contractors to promote the employment of minorities who are underrepresented relative to their proportion of the overall population. Given that public universities are government contractors, the executive order came to promote the enrollment of minority applicants in the admission process at state universities.

Affirmative action has become a contentious issue in recent years, and there are three common claims that opponents of affirmative action cite as reasons for their desire to eliminate the policy. The first claim is that affirmative action constitutes *reverse discrimination* because businesses and universities may choose to not hire workers or admit students based upon an individual's race (Eastland, 1997). The second is that affirmative action may lead to *mismatch*, which unintentionally hurts those whom it is trying to help by placing minorities in situations where they are unequipped for success (Thernstrom and Thernstrom, 1998; Sander, 2004). The final claim is that affirmative action programs perpetuate *racial stigmas* and imply that minorities are incapable of succeeding on an even playing field (Coate and Loury, 1993; Mills, 1994). For these reasons and others, a collection of states and institutions legally banned or voted to eliminate affirmative action between 1996 and 2012.

This paper investigates the effects of these affirmative action bans on postsecondary enrollment and graduation. While prior research has investigated the impact of affirmative action on minority student behavior (Card and Krueger, 2005; Dickson, 2006; Long, 2007*b*; Long and Tienda, 2010), enrollment (Antonovics and Backes, 2013; Cortes, 2010; Brown and Hirschman, 2006; Long, 2007*a*; Backes, 2012; Hinrichs, 2012), and graduation rates (Hinrichs, 2014), this paper extends the frontier of the affirmative action literature in many important ways. This is the first study to implement event study and generalized difference in differences methodologies, which rely solely on variation from ever-treated states, to study the effects of affirmative action. Prior studies, of which Backes (2012) and Hinrichs (2012) are most similar to this paper, have relied upon never-treated states as controls, which may lead to biased results if there are not parallel trends in enrollment and graduation rate between ever-treated and never-treated states. The event study and generalized difference in differences methodologies do not require the assumption that never-treated states provide

[1] A significant reason for focusing solely on racial affirmative action is that the plaintiff in every case attempting to eliminate affirmative action from postsecondary education has been a woman.

a valid counterfactual to states where affirmative action was banned. Furthermore, these methodologies allow for a simple visual check on the assumption that treated universities have conditionally equal outcomes in every year before the introduction of an affirmative action ban. Moreover, the generalized difference in differences methodology, which uses nonselective universities in treated states as an additional control group, provides a manner to control for secular unobserved changes occurring in a state without assuming a functional form. This methodology was inspired by prior research that has shown that affirmative action is more prevalent at selective universities (Kane, 1998; Long, 2004, 2007*b*; Grodsky and Kurlaender, 2010).

In addition, I expand upon the Backes (2012) and Hinrichs (2012) papers by using nine additional years of data and four additional treated states[2] for the main analyses which were unavailable at the time those studies were published. Because many of the states that banned affirmative action in recent years have smaller populations than the initial states that imposed bans, I introduce a weighting scheme that weights universities proportionally to how large of a presence they have in their level of their state's postsecondary education system. I also use population data from the Current Population Survey (CPS) and Surveillance, Epidemiology, and End Results (SEER) program to control for demographic changes in a more robust fashion than statewide time trends, which have been used in prior work.

Moreover, in specifications including private universities (Hinrichs, 2012) includes both private and public universities in states that have banned affirmative action in his treated group, when no private universities were explicitly affected by the ban (except for in Texas). Therefore I use private universities as a control group (section 4.1.1) and falsification test (section 6.1). Although private universities were not explicitly affected by the legislative bans, they were likely indirectly affected if minorities switched their applications from public to private universities in order to continue to enjoy the benefits of affirmative action. Thus minority enrollments should not fall at private universities following an affirmative action ban, and they may in fact rise. Evidence that minority enrollment decreased at private universities would give evidence that either secular changes occurred at the same time as the affirmative action bans or that minorities altered their application behavior. For example, if there is a lack of information minorities may wrongly assume that all universities banned affirmative action when it was in fact only public universities. This may lead to an increase in out-of-state applications which could cause declines in the minority enrollment at both public and private in-state institutions.

Results suggest that banning affirmative action has a significant impact on minority enrollment at universities, with especially large effects at the most selective universities. Point estimates show that banning affirmative action causes minority enrollments to decrease by as much as 10% overall and 20% at selective universities. These estimates are consistent with papers that have found that affirmative action bans cause a

[2]The new additional states are Nebraska, Arizona, New Hampshire, and Oklahoma.

negative impact on the college application process for minorities (Dickson, 2006; Long, 2007*b*; Cortes, 2010; Long and Tienda, 2010) and are similar in magnitude to estimates of the effect on minority college enrollment (Brown and Hirschman, 2006; Long, 2007*a*; Backes, 2012; Hinrichs, 2012). The generalized difference in differences results, which estimate the effects at selective universities relative to nonselective universities, are not only larger in magnitude, which is consistent with prior work, but also more stable than the event study and difference in differences results. This is likely due to the fact that nonselective public universities in the same state provide the best possible control group to account for the changing college-age racial composition that was occurring even in the absence of affirmative action bans. Despite causing changes in minority enrollment, the affirmative actions bans appear to have had no effect on the minority graduation rate.

Falsification tests using untreated private not-for-profit universities and plausibly untreated community colleges within treated states show almost no effect of affirmative action bans and give evidence that the changes at public universities are actually due to the policy changes and not a spurious correlation. Without student-level data, however, more research is needed to determine if the negative impact of banning affirmative action is due to a change in demand, via the acceptance process, or a change in supply, via the application process. This paper adds to the body of evidence that suggests that affirmative action still plays a large role in determining the racial composition of university campuses. This remains an especially relevant question, despite the recent Supreme Court cases that have upheld the constitutionality of affirmative action, given the current Justice Department's investigation into the legality of affirmative action policies.

2 Data

Table 1 gives a list of the events that have led to a change in affirmative action policies at universities. It also gives the region affected by the event, when it occurred, the first cohort affected, and which universities it applied to. All policies that were implemented via voter referendum, executive order, or bill affect only public universities, while court cases affect both public and private universities. The *Hopwood v. Texas* decision theoretically affected the entire Fifth Circuit, which also includes Louisiana and Mississippi, but in practice there was no change to the affirmative action policies in Louisiana and Mississippi. The *Grutter v. Bollinger* case was decided by the Supreme Court and thus affected all states. In particular it overruled the Fifth Circuit Court of Appeals' ruling on *Hopwood v. Texas* which had banned affirmative action. Following *Grutter v. Bollinger*, the University of Texas at Austin reimplemented an affirmative action program[3].

Data come from the Integrated Postsecondary Education Data System (IPEDS), which uses surveys

[3]There is no evidence that other Texas universities reimplemented their affirmative action programs.

Location	Policy	Passed	First Cohort	Universities
Texas	*Hopwood v. Texas*	March 18, 1996	1997-1998	Public & Private
California	Proposition 209	November 5, 1996	1998-1999	Public
Washington	Initiative 200	November 3, 1998	1999-2000	Public
Florida	Executive Order 99-281	November 9, 1999	2001-2002	Public
U.S.	*Grutter v. Bollinger*	June 23, 2003	2004-2005	Public & Private
Texas	Proposal to Consider Race and Ethnicity in Admissions	June, 2004	2005-2006	U.T. Austin
Michigan	Proposal 2	December 22, 2006	2007-2008	Public
Nebraska	Initiative 424	November 4, 2008	2009-2010	Public
Arizona	Proposition 107	November 2, 2010	2011-2012	Public
New Hampshire	House Bill 0623	June 29, 2011	2012-2013	Public
Oklahoma	State Question 759	November 6, 2012	2013-2014	Public
U.S.	*Fisher v. University of Texas*	June 23, 2016	2017-2018	Public & Private

Table 1: Policies that Have Banned or Reinstated Affirmative Action

conducted annually by the U.S. Department of Education's National Center for Education Statistics (NCES). IPEDS gathers information from every college, university, and technical and vocational institution that participates in federal student financial aid programs and includes data on enrollments, program completions, graduation rates, faculty and staff, finances, institutional prices, and student financial aid. The fall enrollment dataset spans the years 1980 and 1984-2014, although there is no data for the years 1985, 1987, nor 1989. The graduation rate data spans the years 1997-2014, although this data corresponds to freshman cohorts first entering in the years 1991-2008 for universities and 1994-2011 for community colleges. Given the timing of the policies listed in table 1, the possible event years for each state are given in table 2.

State	Fall Enrollment	Graduation Rate
Texas	-16, -12, -10, -8, -6 to +18,	-5 to +12
California	-17, -13, -11, -9, -7 to +17	-6 to +11
Washington	-18, -14, -12, -10, -8 to +16	-7 to +10
Florida	-20, -16, -14, -12, -10 to +14	-9 to +8
Michigan	-26, -22, -20, -18, -16 to +8	-15 to +2
Nebraska	-28, -24, -22, -20, -18 to +6	-17 to 0
Arizona	-30, -26, -24, -22, -20 to +4	-19 to -2
New Hampshire	-31, -27, -25, -23, -21 to +3	-20 to -3
Oklahoma	-32, -28, -26, -24, -22 to +2	-21 to -4

Table 2: Event Years Possible in the Data

I drop all institutions from the IPEDS dataset that are missing a unit ID, state, or year. I also drop any institution that is listed as a historically black college or university, tribal college, or if all programs are offered completely via distance education. I group institutions into three types of control (public, private not-for-profit, and private for-profit) as well as three levels (university, community college, and below associates[4])

[4]For the remainder of the paper, I will use *university* to refer to four-year universities and *community college/college* to

and drop any institution whose control or level is not constant throughout the dataset. For the fall enrollment data, I drop any observation where the male and female enrollments of a particular race do not sum to the total enrollment of that race at the institution, while for the graduation rate data I drop any observation where the male and female graduation cohort or graduate count of a particular race do not sum to the total graduation cohort or graduate count of that race at the institution.

The IPEDS data separates students into nine races, white[5], black or African American[6], Hispanic[7], Asian[8], American Indian or Alaska Native[9], Native Hawaiian or other Pacific Islander[10], two or more races[11], race/ethnicity unknown[12], and nonresident alien[13]. I denote blacks, Hispanics, Native Americans, Native Hawaiian or other Pacific Islanders, and two or more races as underrepresented minorities and whites[14] and Asians as non-minorities. I call residents the aggregate of all races except nonresident aliens, and I calculate the total enrollment and graduation cohorts by adding nonresident aliens to the resident total.

Due to the gaps in fall enrollment data in the years between 1980 and 1990 and the fact that some laws have been passed only recently, using a balanced panel significantly restricts the possible number of event years. California[15] restricts the event window to go no further than -7, as there is data for event year -9 but not -8, while Oklahoma restricts the event window to being no larger than $+2$. Thus using a balanced panel requires throwing out many years of data and results in a significant loss of power, especially when estimating linear time trends. For this reason I do not use a balanced panel in my primary specifications. The downside to this strategy is that the first and last event year coefficients are identified using a different subset of universities than the interior event year coefficients, and if the treatment effect is heterogenous between states then there will appear to be changes in the treatment effect for the outermost event years. I present balanced panel results in section 5 as a robustness check for this potential issue and caution against overly interpreting the magnitude of the outermost event year coefficients.

refer to two-year community colleges. An *institution* is neutral and may refer universities, colleges, or schools granting below associates degrees.

[5]A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

[6]A person having origins in any of the black racial groups of Africa.

[7]A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.

[8]A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian Subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

[9]A person having origins in any of the original peoples of North and South America (including Central America) who maintains cultural identification through tribal affiliation or community attachment.

[10]A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

[11]Category used by institutions to report persons who selected more than one race.

[12]This category is used ONLY if the student did not select a racial/ethnic designation, AND the postsecondary institution finds it impossible to place the student in one of the aforementioned racial/ethnic categories during established enrollment procedures or in any post-enrollment identification or verification process.

[13]A person who is not a citizen or national of the United States and who is in this country on a visa or temporary basis and does not have the right to remain indefinitely.

[14]I include students who listed their race as *unknown* with white students, following (Brown and Hirschman, 2006).

[15]Due to the fact that affirmative action was banned in Texas but then reimplemented, I drop Texas from all of the event study and generalized difference in differences analyses, as the concept of an *event year* when a policy has turned on and then back off is not straightforward.

Data on selectivity comes from the 2000 Barron's Admissions Competitiveness Rating which was obtained through the Institutional Data Archive (IDA) on American Higher Education. The Barron's ranking ranges from a value of 1, which denotes *Most Competitive*, to 6, which denotes *Noncompetitive*[16]. Because states vary in the quality of their higher education system and there are significant incentives to attend an in-state college (such as the reduction in tuition), I designate institutions as selective relative only to other institutions in the same state and with the same control. For each state and control I find the minimum (i.e. best) Barron's rating and then designate all institutions in that state with that control and rating as selective. For example, in California both public and private institutions with a Barron's rating of 1 are selective, while in Nebraska public universities with a rating of 4 and private universities with a rating of 3 are deemed selective. I allow for different criteria between public and private universities because they are imperfect substitutes and to guarantee that each state has at least one selective treated university when using the generalized difference in differences specification. As a robustness check, I also present generalized difference in differences results using an alternative selectivity scheme that deems all flagship universities as well as the top 50 universities in the 2000 U.S. News and World Report National University Ranking as selective. The U.S. News and World Report data was also obtained through the IDA.

Population data comes from the Surveillance, Epidemiology, and End Results (SEER) Program, which uses Census data to estimate the single year of age population by race in a given state and year. Races include white, black, American Indian/Alaska Native, and Asian/Pacific Islander, each of which are further broken down into Hispanic and Non-Hispanic origin. I combine all observations of Hispanic origin, regardless of race, to create an estimate of the Hispanic population, and then use only the Non-Hispanic observations to estimate the populations for the other four races. These population estimates are used to control for demographic changes in the underlying college-going population over time. For this reason, I use the combined population estimates for 18-24 year-olds who make up 88% of public and 86% of private nonprofit full-time undergraduates at four-year universities in the year 2013 (National Center for Education Statistics, 2016). Using this population data, I construct the proportional makeup of each race in each state by year to control for demographic changes over time. Further population data comes from the monthly Current Population Survey (CPS) files. I aggregate the weighted population counts of those who have a HS diploma or equivalent by state, year, and race[17] as an alternative demographic control to the SEER data. As with

[16]There is also the value of 7 which denotes *Special* institutions where the admissions requirements are not based primarily on academic criteria, such as schools for the arts.

[17]I denote any observation with the race white as *white*, any observation with race black/Negro, white-black, black-American Indian, black-Asian, black-Hawaiian/Pacific Islander, white-black-American Indian, white-black-Asian, white-black-American Indian-Asian, white-black-Hawaiian/Pacific Islander, or black-American Indian-Asian as *black*, any observation with race American Indian/Aleut/Eskimo, white-American Indian, American Indian-Asian, white-American Indian-Asian, American Indian-Hawaiian/Pacific Islander, white-American Indian-Hawaiian/Pacific Islander, or white-American Indian-Asian-Hawaiian/Pacific Islander as *Native American*, any observation with race Asian or Pacific Islander, Asian only, or white-Asian as *Asian*, any observation with race Hawaiian/Pacific Islander only, white-Hawaiian/Pacific Islander, Asian-Hawaiian/Pacific Islander, or

the SEER data, I use this CPS population data to calculate the proportional makeup of each race in a given state and year.

2.1 Summary Statistics

2.1.1 Fall Enrollment

There are 3,222 institutions from the states that banned affirmative action that submitted full- and part-time[18] first-time first-year degree-seeking undergraduate fall enrollment data to IPEDS. Table A.1 shows the percentage of institutions in the fall enrollment dataset by level and control. The vast majority of the institutions in the dataset are private for-profit schools that grant below associates degrees such as beauty, design, or religious certifications. When the panel nature of the dataset is accounted for, however, these schools account for only about 30% of the observations in the data. Private not-for-profit universities and public community colleges account for nearly as many observations, as shown in table A.2. Table 3 then shows the breakdown by percentage of total enrollment. In terms of sheer numbers the majority of students attend either a public university (31.1%) or community college (49.3%), followed primarily by private not-for-profit universities (9.86%), thus the affirmative action bans affect a large portion of the college-going population.

	University	Community College	Below Associates	Total
Public	31.1	49.3	1.42	81.8
	(6,716,742)	(10,658,468)	(306,209)	(17,681,419)
Private NFP	9.86	.223	.219	10.3
	(2,130,630)	(48,264)	(47,334)	(2,226,228)
Private FP	1.82	1.47	4.57	7.85
	(393,153)	(316,927)	(986,882)	(1,696,962)
Total	42.8	51	6.2	100
	(9,240,525)	(11,023,659)	(1,340,425)	(21,604,609)

Table 3: Percent of Freshman Fall Enrollment by Level and Control (Freshman Fall Enrollment in Parenthesis)

Figure A.1 contains scatter plots of the minority proportion of total enrollment for the nine states which banned affirmative action. Each point represents the weighted average of each individual four-year university's minority proportion of total enrollment using the total enrollment as the weight. Thus each point

white-Asian-Hawaiian/Pacific Islander as *Native Hawaiian or other Pacific Islander*, any observation where with race two or three races, unspecified or three or four races, unspecified as *two or more races*, any observation with race blank or missing as *race/ethnicity unknown*, and any observation where a specific Hispanic origin is given as *Hispanic*. I aggregate the black, Hispanic, Native American, Native Hawaiian or other Pacific Islander, two or more races, and other single race not elsewhere classified data as the minority population, and the white, Asian, and Unknown data as the non-minority population.

[18] As a robustness check I also use a sample of only full-time freshmen.

is equal to the minority proportion of total enrollment if each state had one "super university" that enrolled every single student attending that specific type of institution. The graphs contain a series for both public and private not-for-profit universities by selectivity, so that the changes at the treated public universities can be compared with untreated private universities. The minority proportion of the state's 18-24 year-old population as calculated from the SEER data and minority proportion of the state's high school graduates as calculated from the CPS data are included as a reference for the secular trends that are occurring in each state.

The red lines in each graph lie between the year of the last cohort to enroll with affirmative action in place and the year of the first cohort subject to an affirmative action ban. In figure A.1a the first red line precedes the first cohort subject to the affirmative action ban brought by *Hopwood v. Texas*, while the second red line precedes the first cohort subject to the Proposal to Consider Race and Ethnicity in Admissions which reimplemented affirmative action at the University of Texas at Austin. Similarly, in figure A.1e the first line precedes the first cohort affected by the *Gratz v. Bollinger* decision which ruled that the point system used in the University of Michigan's application process was not a narrowly tailored use of race, while the second line precedes the cohort subject to Proposal 2 which banned affirmative action at public universities altogether.

The first pattern that emerges is that in all of the states that banned affirmative action the minority proportion of total enrollment has steadily increased at both public and private universities. I will explore many different approaches to account for this secular time trend including state time trends, institution time trends, lagged enrollment, and state population data from SEER and the CPS. It is also notable that the data are rather noisy even after aggregating to the state by control by selectivity level. There are noticeable spikes and nonlinearities, especially in the smaller states such as Michigan, Arizona, New Hampshire, and Oklahoma. The event study methodology, which pools the states, should help in smoothing some of the noise in the population data that may affect the results in a case study that just focused on a single state.

In order to demonstrate how pooling the states eliminates a large proportion of the noise in the enrollment data, figure 1a further aggregates the public university data to the event year level. Thus each point represents the minority proportion of total freshman fall enrollment in an event year if all students in the states that have banned affirmative action attended a single university for a given selectivity. There is still a noticeable positive time trend in event time[19], which is likely due to the fact that the largest states have similar event years, but the minority enrollment in the first through twelfth years after the elimination of affirmative action deviates noticeably from the previous time trend. The fall in enrollment is even more striking at selective

[19]The spikes that occur between event years -32 and -8 are due to the gaps in fall enrollment data between 1980 and 1990, in which universities have data for event years two years apart but not the intervening event year.

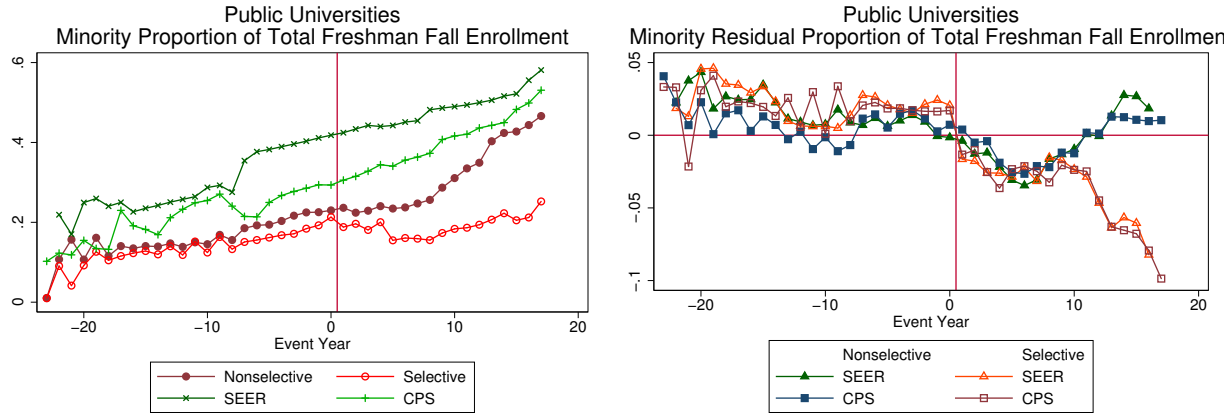
universities where minority enrollment falls about five percentage points after the ban occurs.

Figure 1b attempts to control for secular time trends and differences in baseline minority enrollment between the universities. The points are the weighted mean of the residuals ε_{usted} from the regressions in equations 1 and 2

$$Y_{usted} = \psi_u + \gamma_t + \frac{\text{SEER Minority Population}_{st}}{\text{SEER Total Population}_{st}} + \varepsilon_{usted} \tag{1}$$

$$Y_{usted} = \psi_u + \gamma_t + \frac{\text{CPS Minority Population}_{st}}{\text{CPS Total Population}_{st}} + \varepsilon_{usted} \tag{2}$$

where Y_{usted} is the minority proportion of total freshman fall enrollment at university u in state s in year t, event year e, and selectivity d, ψ_u are university fixed effects, γ_t are year fixed effects, and the total institution enrollment is used as the weight. The SEER and CPS population controls are those described in section 2. Universities of all level and control were included in each regression in an attempt to best control for national and statewide demographic changes[20]. The public university residuals show that there is a sharp decrease in the minority proportion of total enrollment following the elimination of affirmative action regardless of what is used to control for secular trends.



(a) Raw

(b) Detrended

Figure 1: Minority Proportion of Freshman Fall Enrollment by Event Year

Table 4 gives the proportion of total freshman fall enrollment for the five races studied in this paper. The proportions given are the average of all the universities weighted by their total enrollment in that year, and therefore give the proportion of total enrollment if the universities had pooled enrollment. Below the enrollment proportions are the weighted average sum of the SAT 25th/75th percentile for verbal and math

[20]This differs from the event study and generalized difference in differences regressions in sections 4 and 5 which only include public universities in the sample and thus must identify year fixed effects and state/institution time trends off of far fewer observations.

as well as the weighted average ACT total 25th/75th percentiles. The weighted average admission rate is listed after the test score statistics. The first two columns give statistics for the treated universities in states that banned affirmative action, which are the public universities in treated states and public and private universities in Texas. The third and fourth columns are nonselective treated universities, and the fifth and sixth columns are the selective treated universities.

At all types of institutions the white share of enrollment fell in the period following an affirmative action ban. While this may seem counterintuitive, it is likely due to secular time trends leading to increases in the minority enrollment and decreases in white enrollment. Black enrollment, on the other hand, stayed essentially the same at control universities but fell by about 0.6 percentage points at treated universities which may give some suggestive evidence that the black proportion of total enrollment fell following the elimination of affirmative action. Hispanic and Asian enrollment rose as a share of total enrollment in the post period, although Hispanic enrollment rose faster at universities that could still practice affirmative action while Asian enrollment rose fastest at the universities that were required to end their affirmative action programs. Native American enrollment declined slightly and remained a tiny proportion of overall enrollment, although the decline at treated universities was larger than the decline at control universities, and the enrollment fell most at selective treated universities. Overall, simple averages suggest that ending affirmative action helped Asian students at the expense of black, Hispanic, and Native American students.

2.1.2 Graduation Rate

There are 454 four-year institutions from the states that banned affirmative action that submitted adjusted cohort[21] and completers within 150% of normal time data to IPEDS. This is significantly smaller than the number of institutions submitting fall enrollment data because community colleges and below associates institutions do not have four-year programs by definition. As there are only universities in the four-year institution graduation rate dataset, the breakdown by institution in table A.3 is similar to the breakdown by observation in table A.4. Nevertheless, as seen in table 5, almost three quarters of the enrollment in treated states is at public universities, which would be affected by an affirmative action ban.

Figure A.2 plots the minority six-year graduation rate for students attending a four-year university. Each point represents the total sum of minorities who graduated within six years of their initial enrollment divided by the total sum of minorities who started in the same cohort. The year on the x-axis denotes the year in which a cohort of students would have first entered in the fall as freshman. Due to the recent implementation

[21] Revised cohort minus exclusions. The revised cohort is the number of students entering the institution as full-time, first-time degree- or certificate-seeking undergraduates in the reference year. Allowable exclusions include those students who died or were totally and permanently disabled; students who left school to serve in the armed forces (or have been called up to active duty); those who left to serve with a foreign aid service of the federal government, such as the Peace Corps; and those who left to serve on official church missions.

	Treated		Nonselective		Selective	
	Pre	Post	Pre	Post	Pre	Post
Prop. Total Enrollment						
White	.67	.539	.657	.531	.711	.573
	[.221]	[.225]	[.236]	[.237]	[.16]	[.163]
Black	.0715	.0643	.0775	.0685	.0531	.0462
	[.0667]	[.0552]	[.0716]	[.0577]	[.0432]	[.0378]
Hispanic	.144	.195	.158	.213	.1	.116
	[.179]	[.163]	[.199]	[.174]	[.0713]	[.0617]
Asian	.0754	.151	.068	.14	.0985	.196
	[.0988]	[.144]	[.0989]	[.143]	[.0952]	[.141]
Native American	.0152	.00601	.0163	.00598	.0119	.00614
	[.0359]	[.00924]	[.0407]	[.00986]	[.0118]	[.00593]
Selectivity						
SAT 25th Percentile Total	984	994	961	962	1,047	1,121
	[103]	[117]	[96.4]	[101]	[93.8]	[86.7]
SAT 75th Percentile Total	1,210	1,220	1,182	1,186	1,288	1,354
	[105]	[115]	[97.1]	[96.1]	[87.2]	[80.3]
ACT Total 25th Percentile	20.5	20.8	20.1	20.1	22	23.8
	[2.63]	[2.88]	[2.48]	[2.54]	[2.56]	[2.22]
ACT Total 75th Percentile	25.7	26	25.2	25.2	27.6	29.3
	[2.72]	[2.89]	[2.57]	[2.49]	[2.39]	[1.9]
Admission Rate	.719	.598	.724	.618	.702	.514
	[.152]	[.174]	[.139]	[.159]	[.186]	[.205]
Observations	2935	1473	2531	1320	404	153

Table 4: Freshman Fall Enrollment Summary Statistics

	University	Total
Public	71.7	71.7
	(3,899,537)	(3,899,537)
Private NFP	22.4	22.4
	(1,217,973)	(1,217,973)
Private FP	5.95	5.95
	(323,554)	(323,554)
Total	100	100
	(5,441,064)	(5,441,064)

Table 5: Percent of Freshman Fall Enrollment by Level and Control (Freshman Fall Enrollment in Parenthesis)

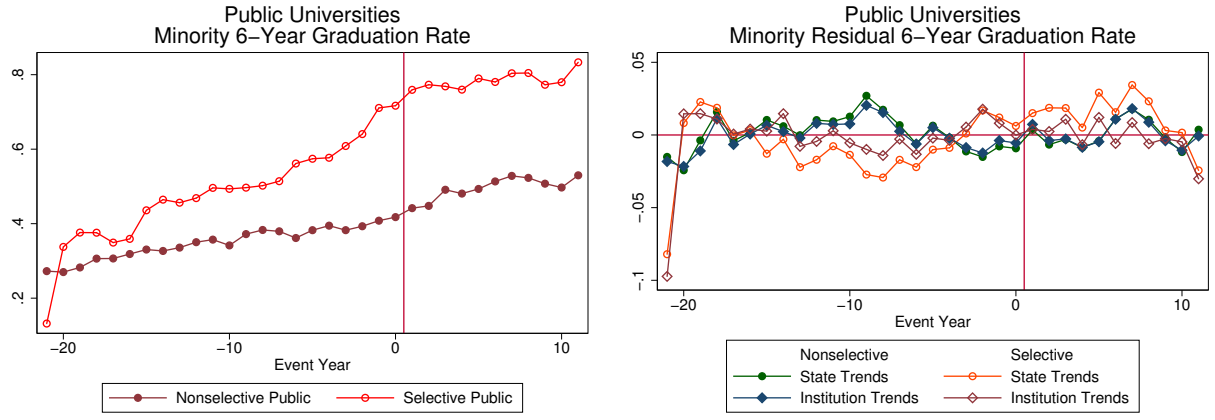
of affirmative action bans in some states and the fact that there is six year lag between a cohort entering and their six-year graduation rate data becoming available, it is currently not possible to estimate the impact of affirmative action on graduation rates in Nebraska, Arizona, New Hampshire, nor Oklahoma. These estimates will be possible in the future as more data becomes available. Minorities appear to be graduating at slightly higher rates over time, although the positive trend is nowhere near as stark as the increase in minority enrollment.

As seen in figure 2a, aggregating to the event year level eliminates much of the noise that was present at the state level. This figure also provides some evidence that selective and nonselective universities may have had differing pre-trends prior to the elimination of affirmative action which would suggest that institution time trends may be a better control than state time trends. Figure 2b gives the weighted mean of the residuals from equations 3 and 4

$$Y_{usted} = \psi_u + \gamma_t + \delta_s \cdot t + \varepsilon_{usted} \tag{3}$$

$$Y_{usted} = \psi_u + \gamma_t + \delta_u \cdot t + \varepsilon_{usted} \tag{4}$$

where Y_{usted} is the minority six-year graduation rate at university u in state s in year t, event year e, and selectivity d, ψ_u are university fixed effects, γ_t are year fixed effects, $\delta_s \cdot t$ is a linear time trend for each state, $\delta_u \cdot t$ is a linear time trend for each institution, and the minority graduation cohort is used as the weight. After controlling for the upward trend in minority graduation rates, it appears that affirmative action has had little impact on the probability of minorities graduating from a university.



(a) Raw

(b) Detrended

Figure 2: Minority 6-Year Graduation Rate by Event Year

Table 6 shows the mean six-year graduation rate for various races with the standard deviation in brackets. Whites and Asians have the highest graduation rates, although minorities have substantially increased their graduation rate relative to non-minority students over time. In absolute terms, all racial groups have increased their graduation rate from the pre- to post-ban period with particularly large increases occurring at selective universities. During this time the admission rate also fell drastically at selective universities, thus it appears that selective universities are becoming more selective in recent years which has led to admitting students who are more likely to succeed to degree completion.

	Treated		Nonselective		Selective	
	Pre	Post	Pre	Post	Pre	Post
150% Time Graduation Rate						
White	.56	.621	.517	.58	.677	.823
	[.175]	[.182]	[.161]	[.167]	[.158]	[.105]
Black	.418	.519	.381	.481	.515	.707
	[.184]	[.196]	[.178]	[.188]	[.162]	[.108]
Hispanic	.47	.558	.428	.517	.582	.76
	[.175]	[.175]	[.162]	[.157]	[.158]	[.109]
Asian	.551	.621	.5	.577	.687	.835
	[.209]	[.194]	[.201]	[.178]	[.164]	[.11]
Native American	.415	.526	.385	.485	.493	.726
	[.229]	[.238]	[.224]	[.232]	[.225]	[.15]
Selectivity						
SAT 25th Percentile Total	989	995	961	965	1,046	1,131
	[100]	[115]	[93.1]	[101]	[89.6]	[64.9]
SAT 75th Percentile Total	1,219	1,218	1,187	1,186	1,284	1,359
	[99.2]	[111]	[90.4]	[93]	[83.6]	[66.2]
ACT Total 25th Percentile	20.4	20.5	19.9	19.9	21.8	23.6
	[2.47]	[2.65]	[2.31]	[2.39]	[2.35]	[1.64]
ACT Total 75th Percentile	25.6	25.6	24.9	25	27.3	29
	[2.44]	[2.74]	[2.26]	[2.42]	[2.1]	[1.48]
Admission Rate	.74	.603	.746	.63	.725	.475
	[.141]	[.169]	[.128]	[.154]	[.172]	[.182]
Observations	1669	958	1453	871	216	87

Table 6: 6-Year Graduation Rate Summary Statistics

3 Identification

3.1 Difference in Differences

Although the primary specification used in this paper is an event study, I will first present difference in differences results as many prior papers in the literature have used this method to study the effects of affirmative action. The difference in differences sample includes all fifty states, as the issue of determining

an event year for a control state is not a problem. As controls I include institution fixed effects ψ_u, year fixed effects γ_t, state/institution time trends t, and data on the demographic makeup of each state $\mathbf{X}_{st}$.

$$Y_{ust} = \Theta \cdot \text{AA Ban}_{st} + \alpha + \mathbf{X}'_{st}\boldsymbol{\beta} + \psi_u + \gamma_t + \delta_{u/s} \cdot t + \varepsilon_{ust} \tag{5}$$

u = university, s = state, t = year

3.2 Event Study

The event study framework takes advantage of the fact that a similar event, in this case the elimination of affirmative action, occurred in different regions in different calendar years. As when estimating the impact of any event that has a distinct pre- and post-period, a threat to identification is the presence of other confounding events that occurred at the same time as the affirmative action bans. This threat is often mitigated by including observations where the event did not take place to difference out any changes that would have occurred even in the absence of an affirmative action ban. A difficulty arises, however, when selecting a control group. States that have banned affirmative action at some point may be systematically different than states that never ban affirmative action, so states without bans may not adequately control for secular changes in the states that do ban affirmative action. The event study framework circumvents this issue by using only the treated states to control for secular changes.

The event year specification is given in equation 6 and includes dummy variables with coefficients θ_τ for each event year (with the year prior to the ban being omitted as event year zero) plus a vector of state-level demographic characteristics X_{st} that controls for the proportion of the college-aged population in a given state that is minority, university fixed effects with coefficients ψ_u, year fixed effects with coefficients γ_t, university/state time trends t as an attempt to control for secular increases in minority enrollment, and a mean zero normally distributed error term ε_{uste}. For all regressions I cluster the standard errors at the state level[22].

$$Y_{uste} = \left[\sum_{\tau=T_{\min}}^{-1} \theta_\tau \cdot (e=\tau)_{ste} + \sum_{\tau=1}^{T_{\max}} \theta_\tau \cdot (e=\tau)_{ste} \right] + \alpha + X'_{st}\boldsymbol{\beta} + \psi_u + \gamma_t + \delta_{u/s} \cdot t + \varepsilon_{uste} \tag{6}$$

u = university, s = state, t = year, e = event year

Because event year zero is omitted, the event year coefficients θ_τ give the expected difference between the outcome in event year τ and the outcome in event year 0 (the cohort prior to the first treated cohort)

[22]Because there are only eight states used in the event study analyses, the assumption that the number of clusters goes to infinity is likely violated. In results not reported, I apply the wild bootstrap method (Cameron, Gelbach and Miller, 2008; Cameron and Miller, 2015) in order to correct the standard errors to account for this violation. Quasi-t and p values were essentially unchanged after applying this correction, so I report analytical clustered standard errors throughout this paper.

conditional on covariates, or $\theta_\tau = \mathrm{E}[Y_{ust\tau}|X_{st}, \psi_u, \gamma_t, t] - \mathrm{E}[Y_{ust0}|X_{st}, \psi_u, \gamma_t, t]$. If the model is correctly specified then $\theta_\tau = 0 \ \forall \tau < 0$ because there should be no changes in the outcome of interest before the elimination of affirmative action.

I do not expect individual institutions to be correlated with the timing of the elimination of affirmative action, so the institution fixed effects should mainly serve to increase precision and reduce the standard errors. On the other hand, the secular time trends that are occurring in all states, particularly for minority enrollment, will be a constant threat to identification, and any estimated effect will essentially be a deviation from the prior trend in enrollment. In order to best estimate the linear time trends, which account for statewide and institution-wide demographic changes over time, and the year fixed effects, which account for national shocks, I use all university observations in treated states despite the fact that this creates an unbalanced panel. An unbalanced panel has the disadvantage of estimating event year coefficients using a different subset of universities for different event years, as each university does not have an observation for all possible event years due to the timing of the affirmative action bans.

In an attempt to provide results that are most similar in spirit to a balanced panel, I set $T_{\min}$ and $T_{\max}$ such that I estimate one additional event year coefficient in both the positive and negative direction than would be possible with a balanced panel that uses all treated states. For example, California prevents the fall enrollment estimates from having event years less than -7, and Oklahoma prevents the estimates from having event years greater than $+2$. I therefore estimate event year coefficients from -8 to $+3$, and I "load" any observations beyond this window onto the -8 or $+3$ event year. In practice this amounts to recoding any observation with an event year less than $T_{\min}$ as $T_{\min}$ and any observation with an event year greater than $T_{\max}$ as $T_{\max}$. In section 5 I present estimates using a balanced panel as a robustness check.

In order to estimate unbiased coefficients θ_τ, the error term ε_{uste} must not be correlated with both the event year dummies and the outcome of interest Y_{uste}. In particular, there can be nothing that occurs at the event year level that would directly or indirectly affect minorities at universities. Because event years are composed of multiple calendar years, the confounding variable could not simply be a national shock to minority enrollment that occurs around the time of a single state's affirmative action ban because this would affect different event years for each state. Furthermore, a shock of this type would be differenced out by the calendar year fixed effects. Thus there would need to be multiple shocks to enrollment where each shock only affected one state, and these shocks would have to coincidentally all occur at the same time relative to the affirmative action ban. The chances of shocks of this nature occurring are likely very low which increases the likelihood that the coefficient estimates represent the causal impact of affirmative action.

3.3 Generalized Difference in Differences

I augment the event study analyses with analyses using a generalized difference in differences methodology. The generalized difference in differences strategy combines an event study with a difference in differences by introducing a control group to the treatment states. If the event study is essentially an extension of a difference in differences, then a generalized difference in differences is most similar to a triple difference in differences. Many prior papers have suggested that the effects of affirmative action are concentrated at selective universities where the probability of admission is low. Thus nonselective universities in states with affirmative action bans are plausibly unaffected by the elimination of affirmative action but are likely affected by the same unobservable statewide trends as selective universities.

The generalized difference in differences specification is given in equation 7 and includes dummy variables with coefficients θ_τ for each event year (with event year zero again being omitted), dummy variables with coefficients ϕ_τ for each event year interacted with a dummy for selectivity (with event year zero times selective being omitted), plus a vector of state-level demographic characteristics X_{st}, university fixed effects with coefficients ψ_u, time fixed effects with coefficients γ_t, university/state time trends t, and a mean zero normally distributed error term ε_{usted}.

$$\begin{aligned} Y_{usted} = &\left[\sum_{\tau=T_{\min}}^{-1} \theta_\tau \cdot (e=\tau)_{ste} + \sum_{\tau=1}^{T_{\max}} \theta_\tau \cdot (e=\tau)_{ste}\right] \\ &+ \left[\sum_{\tau=T_{\min}}^{-1} \phi_\tau \cdot (e=\tau)_{ste} \cdot (d=\text{selective})_{ud} + \sum_{\tau=1}^{T_{\max}} \phi_\tau \cdot (e=\tau)_{ste} \cdot (d=\text{selective})_{ud}\right] \\ &+ \phi_0 \cdot (d=\text{selective})_{ud} + \alpha + X'_{st}\boldsymbol{\beta} + \psi_u + \gamma_t + \delta_{u/s} \cdot t + \varepsilon_{usted} \end{aligned} \tag{7}$$

u = university, s = state, t = year, e = event year, d = selectivity

Event year zero is omitted from both the regular event year coefficients θ_τ and the selective event year coefficients ϕ_τ, so the selective dummy gives the expected difference between selective and nonselective universities in event year zero. For this reason I denote the coefficient for the selective dummy as ϕ_0. ϕ_0 thus becomes the reference difference for all the other event year comparisons between selective and nonselective institutions, as the effect at a nonselective institution in event year τ will be given by θ_τ while the effect at a selective institution will be given by $\theta_\tau + \phi_0 + \phi_\tau$. There are many reasons to believe that ϕ_0 will not equal zero, such as if minorities have weaker/stronger application portfolios on average or if selective universities use affirmative action to a lesser/greater degree. If the difference between selective and nonselective institutions in event year τ is equivalent to the difference in event year zero, then ϕ_τ will equal zero. There is little reason

to believe that this difference should change over time, so if the model is correctly specified then $\theta_\tau = \phi_\tau = 0$ $\forall \tau < 0$. If there were differential changes at selective universities after banning affirmative action, however, then ϕ_τ will not equal zero for positive event years.

3.4 Weights

While it is highly unlikely that there would be state level shocks that occur only in treated states in the years after an affirmative action ban, this could occur in practice due to the nature of the timing of the affirmative action policies. The earliest states to ban affirmative action, California, Washington, and Florida, have large populations, while the most recent states to ban affirmative action, Michigan, Nebraska, Arizona, New Hampshire, and Oklahoma, have much smaller populations. This could cause issues if there is a regional shock that affects minority enrollment around the time that the earliest states banned affirmative action. Because these states account for such a large percentage of the treated states' enrollment, the latter treated states may not carry sufficient weight to prevent the shock from biasing the coefficients. For this reason, I employ two weighting schemes for the analyses. The first weighting scheme, which I call *house* weights, weights each observation by the denominator of the dependent variable. This is the total institution enrollment for the fall enrollment results and the minority cohort size for the graduation rate results. House weights are standard when working with a proportion as the dependent variable and accurately reflect that a one percentage point change in the minority enrollment at a university of 50,000 students is not equivalent to a one percentage point change at a university of 5,000 students. However, house weights give primary importance to states with large populations, and for this reason the average treatment effect will be much closer to the treatment effect in California than to the treatment effect in Nebraska.

I therefore introduce a second weighting scheme, which I call *senate* weights, that divides each observation's house weight by the sum of the house weights of all institutions in that given observation's state, year and level. Fall enrollment senate weights are calculated by equation 8 and graduation rate senate weights are calculated by equation 9. Thus *within* each state an institution is weighted equivalently to house weights, but *between* each state an institution is weighted proportionally to how large of a presence they have in their level of the state's postsecondary education system. Senate weights will give more importance to universities that are small in absolute terms but large relative to their state's total university enrollment than will house weights. By giving more equal weight to each of the states, the risk of a shock biasing the results is reduced.

$$\omega_{ust} = \frac{\text{Total Freshman Enrollment}_{ust}}{\sum_{\forall u \in st} \text{Total Freshman Enrollment}_{ust}} \tag{8}$$

$$\omega_{ust} = \frac{\text{Minority Graduation Cohort}_{ust}}{\sum_{\forall u \in st} \text{Minority Graduation Cohort}_{ust}} \tag{9}$$

4 Full Sample Results

4.1 Fall Enrollment

4.1.1 Difference in Differences

Table 7 shows the minority proportion of total freshman fall enrollment difference in differences results when private not-for-profit universities are included as a control group, so the identification relies on across state and time variation in the affirmative action policies as well as within state variation between public and private universities. All universities are included regardless if they reside in a treated or control state, so there are many more observations than in the event study results. The final five specifications, which best attempt to control for the secular increases in minority enrollment, suggest that the minority proportion of total freshman fall enrollment decreased between 0.4 and 2 percentage points after the elimination of affirmative action. Given that minorities only make up about 24% of students on campus, this equates to as much as an 8% drop in minority enrollment.

	Minority Proportion of Total Freshman Fall Enrollment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AA Banned	.102***	.041	.00357	-.00687	-.0198*	-.00386	-.00614	-.00583
	(.0313)	(.0262)	(.0121)	(.00596)	(.00989)	(.0037)	(.00829)	(.00728)
Institution FE	-	Y	Y	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-	-	-
Institution Time Trends	-	-	-	-	Y	-	-	-
Lagged Dependent Variable	-	-	-	-	-	Y	-	-
SEER Population	-	-	-	-	-	-	Y	-
CPS Population	-	-	-	-	-	-	-	Y
Pre-Ban Y Mean	.235	.235	.235	.235	.235	.253	.244	.235
Observations	48938	48938	48938	48938	48938	40999	41052	47993
Institutions	2669	2669	2669	2669	2669	2355	2430	2625
Adjusted R^2	.0238	.888	.933	.939	.961	.964	.914	.906

Standard errors in parentheses

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

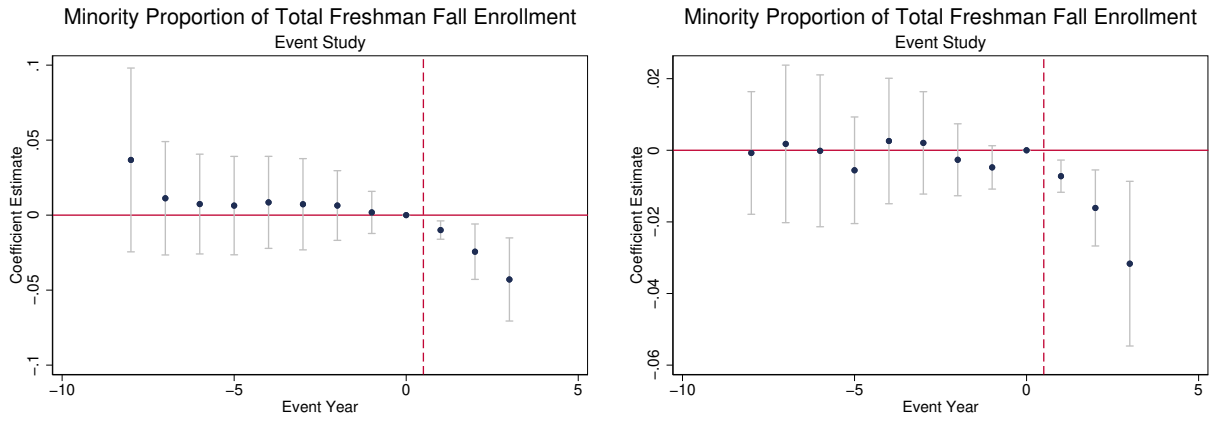
Table 7: Difference in Differences - Private Not-for-Profit as Control

4.1.2 Event Study

Figure 3 plots the coefficients θ_τ for the event year dummies from equation 6, and the grey area represents the 95% confidence interval for the coefficient estimates. As mentioned earlier, event year zero is the omitted

event year and the coefficient is constrained to equal zero. As evidenced in figures B.3a, B.3b, 3a, and 3b, which attempt to control for the increasing trend in minority enrollment in some fashion, the minority proportion of total freshman fall enrollment fell significantly in the years following the elimination of affirmative action. Encouragingly, we fail to reject that the coefficient estimates for the negative event years are different from zero which provides evidence that the model is correctly specified and identifies unbiased estimates of the impact of affirmative action.

The first and last coefficient estimates are often noticeably different then their neighboring coefficients. This is likely due to the "loading" of many event years onto these end points, so I do not draw any conclusions from these points. Event years -7 to $+2$ are estimated using the same set of universities, however, and should provide more reliable results. Interestingly, it appears that minority enrollment falls even further in the second year following an affirmative action ban. While the partial equilibrium effect of eliminating affirmative action should be constant over time, a change in the effect size between years could signal a feedback loop in which minorities alter application and enrollment behavior in response to the reduced minority population at affected universities.



(a) Institution/Year FE & SEER Population

(b) Institution/Year FE & CPS Population

Figure 3: Event Study - Directly Affected Universities

Table 8 provides the coefficient estimates from the event study regressions; the estimates from figure 3 are given in models 4, 5, 7, and 8. The rows below the coefficient estimates display the average pre-ban minority proportion of total freshman fall enrollment for the sample, the number of observations[23] and distinct institutions, the adjusted R^2 of the model, and the F statistic and p value for the hypothesis test that the positive event year coefficients are jointly different from zero. Beginning with model 3, the coefficients for event years one and two are consistently and precisely estimated and suggest that the elimination of

[23]The estimates using SEER data have fewer observations because the first year of SEER data is in 1990, so there is no data for the years 1980, 1984, 1986, nor 1988.

affirmative action caused minority enrollment to fall on average by 0.8 percentage points in the first year and 1.8 percentage points in the second year. Given the baseline average minority enrollment of about 17%, this translates to about a 5% and 11% decrease respectively. In all models the positive event year coefficients are jointly statistically different from zero at the 10% significance level, and the p value falls well below one percent for models four, five, seven, and eight which account for trends in enrollment over time.

	Minority Proportion of Total Freshman Fall Enrollment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Event Year 1	-.00249	-.00074	-.00826**	-.00767**	-.0073**	-.00799	-.00996***	-.00723***
	(.00273)	(.00364)	(.00285)	(.0026)	(.00267)	(.00583)	(.00259)	(.0019)
Event Year 2	-.00865	-.0078	-.0202**	-.0178**	-.0167**	-.0137**	-.0244**	-.0161***
	(.0089)	(.00838)	(.00683)	(.00588)	(.00587)	(.00528)	(.00781)	(.00449)
Event Year 3	.0666**	.0406**	-.0318**	-.0393***	-.0369***	-.0174***	-.0429***	-.0317**
	(.0212)	(.0138)	(.011)	(.00881)	(.0085)	(.00432)	(.0117)	(.00972)
Institution FE	-	Y	Y	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-	-	-
Institution Time Trends	-	-	-	-	Y	-	-	-
Lagged Dependent Variable	-	-	-	-	-	Y	-	-
SEER Population	-	-	-	-	-	-	Y	-
CPS Population	-	-	-	-	-	-	-	Y
Pre-Ban Y Mean	.168	.168	.168	.168	.168	.178	.177	.168
Observations	2409	2409	2409	2409	2409	2066	2072	2409
Institutions	99	99	99	99	99	95	96	99
Adjusted R^2	.172	.847	.917	.929	.961	.972	.936	.927
F Test: $\theta_\tau = 0 \; \forall \; \tau > 0$	31.3	7	8.06	20.6	17.7	6.37	15	30.5
F Test p Value: $\theta_\tau = 0 \; \forall \; \tau > 0$	.000198	.0163	.0113	.000756	.00119	.0207	.00198	.000217

Standard errors in parentheses

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

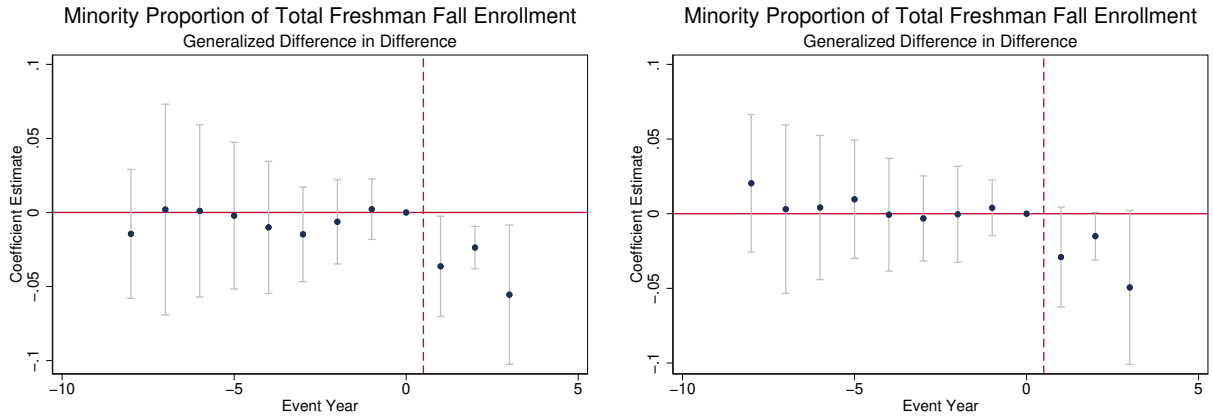
Table 8: Event Study - Directly Affected Universities

As a robustness check, I repeat the event study analyses using only full-time freshmen undergraduates as opposed to both full- and part-time freshmen undergraduates. Figure D.8 and table D.5 show that part-time students are not the primary source of the decrease in minority enrollment, as there is still a significant decline in the minority proportion of full-time freshman enrollment. I also repeat the analyses using senate weights, and figure D.9 and table D.6 confirm that the effects are broadly similar using this alternative weighting scheme.

4.1.3 Generalized Difference in Differences

Figure 4 plots the coefficients ϕ_τ for the event year by selective dummies from equation 7. Both event year zero and the selective event year zero are omitted, thus ϕ_τ gives the difference in minority enrollment between selective and nonselective universities relative to the difference in event year zero. Figures B.4a, B.4b, 4a, and 4b show that the minority enrollment gap between selective and nonselective universities was essentially constant in the years leading up to the elimination of affirmative action, but that

minority enrollment fell at selective universities by a much larger amount than at nonselective universities after affirmative action was banned. This is consistent with the suggestion that affirmative action only has "bite" at selective institutions.



(a) Institution/Year FE & SEER Population

(b) Institution/Year FE & CPS Population

Figure 4: Generalized Difference in Differences - Directly Affected Universities

Table 9 gives the coefficient estimates from figure 4 and has the same layout as table 8. Using nonselective universities as a control group, the effects are much larger at selective universities compared to the estimates for the entire population of universities. Given that selective institutions have a lower average pre-ban minority enrollment of about 15%, the drop on average of 3.3 percentage points in the first year and 2.3 percentage points in the second year following an affirmative action ban are equivalent to about 22% and 15% decreases respectively.

A noticeable difference between the event study and generalized difference in differences models is that the estimates are not sensitive to the inclusion of institution and year fixed effects nor attempts to control for demographic changes. This is almost certainly due to the fact that nonselective public universities adequately control for the statewide secular changes that occur over time, so accounting for yearly trends is redundant. In results available upon request, one can see that the negative event year coefficients are all essentially equal to zero even with no control variables. Another interesting difference is that the negative effect of banning affirmative action is actually smaller in event year two than in the first year after eliminating affirmative action, which could signal that selective universities learned to adapt to the new legal environment and found other ways to promote the enrollment of minorities.

The selectivity scheme using the Barron's Selectivity Index is admittedly *ad hoc*, so as a robustness check I use an alternate selectivity scheme that denotes any flagship university or a university in the top 50 of the 2000 U.S. News and World Report National University Ranking as selective. Figure D.10 plots the coefficient

	Minority Proportion of Total Freshman Fall Enrollment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Event Year 1	-.0315*	-.0325*	-.0358**	-.0356**	-.0312**	-.0332*	-.0364**	-.029*
	(.0136)	(.0148)	(.0146)	(.014)	(.013)	(.0141)	(.0143)	(.0141)
Event Year 2	-.0111	-.0105	-.0201**	-.0222***	-.0138**	.00671	-.0237***	-.0151*
	(.0112)	(.01)	(.00704)	(.00635)	(.00545)	(.0106)	(.00605)	(.00676)
Event Year 3	-.114**	-.0744**	-.0614**	-.0566**	.00369	-.0127**	-.0555**	-.0494*
	(.0331)	(.0283)	(.0233)	(.0223)	(.0114)	(.00481)	(.0199)	(.0218)
Institution FE	-	Y	Y	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-	-	-
Institution Time Trends	-	-	-	-	Y	-	-	-
Lagged Dependent Variable	-	-	-	-	-	Y	-	-
SEER Population	-	-	-	-	-	-	Y	-
CPS Population	-	-	-	-	-	-	-	Y
Selective Pre-Ban Y Mean	.148	.148	.148	.148	.148	.155	.153	.148
Observations	2409	2409	2409	2409	2409	2066	2072	2409
Institutions	99	99	99	99	99	95	96	99
Adjusted R^2	.221	.851	.921	.934	.961	.973	.939	.932
F Test: $\theta_\tau = 0 \; \forall \; \tau > 0$	7.26	2.76	6.99	7.92	4.16	3.34	8.95	4.55
F Test p Value: $\theta_\tau = 0 \; \forall \; \tau > 0$	.0148	.121	.0164	.0119	.055	.0854	.00858	.0453

Standard errors in parentheses

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

Table 9: Generalized Difference in Differences - Directly Affected Universities

estimates ϕ_τ from this alternative selectivity scheme. While the coefficients for the event years following the elimination of affirmative action are for the most part negative, the estimates are smaller in magnitude and insignificantly different from zero. Nevertheless, table D.7 shows that, similar to the generalized difference in differences results using the Barron's Selectivity Index, the coefficient estimates are fairly stable even in the absence of demographic controls. Results using the senate weighting scheme are shown in figure D.11 and table D.8. The senate weights estimates also show a decline in minority freshman fall enrollment, albeit, as with the alternative selectivity scheme, the estimates are smaller in magnitude than the main results and statistically insignificant.

4.2 Graduation Rate

4.2.1 Difference in Differences

Table 10 provides the difference in differences estimates for the minority six-year graduation rate using private not-for-profit universities in treated states as control institutions. The estimates suggest that there is a small increase of about 1.5 percentage points on average in the minority graduation rate following the elimination of affirmative action, although the effect is smaller and insignificant when institution-specific time trends are included as controls. The minority six-year graduation rate is only 41.4%, however, so this amounts to an increase of 3.6%. The coefficients are much higher in the models that don't control for any

time trends, as would be expected given that graduation rates have been increasing over time.

	Minority 6-Year Graduation Rate					
	(1)	(2)	(3)	(4)	(5)	(6)
AA Banned	.0715**	.0565*	.0209*	.0112**	.00634	.0138*
	(.0347)	(.0303)	(.0115)	(.00553)	(.00403)	(.00748)
Institution FE	-	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-
Institution Time Trends	-	-	-	-	Y	-
Lagged Dependent Variable	-	-	-	-	-	Y
Pre-Ban Y Mean	.414	.414	.414	.414	.414	.418
Observations	26334	26334	26334	26334	26334	24056
Institutions	1809	1809	1809	1809	1809	1714
Adjusted R^2	.0136	.865	.897	.901	.925	.91

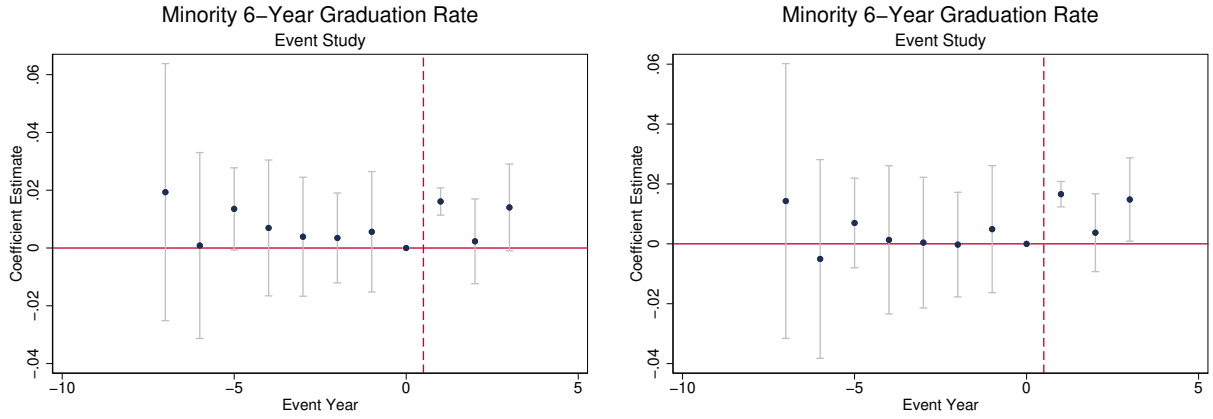
Standard errors in parentheses

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

Table 10: Difference in Differences - Private Not-for-Profit as Control

4.2.2 Event Study

Figure 5 is analogous to figure 3 and plots the event year coefficient estimates from equation 6 using the minority six-year graduation rate as the dependent variable. The event study estimates also suggest that the minority graduation rate increased slightly following the elimination of affirmative action, although, interestingly, the coefficient estimate for the second year following the elimination of affirmative action is essentially zero.



(a) Institution/Year FE & State Time Trends

(b) Institution/Year FE & Institution Time Trends

Figure 5: Event Study - Directly Affected Universities

Table 11 gives the coefficient estimates provided in figure 5. The coefficient estimates using state time

trends are essentially identical to those using institution time trends, and suggest that eliminating affirmative action improves the minority six-year graduation rate on average by 1.6 percentage points one year after the elimination of affirmative action, which amounts to a 3.7% increase on a base graduation rate of 42.7%. As mentioned earlier, there is no statistically significant effect two years after the ban, so the one-year results are merely suggestive. As can be seen in figure D.12 and table D.9, results using senate weights are noisier and less conclusive but paint a similar picture.

	Minority 6-Year Graduation Rate					
	(1)	(2)	(3)	(4)	(5)	(6)
Event Year 1	.0092**	.0187***	.0147***	.0161***	.0166***	.0178**
	(.00266)	(.00144)	(.00217)	(.00199)	(.00179)	(.00546)
Event Year 2	.0186***	.0224***	.00141	.00232	.00372	-.00299
	(.00492)	(.00351)	(.00681)	(.0062)	(.00549)	(.00726)
Event Year 3	.0673**	.0727***	.0212***	.0141*	.0148**	.0154**
	(.0202)	(.00713)	(.00565)	(.00635)	(.00589)	(.00486)
Institution FE	-	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-
Institution Time Trends	-	-	-	-	Y	-
Lagged Dependent Variable	-	-	-	-	-	Y
Pre-Ban Y Mean	.427	.427	.427	.427	.427	.431
Observations	1497	1497	1497	1497	1497	1402
Institutions	91	91	91	91	91	91
Adjusted R^2	.103	.923	.939	.939	.967	.961
F Test: $\theta_\tau = 0 \; \forall \; \tau > 0$	72.3	274	80.5	64.9	65.8	17
F Test p Value: $\theta_\tau = 0 \; \forall \; \tau > 0$	.0000124	1.29e-07	8.64e-06	.0000179	.0000171	.00136

Standard errors in parentheses

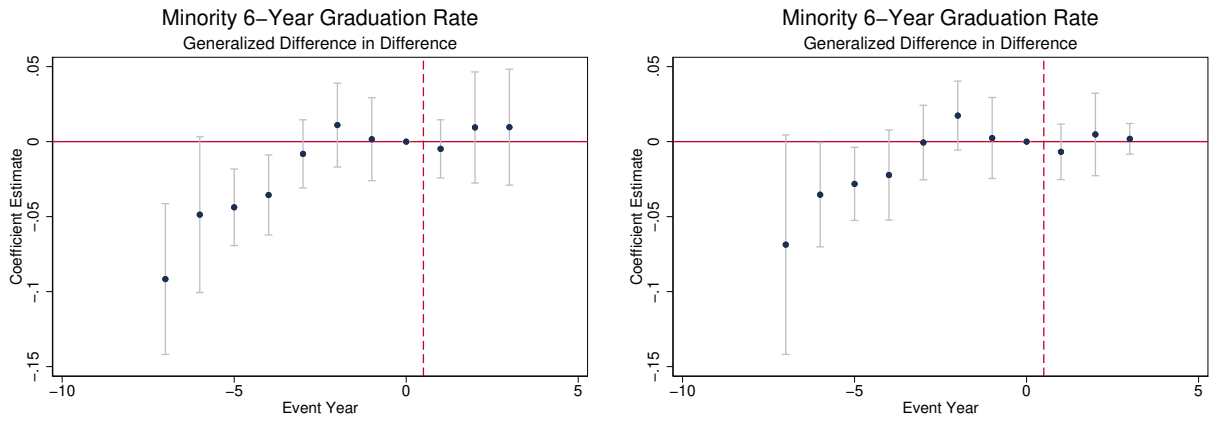
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Event Study - Directly Affected Universities

4.2.3 Generalized Difference in Differences

Figure 6 plots the selective event year coefficient estimates, and the estimates using state time trends clearly violate the assumption that the negative event year coefficient estimates should be equal to zero. The results using institution time trends do not violate this assumption, which may provide more evidence in addition to figure 2a that nonselective and selective universities had differing time trends in their minority graduation rates. For this reason, the generalized difference in differences estimates for graduation rates using state time trends should not be interpreted as the causal effect of affirmative action bans.

Table 12 provides evidence that the minority six-year graduation rate at selective universities was not affected differentially than the minority graduation rate at nonselective universities, as the coefficient esti-



(a) Institution/Year FE & State Time Trends

(b) Institution/Year FE & Institution Time Trends

Figure 6: Generalized Difference in Differences - Directly Affected Universities

mates are all essentially zero and statistically insignificant. Because there was some evidence in section 4.2.2 that the minority graduation rate may have increased at all affected universities following the elimination of affirmative action, this suggests that the affirmative action bans may have led to compositional change at universities of all degrees of selectivity.

Figure D.13 plots the generalized difference in differences estimates using the flagship and top 50 university selectivity scheme. Overall the pattern is consistent with the estimates shown in figure 6, although the Barron's selectivity scheme more strongly violates the assumption that the negative event year coefficients should all be equal to zero when state time trends are included. Table D.10 shows that the coefficient estimates between the two selectivity schemes are largely similar. Although the coefficients in event years one and three have opposite signs between the two schemes, the coefficients are extremely close to zero and are all statistically insignificant. The only noticeable difference between the two schemes is for the second year after an affirmative action ban, as the estimates using the Barron's selectivity scheme are essentially zero while the estimates using flagship universities and the U.S. News and World Report top 50 universities give evidence that the minority six-year graduation rate increased by about 2.3 percentage points more at selective universities than nonselective universities. Nevertheless, this may be a statistical anomaly given the odd pattern of that coefficient in the results that use the Barron's selectivity scheme. The results in figure D.14 and table D.11 that use senate weights are similar to the results using house weights, and overall point to there being no effect at selective universities relative to nonselective universities.

	Minority 6-Year Graduation Rate					
	(1)	(2)	(3)	(4)	(5)	(6)
Event Year 1	.0185	-.0101	-.00701	-.00481	-.00681	-.0106
	(.0342)	(.00596)	(.00745)	(.0082)	(.00782)	(.00653)
Event Year 2	.0261	.00437	.0076	.00946	.0048	.00978
	(.037)	(.0131)	(.0152)	(.0157)	(.0116)	(.0098)
Event Year 3	-.0206	-.00151	.00556	.00965	.00187	.000734
	(.0503)	(.0125)	(.0152)	(.0163)	(.00432)	(.0059)
Institution FE	-	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-
Institution Time Trends	-	-	-	-	Y	-
Lagged Dependent Variable	-	-	-	-	-	Y
Selective Pre-Ban Y Mean	.551	.551	.551	.551	.551	.551
Observations	1497	1497	1497	1497	1497	1402
Institutions	91	91	91	91	91	91
Adjusted R^2	.36	.927	.943	.943	.968	.962
F Test: $\theta_\tau = 0 \; \forall \; \tau > 0$	.338	3.04	1.81	1.1	3.34	1.91
F Test p Value: $\theta_\tau = 0 \; \forall \; \tau > 0$	.799	.102	.233	.411	.0853	.217

Standard errors in parentheses

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

Table 12: Generalized Difference in Differences - Directly Affected Universities

5 Balanced Panel Results

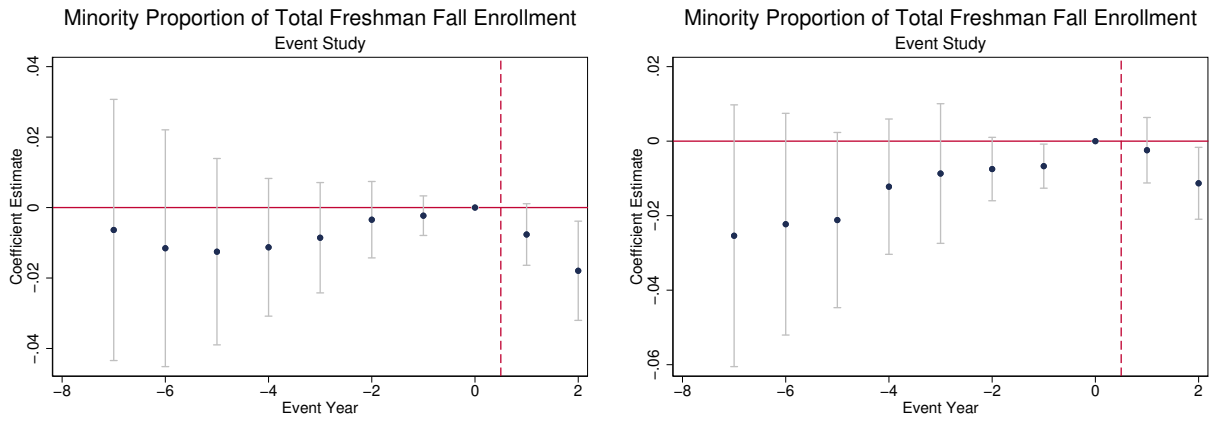
5.1 Fall Enrollment

5.1.1 Event Study

Figure 7 plots the coefficients θ_τ from equation 6 with the minority proportion of total freshmen fall enrollment as the dependent variable. Instead of using all treated states in the IPEDS sample, however, the figures are for regressions in which each university had an observation for every single event year. Therefore θ_τ is identified using the same set of universities for every τ and there is no longer the possibility that θ_τ's value relative to other event years is due to the composition of universities. Overall, it appears that there is a decrease in the minority proportion of freshman enrollment after the elimination of affirmative action, but the estimates are less conclusive than the full sample results.

5.1.2 Generalized Difference in Differences

The balanced panel generalized difference in differences estimates in figure 8 tell a much different story, however. The coefficient estimates for the negative event years are all insignificantly different than zero, yet there is a clear decrease in minority representation after affirmative action is banned. Furthermore, this

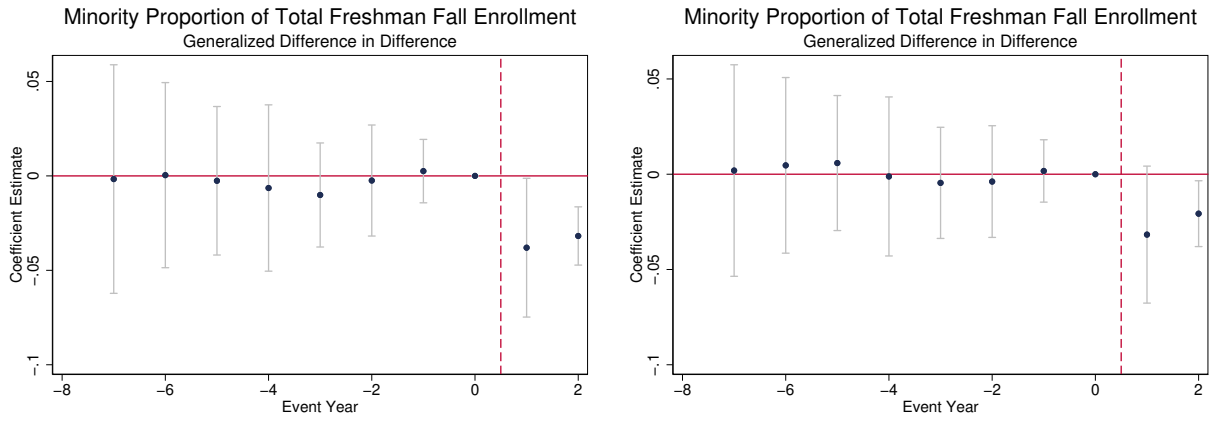


(a) Event Years −7 to +2 with SEER

(b) Event Years −7 to +2 with CPS

Figure 7: Balanced Panel Event Study - Directly Affected Universities

decrease is consistent between both the SEER and CPS population controls. As with the full sample analyses, the generalized difference in differences estimates are likely more stable than the event study estimates because the nonselective treated universities do a much better job of controlling for underlying changes in the college-going population than do demographic controls using the SEER or CPS data. For this reason the increase in minority enrollment over time is more easily differenced out in the generalized difference in differences model than with an event study. The balanced panel generalized difference in differences estimates, combined with the full sample estimates in section 4.1.3, give strong evidence that eliminating affirmative action programs would significantly reduce minority enrollment at selective universities.



(a) Event Years −7 to +2 with SEER

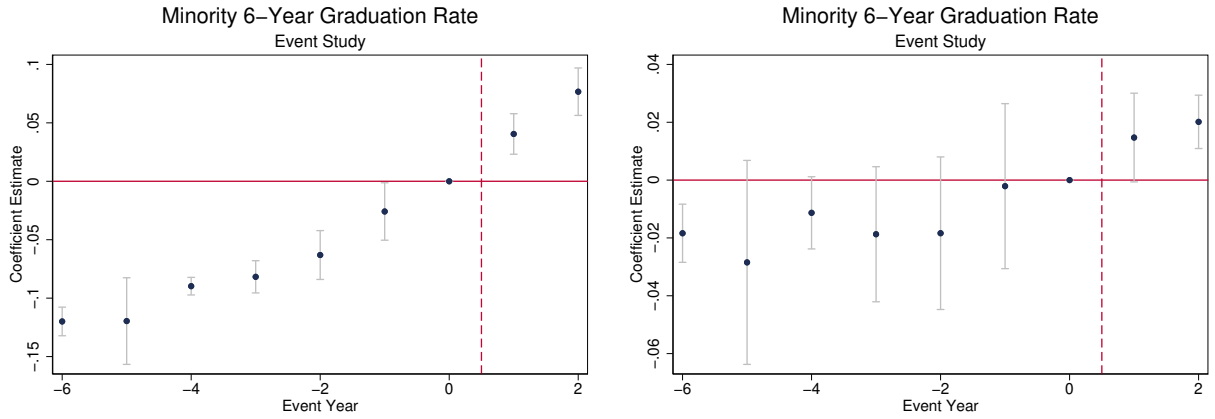
(b) Event Years −7 to +2 with CPS

Figure 8: Balanced Panel Generalized Difference in Differences - Directly Affected Universities

5.2 Graduation Rate

5.2.1 Event Study

The balanced panel event study results for the minority six-year graduation rate in figure 9 show that estimates that control for state time trends should be ignored due to their clear violation of the identifying assumption. Results using institution time trends do not suffer from this issue and show a similar effect to the estimates in section 4.2.2. A key difference is that the effect is a consistent increase in the minority graduation rate as opposed to the full sample results where there was essentially no effect in the second year after the elimination of affirmative action.



(a) Event Years −6 to +2 with State Time Trends (b) Event Years −6 to +2 with Institution Time Trends

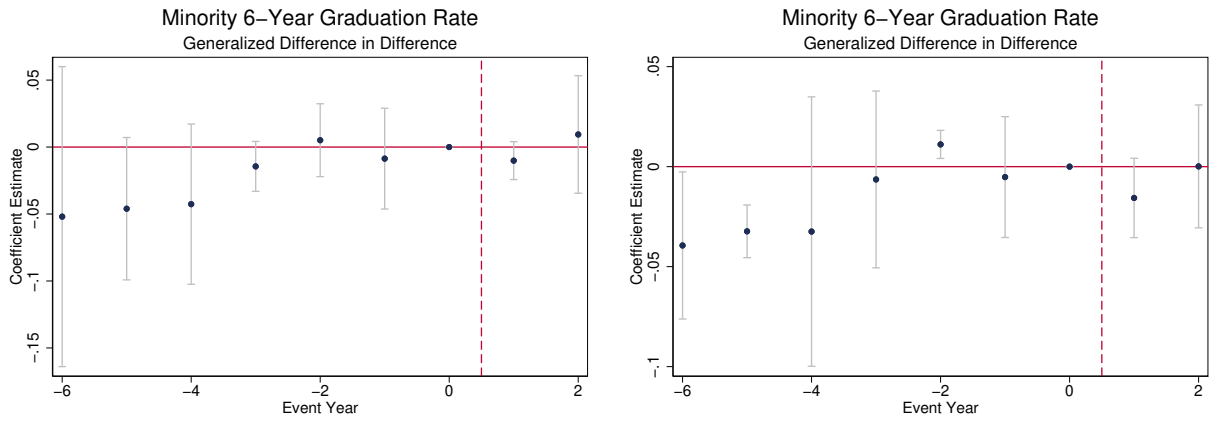
Figure 9: Balanced Panel Event Study - Directly Affected Universities

5.2.2 Generalized Difference in Differences

Figure 10 provides the generalized difference in differences results for the minority six-year graduation rate. The results confirm the findings in section 4.2.3 that the minority graduation rate at selective universities did not change differentially to the graduation rate at nonselective universities following affirmative action bans. The coefficient estimates are essentially equal to zero in both the pre- and post-affirmative action periods, suggesting that the difference between the minority graduation rate at selective and nonselective universities has remained constant over time.

6 Falsification Tests

The previous sections suggest that the minority proportion of total freshmen fall enrollment decreased and the minority six-year graduation rate may have increased slightly following the elimination of affirmative



(a) Event Years −6 to +2 with State Time Trends (b) Event Years −6 to +2 with Institution Time Trends

Figure 10: Balanced Panel Generalized Difference in Differences - Directly Affected Universities

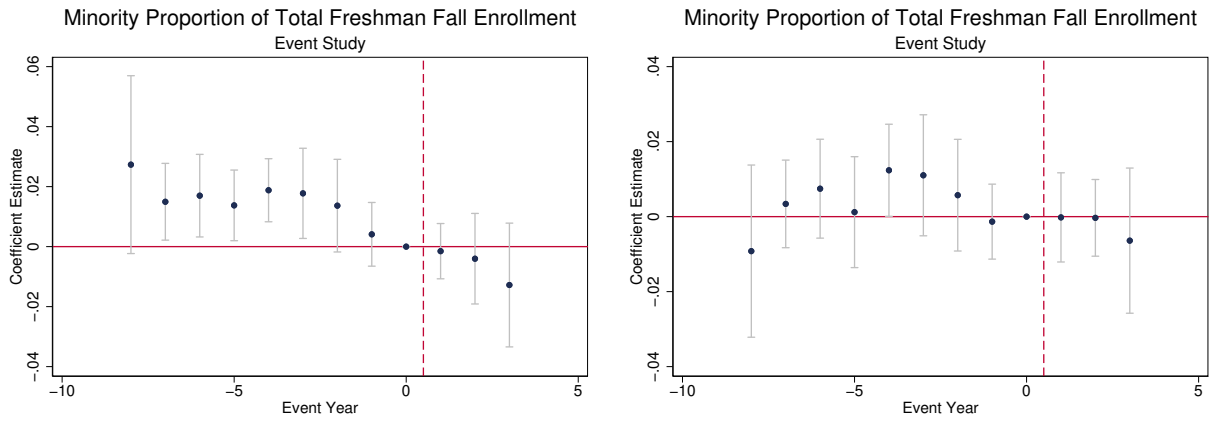
action at public universities. It is difficult to attribute these affects solely to affirmative action with certainty based on this evidence alone. The existence of two types of postsecondary institutions that were not directly affected by the change in admission policies offers insight into whether other events were responsible for these effects. The first, private not-for-profit universities, were not affected because the scope of the laws only included public institutions[24]. The second, public community colleges, should be unaffected because they generally admit all students who apply for classes. If there are no effects at these plausibly unaffected institutions, then it is much more likely that the aforementioned effects were due to the elimination of affirmative action.

6.1 Fall Enrollment

Figure 11 gives the estimated event year coefficients for the minority proportion of total freshmen fall enrollment at private not-for-profit universities. The results provide convincing evidence that affirmative action bans were the true cause of the negative effects in section 4.1.2, as there is no similar negative effect at private not-for-profit universities. Although figure 11a has a slight negative trend for the negative event years, there is no trend break at event year zero and the positive event year coefficients are insignificantly different than zero.

The results for community colleges in figure 12, while not as clear as those for private not-for-profit universities, also show no effect after the elimination of affirmative action. In fact, the coefficient estimates are all positive, although insignificant, with the exception of event year 3 which contains many more observations due to the "loading". This gives evidence that even if something occurred at community colleges following

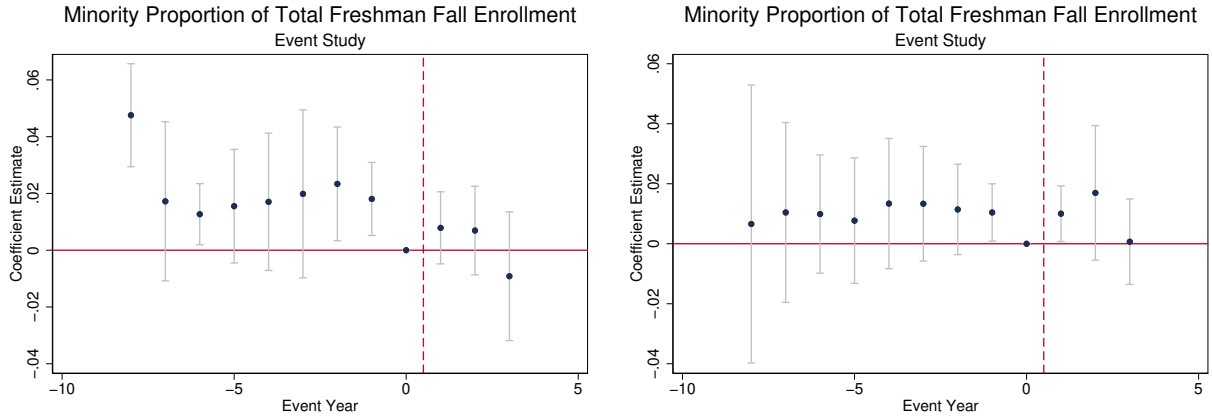
[24]Private not-for-profit universities were affected in Texas, but are excluded from the falsification tests because all event study and generalized difference in differences regressions exclude Texas.



(a) Institution/Year FE & SEER Population (b) Institution/Year FE & CPS Population

Figure 11: Event Study - Private Not-for-Profit Universities

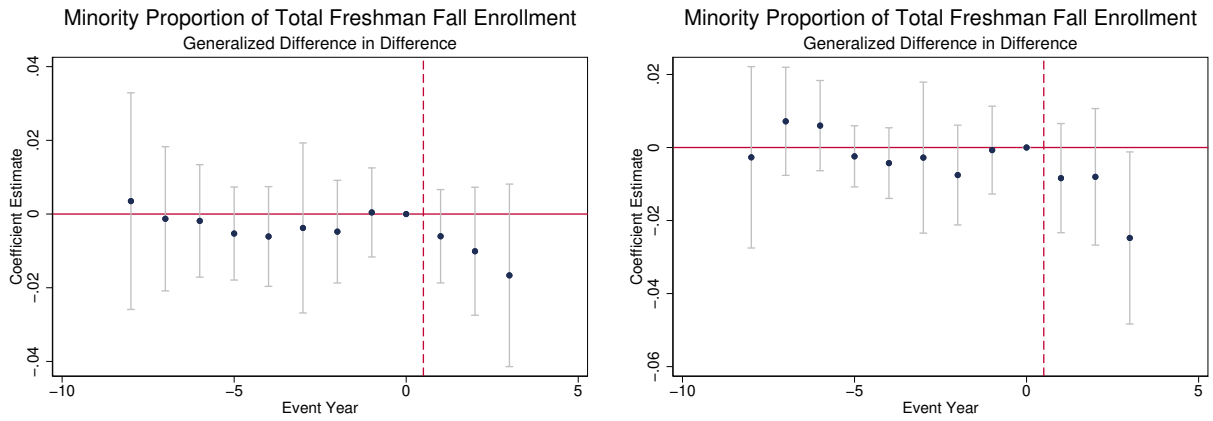
an affirmative action ban they were not affected in the same way as public universities.



(a) Institution/Year FE & SEER Population (b) Institution/Year FE & CPS Population

Figure 12: Event Study - Directly Affected Community Colleges

Figure 13 plots the coefficient estimates from the minority proportion of total freshmen fall enrollment generalized difference in differences for private not-for-profit universities. The estimates suggest that there was no decline in the minority proportion of freshmen enrollment at selective private not-for-profit universities compared to nonselective private non-for-profit universities, which is in stark contrast to the clear decrease in minority enrollment at selective public universities presented in figure 4. Because the generalized difference in differences results are consistent for both the full sample and balanced panel of public universities but absent for private not-for-profit universities, I conclude that the decrease in minority freshman fall enrollment at selective public institutions following the elimination of affirmative action was in fact due to banning affirmative action and not due to some other factor that occurred at the same time.

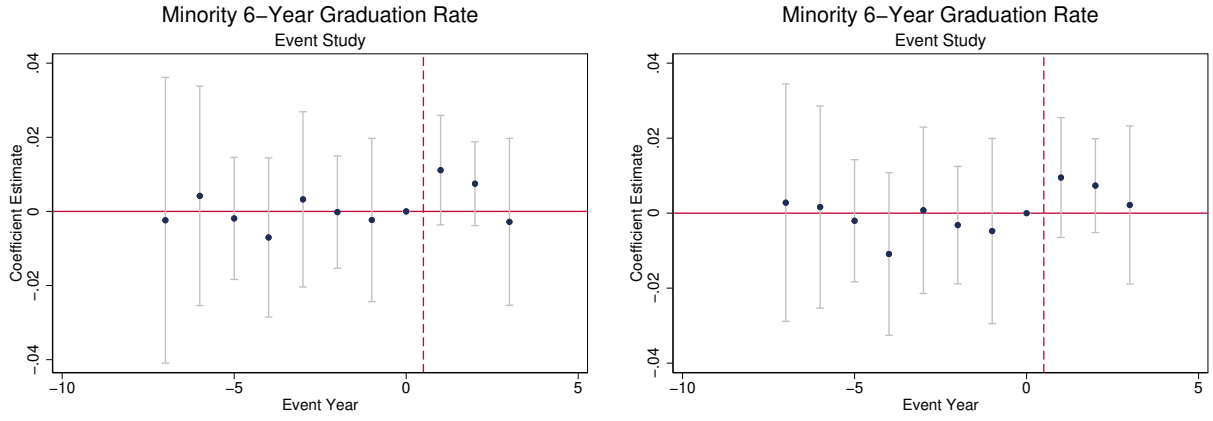


(a) Institution/Year FE & SEER Population (b) Institution/Year FE & CPS Population

Figure 13: Generalized Difference in Differences - Private Not-for-Profit Universities

6.2 Graduation Rate

Figure 14 plots the event study coefficient estimates using the minority six-year graduation rate as the dependent variable. Although the coefficients are all statistically indistinguishable from zero, there is a slight uptick in the minority graduation rate after affirmative action is banned. For this reason, the evidence that banning affirmative action raises minority graduation rates is at most suggestive. Although it would seem that eliminating affirmative action would unequivocally raise the minority graduation rate, in practice the difference between a minority student who was marginally denied in the absence of affirmative action and other admitted minority students may be negligible so that there is no change to the minority graduation rate.

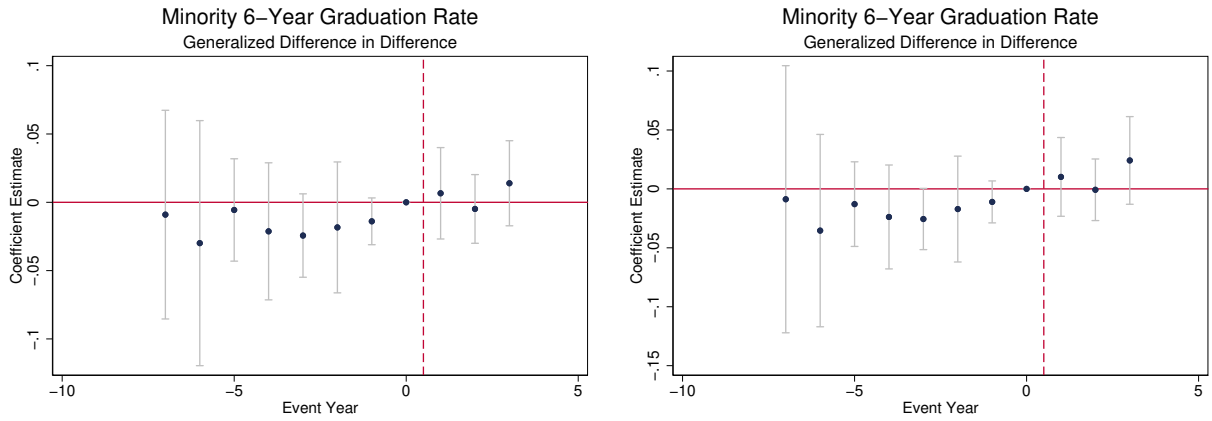


(a) Institution/Year FE & State Time Trends (b) Institution/Year FE & Institution Time Trends

Figure 14: Event Study - Private Not-for-Profit Universities

The generalized difference in differences results for private not-for-profit universities in figure 15 are also

similar to those for public universities, in that there appears to be no change to the difference in minority six-year graduation rates between selective and nonselective universities after the elimination of affirmative action. Nevertheless, the results are encouraging in that private not-for-profit universities appear to be unaffected, so the public university graduation rate results should not be completely discounted.



(a) Institution/Year FE & State Time Trends (b) Institution/Year FE & Institution Time Trends

Figure 15: Generalized Difference in Differences - Private Not-for-Profit Universities

7 Conclusion

For over half a century affirmative action has given extra consideration to minorities who apply to postsecondary institutions or government employment. Sandra Day O'Connor posited in the *Grutter v. Bollinger* case whether affirmative action would be necessary in 25 years, but over a decade later minorities still do not attend universities in proportion to their representation in the overall population despite the continued presence of affirmative action. Using data from IPEDS that essentially covers the universe of four-year institutions in treated states, this paper shows that eliminating affirmative action programs would decrease minority enrollment by as much as 20% at selective public universities and 10% at all public universities. Although one might expect that the decrease in minority enrollment comes at the expense of marginally admitted students under affirmative action, there appears to be little to no effect on the minority graduation rate as a result of the decrease in minority enrollment.

The above conclusions were derived from event study and generalized difference in differences analyses using variation from policies and court cases that banned affirmative action in some states. The effects hold for both total freshmen enrollment and full-time freshmen enrollment, two selectivity schemes that use the Barron's Selectivity Index, flagship status, and the 2000 U.S. News and World Report National University

Ranking to determine selectivity, and an alternative weighting scheme that treats all states equally. Although the event study results using a balanced panel are less conclusive, the balanced panel generalized difference in differences results give strong evidence to support the conclusions from the full sample. Furthermore, there is essentially no effect at private not-for-profit universities and public community colleges, which should not be directly affected by the bans on affirmative action.

The Supreme Court's ruling in *Fisher v. Texas* determined that affirmative action will play a role in the admission process at universities for the foreseeable future. While in place, it is important to study how affirmative action affects the composition and achievement of university students, especially as the minority population in the United States grows. For now, the best strategy for studying these effects is to analyze the states that have eliminated affirmative action, and the answers will only become clearer as it is possible to study the long term effects in the most recent states to ban affirmative action.

A Data

A.1 Summary Statistics

A.1.1 Fall Enrollment

Table A.1 shows the percentage of institutions in the fall enrollment dataset by level and control and table A.2 shows the percentage of observations in the fall enrollment dataset by level and control.

	University	Community College	Below Associates	Total
Public	4.38	9.71	1.68	15.8
	(141)	(313)	(54)	(508)
Private NFP	14.6	3.85	3.2	21.6
	(470)	(124)	(103)	(697)
Private FP	5.74	7.67	49.2	62.6
	(185)	(247)	(1,585)	(2,017)
Total	24.7	21.2	54.1	100
	(796)	(684)	(1,742)	(3,222)

Table A.1: Percent of Institutions by Level and Control (# of Institutions in Parenthesis)

	University	Community College	Below Associates	Total
Public	10.4	23.9	1.25	35.5
	(3,565)	(8,199)	(429)	(12,193)
Private NFP	21.6	2.29	1.63	25.5
	(7,417)	(785)	(559)	(8,761)
Private FP	3.68	5.22	30	38.9
	(1,262)	(1,791)	(10,309)	(13,362)
Total	35.7	31.4	32.9	100
	(12,244)	(10,775)	(11,297)	(34,316)

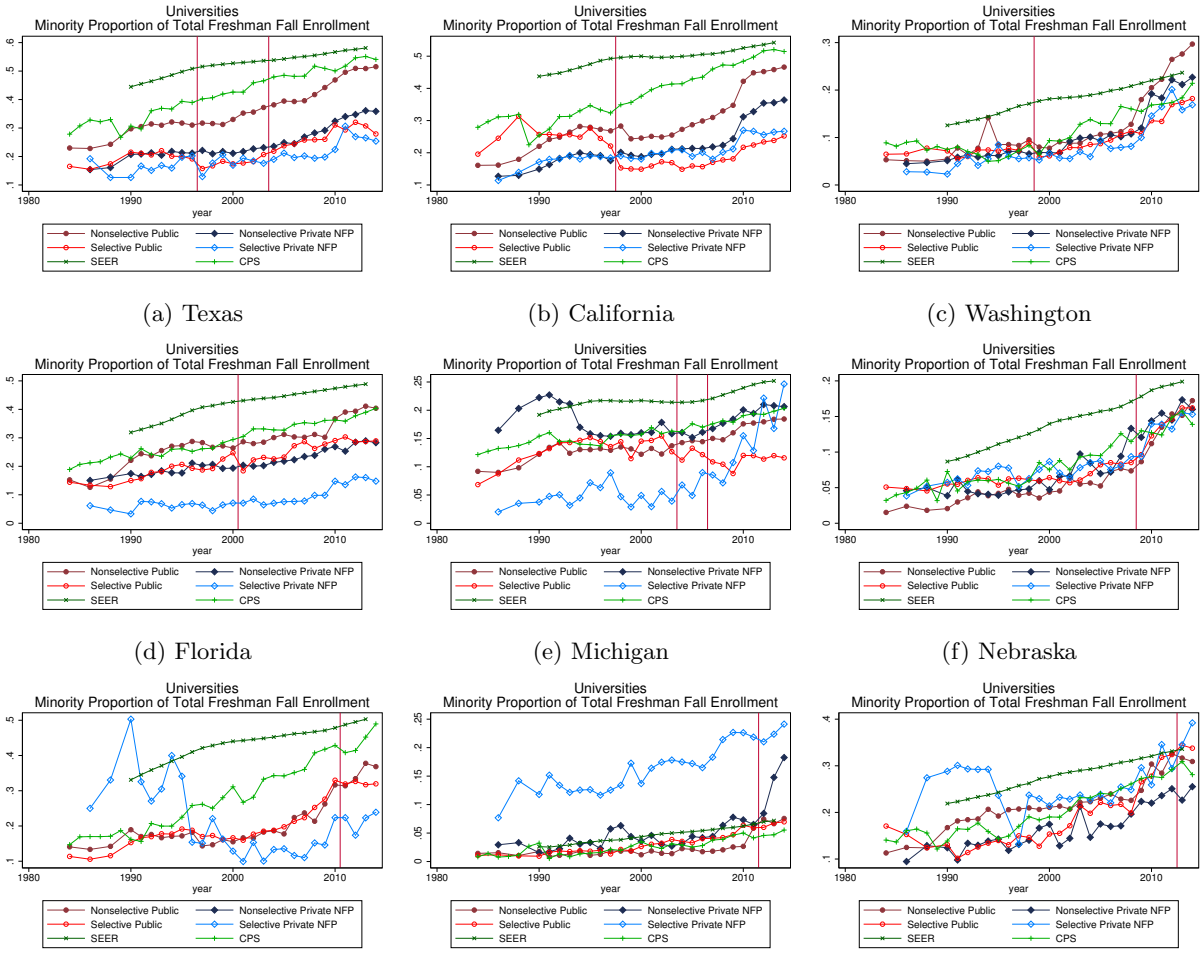
Table A.2: Percent of Observations by Level and Control (# of Observations in Parenthesis)

Figure A.1 contains scatter plots of the minority proportion of total freshman enrollment for the nine states which banned affirmative action.

A.1.2 Graduation Rate

Table A.3 shows the percentage of institutions in the graduation rate dataset by level and control and table A.4 shows the percentage of observations in the graduation rate dataset by level and control.

Figure A.2 contains scatter plots of the minority six-year graduation rate for the nine states which banned affirmative action.



(a) Texas (b) California (c) Washington

(d) Florida (e) Michigan (f) Nebraska

(g) Arizona (h) New Hampshire (i) Oklahoma

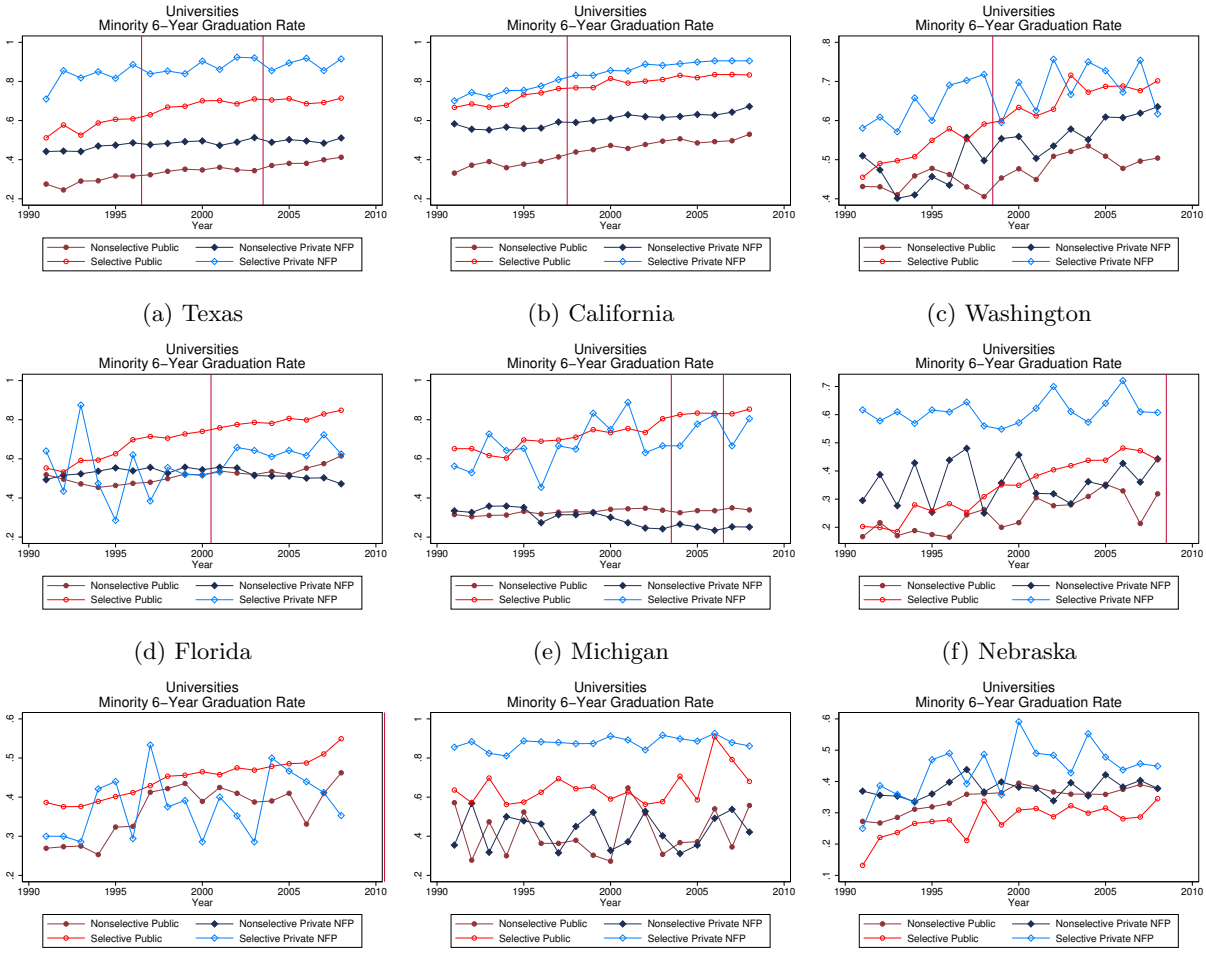
Figure A.1: Minority Proportion of Freshman Fall Enrollment by Year

	University	Total
Public	27.3	27.3
	(124)	(124)
Private NFP	57.7	57.7
	(262)	(262)
Private FP	15	15
	(68)	(68)
Total	100	100
	(454)	(454)

Table A.3: Percent of Institutions by Level and Control (# of Institutions in Parenthesis)

	University	Total
Public	32.3 (2,011)	32.3 (2,011)
Private NFP	60 (3,735)	60 (3,735)
Private FP	7.71 (480)	7.71 (480)
Total	100 (6,226)	100 (6,226)

Table A.4: Percent of Observations by Level and Control (# of Observations in Parenthesis)



(a) Texas (b) California (c) Washington

(d) Florida (e) Michigan (f) Nebraska

(g) Arizona (h) New Hampshire (i) Oklahoma

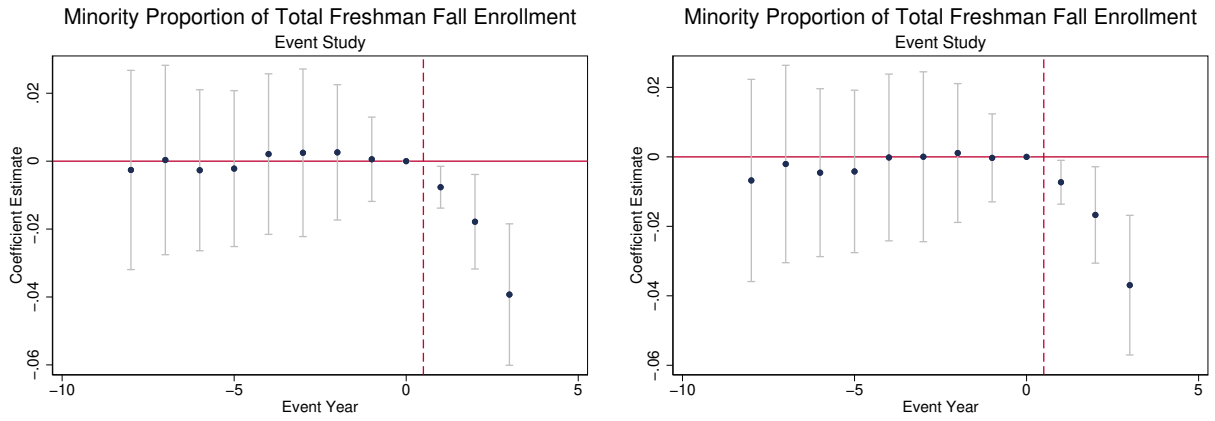
Figure A.2: Minority 6-Year Graduation Rate by Year

B Full Sample Results

B.1 Fall Enrollment

B.1.1 Event Study

Figure B.3 plots the coefficients θ_τ for the event year dummies from equation 6 for the minority proportion of total freshman fall enrollment, and the grey area represents the 95% confidence interval for the coefficient estimates.

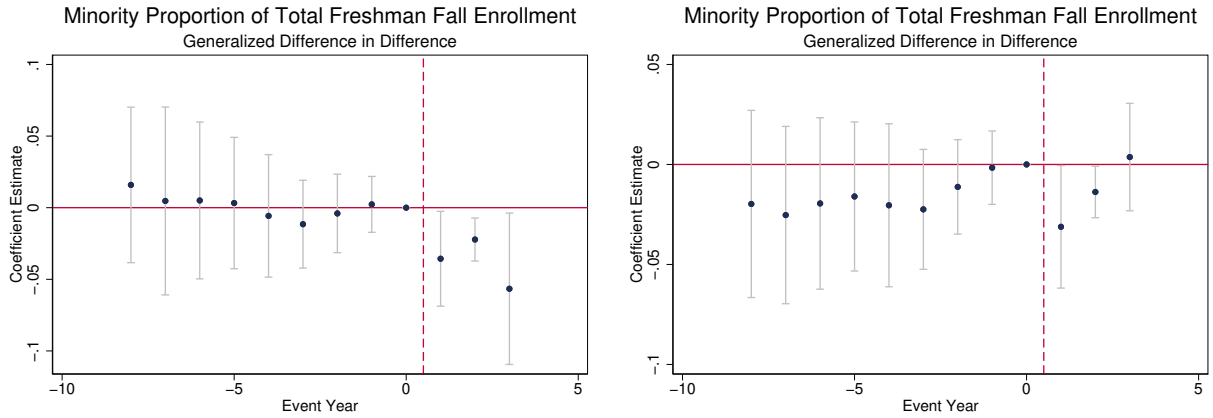


(a) Institution/Year FE & State Time Trends (b) Institution/Year FE & Institution Time Trends

Figure B.3: Event Study - Directly Affected Universities

B.1.2 Generalized Difference in Differences

Figure B.4 plots the coefficients ϕ_τ for the event year by selective dummies from equation 7 for the minority proportion of total freshman fall enrollment, and the grey area represents the 95% confidence interval for the coefficient estimates.



(a) Institution/Year FE & State Time Trends

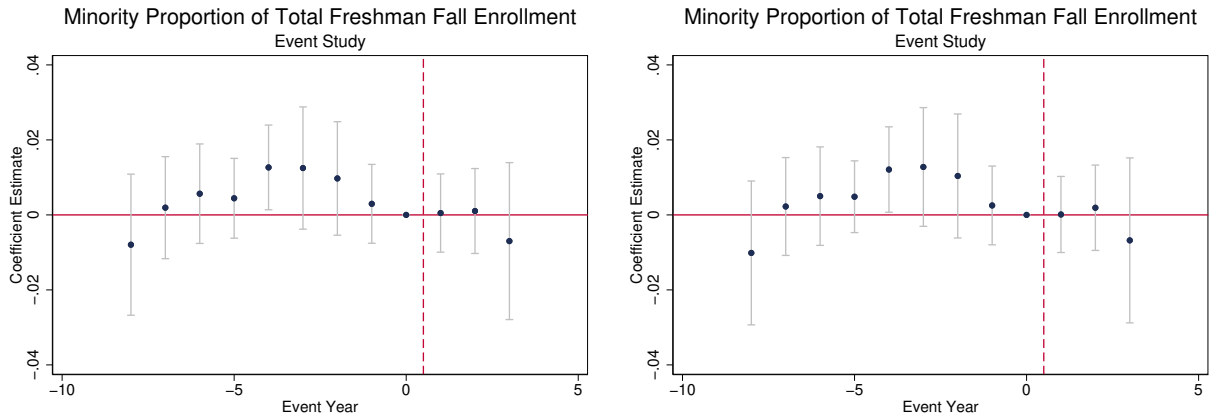
(b) Institution/Year FE & Institution Time Trends

Figure B.4: Generalized Difference in Differences - Directly Affected Universities

C Falsification Tests

C.1 Fall Enrollment

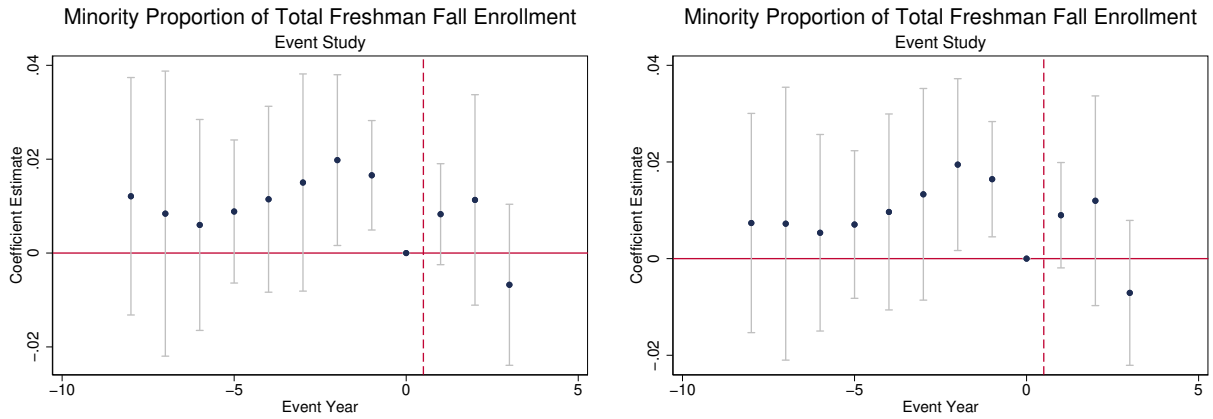
Figure C.5 plots the coefficients θ_τ for the event year dummies from equation 6 for the minority proportion of total freshmen fall enrollment at private not-for-profit universities, and the grey area represents the 95% confidence interval for the coefficient estimates.



(a) Institution/Year FE & State Time Trends (b) Institution/Year FE & Institution Time Trends

Figure C.5: Event Study - Private Not-for-Profit Universities

Figure C.6 plots the coefficients θ_τ for the event year dummies from equation 6 for the minority proportion of total freshmen fall enrollment at community colleges, and the grey area represents the 95% confidence interval for the coefficient estimates.

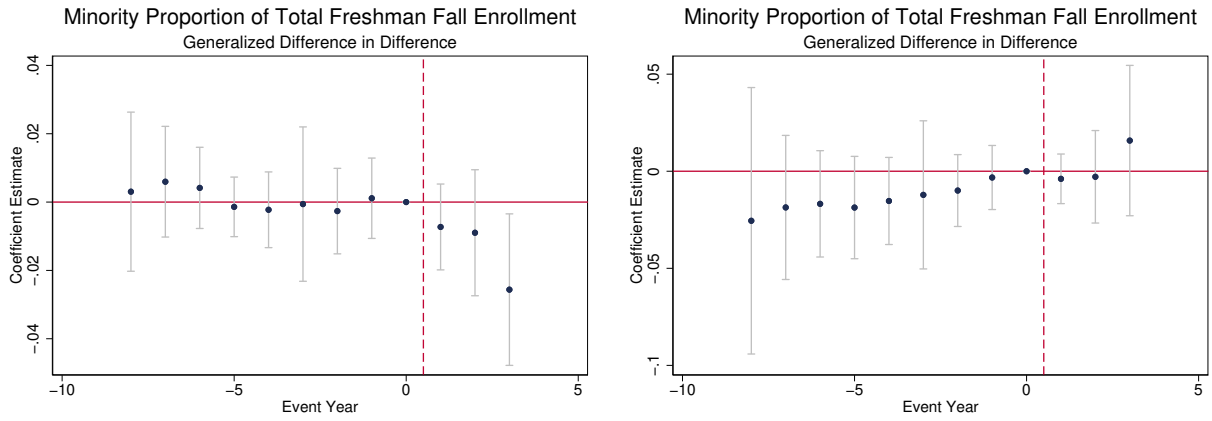


(a) Institution/Year FE & State Time Trends (b) Institution/Year FE & Institution Time Trends

Figure C.6: Event Study - Directly Affected Community Colleges

Figure C.7 plots the coefficients ϕ_τ for the event year by selective dummies from equation 7 for the

minority proportion of total freshman fall enrollment at private not-for-profit universities, and the grey area represents the 95% confidence interval for the coefficient estimates.



(a) Institution/Year FE & State Time Trends

(b) Institution/Year FE & Institution Time Trends

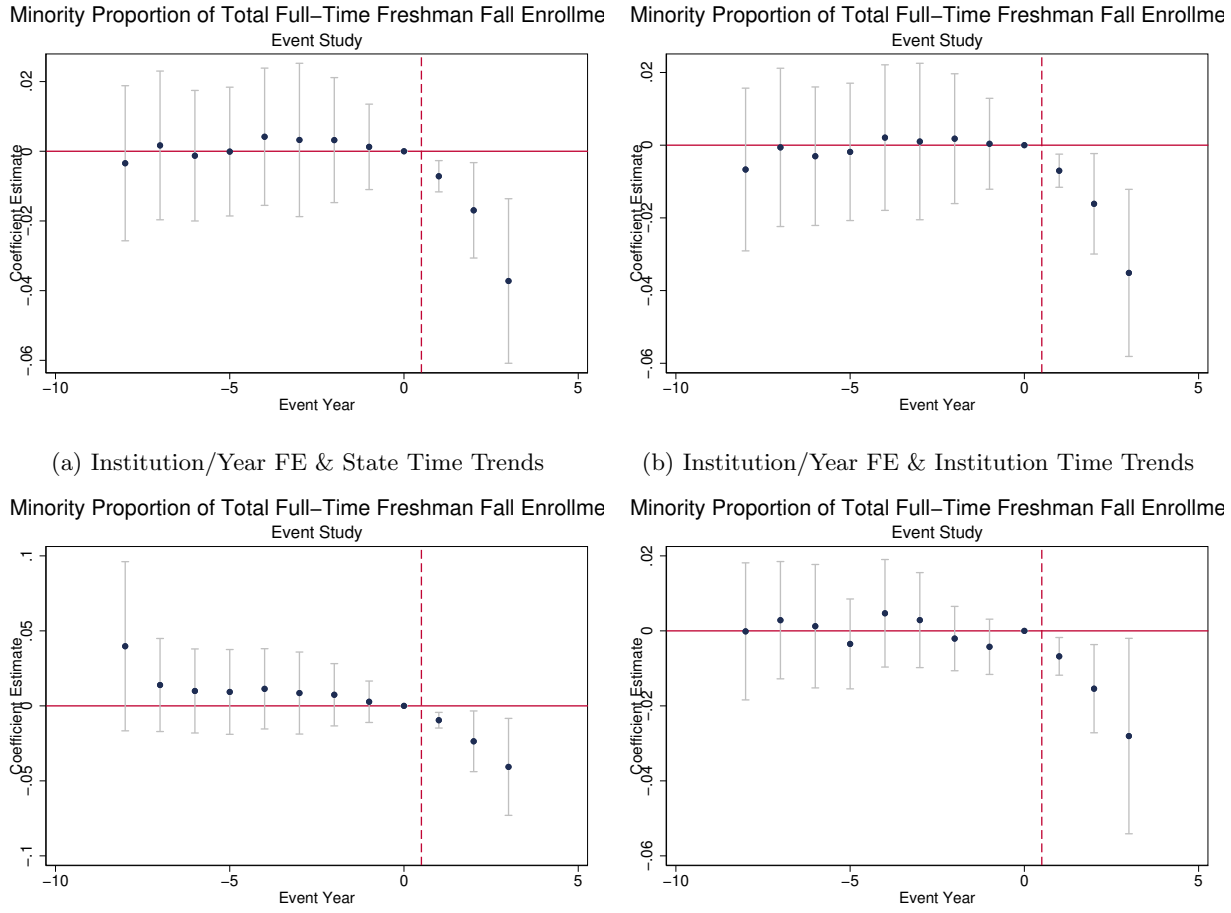
Figure C.7: Generalized Difference in Differences - Private Not-for-Profit Universities

D Robustness Checks

D.1 Fall Enrollment

D.1.1 Event Study

Figure D.8 and table D.5 give the coefficients θ_τ for the event year dummies from equation 6 for the minority proportion of full-time freshman fall enrollment, and the grey area represents the 95% confidence interval for the coefficient estimates.



(a) Institution/Year FE & State Time Trends

(b) Institution/Year FE & Institution Time Trends

(c) Institution/Year FE & SEER Population

(d) Institution/Year FE & CPS Population

Figure D.8: Event Study - Directly Affected Universities, Full-Time Students

Figure D.9 and table D.6 give the coefficients θ_τ for the event year dummies from equation 6 for the minority proportion of total freshman fall enrollment using senate weights, and the grey area represents the 95% confidence interval for the coefficient estimates.

	Minority Proportion of Total Full-Time Freshman Fall Enrollment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Event Year 1	-.00153	.0000876	-.00772**	-.00717***	-.00703***	-.00721	-.00957***	-.0068**
	(.00264)	(.0033)	(.00222)	(.0019)	(.00193)	(.00541)	(.0022)	(.00213)
Event Year 2	-.00742	-.00668	-.0194**	-.0169**	-.0161**	-.0127*	-.0236**	-.0154**
	(.00985)	(.00906)	(.00729)	(.00579)	(.00584)	(.00566)	(.00856)	(.00497)
Event Year 3	.0717***	.0451***	-.0283*	-.0372***	-.0351***	-.0162***	-.0407**	-.0281**
	(.0198)	(.0127)	(.0123)	(.00999)	(.00972)	(.00448)	(.0137)	(.011)
Institution FE	-	Y	Y	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-	-	-
Institution Time Trends	-	-	-	-	Y	Y	-	-
Lagged Dependent Variable	-	-	-	-	-	-	-	-
SEER Population	-	-	-	-	-	-	Y	-
CPS Population	-	-	-	-	-	-	-	Y
Pre-Ban Y Mean	.161	.161	.161	.161	.161	.171	.17	.161
Observations	2402	2402	2402	2402	2402	2060	2065	2402
Institutions	98	98	98	98	98	95	95	98
Adjusted R^2	.181	.847	.919	.933	.961	.972	.936	.929
F Test: $\theta_\tau = 0 \; \forall \; \tau > 0$	6.34	5.12	13.7	24.5	20	4.58	14.4	10.9
F Test p Value: $\theta_\tau = 0 \; \forall \; \tau > 0$	.0209	.0347	.0026	.000434	.000828	.0447	.00224	.00496

Standard errors in parentheses

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

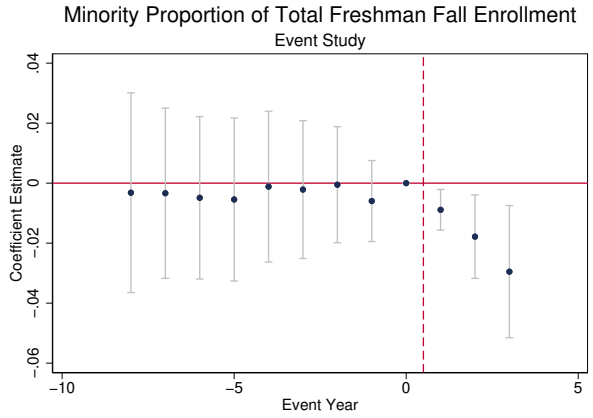
Table D.5: Event Study - Directly Affected Universities, Full-Time Students

	Minority Proportion of Total Freshman Fall Enrollment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Event Year 1	.00238	.000536	-.00734*	-.00889**	-.00856**	-.0123**	-.00906***	-.0075**
	(.00559)	(.00436)	(.00351)	(.00287)	(.00303)	(.0046)	(.00254)	(.0022)
Event Year 2	-.00324	-.00228	-.0174**	-.0178**	-.017**	-.0153**	-.0208***	-.0135**
	(.00811)	(.00791)	(.00601)	(.00589)	(.00603)	(.00554)	(.00505)	(.00489)
Event Year 3	.0433	.0289*	-.0199	-.0295**	-.028**	-.0174**	-.0261**	-.0186
	(.0372)	(.0146)	(.0153)	(.00932)	(.00935)	(.00643)	(.00795)	(.0102)
Institution FE	-	Y	Y	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-	-	-
Institution Time Trends	-	-	-	-	Y	-	-	-
Lagged Dependent Variable	-	-	-	-	-	Y	-	-
SEER Population	-	-	-	-	-	-	Y	-
CPS Population	-	-	-	-	-	-	-	Y
Pre-Ban Y Mean	.139	.139	.139	.139	.139	.148	.147	.139
Observations	2409	2409	2409	2409	2409	2066	2072	2409
Institutions	99	99	99	99	99	95	96	99
Adjusted R^2	.137	.867	.915	.931	.952	.959	.934	.926
F Test: $\theta_\tau = 0 \; \forall \; \tau > 0$	.838	1.65	3.42	6.25	5.15	3.6	10.6	4.82
F Test p Value: $\theta_\tau = 0 \; \forall \; \tau > 0$	.515	.263	.0818	.0216	.0343	.074	.00533	.0399

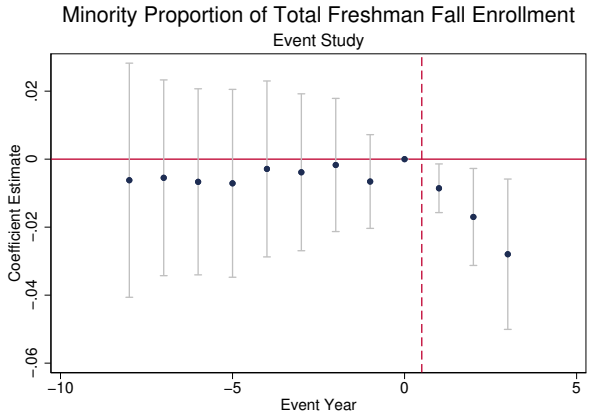
Standard errors in parentheses

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

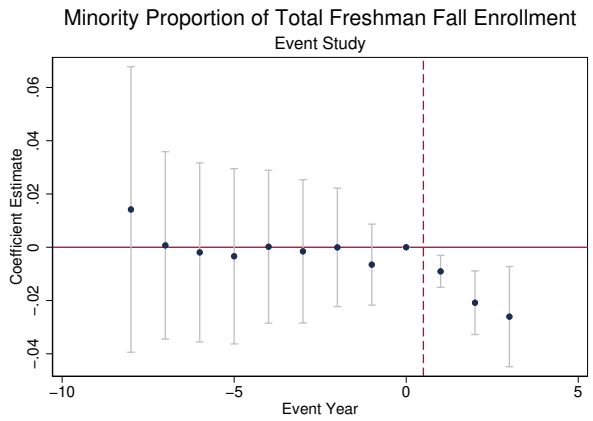
Table D.6: Event Study - Directly Affected Universities, Senate Weights



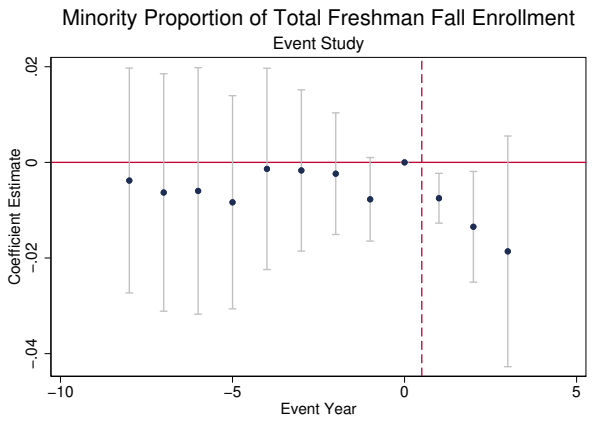
(a) Institution/Year FE & State Time Trends



(b) Institution/Year FE & Institution Time Trends



(c) Institution/Year FE & SEER Population

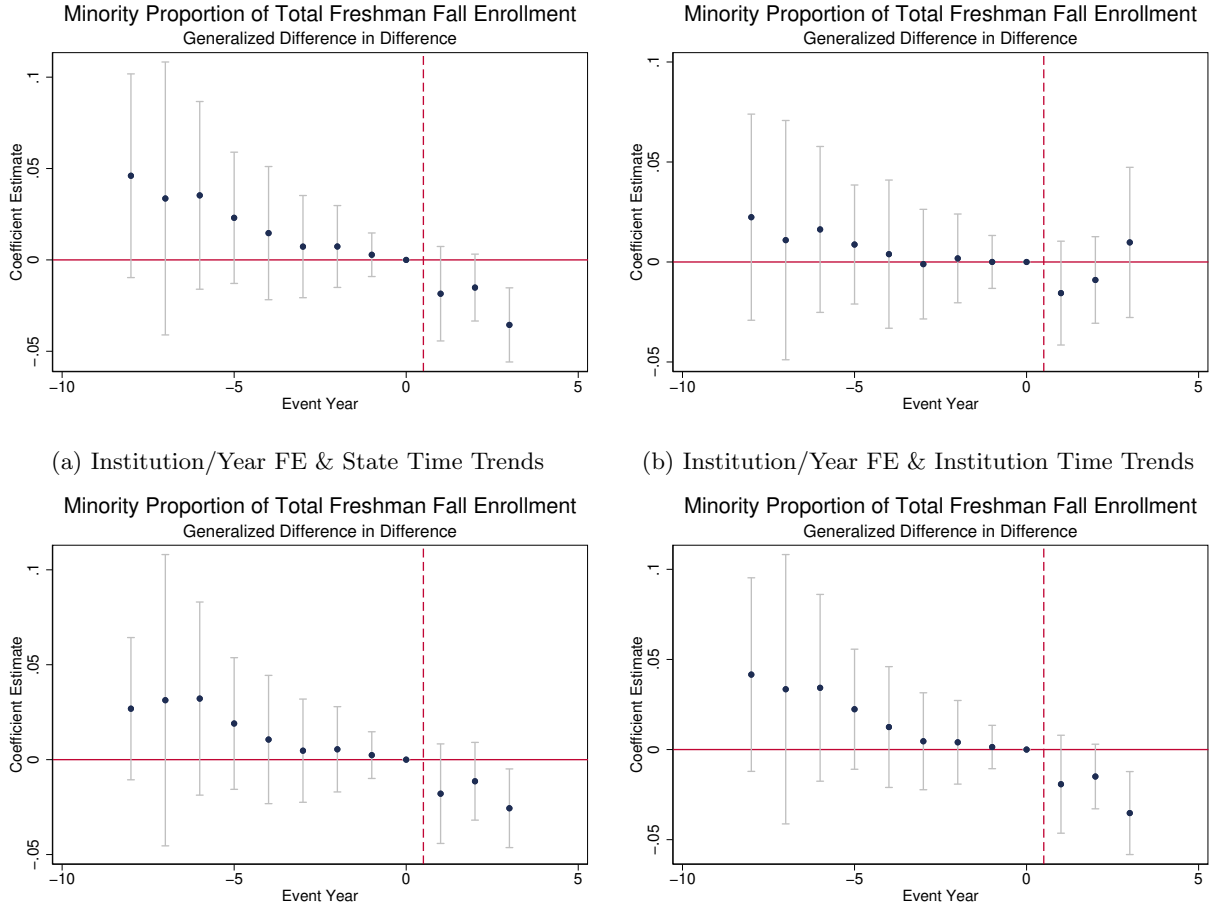


(d) Institution/Year FE & CPS Population

Figure D.9: Event Study - Directly Affected Universities, Senate Weights

D.1.2 Generalized Difference in Differences

Figure D.10 and table D.7 give the coefficients ϕ_τ for the event year by selective dummies from equation 7 for the minority proportion of total freshman fall enrollment where flagship universities and universities in the top 50 of the 2000 U.S. News and World Report National University Ranking are denoted selective, and the grey area represents the 95% confidence interval for the coefficient estimates.



(a) Institution/Year FE & State Time Trends

(b) Institution/Year FE & Institution Time Trends

(c) Institution/Year FE & SEER Population

(d) Institution/Year FE & CPS Population

Figure D.10: Generalized Difference in Differences - Directly Affected Universities, Flagship 50

Figure D.11 and table D.8 give the coefficients ϕ_τ for the event year by selective dummies from equation 7 for the minority proportion of total freshman fall enrollment using senate weights, and the grey area represents the 95% confidence interval for the coefficient estimates.

	Minority Proportion of Total Freshman Fall Enrollment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Event Year 1	-.0153	-.017	-.0181	-.0185	-.0156	-.0159	-.0179	-.0192
	(.0116)	(.0118)	(.0114)	(.0109)	(.011)	(.014)	(.0111)	(.0115)
Event Year 2	-.0116	-.0127	-.0143	-.0151*	-.009	.000994	-.0114	-.015*
	(.00964)	(.00849)	(.00806)	(.00774)	(.00915)	(.00696)	(.00866)	(.00758)
Event Year 3	-.0707***	-.0362***	-.0313**	-.0356***	.00978	-.00508	-.0256**	-.0352***
	(.0118)	(.00914)	(.0106)	(.00858)	(.0159)	(.00654)	(.00877)	(.00974)
Institution FE	-	Y	Y	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-	-	-
Institution Time Trends	-	-	-	-	Y	-	-	-
Lagged Dependent Variable	-	-	-	-	-	Y	-	-
SEER Population	-	-	-	-	-	-	Y	-
CPS Population	-	-	-	-	-	-	-	Y
Selective Pre-Ban Y Mean	.147	.147	.147	.147	.147	.152	.151	.147
Observations	2409	2409	2409	2409	2409	2066	2072	2409
Institutions	99	99	99	99	99	95	96	99
Adjusted R^2	.243	.852	.922	.937	.961	.972	.939	.933
F Test: $\theta_\tau = 0 \; \forall \; \tau > 0$	14.8	13.5	8.62	15.4	6.16	.529	3.04	10.4
F Test p Value: $\theta_\tau = 0 \; \forall \; \tau > 0$	.00207	.0027	.0095	.00182	.0224	.677	.102	.00561

Standard errors in parentheses

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

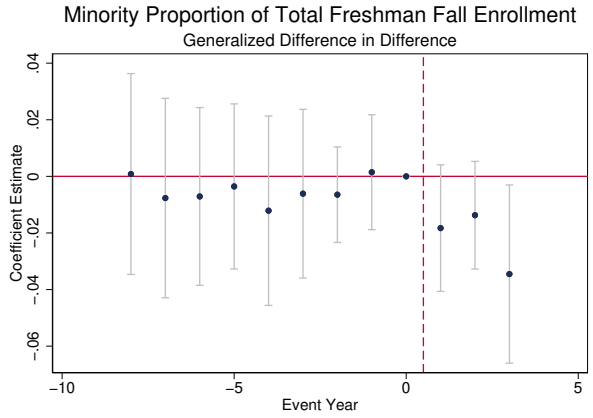
Table D.7: Generalized Difference in Differences - Directly Affected Universities, Flagship 50

	Minority Proportion of Total Freshman Fall Enrollment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Event Year 1	-.00517	-.011	-.0168	-.0183*	-.0161	-.0164	-.0184	-.0149
	(.0116)	(.0102)	(.0097)	(.00946)	(.00894)	(.0123)	(.00971)	(.00841)
Event Year 2	-.00829	-.00346	-.0144*	-.0137	-.00844	.0012	-.0191**	-.0105*
	(.0137)	(.0119)	(.00754)	(.00804)	(.00761)	(.009)	(.00696)	(.0055)
Event Year 3	-.0764*	-.0395	-.0387*	-.0345**	.0108	-.00963	-.0337*	-.0313**
	(.0374)	(.0242)	(.0167)	(.0133)	(.0115)	(.00862)	(.0144)	(.0119)
Institution FE	-	Y	Y	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-	-	-
Institution Time Trends	-	-	-	-	Y	-	-	-
Lagged Dependent Variable	-	-	-	-	-	Y	-	-
SEER Population	-	-	-	-	-	-	Y	-
CPS Population	-	-	-	-	-	-	-	Y
Selective Pre-Ban Y Mean	.117	.117	.117	.117	.117	.123	.122	.117
Observations	2409	2409	2409	2409	2409	2066	2072	2409
Institutions	99	99	99	99	99	95	96	99
Adjusted R^2	.191	.868	.917	.932	.953	.959	.935	.928
F Test: $\theta_\tau = 0 \; \forall \; \tau > 0$	1.74	1.17	2.29	2.61	5.66	.969	3.13	3.05
F Test p Value: $\theta_\tau = 0 \; \forall \; \tau > 0$	.245	.388	.165	.134	.0275	.459	.0969	.101

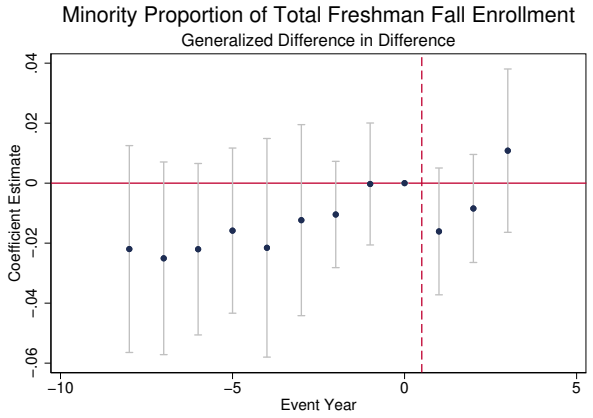
Standard errors in parentheses

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

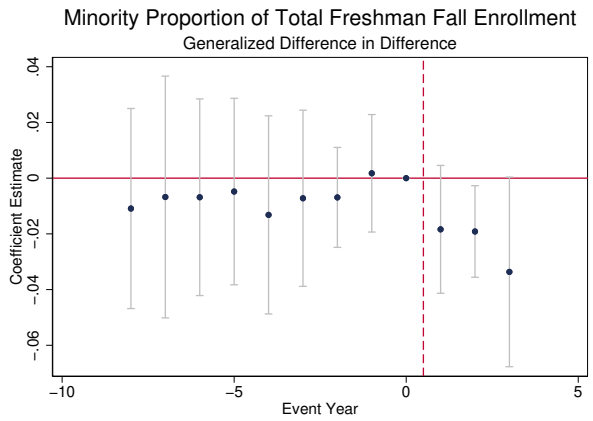
Table D.8: Generalized Difference in Differences - Directly Affected Universities, Senate Weights



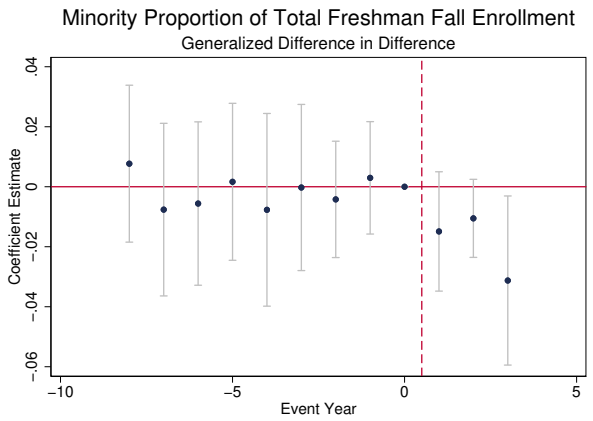
(a) Institution/Year FE & State Time Trends



(b) Institution/Year FE & Institution Time Trends



(c) Institution/Year FE & SEER Population



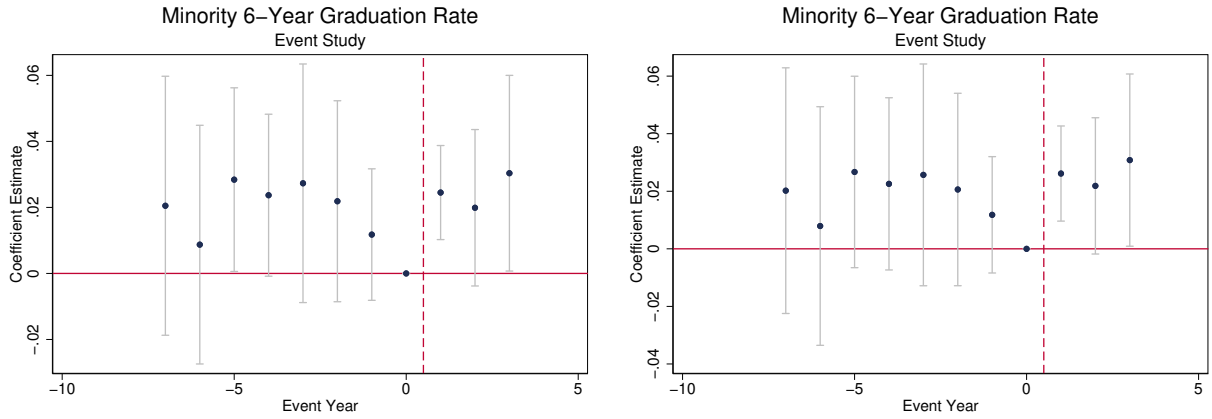
(d) Institution/Year FE & CPS Population

Figure D.11: Generalized Difference in Differences - Directly Affected Universities, Senate Weights

D.2 Graduation Rate

D.2.1 Event Study

Figure D.12 and table D.9 give the coefficients θ_τ for the event year dummies from equation 6 for the minority six-year graduation rate using senate weights, and the grey area represents the 95% confidence interval for the coefficient estimates.



(a) Institution/Year FE & State Time Trends

(b) Institution/Year FE & Institution Time Trends

Figure D.12: Event Study - Directly Affected Universities, Senate Weights

D.2.2 Generalized Difference in Differences

Figure D.13 and table D.10 give the coefficients ϕ_τ for the event year by selective dummies from equation 7 for the minority six-year graduation rate where flagship universities and universities in the top 50 of the 2000 U.S. News and World Report National University Ranking are denoted selective, and the grey area represents the 95% confidence interval for the coefficient estimates.

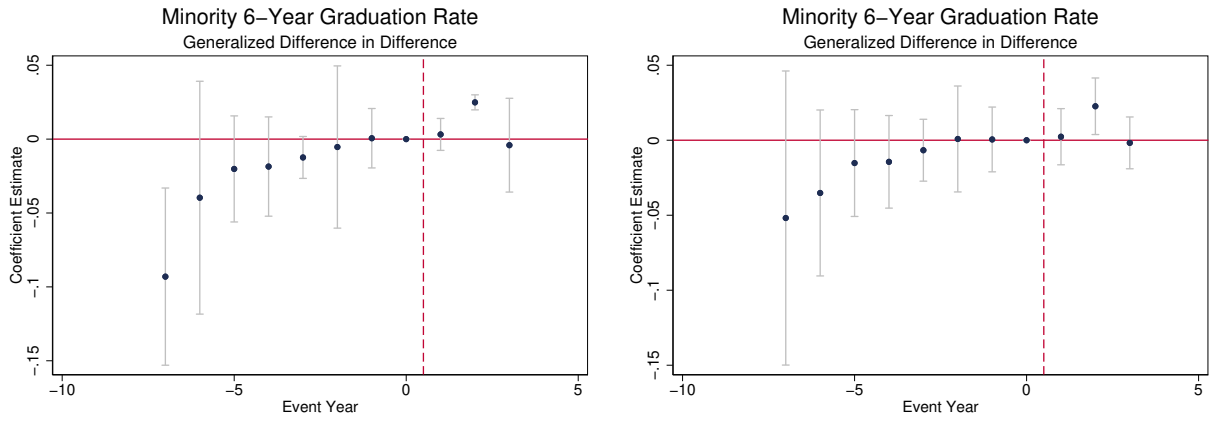
Figure D.14 and table D.11 give the coefficients ϕ_τ for the event year by selective dummies from equation 7 for the minority six-year graduation rate using senate weights, and the grey area represents the 95% confidence interval for the coefficient estimates.

	Minority 6-Year Graduation Rate					
	(1)	(2)	(3)	(4)	(5)	(6)
Event Year 1	.0236	.0184**	.0128	.0245***	.0262***	.0211**
	(.0153)	(.00637)	(.00919)	(.00603)	(.00699)	(.00801)
Event Year 2	.0363	.0251*	.00822	.0199*	.0219*	.00831
	(.0192)	(.0113)	(.0123)	(.01)	(.01)	(.00877)
Event Year 3	.0925**	.0749***	.0278	.0304**	.0308**	.0236*
	(.0287)	(.0112)	(.0179)	(.0125)	(.0127)	(.0116)
Institution FE	-	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-
Institution Time Trends	-	-	-	-	Y	-
Lagged Dependent Variable	-	-	-	-	-	Y
Pre-Ban Y Mean	.41	.41	.41	.41	.41	.413
Observations	1497	1497	1497	1497	1497	1402
Institutions	91	91	91	91	91	91
Adjusted R^2	.155	.87	.895	.9	.93	.914
F Test: $\theta_\tau = 0 \; \forall \; \tau > 0$	5.93	19.9	1.18	5.98	4.83	2.45
F Test p Value: $\theta_\tau = 0 \; \forall \; \tau > 0$	.0246	.00083	.385	.0241	.0397	.149

Standard errors in parentheses

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

Table D.9: Event Study - Directly Affected Universities, Senate Weights



(a) Institution/Year FE & State Time Trends

(b) Institution/Year FE & Institution Time Trends

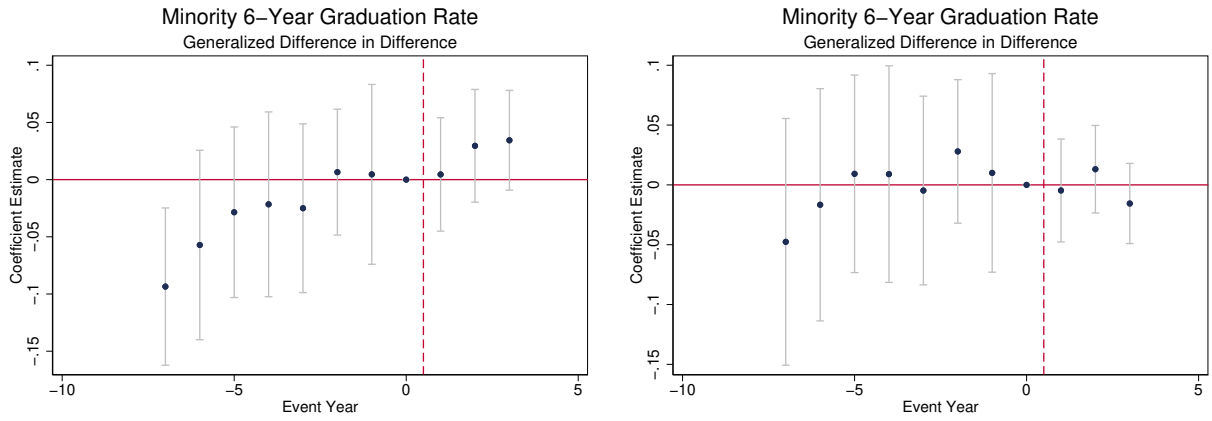
Figure D.13: Generalized Difference in Differences - Directly Affected Universities, Flagship 50

	Minority 6-Year Graduation Rate					
	(1)	(2)	(3)	(4)	(5)	(6)
Event Year 1	.00488	.00041	.00193	.00317	.00234	.000323
	(.0109)	(.00625)	(.00482)	(.00457)	(.00792)	(.00849)
Event Year 2	.0199	.0221***	.024***	.0249***	.0227**	.0215***
	(.0117)	(.00378)	(.00191)	(.00215)	(.00797)	(.00555)
Event Year 3	-.0346	-.00811	-.00551	-.0041	-.00176	-.00482
	(.0326)	(.0136)	(.0129)	(.0134)	(.0073)	(.00414)
Institution FE	-	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-
Institution Time Trends	-	-	-	-	Y	-
Lagged Dependent Variable	-	-	-	-	-	Y
Selective Pre-Ban Y Mean	.599	.599	.599	.599	.599	.602
Observations	1497	1497	1497	1497	1497	1402
Institutions	91	91	91	91	91	91
Adjusted R^2	.541	.928	.943	.943	.968	.962
F Test: $\theta_\tau = 0 \; \forall \; \tau > 0$	35.4	150	94.6	59.4	20.8	9.44
F Test p Value: $\theta_\tau = 0 \; \forall \; \tau > 0$	.000133	1.03e-06	4.99e-06	.0000241	.000732	.00743

Standard errors in parentheses

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

Table D.10: Generalized Difference in Differences - Directly Affected Universities, Flagship 50



(a) Institution/Year FE & State Time Trends

(b) Institution/Year FE & Institution Time Trends

Figure D.14: Generalized Difference in Differences - Directly Affected Universities, Senate Weights

	Minority 6-Year Graduation Rate					
	(1)	(2)	(3)	(4)	(5)	(6)
Event Year 1	.0683	-.00153	-.0067	.00454	-.00468	-.0104
	(.0779)	(.0166)	(.0156)	(.021)	(.0182)	(.021)
Event Year 2	.0882	.0237	.0181	.0295	.0131	.0211
	(.0767)	(.0161)	(.0152)	(.0208)	(.0155)	(.0182)
Event Year 3	.0295	.0177	.0179	.0344	-.0156	.0124
	(.078)	(.0178)	(.0147)	(.0185)	(.0142)	(.0175)
Institution FE	-	Y	Y	Y	Y	Y
Year FE	-	-	Y	Y	Y	Y
State Time Trends	-	-	-	Y	-	-
Institution Time Trends	-	-	-	-	Y	-
Lagged Dependent Variable	-	-	-	-	-	Y
Selective Pre-Ban Y Mean	.472	.472	.472	.472	.472	.476
Observations	1497	1497	1497	1497	1497	1402
Institutions	91	91	91	91	91	91
Adjusted R^2	.312	.881	.906	.908	.932	.917
F Test: $\theta_\tau = 0 \; \forall \; \tau > 0$	7.13	6.05	6.69	14.7	4.92	6.99
F Test p Value: $\theta_\tau = 0 \; \forall \; \tau > 0$	.0155	.0234	.0183	.0021	.0381	.0164

Standard errors in parentheses

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

Table D.11: Generalized Difference in Differences - Directly Affected Universities, Senate Weights

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