Online Appendix

Affirmative Action, Mismatch, and Economic Mobility after California's Proposition 209

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Appendix A: Public Universities Practicing Affirmative Action in 2020

Many public and private universities are non-transparent about their undergraduate admissions policies. However, most universities publish annual "Common Data Set" reports that provide a response to the question: What is the "relative importance of each of the following academic and nonacademic factors in first-time, first-year, degree-seeking (freshman) admission decisions: ... Racial/ethnic status: Very Important, Important, Considered, and Not Considered".

The following is a list of states with public universities where race/ethnic status is at least considered in undergraduate admissions – according to their most recent common data set available in July 2020 – naming the university in parentheses if it differs from the state's flagship public university: CO, CT, DE, GA (Georgia Tech), IL, IN, LA (Grambling State), ME (University of Southern Maine), MD, MA, MI, NJ, NY, NC, OH, OR, PA, RI, SC, TN, TX, UT, VT, VI, and WI. The University of New Hampshire reports considering race in admissions, but is prohibited by law from providing preference to applicants based on their race. The University of New Mexico does not report whether or not it considers race in admissions.

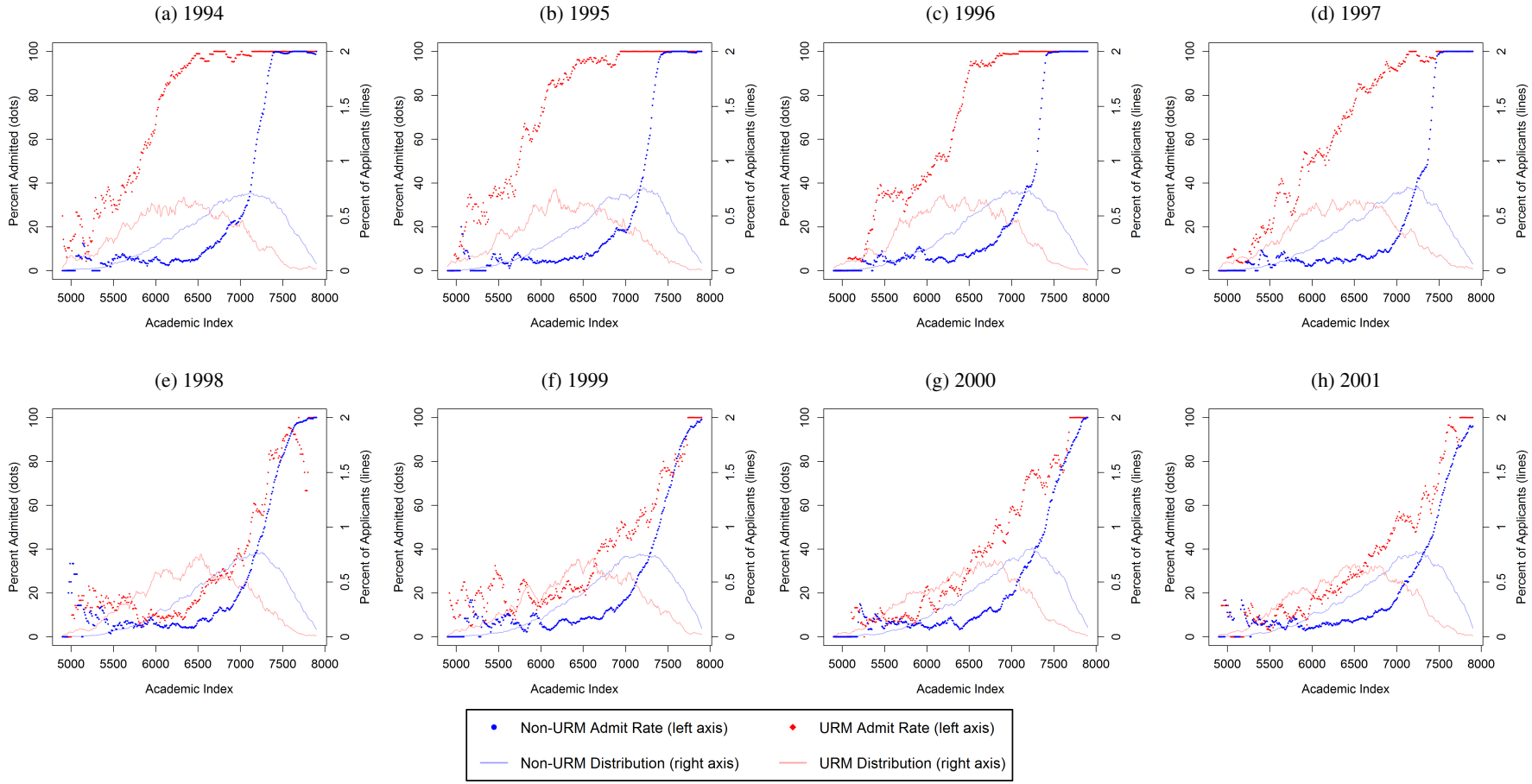
Appendix B: URM and Non-URM Admissions by UC Campus and AI, 1994-2001

The figures below show the raw admissions likelihood and application distribution of URM and non-URM applicants to each UC campus by Academic Index from 1994 to 2001. The figures clarify how affirmative action was practiced by different UC campuses before 1998, and how Prop 209 changed the admissions likelihood of URM applicants (and, to some degree, non-URM applicants).[1] For example, UC Davis and UC Santa Cruz guaranteed admission to nearly all UC-eligible URM applicants before 1996, while UC Berkeley extended their admissions guarantee to URM students with AI more than 1,000 points lower than the guarantee extended to non-URM students. The URM and non-URM admissions rates sharply converged after Prop 209, though at most campuses URM applicants at nearly every AI remained more likely to be admitted than non-URM applicants. The differences between the admissions likelihoods of URM and non-URM UC applicants in different years are summarized in Figure I.

The AI distribution of applicants was most-dissimilar by ethnicity at the Berkeley and UCLA campuses, which had far higher shares of low-AI URM applicants than low-AI non-URM applicants, reflecting the large admissions advantages provided by those campuses to even lower-AI URM applicants under affirmative action. The distribution of applicant AI rose over time at most campuses, likely driven both by grade inflation and growing cross-campus interest in UC enrollment among high-AI California high school graduates.

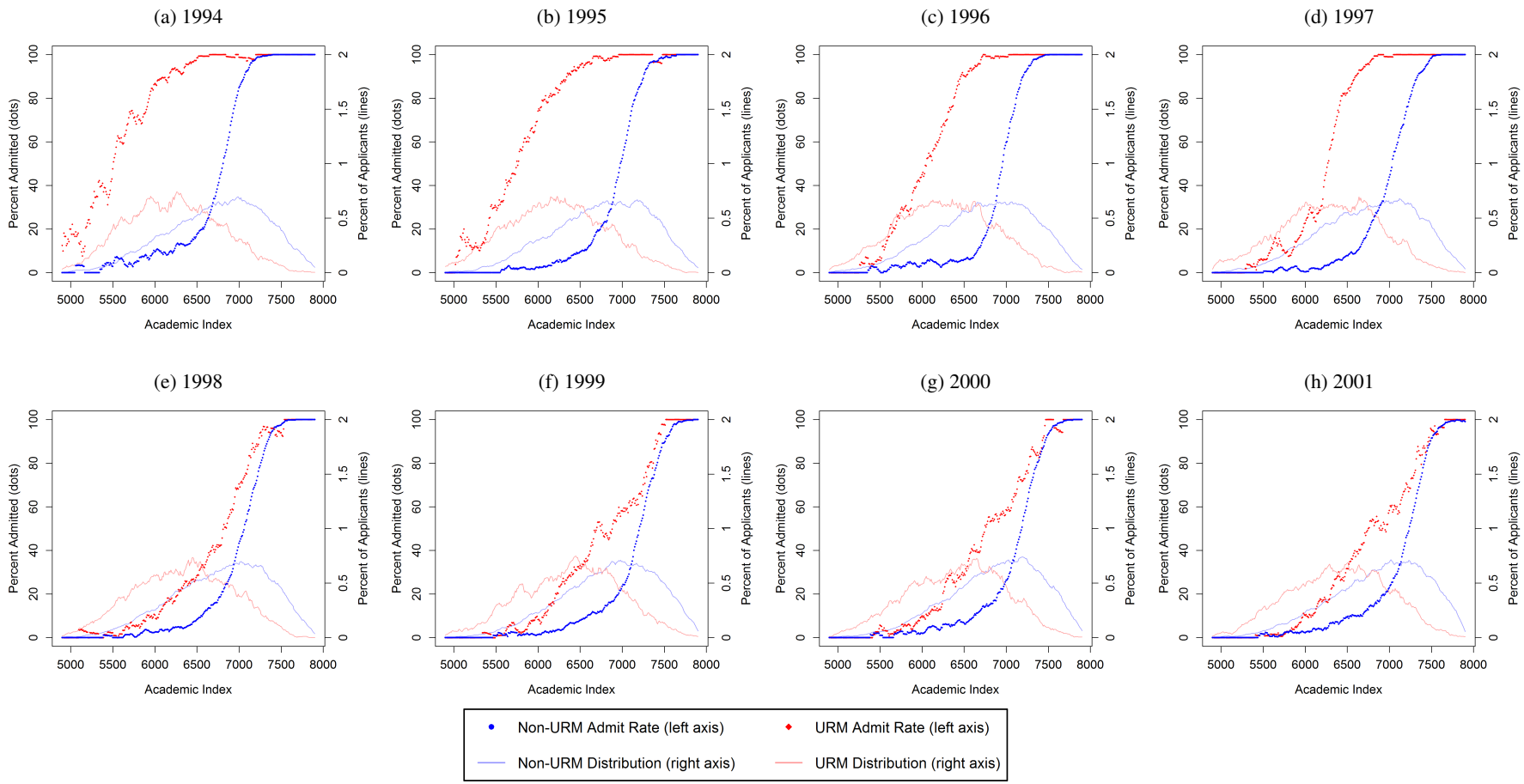
[1] Latino UC applicants – who made up about one in five URM UC applicants in the period – received somewhat smaller admissions advantages than American Indian, Black, and Chicano UC applicants in some years at some campuses (e.g. see Figure A-3). They are omitted from the figures in this Appendix.

Figure B-1: Annual "Normal" Admissions at UC Berkeley



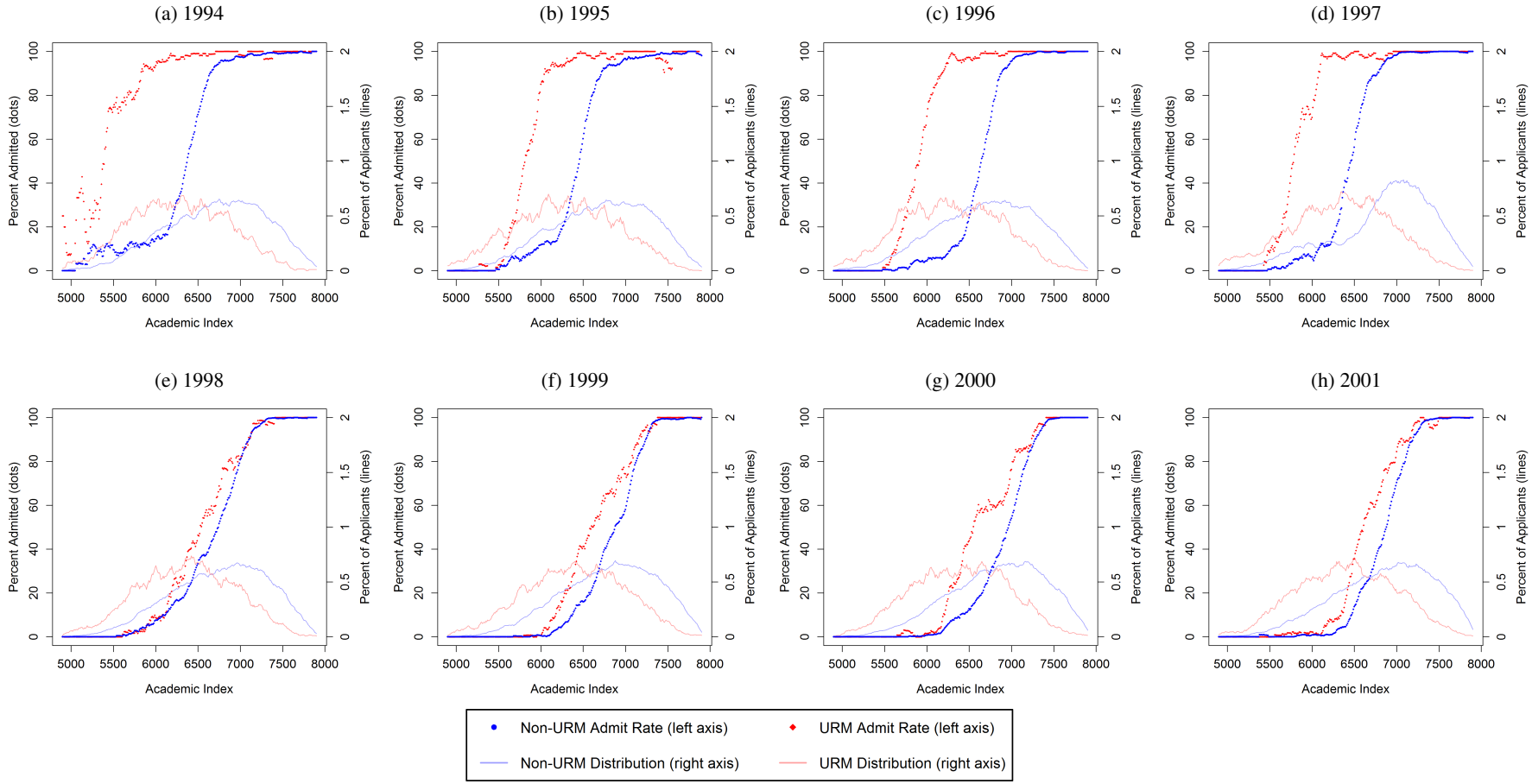
Note: This figure shows the 1994-2001 annual UC Berkeley admissions rate for URM and non-URM applicants by Academic Index, as well as the annual distribution of UC Berkeley applicants by Academic Index and ethnicity. Raw percent of URM and non-URM students admitted to UC Berkeley by Academic Index (AI) – the sum of (top-censored) high school GPA, SAT I score, and three SAT II scores – each year from 1994 to 2001 (left axis). The lines show the probability density function of URM and non-URM UC applicants by AI (right axis). Admission rates and distributions are smoothed with a uniform kernel of bandwidth 50; AI below 4900 and above 7900 are omitted. The sample is restricted to freshman fall California-resident applicants who (a) were UC-eligible, meaning that they satisfactorily completed UC's minimum high school coursework requirement, and (b) reported an intended major that did not have special admissions restrictions, like engineering at some campuses. Latino (but not Chicano) applicants received slightly smaller admissions advantages (see Figure A-3) and are omitted from these figures; URM includes American Indian, African American (Black), and Chicano applicants. Source: UC Corporate Student System.

Figure B-2: Annual "Normal" Admissions at UCLA



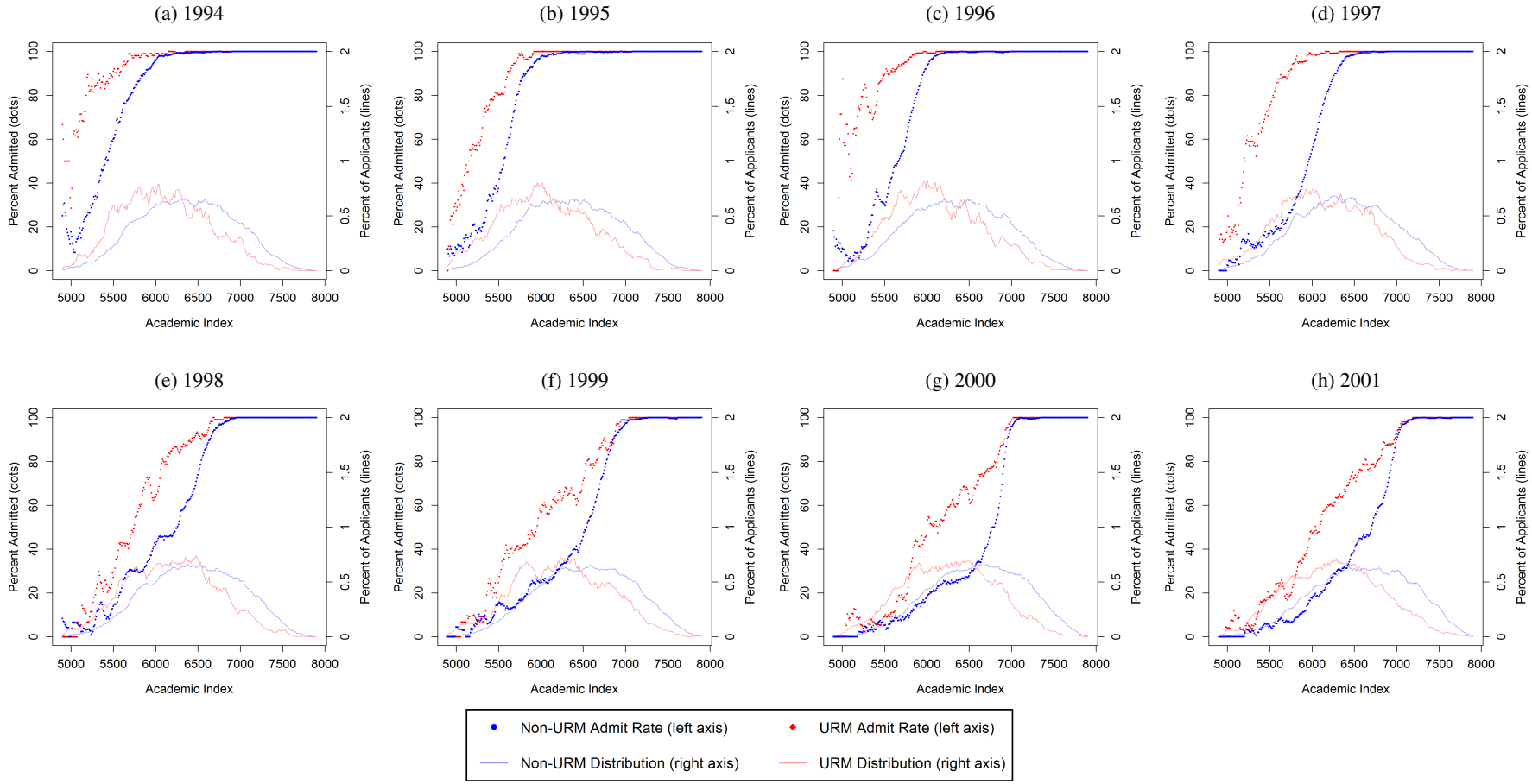
Note: This figure shows the 1994-2001 annual UCLA admissions rate for URM and non-URM applicants by Academic Index, as well as the annual distribution of UCLA applicants by Academic Index and ethnicity. Raw percent of URM and non-URM students admitted to UCLA by Academic Index (AI) – the sum of (top-censored) high school GPA, SAT I score, and three SAT II scores – each year from 1994 to 2001 (left axis). The lines show the probability density function of URM and non-URM UC applicants by AI (right axis). Admission rates and distributions are smoothed with a uniform kernel of bandwidth 50; AI below 4900 and above 7900 are omitted. The sample is restricted to freshman fall California-resident applicants who (a) were UC-eligible, meaning that they satisfactorily completed UC's minimum high school coursework requirement, and (b) reported an intended major that did not have special admissions restrictions, like engineering at some campuses. Latino (but not Chicano) applicants received slightly smaller admissions advantages (see Figure A-3) and are omitted from these figures; URM includes American Indian, African American (Black), and Chicano applicants. Source: UC Corporate Student System.

Figure B-3: Annual "Normal" Admissions at UC San Diego



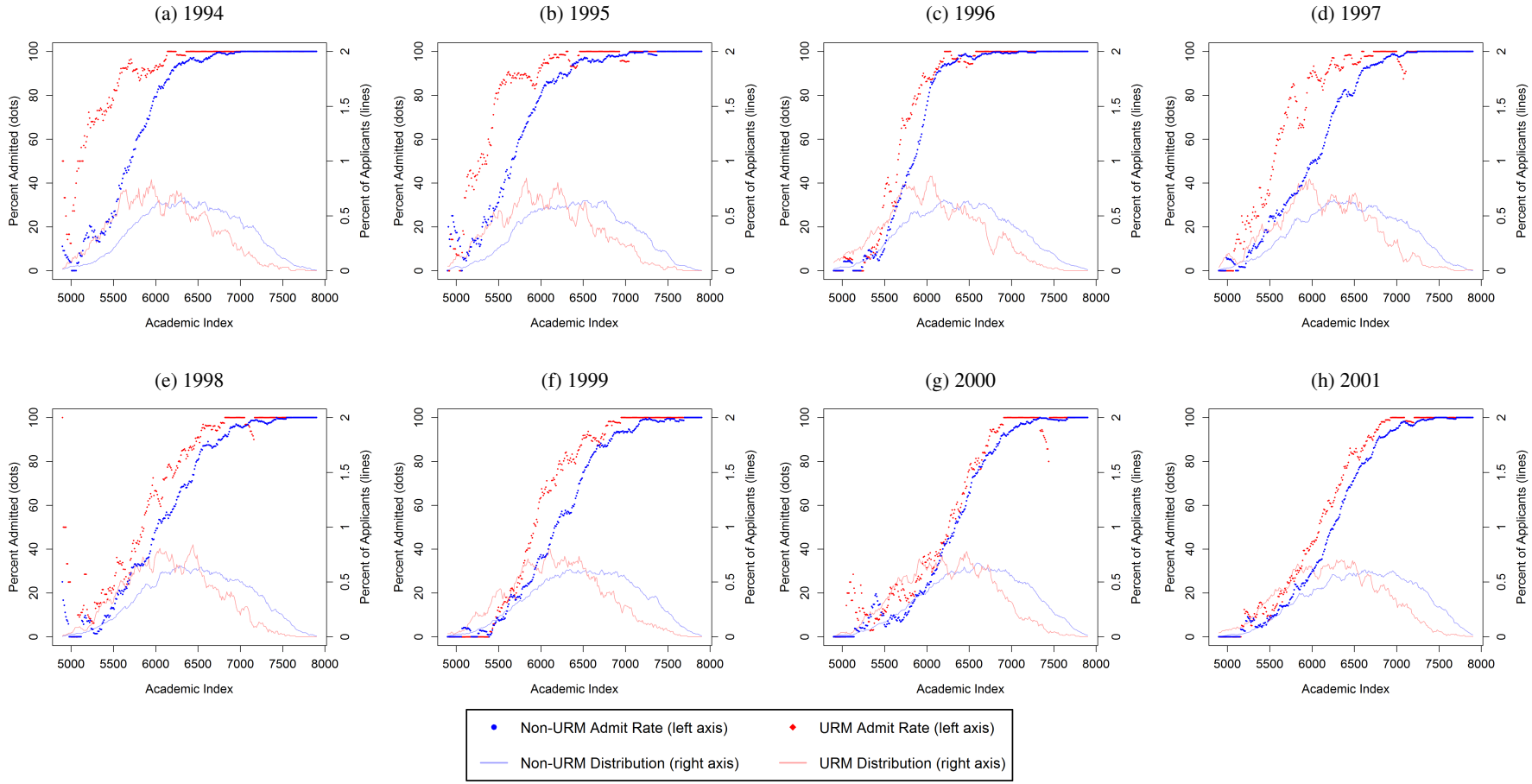
Note: This figure shows the 1994-2001 annual UC San Diego admissions rate for URM and non-URM applicants by Academic Index, as well as the annual distribution of UC San Diego applicants by Academic Index and ethnicity. Raw percent of URM and non-URM students admitted to UC San Diego by Academic Index (AI) – the sum of (top-censored) high school GPA, SAT I score, and three SAT II scores – each year from 1994 to 2001 (left axis). The lines show the probability density function of URM and non-URM UC applicants by AI (right axis). Admission rates and distributions are smoothed with a uniform kernel of bandwidth 50; AI below 4900 and above 7900 are omitted. The sample is restricted to freshman fall California-resident applicants who (a) were UC-eligible, meaning that they satisfactorily completed UC's minimum high school coursework requirement, and (b) reported an intended major that did not have special admissions restrictions, like engineering at some campuses. Latino (but not Chicano) applicants received slightly smaller admissions advantages (see Figure A-3) and are omitted from these figures; URM includes American Indian, African American (Black), and Chicano applicants. Source: UC Corporate Student System.

Figure B-4: Annual "Normal" Admissions at UC Santa Barbara



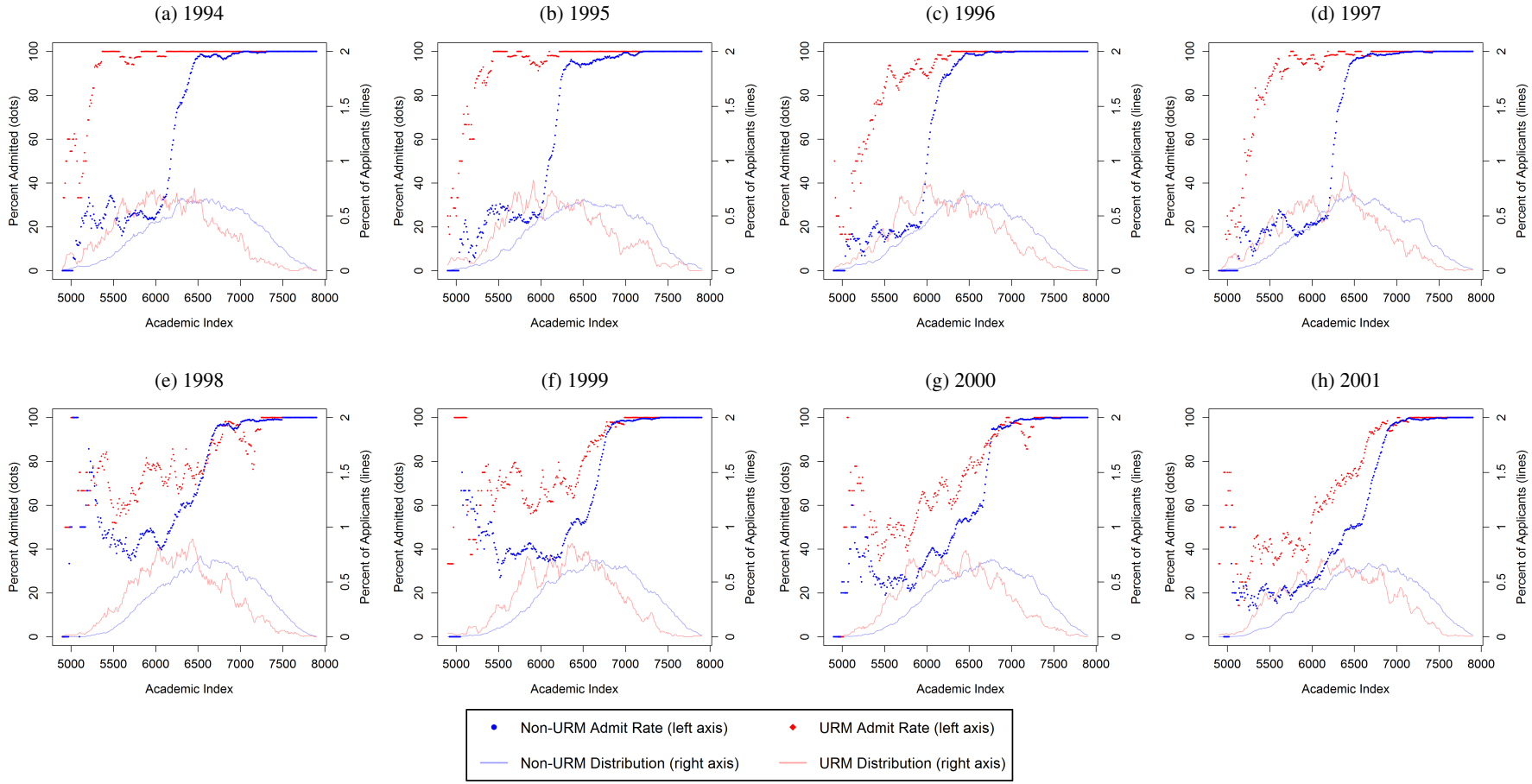
Note: This figure shows the 1994-2001 annual UC Santa Barbara admissions rate for URM and non-URM applicants by Academic Index, as well as the annual distribution of UC Santa Barbara applicants by Academic Index and ethnicity. Raw percent of URM and non-URM students admitted to UC Santa Barbara by Academic Index (AI) – the sum of (top-censored) high school GPA, SAT I score, and three SAT II scores – each year from 1994 to 2001 (left axis). The lines show the probability density function of URM and non-URM UC applicants by AI (right axis). Admission rates and distributions are smoothed with a uniform kernel of bandwidth 50; AI below 4900 and above 7900 are omitted. The sample is restricted to freshman fall California-resident applicants who (a) were UC-eligible, meaning that they satisfactorily completed UC's minimum high school coursework requirement, and (b) reported an intended major that did not have special admissions restrictions, like engineering at some campuses. Latino (but not Chicano) applicants received slightly smaller admissions advantages (see Figure A-3) and are omitted from these figures; URM includes American Indian, African American (Black), and Chicano applicants. Source: UC Corporate Student System.

Figure B-5: Annual "Normal" Admissions at UC Irvine



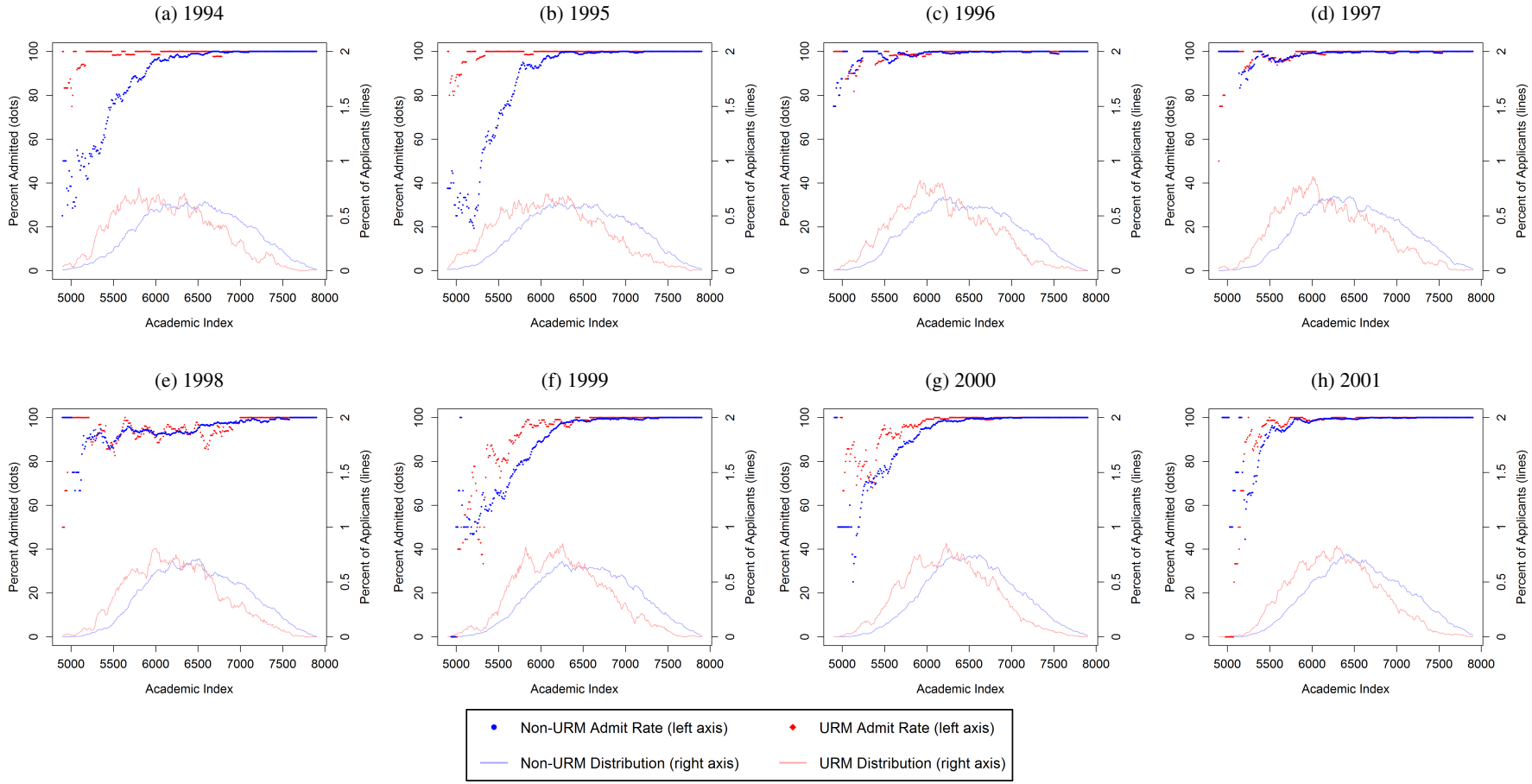
Note: This figure shows the 1994-2001 annual UC Irvine admissions rate for URM and non-URM applicants by Academic Index, as well as the annual distribution of UC Irvine applicants by Academic Index and ethnicity. Raw percent of URM and non-URM students admitted to UC Irvine by Academic Index (AI) – the sum of (top-censored) high school GPA, SAT I score, and three SAT II scores – each year from 1994 to 2001 (left axis). The lines show the probability density function of URM and non-URM UC applicants by AI (right axis). Admission rates and distributions are smoothed with a uniform kernel of bandwidth 50; AI below 4900 and above 7900 are omitted. The sample is restricted to freshman fall California-resident applicants who (a) were UC-eligible, meaning that they satisfactorily completed UC's minimum high school coursework requirement, and (b) reported an intended major that did not have special admissions restrictions, like engineering at some campuses. Latino (but not Chicano) applicants received slightly smaller admissions advantages (see Figure A-3) and are omitted from these figures; URM includes American Indian, African American (Black), and Chicano applicants. Source: UC Corporate Student System.

Figure B-6: Annual "Normal" Admissions at UC Davis



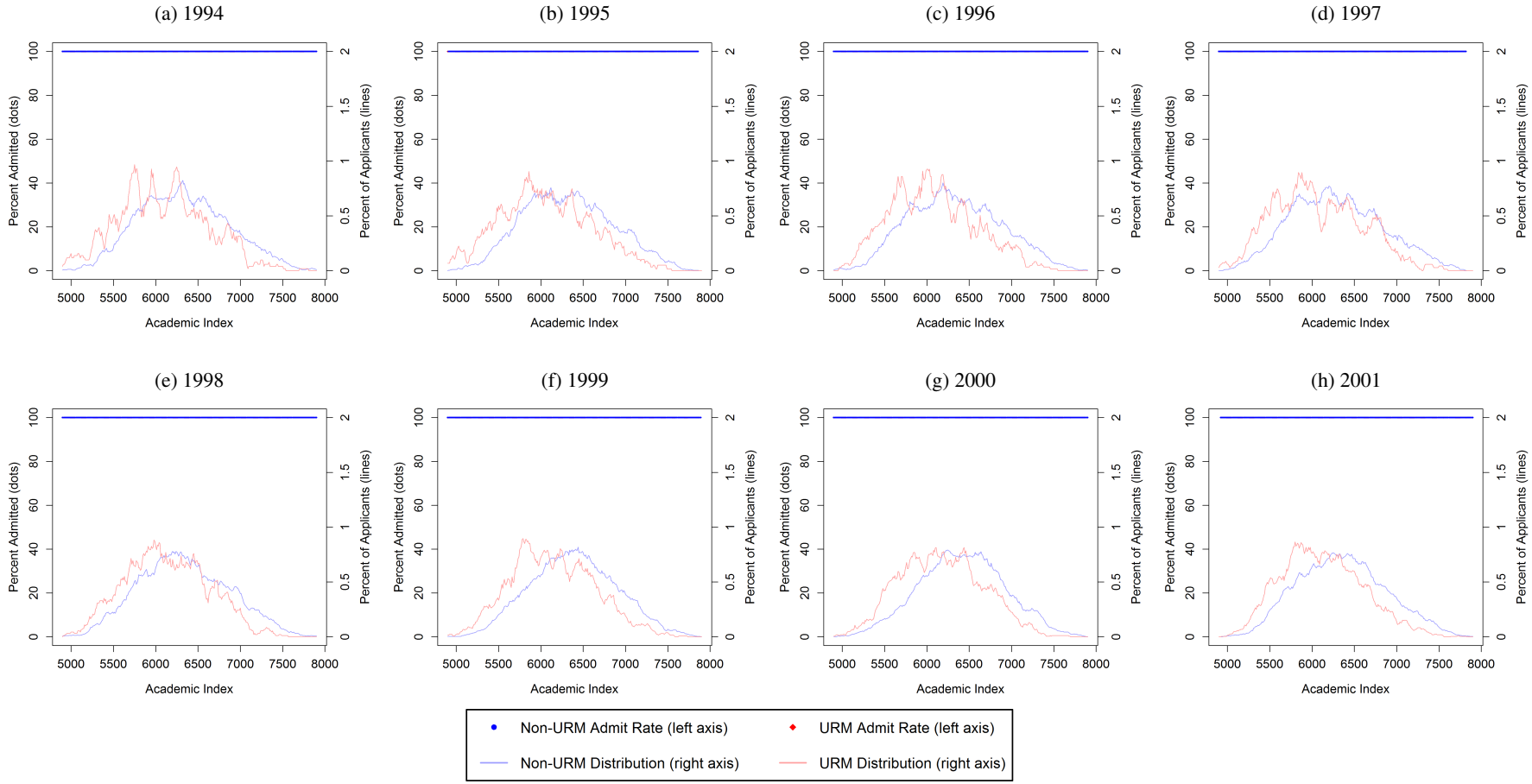
Note: This figure shows the 1994-2001 annual UC Davis admissions rate for URM and non-URM applicants by Academic Index, as well as the annual distribution of UC Davis applicants by Academic Index and ethnicity. Raw percent of URM and non-URM students admitted to UC Davis by Academic Index (AI) – the sum of (top-censored) high school GPA, SAT I score, and three SAT II scores – each year from 1994 to 2001 (left axis). The lines show the probability density function of URM and non-URM UC applicants by AI (right axis). Admission rates and distributions are smoothed with a uniform kernel of bandwidth 50; AI below 4900 and above 7900 are omitted. The sample is restricted to freshman fall California-resident applicants who (a) were UC-eligible, meaning that they satisfactorily completed UC's minimum high school coursework requirement, and (b) reported an intended major that did not have special admissions restrictions, like engineering at some campuses. Latino (but not Chicano) applicants received slightly smaller admissions advantages (see Figure A-3) and are omitted from these figures; URM includes American Indian, African American (Black), and Chicano applicants. Source: UC Corporate Student System.

Figure B-7: Annual "Normal" Admissions at UC Santa Cruz



Note: This figure shows the 1994-2001 annual UC Santa Cruz admissions rate for URM and non-URM applicants by Academic Index, as well as the annual distribution of UC Santa Cruz applicants by Academic Index and ethnicity. Raw percent of URM and non-URM students admitted to UC Santa Cruz by Academic Index (AI) – the sum of (top-censored) high school GPA, SAT I score, and three SAT II scores – each year from 1994 to 2001 (left axis). The lines show the probability density function of URM and non-URM UC applicants by AI (right axis). Admission rates and distributions are smoothed with a uniform kernel of bandwidth 50; AI below 4900 and above 7900 are omitted. The sample is restricted to freshman fall California-resident applicants who (a) were UC-eligible, meaning that they satisfactorily completed UC's minimum high school coursework requirement, and (b) reported an intended major that did not have special admissions restrictions, like engineering at some campuses. Latino (but not Chicano) applicants received slightly smaller admissions advantages (see Figure A-3) and are omitted from these figures; URM includes American Indian, African American (Black), and Chicano applicants. Source: UC Corporate Student System.

Figure B-8: Annual "Normal" Admissions at UC Riverside



Note: This figure shows the 1994-2001 annual UC Riverside admissions rate for URM and non-URM applicants by Academic Index, as well as the annual distribution of UC Riverside applicants by Academic Index and ethnicity. Raw percent of URM and non-URM students admitted to UC Riverside by Academic Index (AI) – the sum of (top-censored) high school GPA, SAT I score, and three SAT II scores – each year from 1994 to 2001 (left axis). The lines show the probability density function of URM and non-URM UC applicants by AI (right axis). Admission rates and distributions are smoothed with a uniform kernel of bandwidth 50; AI below 4900 and above 7900 are omitted. The sample is restricted to freshman fall California-resident applicants who (a) were UC-eligible, meaning that they satisfactorily completed UC's minimum high school coursework requirement, and (b) reported an intended major that did not have special admissions restrictions, like engineering at some campuses. Latino (but not Chicano) applicants received slightly smaller admissions advantages (see Figure A-3) and are omitted from these figures; URM includes American Indian, African American (Black), and Chicano applicants. Source: UC Corporate Student System.

Appendix C: UC Admissions and Yield after Prop 209

Table C-1 presents estimates of Equation 1's β_0 and $\beta_{\cdot 98-99}$ for admission to each UC campus, estimated on the 1996-1999 sample of applicants to that campus. While URM applicants were 37 and 27 percentage points more likely than comparable non-URM applicants to be admitted to Berkeley and UCLA under affirmative action, these advantages fell to 13 and 11 percentage points after Prop 209.[2] URM applicants faced similar-magnitude declines in their admissions likelihood at San Diego and Davis, and their admissions advantage fell at every campus. Among all applicants to any UC campus, URM applicants' admissions advantage over non-URM applicants (to be admitted to at least one campus) fell from 9.3 to 1.4 percentage points. Prop 209 had generally-similar impacts on the admissions likelihood of Black and Hispanic UC applicants: though Black students received somewhat-larger admissions advantages under affirmative action relative to academically-comparable non-URM applicants, Prop 209 caused slightly larger admissions declines for Hispanic applicants to UC's more-selective campuses than for Black UC applicants.

Table A-6 shows that admitted URM applicants became more likely to enroll at every UC campus after Prop 209, though URM applicants who were admitted to some UC campus became **less** likely to enroll at UC, a case of Simpson's Paradox reflecting the decline in the number of UC campuses to which URM applicants were admitted. Antonovics and Sander (2013) argue that this "warming effect" across UC campuses resulted from an increase in the signaling value of attending UC for URM applicants. As in that study, conditioning on the set of UC campuses to which applicants were admitted flips the sign of the UC-wide coefficient (to 2.8 percentage points); compared to academically-similar students admitted to the same UC campuses, post-1998 URM students are more likely to enroll at some UC campus. Admissions and enrollment statistics are slightly larger when estimated relative to the '94-95 baseline; see Table C-2.

Appendix D: Data Quality

D.1 Applicants Who Decline to Report Ethnicity

The percent of UC applicants who declined to report ethnicity on their application increased from 4.1 percent in '96-97 to 10.5 percent in '98-99, potentially challenging the identification of URM applicants.[3] To identify the ethnicity of missing-ethnicity applicants, I estimate a multinomial logistic regression of ethnicity (Asian, Black, Hispanic, and white) on the leave-one-out ethnicity shares of each known-ethnicity applicant for applicants' first name, middle name, last name, high school, zip code, and Census block, holding out a randomly-selected 10 percent of applicants. I then predict each missing-ethnicity applicant's likelihood of being each ethnicity, classifying them if their estimated likelihood of being that ethnicity exceeds 75

[2]Note that these models do not control for family income or other measures of pre-college opportunity likely correlated with URM status. Since those factors remained part of UC admissions, it is unsurprising that the presented models still identify advantages for URM applicants despite Prop 209.

[3]Throughout this study, applicants are categorized as "Black" if they self-report their ethnicity as "Black/African American"; as "Hispanic" if they self-report as "Chicano/Mexican-American" or "Latino/Other Spanish-American"; and as "Asian" if they self-report their ethnicity as "Chinese/Chinese-American," "East Indian/Pakistani," "Japanese/Japanese-American," "Korean," "Pilipino/Filipino," "Thai/Other Asian," or "Vietnamese".

Table C-1: Difference-in-Difference Estimates of Post-1998 URM Admissions by UC Campus

Campus:	UCB	UCLA	UCSD	UCSB	UCI	UCD	UCSC	UCR	Total
Overall admission conditional on application (%)									
URM	37.3	26.8	23.8	17.0	10.1	27.5	7.0	4.2	9.3
	(0.6)	(0.5)	(0.5)	(0.5)	(0.6)	(0.5)	(0.6)	(0.6)	(0.3)
URM ×	-24.5	-16.0	-18.7	-6.3	-3.1	-18.6	-5.8	-3.7	-7.9
Prop 209	(0.7)	(0.6)	(0.6)	(0.6)	(0.7)	(0.7)	(0.8)	(0.7)	(0.4)
$\bar{Y}$	32.3	35.1	51.8	65.2	65.8	70.1	81.8	85.0	82.3
Obs.	88,905	108,327	93,238	82,061	70,343	73,834	45,053	45,396	199,321
Admission conditional on application (%), **Black**									
Black	49.8	44.4	28.8	22.8	23.7	40.1	14.9	18.3	15.9
	(1.0)	(0.8)	(1.1)	(1.1)	(1.2)	(1.1)	(1.3)	(1.3)	(0.6)
Black ×	-25.4	-25.5	-20.6	-8.7	-15.3	-27.2	-17.4	-20.9	-16.8
Prop 209	(1.3)	(1.1)	(1.4)	(1.5)	(1.6)	(1.5)	(1.8)	(1.5)	(0.8)
$\bar{Y}$	33.8	38.2	53.6	68.3	68.7	69.0	82.4	84.7	83.5
Obs.	71,821	85,476	79,947	65,728	57,492	62,326	36,445	35,880	160,180
Admission conditional on application (%), **Hispanic**									
Hispanic	39.7	34.2	21.6	8.3	19.3	31.3	13.4	14.1	12.7
	(0.7)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.7)	(0.3)
Hispanic ×	-29.9	-26.2	-18.8	0.1	-13.6	-23.3	-12.1	-13.4	-11.1
Prop 209	(0.9)	(0.7)	(0.8)	(0.7)	(0.8)	(0.9)	(0.8)	(0.8)	(0.4)
$\bar{Y}$	34.3	38.4	53.3	68.1	68.6	69.8	82.3	84.8	83.5
Obs.	77,988	95,495	87,802	74,487	64,688	67,352	42,051	41,654	180,540

Note: OLS coefficient estimates of β_0 and $\beta_{\cdot 98-99}$ from Equation 1, a difference-in-difference model of 1996-1999 URM UC freshman California-resident applicants' UC admission compared to non-URM applicants after Prop 209, overall or excluding non-Black or non-Hispanic URM applicants. Models are conditioned on applying to that UC campus. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21), and are estimated independently by campus or "Total" (all applicants to any UC campus). Robust standard errors in parentheses. Source: UC Corporate Student System.

percent.[4]

In '96-97, I find that among the 88 percent of missing-ethnicity applicants whose ethnicity can be classified, 68 percent are white, 29 percent are Asian, 2.5 percent are Hispanic, and 0.6 percent are Black. The URM shares are hardly higher in '98-99; of the 87 percent classified, whites and Asians make up 65 and 29 percent, while Hispanics and Blacks make up 4.2 and 1.3 percent. Thus, while the decline in URM reporting incentives may have disproportionately increased non-reporting among URM university applicants (Antman and Duncan, 2015), the very large majority of non-reporters remains non-URM. These results justify the assumption in the baseline analysis that missing-ethnicity applicants are non-URM. No presented result changes statistically or qualitatively if predicted-URM applicants are re-assigned as URM.

[4]Types 1 and 2 error by ethnicity, measured using the 10 percent of hold-outs, are: 13.2% and 15.2% (white), 3.9% and 12.4% (Asian), 0.3% and 55.5% (Black), and 1.2% and 27% (Hispanic). I replace non-reported ethnicity with predicted ethnicities in Figures IV(f) and VII to avoid dropping data.

Table C-2: Difference-in-Difference Estimates of Post-1998 URM Admissions by UC Campus, Compared to '94-5 Baseline

Campus:	UCB	UCLA	UCSD	UCSB	UCI	UCD	UCSC	UCR	Total
Application conditional on UC application (%)									
URM	11.8	9.9	-1.8	-8.6	-8.9	-4.8	-3.2	-8.2	
	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)	(0.3)	
URM × Prop 209	-2.9	-5.7	-1.3	3.1	-0.8	1.5	0.9	5.9	
	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	
$\bar{Y}$	43.9	53.5	48.1	40.8	35.7	37.8	23.1	23.8	
Obs.	190,540	190,540	190,540	190,540	190,540	190,540	190,540	190,540	
Admission conditional on application (%)									
URM	43.5	37.8	23.5	10.8	20.3	32.6	13.2	15.2	13.4
	(0.6)	(0.5)	(0.6)	(0.5)	(0.6)	(0.6)	(0.6)	(0.6)	(0.3)
URM × Prop 209	-29.6	-26.8	-19.7	-1.4	-14.0	-24.0	-12.9	-15.2	-12.4
	(0.7)	(0.6)	(0.7)	(0.7)	(0.7)	(0.8)	(0.8)	(0.7)	(0.4)
$\bar{Y}$	34.5	38.5	52.8	67.8	68.2	69.7	81.9	84.1	82.9
Obs.	82,637	100,991	91,227	77,640	67,320	70,424	43,987	44,165	190,540
Enrollment conditional on **application** (%)									
URM	14.6	12.9	0.3	-1.5	-1.6	4.4	-1.6	2.0	8.3
	(0.6)	(0.5)	(0.5)	(0.6)	(0.6)	(0.7)	(0.7)	(0.8)	(0.4)
URM × Prop 209	-10.6	-10.6	-2.2	2.8	-1.5	-4.4	-1.3	-4.5	-11.6
	(0.7)	(0.6)	(0.6)	(0.7)	(0.7)	(0.8)	(0.9)	(0.9)	(0.5)
$\bar{Y}$	16.4	14.8	13.0	16.4	18.0	18.7	17.1	17.2	49.6
Obs.	83,559	101,940	91,720	77,804	67,980	72,062	44,031	45,302	190,540
Enrollment conditional on **admission** (%)									
URM	-20.8	-17.9	-17.3	-7.8	-14.2	-12.0	-6.6	-3.5	1.6
	(1.1)	(0.9)	(0.8)	(0.7)	(0.8)	(0.8)	(0.8)	(0.9)	(0.5)
URM × Prop 209	10.9	9.2	10.7	5.2	5.1	6.2	3.2	0.8	-6.3
	(1.5)	(1.3)	(1.2)	(1.0)	(1.1)	(1.1)	(1.1)	(1.1)	(0.6)
$\bar{Y}$	42.7	38.5	24.7	24.1	26.6	27.3	20.8	21.0	59.7
Obs.	28,497	38,849	48,126	52,669	45,891	49,074	36,025	37,155	157,881

Note: This table shows that URM declines in UC admissions and enrollment were larger after Prop 209 when compared to '94-95 as a baseline. OLS coefficient estimates of β_0 and $\beta_{\cdot 98-99}$ from Equation 1, a difference-in-difference model of 1994-1995 and 1998-1999 URM UC freshman California-resident applicants' UC applications, admissions, and enrollment compared to non-URM applicants after the 1998 end of UC's affirmative action program. The years 1996-1997 are omitted because some universities preemptively curtailed their affirmative action programs in those years. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21), and are estimated independently by campus or "Total" (all applicants to any UC campus). Robust standard errors in parentheses. Source: UC Corporate Student System and National Student Clearinghouse.

D.2 National Student Clearinghouse Coverage

Dynarski, Hemelt and Hyman (2015) show that national NSC enrollment coverage at four-year institutions was below 50 percent in 1996, rising to over 80 percent by 2000.[5] Coverage at the somewhat-selective

[5]NSC reports that about 4 percent of records are censored due to student- or institution-requested blocks for privacy con-

Table E-1: Difference-in-Difference Estimates of **Asian** UC Applicants' Post-1998 Enrollment

	UC Campuses by Selectivity				Comm.		CA	Non-CA	Not in
	Most	Middle	Least	CSU	Coll.	Ivy+	Priv.	Univ.	NSC
Asian	6.5	-1.7	-1.3	-2.1	2.2	0.8	-1.6	-3.6	0.5
	(0.3)	(0.3)	(0.2)	(0.3)	(0.3)	(0.1)	(0.2)	(0.2)	(0.2)
Asian ×	-0.2	0.1	1.5	-0.1	-1.1	0.0	-0.6	0.8	-0.5
Prop 209	(0.4)	(0.4)	(0.2)	(0.3)	(0.3)	(0.2)	(0.3)	(0.3)	(0.2)
$\bar{Y}$	22.6	20.6	6.4	12.7	11.7	2.8	8.8	9.1	5.8
Obs.	150,968	150,968	150,968	150,968	150,968	150,968	150,968	150,968	150,968

Note: Estimates of β_0 and $\beta_{\cdot 98-99}$ from Equation 1, an OLS difference-in-difference model of 1996-1999 Asian UC freshman California-resident applicants' enrollment outcomes compared to non-Asian outcomes after the 1998 end of UC's affirmative action program (restricting the sample to non-URM applicants). Outcomes defined as the first institution of enrollment by college or university type within six years of graduating high school, as measured in the NSC. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Academic Index (AI) is defined in footnote 6; models by AI quartile are estimated independently, with quartiles defined by the AI distribution of 96-97 URM UC applicants. "Ivy+" universities include the Ivy League, MIT, Stanford, and the University of Chicago; private and non-CA universities exclude those institutions. Robust standard errors in parentheses. Source: UC Corporate Student System and National Student Clearinghouse.

institutions at which UC applicants tended to enroll was much higher. Appendix A in Bleemer (2021) shows that while some California community colleges were not reporting enrollment statistics to NSC by the mid-1990s, only a small number of universities may not have been reporting graduation statistics by 1999 (the earliest year that 1996 applicants could plausibly earn a four-year degree), the largest of which was 2,100-student adult-education-oriented Brandman University. The same trend likely holds for other states; Table A-7 shows that only 6.2 percent of the baseline sample did not have observed enrollment in NSC, some of whom likely enrolled at community colleges before the colleges' NSC participation (and others who actually choose against postsecondary enrollment).

A comparison between UC and NSC graduation records suggests that only UC Santa Cruz failed to report a substantial number of earned degrees among the late 1990s graduation cohorts, while a comparison between NSC and UC major reporting (measured by which students earned STEM degrees) shows that NSC routinely captures more than 90 percent of STEM degree attainment at all campuses throughout the period (conditional on degree reporting in both data sets). The six-year graduation and STEM major choice estimates presented in Panel A of Table III are robust when restricted to NSC records only or to NSC records augmented by only UCSC degrees (see Table A-12). As a result, differential NSC non-reporting by URM applicants is unlikely to explain the observed degree attainment patterns. Moreover, this concern does not extend to the graduate degree estimates; most such degrees are not earned at the same institutions where applicants earned their undergraduate degrees, and NSC coverage was very wide by the time applicants in the sample were earning graduate degrees.

Appendix E: Differential Impact of Prop 209 on Asian UC Applicants

The baseline difference-in-difference analysis in the main text does not differentiate between groups of non-URM UC applicants, but there is some speculation that affirmative action policies differentially impact Asian applicants relative to white applicants (Arcidiacono, Kinsler and Ransom, 2020). I test for heterogeneity in Prop 209's effect on non-URM students by restricting the UC applicant sample to non-URM students and re-estimating versions of Equation 1 with Asian students as the treated group (replacing URM).[6] Table E-1 presents estimates of Prop 209's effect on Asian students' enrollment institutions. The coefficients on Asian students' enrollment at more-selective and selective UC campuses are precisely-estimated zeroes: ending UC's affirmative action program did not lead to a relative increase in Asian UC applicants' enrollment at those campuses. There is a small measurable enrollment shift from community and private California colleges into non-California universities and the less-selective UC campuses, though the effects' magnitudes are a small fraction of those observed for URM students. Figure E-1 shows that Prop 209 also caused no estimable change in Asian applicants' longer-run wage outcomes relative to other non-URM applicants. I conclude that there is little reason to treat white and Asian applicants as having been differently-treated by Prop 209, conditional on prior academic opportunities and preparation as measured by the components of AI.

Appendix F: Selection into Application: Reanalyzing Card and Krueger (2005)

Figure A-15 shows that the annual proportion of URM California high school graduates who applied to some UC campus declined (relative to non-URM applications) after 1998 among both low- and high-AI students. This contrasts with the evidence presented by Card and Krueger (2005) (hereafter CK), who use a difference-in-difference design to show that the annual proportion of URM California SAT-takers who send their scores to UC campuses – an oft-used proxy for university application, since score-sending is a mandatory component of many universities' applications – declined overall, but remained steady (or perhaps increased) among the high-SAT and/or high-GPA URM test-takers who were competitive candidates for selective university admission.

I reconcile these findings by matching the College Board SAT-takers database – only available for California public high school students, whereas CK includes private high schools – to the UC application database by name, birthdate, and high school.[7] While the College Board data show that more than 90 percent of UC Berkeley or UCLA applicants sent their SAT scores to those campuses, fewer than 60 percent of students who send their SAT scores to each of those campuses actually apply to them. This suggests that SAT-sending may be a poor proxy for university application in some contexts.

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cerns, and that the only public university in California with censorship greater than 10 percent is UC Berkeley (National Student Clearinghouse Research Center, 2017).

[6]Table A-5 presents descriptive statistics for white and Asian UC applicants before and after Prop 209, with both showing similar admissions trends after 1998.

[7]The match rate of public-HS SAT-submitting freshman UC applicants to the College Board – matching any six of the seven pieces of available information (three names, three birthdate components, and high school) and dropping a small number of possible duplicate matches – is 93 percent among 1994-2001 applicants.

Figure E-1: Difference-in-Difference Estimates of Asian and URM UC Applicants' Post-1998 Wage Outcomes

Note: This figure shows simultaneous difference-in-difference estimates for URM and Asian labor market outcomes relative to white students, showing that Asian students' long-run labor market outcomes closely-tracked white students' outcomes while URM students' outcomes deteriorated. Estimates of $\beta_{\cdot 98-99}$ from an extension Equation 1 adding indicators for Asian students and Asian interacted with post-209 ($\beta'_{1998-1999}$), an OLS difference-in-difference model of 1996-1999 URM and Asian UC freshman California-resident applicants' educational outcomes compared to other non-URM students' outcomes after the 1998 end of UC's affirmative action program. Outcomes defined as non-zero California wages ("CA Employment"), California wages in dollars and log-dollars (omitting 0's), and unconditional indicators for having wages above specified wage thresholds ($75,00, $100,000, and $150,000) as measured in the California Employment Development Department database, which includes employment covered by California unemployment insurance. Coefficients in each year after UC application are estimated independently. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Academic Index (AI) is defined in footnote 6; models by AI quartile are estimated independently, with quartiles defined by the AI distribution of 96-97 URM UC applicants. Annual wages CPI-adjusted to 2018 and winsorized at top and bottom 1 percent. Robust 95-percent confidence intervals shown. Source: UC Corporate Student System and the California Employment Development Department.

Table F-1 shows that among students at all California high schools (reported by CK) or at public California high schools, California URM SAT-takers who reported A and A+ average high school grades were no less likely to send their scores to any UC campus or to the more-selective Berkeley and UCLA campuses after 1998 relative to non-URM SAT-takers; indeed, URM send rates increased in 1995 and 1996 and only slightly declined in 1998. However, the pattern in actual university applications appears quite different: high-GPA URM students' relative likelihood of UC and Berkeley/UCLA application declined sharply in 1996 – when the application deadline was only a few months after the passage of Prop 209 – recovered in

Table F-1: Replication of Table 4 in Card and Krueger (2005) with New Specifications: *"Changes in the Relative Probability that Minority Students Send SAT Scores to Selective and Most Selective State Universities"*

	All UC Campuses			Berkeley and UCLA Only		
Dep. Var.:	Send	Send	Apply	Send	Send	Apply
URM × 1995	0.021	0.009	-0.002	0.023	0.011	-0.008
	(0.010)	(0.012)	(0.014)	(0.012)	(0.014)	(0.013)
URM × 1996	0.027	0.016	-0.029	0.030	0.015	-0.035
	(0.010)	(0.012)	(0.013)	(0.011)	(0.014)	(0.013)
URM × 1997	0.028	0.015	-0.006	0.037	0.029	-0.007
	(0.009)	(0.011)	(0.013)	(0.011)	(0.013)	(0.013)
URM × 1998	0.025	0.009	-0.028	0.029	0.011	-0.032
	(0.009)	(0.011)	(0.013)	(0.011)	(0.013)	(0.013)
URM × 1999	0.032	0.015	-0.019	0.026	0.013	-0.032
	(0.009)	(0.011)	(0.013)	(0.011)	(0.013)	(0.013)
URM × 2000	0.033	0.013	-0.038	0.039	0.017	-0.037
	(0.009)	(0.011)	(0.013)	(0.011)	(0.013)	(0.013)
URM × 2001	0.036	0.006	-0.002	0.045	0.025	-0.001
	(0.009)	(0.011)	(0.012)	(0.011)	(0.013)	(0.012)
CK Controls[1]	X	X	X	X	X	X
A/A+ GPA Only	X	X	X	X	X	X
Public HS Only		X	X		X	X
Source	CK	Replication		CK	Replication	
Average(1999-2001) - Average(1994-1995)[2]						
Estimate	0.018	0.006	-0.019	0.019	0.013	-0.018
(Std. Err.)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
Obs.	-	179,682	179,682	-	179,682	179,682

Note: Difference-in-difference OLS regression coefficient estimates across all California 1994-2001 SAT-takers (or restricted to those from public high schools) of URM students' likelihood of either sending SAT scores or applying to any UC campus or the Berkeley and UCLA campuses, relative to 1994 and non-URM students. Models correspond to columns (3) and (6) in Card and Krueger (2005), with the sample restricted to SAT-takers who report A or A+ high school average grades. Test-taking and applicant records merged by name, birthdate, and high school. [1] "CK Controls" include indicators by year, ethnicity, SAT score category (< 1150, $1150 - 1300$, and > 1300), father's and mother's education, reported high school GPA (A or A+), and 8 class rank indicators (including missing). [2] Estimates from CK include 1994-1996 instead of 1994-1995, but the results suggest that URM application rates began falling in 1996 (following the passage of SP-1 and Prop 209). Standard errors (in parentheses) are robust. Source: College Board and UC Corporate Student System.

1997, and then sharply (and somewhat-persistently) declined again in 1998 when the proposition went into effect. Models restricted to high-SAT test-takers reveal a similar pattern.[8]

In total, URM UC relative application rates declined by 1.9 percentage points between 1998 and 2000 (relative to 1994-1995), and relative application rates to the Berkeley and UCLA campuses declined by 1.8 percentage points. These patterns are consistent with Figure A-15, which shows a decline in high-AI URM

[8] See Tables F-2 and F-3. Table F-4 shows that score-sending to Berkeley and UCLA became a poor proxy for URM students' applications to those schools in 1996 (and worse still in 1999), when URM score-senders across the SAT distribution became less likely to apply to either, though after 1998 it became a particularly poor proxy for low-SAT students.

Table F-2: Replication of Card/Krueger (2005), Table 4, for All UC Campuses

	Any UC Campus						
	Send	Apply	Send	Apply	Send	Apply	Apply
URM × 1995	0.005	-0.012	0.002	-0.007	0.009	-0.002	-0.004
	(0.004)	(0.004)	(0.013)	(0.015)	(0.012)	(0.014)	(0.013)
URM × 1996	-0.002	-0.033	0.016	-0.012	0.016	-0.029	-0.032
	(0.004)	(0.004)	(0.013)	(0.015)	(0.012)	(0.013)	(0.013)
URM × 1997	-0.010	-0.040	0.011	-0.026	0.015	-0.006	-0.008
	(0.004)	(0.004)	(0.013)	(0.015)	(0.011)	(0.013)	(0.013)
URM × 1998	-0.019	-0.044	-0.010	-0.054	0.009	-0.028	-0.029
	(0.004)	(0.004)	(0.013)	(0.015)	(0.011)	(0.013)	(0.013)
URM × 1999	-0.020	-0.049	0.001	-0.027	0.015	-0.019	-0.022
	(0.004)	(0.004)	(0.013)	(0.015)	(0.011)	(0.013)	(0.013)
URM × 2000	-0.022	-0.047	0.012	-0.030	0.013	-0.038	-0.040
	(0.004)	(0.004)	(0.012)	(0.015)	(0.011)	(0.013)	(0.013)
URM × 2001	-0.028	-0.038	0.004	-0.014	0.006	-0.002	-0.006
	(0.004)	(0.004)	(0.012)	(0.014)	(0.011)	(0.012)	(0.012)
CK Controls[1]	X	X	X	X	X	X	X
Pred. Eth.							X
Sample	Full		High SAT		High GPA		
R^2	0.20	0.31	0.12	0.18	0.09	0.17	0.17
N	891,254	891,254	208,765	208,765	179,682	179,682	179,682

Note: This table shows that while the proportion of competitive URM applicants sending their SAT scores to UC only slightly declined after Prop 209, there is a larger decline in actual URM applications to those schools, suggesting that score-sending is a poor proxy in this context. Difference-in-difference OLS regression coefficient estimates across all California 1994-2001 public-HS SAT-takers of URM students' likelihood of either sending SAT scores or applying to any UC campus, relative to 1994 and non-URM students. Models are either unrestricted, restricted to SAT-takers with scores above 1150, or restricted to SAT-takers who report A or A+ GPAs, following the first three columns of Table 4 of Card and Krueger (2005). Test-taking and applicant records merged by name, birthdate, and high school. The final column augments reported ethnicity by predicting the ethnicities of non-reporters using name and high school; see Appendix D for details. Standard errors (in parentheses) are robust. [1] "CK Controls" include indicators by year, ethnicity, SAT score category (< 1150, $1150 - 1300$, and > 1300), father's and mother's education, reported high school GPA (A or A+), and 8 class rank indicators (including missing). Source: College Board and UC Corporate Student System.

application rates, and suggests that academically-strong URM students were dissuaded from UC application by Prop 209 despite sending their SAT scores to UC campuses (which they may have done many months earlier, on the day they took the test).

Appendix G: Course Performance and Persistence at Berkeley after Prop 209

Section 7 shows that the STEM performance and persistence of URM students across five UC campuses does not improve following Prop 209, despite those students' enrollment at less-selective campuses. This tests the "Science Mismatch Hypothesis" as suggested by Griffith (2010) and Arcidiacono, Aucejo and Hotz (2016). However, other studies have tested narrower versions of the Hypothesis, claiming only that URM students admitted under affirmative action are lower-performing in STEM courses than their non-URM peers, unconditional (Loury and Garman, 1993; Holzer and Neumark, 2000; Fischer and Massey, 2007) or

Table F-3: Replication of Card/Krueger (2005), Table 4, for UC's Most-Selective Campuses

	Berkeley and UCLA								
	Send	Apply	Send	Apply	Send	Apply	Send	Apply	Apply
URM × 1995	0.002	-0.004	0.000	-0.013	0.011	-0.008	-0.006	-0.018	-0.019
	(0.004)	(0.003)	(0.016)	(0.015)	(0.014)	(0.013)	(0.011)	(0.012)	(0.012)
URM × 1996	-0.005	-0.026	0.024	-0.006	0.015	-0.035	0.002	-0.021	-0.022
	(0.004)	(0.003)	(0.015)	(0.015)	(0.014)	(0.013)	(0.011)	(0.012)	(0.011)
URM × 1997	-0.007	-0.030	0.012	-0.021	0.029	-0.007	-0.004	-0.035	-0.038
	(0.004)	(0.003)	(0.015)	(0.015)	(0.013)	(0.013)	(0.011)	(0.011)	(0.011)
URM × 1998	-0.016	-0.032	-0.007	-0.047	0.011	-0.032	-0.007	-0.035	-0.037
	(0.004)	(0.003)	(0.015)	(0.015)	(0.013)	(0.013)	(0.010)	(0.011)	(0.011)
URM × 1999	-0.018	-0.041	-0.005	-0.027	0.013	-0.032	-0.008	-0.075	-0.076
	(0.004)	(0.003)	(0.015)	(0.015)	(0.013)	(0.013)	(0.011)	(0.011)	(0.011)
URM × 2000	-0.020	-0.033	0.016	-0.011	0.017	-0.037	-0.006	-0.028	-0.031
	(0.004)	(0.003)	(0.015)	(0.015)	(0.013)	(0.013)	(0.010)	(0.011)	(0.011)
URM × 2001	-0.020	-0.027	0.021	-0.003	0.025	-0.001	0.014	-0.007	-0.007
	(0.004)	(0.003)	(0.015)	(0.015)	(0.013)	(0.012)	(0.010)	(0.011)	(0.011)
CK Controls[1]	X	X	X	X	X	X	X	X	X
Pred. Eth.									X
	Full		High SAT		High GPA		AI 5500-7000		
R^2	0.24	0.30	0.21	0.23	0.17	0.21	0.12	0.11	0.11
N	891,254	891,254	208,765	208,765	179,682	179,682	212,133	212,133	212,133

Note: This table shows that while the proportion of competitive URM applicants sending their SAT scores to Berkeley and UCLA only slightly declined after Prop 209, there is a larger decline in actual URM applications to those schools, suggesting that score-sending is a poor proxy in this context. Difference-in-difference OLS regression coefficient estimates across all California 1994-2001 public-HS SAT-takers of URM students' likelihood of either sending SAT scores or applying to either UC Berkeley or UCLA, relative to 1994 and non-URM students. Models are either unrestricted, restricted to SAT-takers with scores above 1150, restricted to SAT-takers who report A or A+ GPAs, restricted to SAT-takers with academic indices between 5500 and 7000 (who faced the most-dramatic decline in admissions likelihood at Berkeley and UCLA), following the last three columns of Table 4 of Card and Krueger (2005). Test-taking and applicant records merged by name, birthdate, and high school. The final column augments reported ethnicity by predicting the ethnicities of non-reporters using name and high school; see Appendix D for details. Standard errors (in parentheses) are robust. [1] "CK Controls" include indicators by year, ethnicity, SAT score category (< 1150, $1150 - 1300$, and > 1300), father's and mother's education, reported high school GPA (A or A+), and 8 class rank indicators (including missing). Source: College Board and UC Corporate Student System.

conditional on prior academic preparation (Rose, 2005).

Following this previous literature, I also test whether the persistence and performance of URM students at UC Berkeley – the campus where Prop 209 most impacted URM students' likelihood of admission – improved after 1998, when Prop 209 caused a decline in the URM share of the student body by more than half. I restrict the sample to 1996-1999 Berkeley students and estimate Equation 3 with and without academic covariates (α_{h_i} and X_{iy}). The last column of Table G-1 shows that before Prop 209, Berkeley's URM students earned lower average grades by 0.84 grade points and were 19 percentage points less likely to persist along STEM course sequences. These gaps are broadly present across most introductory STEM courses. If admissions mismatch is a primary cause of these large ethnicity gaps, then Prop 209 would be expected to sharply narrow them. In fact, Prop 209 does lead Berkeley's (higher-testing) URM students to earn slightly higher STEM grades (by 0.18 grade points), but if anything their STEM persistence slightly declined.

Table F-4: The Relationship between SAT Send Rates and Most-Selective UC Application

		Coef.	St. Err.	p			Coef.	St. Err.	p
Send		0.371	(0.003)	0.000	Send×SAT		0.189	(0.003)	0.000
URM		0.020	(0.002)	0.000	URM×SAT		0.007	(0.002)	0.000
Norm. SAT		-0.001	(0.001)	0.371	Send×URM×SAT		-0.035	(0.006)	0.000
Send×URM		0.023	(0.006)	0.000					
Indicator	1995	-0.001	(0.001)	0.479	Send×URM×	1995	-0.005	(0.009)	0.572
	1996	0.002	(0.001)	0.155		1996	-0.032	(0.009)	0.000
	1997	0.003	(0.001)	0.015		1997	-0.041	(0.009)	0.000
	1998	0.002	(0.001)	0.027		1998	-0.042	(0.009)	0.000
	1999	0.008	(0.001)	0.000		1999	-0.058	(0.009)	0.000
	2000	0.007	(0.001)	0.000		2000	-0.052	(0.009)	0.000
	2001	-0.003	(0.001)	0.011		2001	-0.045	(0.009)	0.000
Send×	1995	0.032	(0.005)	0.000	Send×SAT×	1995	0.001	(0.004)	0.886
	1996	0.042	(0.004)	0.000		1996	0.009	(0.004)	0.021
	1997	0.026	(0.004)	0.000		1997	0.016	(0.004)	0.000
	1998	0.030	(0.004)	0.000		1998	0.012	(0.004)	0.001
	1999	0.042	(0.005)	0.000		1999	-0.002	(0.004)	0.619
	2000	0.046	(0.005)	0.000		2000	-0.001	(0.004)	0.773
	2001	0.080	(0.005)	0.000		2001	0.003	(0.004)	0.482
URM×	1995	0.001	(0.003)	0.875	URM×SAT×	1995	0.001	(0.003)	0.682
	1996	-0.004	(0.003)	0.253		1996	-0.001	(0.003)	0.615
	1997	-0.001	(0.003)	0.706		1997	0.001	(0.003)	0.775
	1998	0.000	(0.003)	0.942		1998	-0.003	(0.003)	0.362
	1999	-0.007	(0.003)	0.026		1999	-0.006	(0.003)	0.032
	2000	-0.001	(0.003)	0.849		2000	-0.002	(0.003)	0.484
	2001	0.002	(0.003)	0.434		2001	-0.000	(0.003)	0.965
SAT×	1995	-0.001	(0.001)	0.337	Send×URM×SAT×	1995	0.008	(0.008)	0.320
	1996	0.002	(0.001)	0.139		1996	0.015	(0.008)	0.061
	1997	0.003	(0.002)	0.053		1997	0.004	(0.008)	0.572
	1998	0.007	(0.002)	0.000		1998	0.000	(0.008)	0.959
	1999	0.012	(0.002)	0.000		1999	0.021	(0.008)	0.007
	2000	0.009	(0.002)	0.000		2000	0.021	(0.008)	0.007
	2001	-0.000	(0.001)	0.865		2001	0.029	(0.008)	0.000
CK Controls[1]					X				
R^2					0.51				
N					841,358				

Note: This regression shows that score-sending to Berkeley and UCLA became a poor proxy for URM students' applications to those schools in 1996, when URM score-senders across the SAT distribution became less likely to apply to either, though after 1998 it became a particularly poor proxy for low-SAT students. Quadruple-difference OLS regression of an indicator of applying to either UC Berkeley or UCLA on interactions between score-sending to one of those schools, URM status, normalized SAT score, and year (holding out 1994), restricting the sample to 1994-2001 SAT-takers from California public high schools. All coefficients are from the same regression. Standard errors are robust; p-values report statistical tests from the null hypothesis. [1] "CK Controls" include indicators by year, ethnicity, SAT score category (< 1150, $1150 - 1300$, and > 1300), father's and mother's education, reported high school GPA (A or A+), and 8 class rank indicators (including missing). Source: College Board and UC Corporate Student System.

Panel B of Table G-1 adds academic covariates and shows that, as was the case across the five UC campuses, cross-high-school and AI differences wholly explain URM students' low persistence and performance before Prop 209; in the period when Berkeley was implementing affirmative action, URM students earned similar grades and were (if anything) **more** likely to persist in some of Berkeley's STEM fields than their academically-comparable non-URM peers. Unlike at those other campuses, however, ending affirmative action led to relative **declines** in URM students' persistence and (perhaps) performance across most

Table G-1: Difference-in-Difference Estimates of URM Berkeley Students' Post-1998 STEM Outcomes

	Chemistry				Biology		Physics		Comp. Science			
	1	2	3	4	1	2	1	2	1	2	3	Combined
Panel A: Unconditional Difference-in-Difference												
Grade in Course (if earned grade)												
URM	-0.75	-0.96	-0.98	-0.64	-0.93	-0.73	-0.86	-0.63	-0.64	-0.57	-0.00	-0.84
	(0.05)	(0.08)	(0.09)	(0.10)	(0.09)	(0.11)	(0.09)	(0.17)	(0.19)	(0.27)	(0.16)	(0.08)
URM × Prop 209	0.18	0.34	0.26	0.21	0.31	0.09	0.01	-0.02	-0.12	0.03	-0.76	0.18
	(0.08)	(0.14)	(0.15)	(0.17)	(0.14)	(0.21)	(0.15)	(0.27)	(0.31)	(0.41)	(0.45)	(0.08)
$\bar{Y}$	2.85	2.64	2.53	2.74	2.71	2.63	2.69	2.90	2.90	3.05	3.19	2.76
Obs.	4,837	3,339	3,270	2,348	2,392	2,263	2,504	1,307	1,757	1,238	1,139	26,394
Indicator for Persistence to Next Course (%)												
URM	-11.6	-11.4	-23.4		-30.4		-27.1		-25.9	-13.7		-18.6
	(2.6)	(2.6)	(3.3)		(3.9)		(3.8)		(7.4)	(9.2)		(2.8)
URM × Prop 209	-6.1	-5.0	0.1		-5.2		9.6		6.1	1.3		-3.1
	(4.2)	(4.8)	(5.8)		(6.5)		(6.4)		(12.2)	(15.9)		(2.6)
$\bar{Y}$	60.2	87.8	68.5		70.2		48.0		67.9	81.2		68.0
Obs.	4,949	3,393	3,321		2,418		2,542		1,777	1,256		19,656
Panel B: Conditional on Academic Preparation												
Grade in Course (if earned grade)												
URM	0.15	0.01	0.04	0.14	-0.00	0.23	0.04	-0.05	-0.12	-0.05	0.09	0.05
	(0.05)	(0.10)	(0.10)	(0.13)	(0.09)	(0.12)	(0.10)	(0.20)	(0.22)	(0.28)	(0.22)	(0.05)
URM × Prop 209	-0.13	-0.09	-0.06	-0.04	-0.02	-0.09	-0.14	-0.08	-0.14	-0.19	0.46	-0.04
	(0.07)	(0.15)	(0.16)	(0.21)	(0.13)	(0.21)	(0.15)	(0.35)	(0.32)	(0.61)	(0.52)	(0.04)
Acad. Prep.	X	X	X	X	X	X	X	X	X	X	X	X
$\bar{Y}$	2.85	2.64	2.53	2.74	2.71	2.63	2.69	2.90	2.90	3.05	3.19	2.76
Obs.	4,837	3,339	3,270	2,348	2,392	2,263	2,504	1,307	1,757	1,238	1,139	26,394
Indicator for Persistence to Next Course (%)												
URM	5.8	-4.4	0.1		-0.1		2.2		-8.0	0.4		3.1
	(3.2)	(2.9)	(4.4)		(5.0)		(5.3)		(10.3)	(12.0)		(2.2)
URM × Prop 209	-9.9	-9.4	-12.9		-16.5		1.7		-4.3	-15.3		-10.1
	(4.6)	(5.4)	(6.6)		(7.9)		(8.0)		(15.3)	(20.0)		(2.2)
Acad. Prep.	X	X	X		X		X		X	X		X
$\bar{Y}$	60.2	87.8	68.5		70.2		48.0		67.9	81.2		68.0
Obs.	4,949	3,393	3,321		2,418		2,542		1,777	1,256		19,656

Note: This table shows course-specific and stacked regression coefficients showing evidence of deteriorated unconditional URM course persistence in Chemistry and Biology courses at Berkeley after Prop 209, and widespread deterioration in performance and persistence relative to academically-similar non-URM students. Difference-in-difference OLS regression coefficient estimates across 1996-1999 UC Berkeley CA-resident freshman enrollees' introductory STEM courses, differencing across URM status and post-1998 using Equation 3. The final column stacks across courses, weights equally across students, and clusters standard errors by student and course; clustered standard errors may be downward-biased as a result of few clusters (15). Persistence indicates completing the subsequent course in the introductory STEM course sequence; course grade is the grade points received in completed courses. Academic covariates include high school fixed effects and the components of UC's Academic Index (see footnote 21). Standard errors (in parentheses) are robust. The specific courses comprising each sequence can be seen in Appendix H; courses taken after the first 2.5 years of matriculation are omitted. Source: UC Corporate Student System and UC-CHP Database (Bleemer, 2018).

Table G-2: Additional Specifications of Difference-in-Difference Models of Science Persistence

	Other Campuses					Restricted Samples, UC Berkeley			
						High SAT Scores		Low SAT Scores	
	Santa Barbara	Davis	Santa Cruz	Riverside	Berkeley Add'l Cov.	High GPA	Low GPA	High GPA	Low GPA
URM	1.4	1.0	-3.6	0.6	6.1	-5.3	-4.9	7.3	12.4
	(4.4)	(2.7)	(1.4)	(2.2)	(2.0)	(4.2)	(4.3)	(7.8)	(2.9)
URM × Prop 209	-0.3	-0.3	2.9	-1.0	-10.0	-5.4	12.6	-9.4	-9.0
	(4.6)	(1.8)	(2.0)	(3.7)	(2.7)	(5.5)	(5.4)	(10.1)	(6.1)
Acad. Prep.	X	X	X	X	X	X	X	X	X
Parental Cov.					X				
$\bar{Y}$	50.1	56.8	60.5	55.7	68.0	76.0	65.0	62.2	49.7
# of Obs.	6,857	29,470	15,149	14,072	19,656	9,808	5,441	1,647	2,712

Note: This table helps to arbitrate between competing explanations for the relative decline in URM Berkeley students' STEM persistence after Prop 209. The table provides evidence against the hypothesis that holistic review negatively-selected URM students, and evidence favoring the hypothesis that the enrollment decline among lower-SAT URM students caused selection away from students whose academic capabilities are underestimated by standardized tests. Difference-in-difference OLS regression coefficient estimates across 1995-2000 UC Berkeley or other UC campus enrollees' introductory STEM courses (excluding out-of-state, transfer, and engineering students), differencing across URM status and post-1998 using Equation 3. The outcomes indicates whether the student completes the following course in the specified course sequence; see Appendix H. Academic covariates include high school fixed effects and the components of UC's Academic Index (see footnote 21). Parental covariates include parental income (with an indicator for missing income), (289) parental occupation fixed effects, and (7) max parental education fixed effects. The last four columns partition students by whether their high school GPAs and SAT scores are in the top tercile of 1996-1999 URM Berkeley students' grades and scores. Standard errors (in parentheses) are robust. Source: UC Corporate Student System and UC-CHP Database (Bleemer, 2018)

STEM courses. Why would URM Berkeley students' relative STEM performance and persistence decline after Prop 209, instead of remaining steady as it did across the UC system? Table G-2 shows that the effects of Prop 209 on URM persistence were tightly-estimated 0's at the other four other observed UC campuses. One hypothesis is that Berkeley's post-209 'holistic review' admissions policy inefficiently targeted underperforming students as a result of its inability to provide direct race-based admissions advantages (Chan and Eyster, 2003; Fryer, Loury and Yuret, 2008). Under that hypothesis, the decline would likely be (partly) absorbed by family background covariates like parental income, education, and occupation; however, adding those covariates does not change the estimated coefficient. An alternative hypothesis is that SAT scores are relatively negatively-biased measures of low-testing URM students' academic preparation, such that Berkeley's selection away from those students causes a decline in URM enrollees' relative overperformance (Vars and Bowen, 1998; Niu and Tienda, 2010). This hypothesis is supported by the finding that the relative decline in URM performance is driven by URM students in the bottom two terciles of SAT scores, with no observed declines among high- or low-GPA high-SAT students (see Table G-2). However, the question remains open for future research.

Appendix H: Introductory STEM Courses at UC Campuses

Section 7 estimates changes in URM UC students' persistence and performance in introductory STEM courses after Prop 209. I identify those introductory courses – four courses in Chemistry (two introductory, two organic), two in Biology, two in Physics, and three in Computer Science – using contemporaneous

course catalogs and the student transcript data.[9] I chose these fields because they are uniformly available across campuses, offer similarly-structured introductory course sequences, and are not generally required for non-STEM majors (like Mathematics and Statistics, in which many non-STEM fields often require partial course sequence completion). Some schools had multiple versions of a given introductory course, all of which are included in the analysis. Where schools on quarter systems required three courses in a sequence instead of two, I define the sequence by its first and third courses. Here is the full list:

- Intro. Chem.: UCB CHEM 1A/B, UCD CHEM 2A/C, UCR CHEM 1A/B, UCSC CHEM 1B/C, UCSB CHEM 1A/B
- Organic Chem.: UCB CHEM 3A/B or 112A/B, UCD CHEM 8A/B or 118A/B, UCR CHEM 112A/B, UCSC CHEM 108A/B or 112A/B, UCSB CHEM 6A/B or 107A/B
- Biology: UCB BIO 1B/A, UCD BIO 1A/C, UCR BIO 5A/C, UCSC BIOL 10-12 or 20A/C, UCSB MCDB/EECB/BIOL 1A/4A/5A and 1C/4C/5C/2
- Physics: UCB PHYSICS 8A/B, UCD PHYSICS 1A/B or 5A/C or 7A/C or 9A/C, PHYSICS PHYS 2A/C, UCSC PHYS 5A/C or 6A/C or 7A/B, UCSB PHYS 6A/C
- Computer Science: UCB COMPSCI 61A/B/C, UCD ECOMPSCI 20-or-30/40/50, UCR EEC 10/12/14, UCSC CMPS 12A/B/C-or-101, UCSB CMPSC 10/20/30

Berkeley allowed students to take BIO 1A before BIO 1B, but only 25% of students did so. Berkeley also allowed many students to skip CHEM 1B; persistence to CHEM 1B is defined to include students who complete CHEM 3A or 12A.

Appendix I: Value-Added Statistics

In order to characterize the change in institutional quality faced by URM UC applicants after Prop 209, I estimate university and college value-added statistics for two student outcomes – six-year degree attainment (as measured in the union of NSC and UC records) and average wages 12-16 years after UC application, when most applicants are in their early 30s – using the 1995-1997 sample of UC California-resident freshman fall applicants who enroll at a postsecondary institution. Applicants' early-30s wages are averaged over years in which they have observed EDD-covered wages, and the wages are CPI-adjusted to 2018 and winsorized at the top and bottom one percent. The value-added statistics are estimated using a fixed effect specification:

$$Y_{iy} = \zeta_y + \alpha_{U_i} + X_i + \epsilon_{iy} \tag{I-1}$$

where U_i is the first institution where applicant i enrolled (in NSC) after applying to enroll in y, within six years of y. Value-added coefficients α_U are estimated using year fixed effects ζ_y and three sets of X_i covariates, which are intended to absorb the sample selection bias that arises from applicants' non-random enrollment across postsecondary institutions. First, following Mountjoy and Hickman (2020) ("MH"), I define X_i to include indicators for every combination of UC campuses to which the applicant applied and

[9] Catalogs for UC Berkeley available from the Berkeley Library, and for other campuses from CollegeSource Online.

UC campuses to which they were admitted.[10] Second, I augment this approach by estimating a much higher-dimension version of this model including indicators for every combination of postsecondary institutions to which the applicant applies, proxying application by SAT sends (as in Card and Krueger (2005)) by matching the applicant pool to College Board's SAT database by name and birthdate ("MH+"). This approach limits the sample size to public high school graduates matched in the available College Board data and as a result of the high-dimensionality of applicants' score-send set, with unique sets dropped from the sample. Third, following Chetty et al. (2020a) ("CFSTY"), I define X_i to include (15) ethnicity indicators and quintics in both SAT score and family income.[11] I also estimate a version of "CFSTY" value-added statistics for the interaction between institution indicators α_{U_i} and applicant ethnicity: white, Asian, Black, or Hispanic. For interpretative simplicity (and because they already prove too conservative), I do not shrink the value-added coefficients or otherwise account for noise in their estimation.

Value-added coefficients are not calculated for institutions with fewer than 50 in-sample enrollees. Effective sample sizes differ across specification – for example, students who apply and are admitted to a unique set of UC campuses are omitted from "MH" value-added estimation – and wage VA measures omit the 26 percent of applicants with no observable wages 12-16 years after UC application. The total samples for the "CFSTY" value-added measures after omissions are 112,707 for six-year graduation and 82,807 for early-30s wages. More than half of in-sample applicants (66,400) enroll at a UC campus, with the remainder enrolling at CSU campuses (14,800), California community colleges (10,800), and private and out-of-state universities (20,700, with 3,900 at USC and 1,500 at Stanford). The sample size statistics in the tables below show the number of students who enroll at each school and have observable early-30s wages.

In order to evaluate the quality of these estimated value-added statistics, I also estimate a version of Equation I-1 replacing the outcome with applicants' high school GPAs (on a weighted 5 point scale). GPAs are not included as a covariate in any value-added specification, and thus provide a useful placebo to test whether the covariate sets are fully absorbing the sample selection bias that arises from both universities' admissions decisions and applicants' subsequent enrollment choice. Effective value-added statistics should likely largely absorb cross-institution differences in applicants' high school GPAs.

Tables I-1, I-2, and I-3 present "MH" and "CFSTY" value-added coefficients for the full set of available institutions, omitting coefficients with insufficient sample sizes. "CFSTY" coefficients are presented overall and for Hispanic applicants (as well as Black applicants at UC and CSU campuses, where their sample size is sufficiently high). For UC and CSU campuses, I also present an additional series of statistics: "Raw" estimates of α_{U_i} from a version of Equation I-1 with null X_i and estimates of high school GPA "value-added". All value-added coefficients are estimated relative to CSU Long Beach (LB), a high-enrollment teaching-oriented California public university.

Panel A of Table I-1 shows that the students who enroll at UC campuses are 20-40 percentage points more likely to earn a college degree within 6 years than those who enroll at LB. Some of this gap – around 10-15 percentage points in most cases – is absorbed by both sets of covariates, with the "MH" covariates

[10] This strategy was first proposed by Dale and Krueger (2002), and is implemented by Mountjoy and Hickman (2020) using applications and admissions to schools in the University of Texas system.

[11] Chetty et al. (2020a) measure incomes in age-specific rank instead of dollars. I include a dummy for applicants without observed family income – winsorizing family income at the top and bottom 1 percent – but omit the few applicants without observed SAT scores.

Table I-1: 1995-1997 Value-Added Estimates for Public California Universities

	6-Yr. Grad.			Wages in Early 30s					High School GPA			
	Raw	MH	CFSTY	Raw	MH	CFSTY	CFSTY		Raw	MH	CFSTY	Sample
Inst.	All	All	All	All	All	All	Black	Hisp.	All	All	All	Size
Panel A: University of California System												
Berkeley	34.5	19.8	24.0	30,100	12,900	16,800	3,900	4,400	0.66	0.04	0.37	9,078
Davis	31.7	18.7	22.2	20,800	10,100	12,400	18,100	9,500	0.45	0.02	0.28	5,927
Irvine	29.1	18.0	20.6	14,900	7,200	7,000	16,400	1,300	0.37	0.01	0.21	5,730
UCLA	35.7	20.1	25.8	24,900	8,900	15,000	5,200	4,200	0.61	0.01	0.39	8,271
Riverside	33.2	25.1	28.1	9,000	6,400	4,700	11,700	1,000	0.21	0.01	0.12	1,204
San Diego	36.3	20.4	25.4	21,800	8,400	11,100	15,200	4,800	0.62	0.03	0.38	5,648
Santa Barbara	29.1	19.2	19.6	12,800	7,600	6,900	1,300	-1,400	0.24	-0.00	0.11	8,104
Santa Cruz	21.7	14.6	12.9	-2,600	-1,900	-9,000	-1,100	-10,500	0.19	-0.02	0.04	3,976
Panel B: California State University System												
Cal Poly.	21.8	12.8	12.3	25,600	19,100	19,500	21,800	10,600	0.34	0.06	0.20	2,626
Cal Poly. Pom.	0.5	0.3	-2.8	7,100	6,500	3,800		-1,200	0.02	0.00	-0.03	1,031
Chico	21.3	17.8	12.9	7,800	7,200	2,900		200	0.01	0.03	-0.04	372
Dom. Hills	-8.1	-8.6	0.2	-5,400	-6,400	3,800	-1,400	-1,300	-0.10	-0.15	0.03	137
East Bay	5.6	2.9	4.8	5,700	1,100	5,200	-7,600		0.07	-0.06	0.07	216
Fresno	9.5	4.8	9.3	6,700	2,600	5,000		2,500	0.19	0.03	0.22	311
Fullerton	4.2	5.2	3.7	1,400	1,800	900	2,800	-1,100	-0.05	-0.02	-0.06	835
Long Beach	0.0	0.0	0.0	0	0	0	0	0	0.00	0.00	0.00	1,286
Monteray Bay	10.1	10.8	8.6	-6,700	-2,800	-6,100			-0.10	-0.04	-0.09	60
Northridge	-3.8	-4.1	-2.3	-900	-700	-700	-5,600	-3,400	-0.09	-0.05	-0.05	995
Sacramento	5.3	2.1	2.4	13,000	8,800	10,200		9,100	0.11	-0.00	0.06	453
San Bern.	-0.8	-1.0	1.8	100	1,900	3,900		0	-0.01	0.00	0.03	270
San Marcos	2.4	0.4	-0.3	-3,800	-4,100	-6,400		-3,800	0.08	0.00	0.07	112
Stanislaus	8.1	2.9	2.9	7,800	3,500	5,900			0.20	0.01	0.13	69
Humboldt St.	2.3	-1.2	-5.0	-11,300	-10,900	-15,300			0.10	0.02	-0.02	204
San Diego St.	3.4	2.2	1.4	400	-300	500	1,000	-3,800	-0.02	-0.01	-0.04	1,677
San Fran. St.	-0.1	-0.3	-3.9	3,000	1,300	300	-4,100	-2,200	-0.03	-0.05	-0.07	918
San Jose St.	-0.5	-1.0	-3.1	16,800	14,700	13,800	-6,300	14,700	-0.03	-0.04	-0.05	728
Sonoma St.	11.4	7.8	0.4	-5,100	-7,400	-8,600			0.06	-0.01	-0.03	88

Note: This table shows value-added estimates for the University of California and California State University public university systems. Value-added estimates from Equation I-1 using 1995-1997 UC CA-resident freshman fall applications. See text for outcome definitions and covariate definitions "MH" (following Mountjoy and Hickman, 2020) and "CFSTY" (following Chetty et al., 2020a). "Raw" coefficients estimated with null X_i. Ethnicity-specific coefficients estimated by interacting U_i with five ethnicity buckets: white, Black, Hispanic, Asian, and other. Sample size for "CFSTY" wage value-added coefficients. Estimates are not shrunk or otherwise adjusted for noise. Source: UC Corporate Student System, National Student Clearinghouse, and the CA Employment Development Department.

tending to absorb more of the gap. Similarly, the students who enroll at the most-selective UC campuses have higher average early-30s wages than LB enrollees by 25 to 30 thousand dollars, though about half of the gap is absorbed by covariates. UC campuses' wage VA statistics are uniformly lower for Hispanic students, especially at the more-selective campuses, but highly varying for Black students, whose wage VA is above-average at half of UC campuses.

The final columns of Table I-1 show that there is substantial high school GPA variation across UC campuses, with UC Berkeley enrollees having higher average GPAs than UC Santa Cruz enrollees by almost a half of a letter grade. The "MH covariates" fully absorb this variation, while the "CFSTY" covariates absorb only absorb about half of the variation on average, with poorer performance at the more-selective UC campuses. This suggests that "CFSTY" value-added statistics likely still incorporate a degree of sample selection bias, with the coefficients strongly suggesting that the bias is positively correlated with university selectivity. As discussed in the text, this likely implies that the baseline difference-in-difference in URM

Table I-2: 1995-1997 Value-Added Estimates for California Community Colleges

	6-Yr. Grad.		Wages in Early 30s					6-Yr. Grad.		Wages in Early 30s			
	MH	CFSTY	MH	CFSTY		Samp.		MH	CFSTY	MH	CFSTY		Samp.
Inst.	All	All	All	All	Hisp.	Size	Inst.	All	All	All	All	Hisp.	Size
Allan H.	-17.6	-13.5	-6,100	-3,300		61	LA Valley	-20.0	-17.0	-300	-1,400		51
Am. River	-17.1	-16.9	-7,300	-5,000		85	MiraCosta	-2.7	-1.8	5,100	500		86
Cabrillo	-25.6	-29.0	7,700	9,200		63	Moorpark	-5.7	-8.3	6,300	4,800		168
Canada	5.9	0.0					Mt. SA	-14.5	-13.9	-2,000	-3,900	-7,500	451
Cerritos	-21.1	-15.6	-4,200	-2,300	-10,100	185	Mt. SJ	-15.6	-13.4	1,600	2,600		69
Chabot	-1.8	-1.1	7,900	8,800	2,600	174	Ohlone	-9.0	-12.3	16,600	13,400		94
Chaffey	-20.3	-17.3	-12,100	-9,000	-4,800	81	Or. Coast	-31.2	-34.1	-12,200	-16,900		65
SF	2.8	-0.5	6,900	4,300	-9,200	405	Palomar	-11.1	-13.9	-4,100	-7,700		105
San Mateo	1.7	-2.6	17,300	15,200		259	Pasadena	-14.6	-15.0	-3,100	-6,100	-13,200	369
C. of Des.	-18.5	-9.4	-1,100	6,400	6,400	67	Riverside	-11.6	-5.1	1,500	3,100	-800	583
Cuesta	-14.4	-18.2	400	-1,400		129	Sac.	-15.4	-10.0	-200	2,800		174
Cypress	-14.5	-14.5	-2,700	-7,200		112	Saddleback	-7.0	-11.6	5,500	2,600		213
De Anza	-0.6	-2.4	15,000	12,600	13,700	651	SB Valley	-2.8	6.7	2,300	6,000	700	77
Diab. Vall.	0.5	-3.3	9,300	8,700	1,400	478	SD	-26.0	-26.3	-18,400	-17,100		56
East LA	-32.5	-23.3	-9,700	-6,300	-12,500	50	SD Mesa	-13.0	-12.4	-1,100	-2,400	-8,000	295
El Camino	-18.1	-16.4	-6,000	-5,400	-7,700	308	SD Mir.	-11.2	-10.8	3,000	1,700		75
Foothill	-3.6	-5.1	10,000	9,500		258	SJ Delta	-20.3	-22.0	-3,500			
Fresno	-23.4	-23.3	-13,500	-14,800		87	Santa Ana	-18.8	-17.9	-5,200	-3,100	-7,700	156
Fullerson	-12.0	-11.7	-5,800	-7,800	-11,200	154	S. Barb.	-28.9	-33.9	-8,100	-10,700		72
Hartnell	-14.4	-7.5	4,400	5,700	6,600	56	S. Monica	-12.7	-12.9	-1,000	600	-9,200	671
Irv. Vall.	-11.6	-17.3	1,200	-1,900		213	S. Rosa	-6.5	-8.9	-5,000	-4,200		91
Laney	-4.2	-3.8	4,500	4,100		86	Sierra	-14.8	-15.7	-2,900	-2,600		108
Las Positas	-10.8	-14.3	6,600	7,800		55	Skyline	4.0	2.0	17,900	18,000		141
L. Beach	-20.4	-18.9	-2,900	-1,900	-7,600	184	Solano	-4.4	0.2	28,100	31,400		52
LA Pierce	-15.2	-17.1	-4,600	-8,400		75	Ventura	-15.0	-9.6	-3,500	-2,500	-2,100	101

Note: This table shows value-added estimates for estimable California Community Colleges. Value-added estimates from Equation I-1 using 1995-1997 UC CA-resident freshman fall applications, excluding colleges with fewer than 50 in-sample enrollees (or 30 enrollees for ethnicity-specific estimates). See text for outcome definitions and covariate definitions "MH" (following Mountjoy and Hickman, 2020) and "CFSTY" (following Chetty et al., 2020a). Ethnicity-specific coefficients estimated by interacting U_i with five ethnicity buckets: white, Black, Hispanic, Asian, and other. Sample size for "CFSTY" wage value-added coefficients. Estimates are not shrunk or otherwise adjusted for noise. Source: UC Corporate Student System, National Student Clearinghouse, and the CA Employment Development Department.

UC applicants' "CFSTY" institutional value-added measures are somewhat upwardly-biased relative to the actual average difference in average treatment effects across those institutions.

The highest wage VA coefficients among public universities were estimated for the California Polytechnic Institute (Cal Poly), a teaching-oriented university in the CSU system. Panel B of Table I-1 shows that most CSU campuses had degree and wage VA estimates similar to CSU Long Beach, lower than most UC campuses, but that three CSU campuses – Cal Poly, CSU Sacramento, and San José State – appear comparable to UC. Those three also have notably-high ethnicity-specific VA coefficients for Hispanic students. Sample sizes are generally too small to estimate ethnicity-specific VA coefficients for Black students outside of the UC system. Even though the "MH" application and admission partition does not include outcomes at the CSU campuses, the "MH" procedure nevertheless largely eliminates cross-campus average differences in enrollees' high school GPAs, while the "CFSTY" estimates continue to identify some cross-campus GPA variation.

Table I-2 shows that California's community colleges have estimated degree VA below most of the institutions in the UC or CSU systems, but there is substantial variation in community colleges' wage VA estimates, with many colleges having wage VA estimates comparable to CSU or UC campuses. The high-wage-VA community colleges are clustered in the high-wage and high-cost-of-living "South Bay" of northern California, like Ohlone College in Fremont, Skyline College in San Bruno, De Anza in Cupertino, and

Table I-3: 1995-1997 Value-Added Estimates for Private and Out-of-State Universities

	6-Yr. Grad.		Wages in Early 30s					6-Yr. Grad.		Wages in Early 30s			
	MH	CFSTY	MH	CFSTY		Samp.		MH	CFSTY	MH	CFSTY		Samp.
Inst.	All	All	All	All	Hisp.	Size	Inst.	All	All	All	All	Hisp.	Size
American	32.4	27.5	27,500	22,500		52	Pitzer	30.6	31.3	-800	-2,100	-3,400	113
Arizona	6.7	-0.2	7,900	3,600		101	P. L. Naz.	20.9	16.7	-6,900	-9,300		87
AZ State	22.3	21.0					Pomona	28.9	32.9	13,400	14,200	6,200	299
Asuza Pac.	25.6	25.8	-2,300	-600		84	Port. State	1.2	-0.6				
Biola	24.2	23.3	-14,500	-15,300		101	Princeton	32.3	35.9	36,700	35,800		166
Boston C.	-20.8	-20.0	12,500	13,100		127	Rice	10.3	12.6				
Boston U.	23.2	20.9	3,200	300		245	St. Mary's	26.4	25.3	11,700	12,700	4,300	333
Brandeis	26.8	28.3	8,500	7,800		59	Santa Clara	32.2	31.7	31,000	31,400	27,700	545
BYU	-10.3	-11.2	400	2,200		159	Scripps	28.4	28.3	3,700	-2,300		92
Bryn Mawr	27.8	30.4					S. Meth.	26.3	23.3				
CA Luth.	24.3	23.0	12,400	7,400		87	Spelman	34.2	46.0			-7,300†	32
Carleton	28.4	29.1					Stanford	28.2	32.0	37,100	36,800	23,300	1,116
CMU	19.7	18.8					Swarthmore	33.1	35.7				
Clar. Mc.	28.3	30.4	27,700	25,900	11,800	239	Syracuse	30.5	30.0	19,300	20,600		113
CO State	24.8	21.3	6,700	4,400		50	Tufts	28.9	29.8	4,900	500		80
Columbia	23.9	27.6	12,000	12,700		189	Tulane	28.9	27.6	20,000	17,500		80
Cornell	26.3	28.8	18,300	19,200		320	Colorado	24.9	20.2	17,700	14,900		472
Creighton	26.7	24.0	26,800	22,400		59	Michigan	30.2	30.9	29,500	31,800		99
Dartmouth	-57.8	-55.5	26,500	24,600		119	Nevada	10.8	8.5				
Duke	-21.2	-18.7	40,300	42,900		167	Oregon	26.2	18.6	2,100	-6,400		253
Georgetown	29.3	33.3	37,400	40,300	18,100	169	U. Penn.	28.0	30.7	38,200	39,700		271
Gonzaga	26.5	25.7					Puget Sound	24.6	21.9	700	-5,600		90
Harvard	-37.2	-32.9	20,100	19,000		89	Redlands	28.6	29.2	-700	-2,700	1,900	157
H. Mudd	24.5	26.7	27,500	27,200		109	USF	27.2	24.3	12,100	12,600	9,500	460
J. Hopkins	22.1	25.3	25,500	26,100		121	USC	20.8	21.7	17,400	18,100	5,900	3,192
La Sierra	4.9	8.0	-100	-4,600		75	U. Pacific	24.2	25.5	26,100	26,300	7,000	421
Lew. & Clk.	30.7	25.6	-2,400	-12,100		62	Virginia	32.6	33.2				
Loyola M.	22.0	21.6	11,700	12,700	9,800	853	Washington	24.9	25.7				
Mills	29.3	27.6	-9,200	-10,400		72	Wisconsin	24.0	23.3	5,800	3,500		106
Mt. Holyoke	-48.8	-48.8					Vanderbilt	28.4	29.7	16,800	19,200		101
Mt. St. M.	23.8	28.2	4,300	6,800	1,900	129	Wash. In SL	21.8	24.8				
NYU	23.2	21.8	-7,700	-10,500		242	Wellesley	30.0	33.9	9,100	12,000		88
N. Arizona	24.7	17.0	4,500				Wesleyan	34.7	34.2				
Northwest.	24.4	27.5	20,100	20,900		210	Westmont	-42.6	-44.4	-8,300	-12,000		123
Oberlin	0.9	-0.1					Whitman	32.7	33.1				
Occidental	33.6	34.5	1,800	3,900	-4,100	194	Whittier	26.2	29.3	6,900	9,600	5,600	147
Penn. State	21.8	17.5					Williams	33.0	35.1				
Pepperdine	29.3	27.3	4,700	6,000	3,200	316	Yale	29.0	33.8	39,100	39,300	13,400	260

Note: This table shows value-added estimates for all estimable private and non-California colleges and universities. Value-added estimates from Equation I-1 using 1995-1997 UC CA-resident freshman fall applications, excluding colleges with fewer than 50 in-sample enrollees (or 30 enrollees for ethnicity-specific estimates). See text for outcome definitions and covariate definitions "MH" (following Mountjoy and Hickman, 2020) and "CFSTY" (following Chetty et al., 2020a). Ethnicity-specific coefficients estimated by interacting U_i with five ethnicity buckets: white, Black, Hispanic, Asian, and other. Sample size for "CFSTY" wage value-added coefficients. Estimates are not shrunk or otherwise adjusted for noise. † Spelman is a historically Black college; this estimate is for Black students. Source: UC Corporate Student System, National Student Clearinghouse, and the CA Employment Development Department.

Table I-4: Comparison Between Various Value-Added Estimates and Student Outcomes for Matched Samples

	"MH" VA[1]				"MH+" VA[1]				"CFSTY" VA[1]				Eth.-Specific "CFSTY" VA[1]			
	Six-Year Deg.		Early-30s Wage		Six-Year Deg.		Early-30s Wage		Six-Year Deg.		Early-30s Wage		Six-Year Deg.		Early-30s Wage	
	VA	Obs.	VA	Obs.	VA	Obs.	VA	Obs.	VA	Obs.	VA	Obs.	VA	Obs.	VA	Obs.
Panel A: Difference-in-Difference Coefficients																
URM	2.0	-2.8	1,860	-786	3.0	-3.2	2,378	-1,010	2.8	-2.9	2,818	-805	1.7	-2.2	1,359	-808
	(0.1)	(0.4)	(83)	(573)	(0.1)	(0.5)	(84)	(633)	(0.1)	(0.4)	(94)	(574)	(0.1)	(0.4)	(91)	(601)
URM × Prop 209	-0.6	-0.5	-447	-2,239	-1.2	0.0	-1,032	-2,039	-1.0	-0.5	-952	-2,243	0.1	-0.1	57	-2,115
	(0.2)	(0.5)	(102)	(691)	(0.2)	(0.6)	(104)	(765)	(0.2)	(0.5)	(115)	(692)	(0.2)	(0.5)	(110)	(723)
Obs.	177,365	177,365	136,237	136,237	145,690	145,690	112,205	112,205	176,092	176,092	136,032	136,032	169,534	169,534	129,477	129,477
Panel B: Estimates of URM × Prop 209 ($\beta_{\cdot 98-99}$) by AI Quartile																
Bottom Quartile	-1.6	-3.6	-591	-2,152	-2.3	-3.7	-883	-1,169	-1.9	-3.6	-734	-2,152	-1.1	-3.1	97	-1,485
	(0.4)	(1.6)	(235)	(1,579)	(0.5)	(1.8)	(262)	(1,797)	(0.5)	(1.6)	(270)	(1,582)	(0.5)	(1.7)	(288)	(1,685)
Second Quartile	-0.5	-0.7	-448	-1,384	-1.4	-0.1	-1,493	-316	-1.3	-0.6	-1,269	-1,382	0.2	0.0	454	-1,512
	(0.4)	(1.3)	(219)	(1,450)	(0.4)	(1.4)	(232)	(1,585)	(0.4)	(1.3)	(264)	(1,451)	(0.4)	(1.3)	(253)	(1,500)
Third Quartile	0.1	1.8	-468	-2,160	-0.7	2.1	-1,291	-2,648	-0.4	1.9	-1,372	-2,117	0.9	1.9	85	-1,899
	(0.3)	(1.1)	(202)	(1,451)	(0.3)	(1.2)	(206)	(1,598)	(0.3)	(1.1)	(242)	(1,452)	(0.3)	(1.1)	(219)	(1,515)
Top Quartile	-0.8	-0.1	-387	-2,637	-0.5	0.4	-726	-2,624	-1.0	-0.3	-708	-2,641	0.1	-0.3	284	-2,517
	(0.3)	(0.9)	(248)	(1,648)	(0.2)	(1.0)	(231)	(1,788)	(0.3)	(0.9)	(257)	(1,648)	(0.3)	(0.9)	(223)	(1,707)

Note: This figure tests the performance of several institution and institution-gender-ethnicity value-added estimates against actual changes in student outcomes after Prop 209, with some measures performing relatively-well in measuring degree attainment but all measures generally underestimating (and poorly explaining the patterns in) declines in early-30s wages. Estimates of β_0 and $\beta_{\cdot 98-99}$ from Equation 1, a difference-in-difference model of 1996-1999 URM UC freshman California-resident applicants' outcomes compared to non-URM outcomes after the 1998 end of UC's affirmative action program. Outcomes defined as estimated value-added of the first two- or four-year institution at which the applicant enrolled within six years of UC application as measured in the NSC, or actual student outcomes matching the value-added measures: six-year Bachelor's degree attainment or average conditional California wages between 12 and 16 years after UC application. Outcome samples are restricted to observations with observed VA (implying that the student first enrolled at an institution with sufficient sample size to estimate VA), and wage VA samples restricted to observations with observed early-30s wages (omitting observations with no California employment in that period, 12-16 years after UC application). Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Robust standard errors in parentheses. [1]Value-added measures are estimated by regressing six-year BA attainment (in NSC) or 15-year conditional wages (in EDD) on college indicators, year FEs, and either indicators for each applicant's set of UC campus applications and admissions (following Mountjoy and Hickman (2020), "MH"), indicators for each applicant's complete set of institutions to which they sent their SAT scores (using matched College Board testing data; an extension of Mountjoy and Hickman (2020), "MH+") or ethnicity indicators and quintics in SAT score and family income (following Chetty et al. (2020a), "CFSTY") using the 1995-1997 UC applicant pool. Ethnicity-specific coefficients estimated by interacting U_i with five ethnicity buckets: white, Black, Hispanic, Asian, and other. Source: UC Corporate Student System, National Student Clearinghouse, and the California Employment Development Department.

Foothill College in Los Altos. Though the table does not show it, the estimates show that there is relatively little variation across community colleges in their UC-applicant enrollees' average high school GPAs: the standard deviation of raw average high school GPA coefficients is 0.09 across community colleges, whereas the standard deviation across "MH" estimates of high school GPA is 0.04 (and 0.09 for "CFSTY").

Table I-3 shows that the private and out-of-state universities where UC applicants tend to enroll have degree VA estimates as larger or larger than the UC system, and many have wage VA estimates higher than UC, though there is a great deal of variation.[12] With many of these institutions among the nation's more-selective, Wage VA estimates are highest at many of the nation's more-selective universities, including Ivy League institutions like Princeton, the University of Pennsylvania, and Yale as well as Duke and Stanford. Out-of-state flagship public universities tend to have similar VA estimates to the UC system, while California's less-selective private institutions vary widely, from the high-VA Santa Clara University to lower-VA Mills College (though even the lower-VA California institutions have high degree VA estimates relative to less-selective public institutions). As in the case of the UC campuses, there is substantial variation in average high school GPAs across these institutions (s.d. 0.25), but most is absorbed by "MH" value-added estimates (s.d. 0.08; 0.15 using "CFSTY").

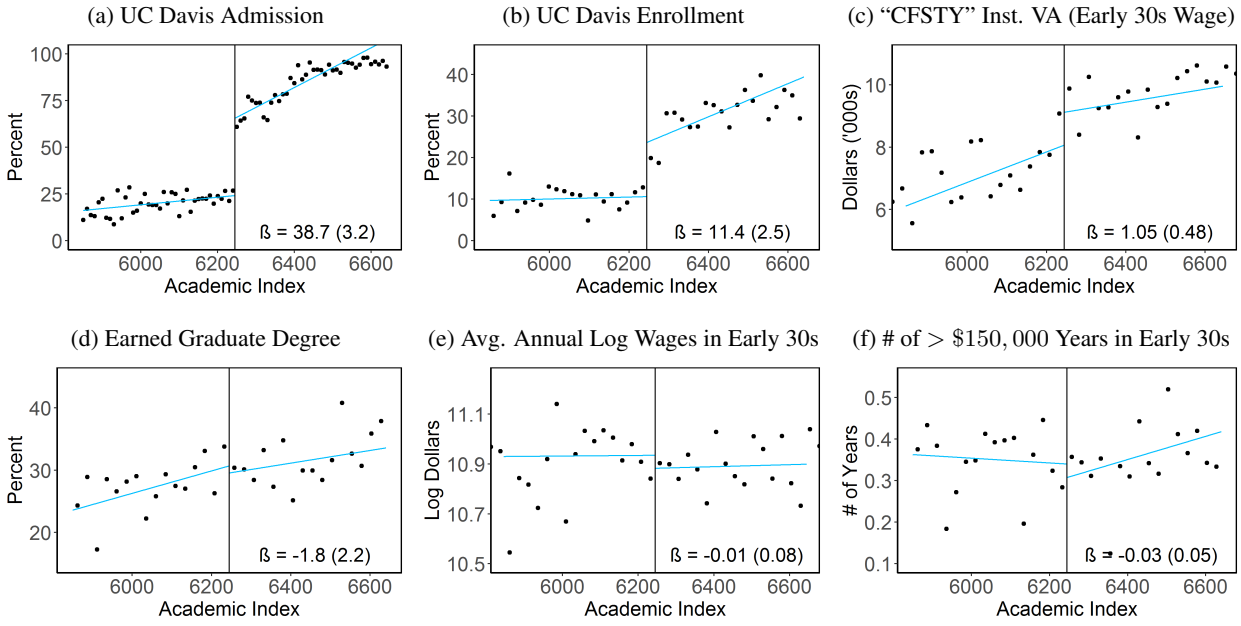
Figure III shows that Prop 209 tended to shift URM UC students' enrollment from the more-selective UC campuses into the less-selective campuses, CSU campuses, and some private and out-of-state institutions. Students also cascaded out of the moderately and less-selective UC campuses into other institutions, yielding unchanged URM enrollment at all but the more-selective UCs. The estimates presented in these tables specify the way in which these switches led students to enroll at institutions with lower estimated value-added in terms of degree attainment and early-career wages, as summarized in Table II.

There has been minimal quasi-experimental validation of university value-added statistics. I conclude by testing the degree to which value-added measures explain the observed changes in URM applicant outcomes after Prop 209. Table I-4 presents VA and observed degree attainment and early-30s wages for several VA specifications, aligning samples for missing data. It shows that changes in URM applicants' university enrollment's estimated value-added statistics yield relatively-accurate predictions of the decline in degree attainment by AI quartile, but underestimates of the actual changes in observed early-30s wages. The "MH" value-added statistics yield the most compressed distribution of value-added statistics across universities, as would be expected given their near-complete absorption of cross-school variation in high school GPAs, but this yields poorer performance in explaining outcome variation after Prop 209. Allowing gender- and ethnicity-specific VA coefficients (using the "CFSTY" approach) yields precise 0's for the wage VA estimates across all AI quartiles, implying particularly poor performance.

Figure A-18 visualizes these discrepancies, plotting smoothed (but not covariate-adjusted) difference-in-difference averages for both VA and actual degree attainment and early-30s wages. The two lines poorly mirror each other, suggesting both that VA poorly-explains and substantially underestimates the observed labor market effects of Prop 209.

[12] A small number of institutions, like Duke University and Dartmouth College, may have low degree VA estimates as a result of incomplete NSC degree reporting in the sample period.

Figure J-1: Estimated Return to '96-97 UC Davis Enrollment for On-the-Margin Non-URM Applicants



Note: This figure shows that on-the-margin 1996-1997 non-URM applicants to UC Davis would have otherwise enrolled at lower-value-added institutions but experienced similar educational and wage outcomes, though interpretation is challenged by the increase in above-threshold students likelihood of applying to Davis. Regression discontinuity plots and estimates around the 1996-1997 UC Davis guaranteed admission AI threshold among non-URM applicants, estimated by local linear regression following Calonico et al. (2014). See the notes to Tables II, III, and IV for a description of the outcome variables; "CFSTY" institutional value-added measured relative to CSU Long Beach. Reduced form coefficients from local linear regressions (conditional on year), with bias-corrected robust standard errors in parentheses. Running variable defined as $AI + (250 \times \mathbb{1}_{1997})$ to align thresholds over years. Source: UC Corporate Student System, National Student Clearinghouse, and the CA Employment Development Department.

Appendix J: Return to UC Davis Enrollment for On-the-Margin Non-URM Applicants

Figures B-1 to B-8 show that only two UC campuses exhibited discontinuities in their applicants' likelihood of admission before Prop 209 when ordered by AI: the campuses at Berkeley and Davis. As a result, UC Davis's admissions policies admit a regression discontinuity design that could provide additional evidence, along with Section 6, on the return to UC admission for the on-the-margin non-URM students who may gain access to the campus following Prop 209.

The challenge in interpreting the return to enrollment at UC Davis for on-the-margin non-URM 1996-1997 applicants is that the discontinuities themselves – at exactly 6,000 in 1996 and 6,250 in 1997 – appear to have been known by some applicants. McCrary (2008) tests fail at both thresholds (p=0.016 and p=0.025) as a result of a 13 percent increase in students' likelihood of applying to UC Davis at the campus's AI admissions threshold. As in Section 6, I test for selection on observables at the UC Davis AI admissions threshold by characterizing each applicant by their expected log wages on the basis of demographic and socioeconomic features and find weak evidence of negative selection above the threshold, with lower predicted wages by 0.025 log points (s.e. 0.020 log points) immediately above the threshold.

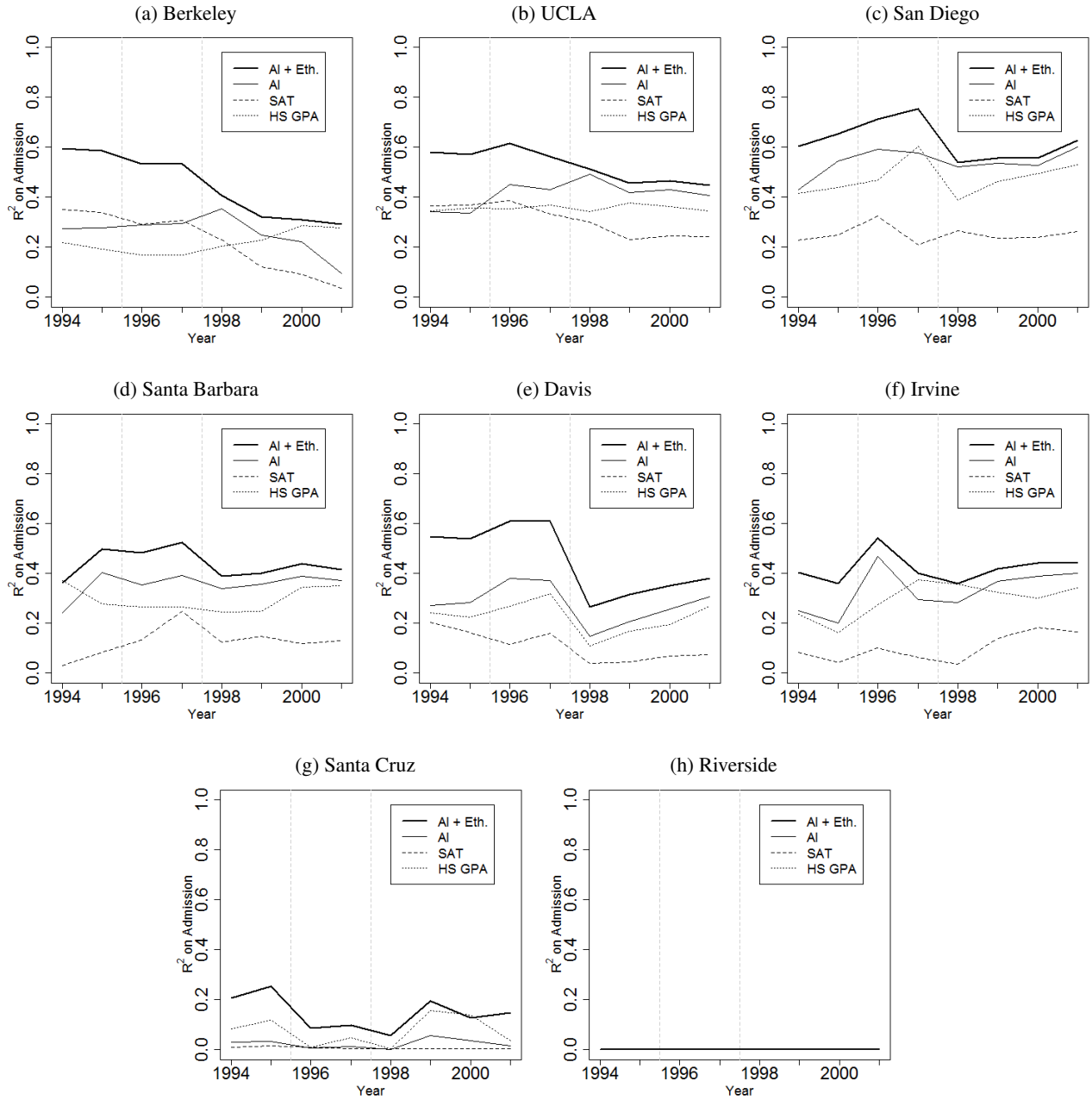
Despite these limitations to the research design, Figure J-1 shows how UC Davis's applicants above

and below that school's AI admissions threshold differ in terms of educational and employment outcomes. Above-threshold students are 40 percentage points more likely to attend Davis, and excluding a small group of applicants immediately above the threshold, take-up appears to be close to half, with enrollment increases around 20 percentage points. Unlike in the Berkeley context, UC Davis is a higher-value-added institution than on-the-margin applicants' counterfactual enrollments, leading to an estimated $1,000 increase in wage value-added at the threshold, about four times the average increase in value-added for non-URM enrollees at California public universities after Prop 209 (see Figure A-2). But as in the case of UC Berkeley, enrolling at UC Davis does not generate returns for on-the-margin non-URM students, who are no more likely to earn a graduate degree or earn higher wages if they have access to UC Davis; indeed, all three point estimates are negative (and statistically indistinguishable from 0).

The smoothness of the resulting wage trends suggests that these findings are not just limited to the differentially-selected students close to the eligibility threshold, but also reflect broader negligible treatment effects of access to UC Davis on non-URM student outcomes prior to Prop 209. This evidence further supports the main text's claim that non-URM students on the margin of admission to UC campuses prior to Prop 209 appear to derive small benefits from enrolling at those campuses, particularly in comparison with the estimated costs faced by URM students who lost access to selective universities following Prop 209.

Other Appendix Figures and Tables

Figure A-1: Annual Explanatory Power of Academic Index and Ethnicity for UC Admission

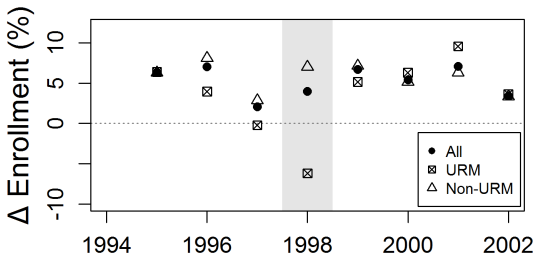


Note: This figure shows that a large share of UC campuses' admissions, especially before 1998 but also after, can be explained strictly by students' Academic Index, with a large additional share explained by ethnicity before 1998. The R^2 coefficients of annual OLS regressions of admission on the leave-one-out likelihood of admission for students with the same Academic Index (AI), SAT score, high school GPA (rounded to the nearest hundredth), or AI and ethnicity, among 'normal' UC freshman fall applicants to each campus. 'Normal' applicants are freshman fall California-resident applicants who (a) were UC-eligible, which means that they satisfactorily completing the required high school coursework, and (b) who selected intended majors that did not have special admissions restrictions (e.g. engineering at some campuses). Figure A-5 shows the differences between the first and second line for each campus. Source: UC Corporate Student System.

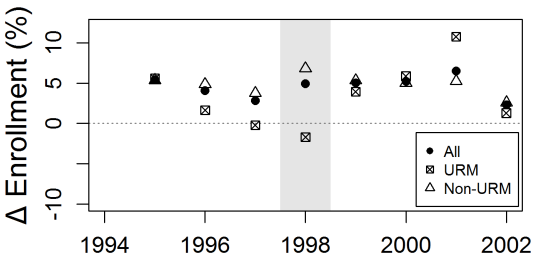
Figure A-2: Annual Changes in Undergraduate Enrollment at California Institutions

Panel A: Annual Change in Freshman Fall Undergraduate Enrollment

(a) Public California Universities



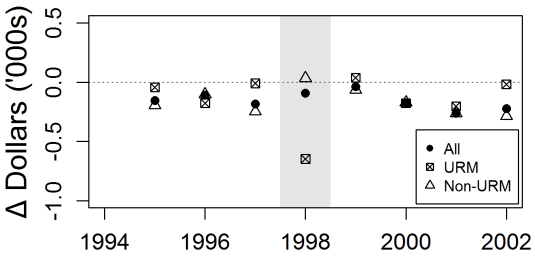
(b) California Universities



Panel B: Annual Change in Undergraduate Enrollment "CFSTY" Value-Added

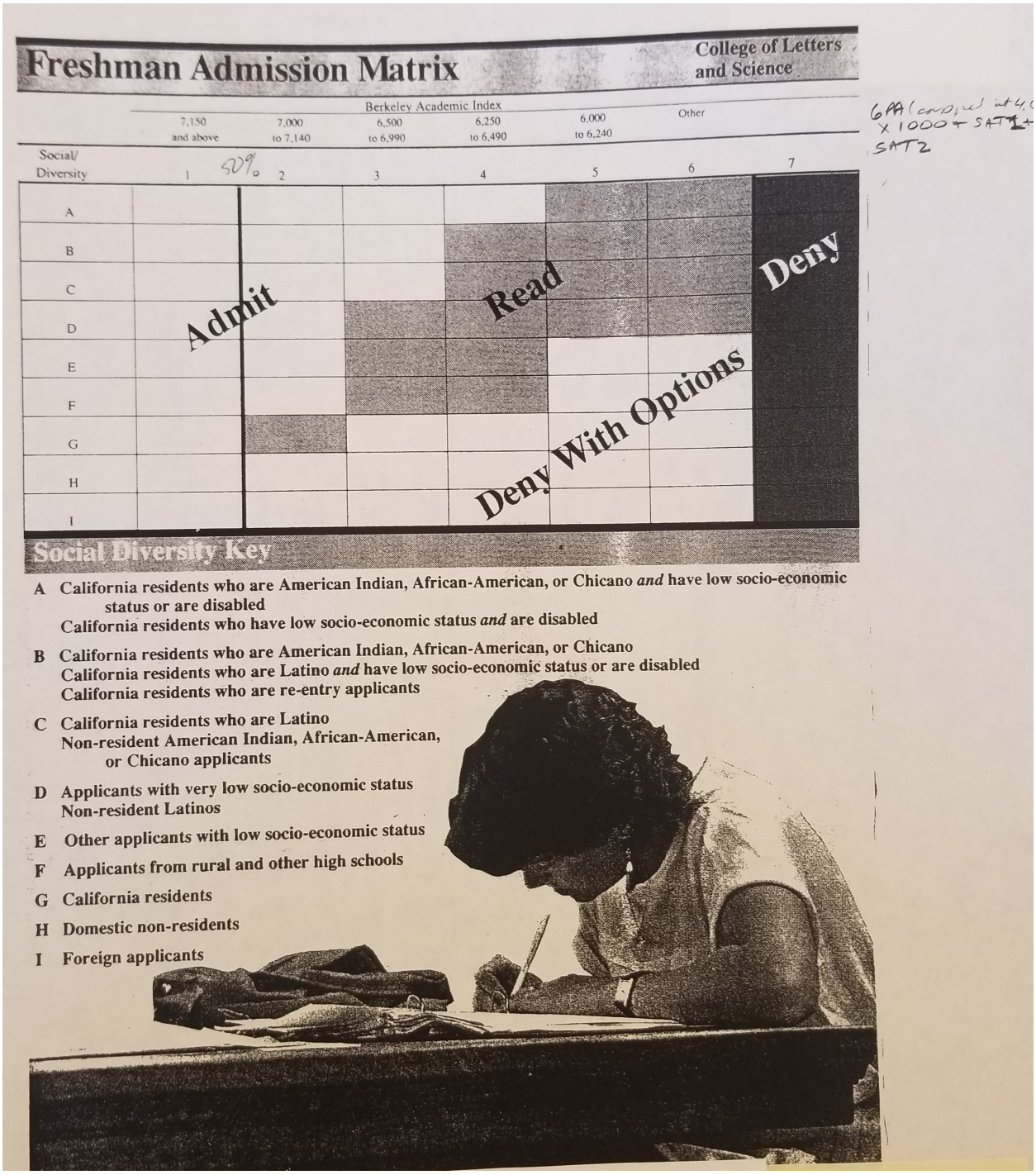
(c) Public California Universities

(d) California Universities



Note: This figure shows that while Prop 209 may have slightly depressed the growth of California public universities in 1997 and 1998, it had no measurable net effect on either the growth of all California institutions or the relative number of students enrolled at higher- or lower-value-added California institutions, with sharp declines in the value-added of URM students' enrollment institutions compensated for by increases among non-URM students in 1998. Year-over-year changes in freshman fall undergraduate enrollment and the enrollment-weighted average value-added of public and all California universities, overall and for URM and non-URM freshman students. Universities include all four-year institutions in California. See Appendix I for methodological details and the estimated "CFSTY" value-added statistics; value-added measured relative to CSU Long Beach. Source: The Integrated Postsecondary Education Data System, UC Corporate Student System, and the CA Employment Development Department.

Figure A-3: Archival Example of UC Berkeley Pre-1998 Admissions Policy



Freshman Admission Matrix

College of Letters and Science

Social/ Diversity	Berkeley Academic Index: 7,150 and above (1)	7,000 to 7,140 (2)	6,500 to 6,990 (3)	6,250 to 6,490 (4)	6,000 to 6,240 (5)	Other (6)	(7)
A							
B							
C							
D							
E							
F							
G							
H							
I							

Admit

Read

Deny With Options

Deny

Social Diversity Key

A California residents who are American Indian, African-American, or Chicano *and* have low socio-economic status or are disabled
California residents who have low socio-economic status *and* are disabled

B California residents who are American Indian, African-American, or Chicano
California residents who are Latino *and* have low socio-economic status or are disabled
California residents who are re-entry applicants

C California residents who are Latino
Non-resident American Indian, African-American, or Chicano applicants

D Applicants with very low socio-economic status
Non-resident Latinos

E Other applicants with low socio-economic status

F Applicants from rural and other high schools

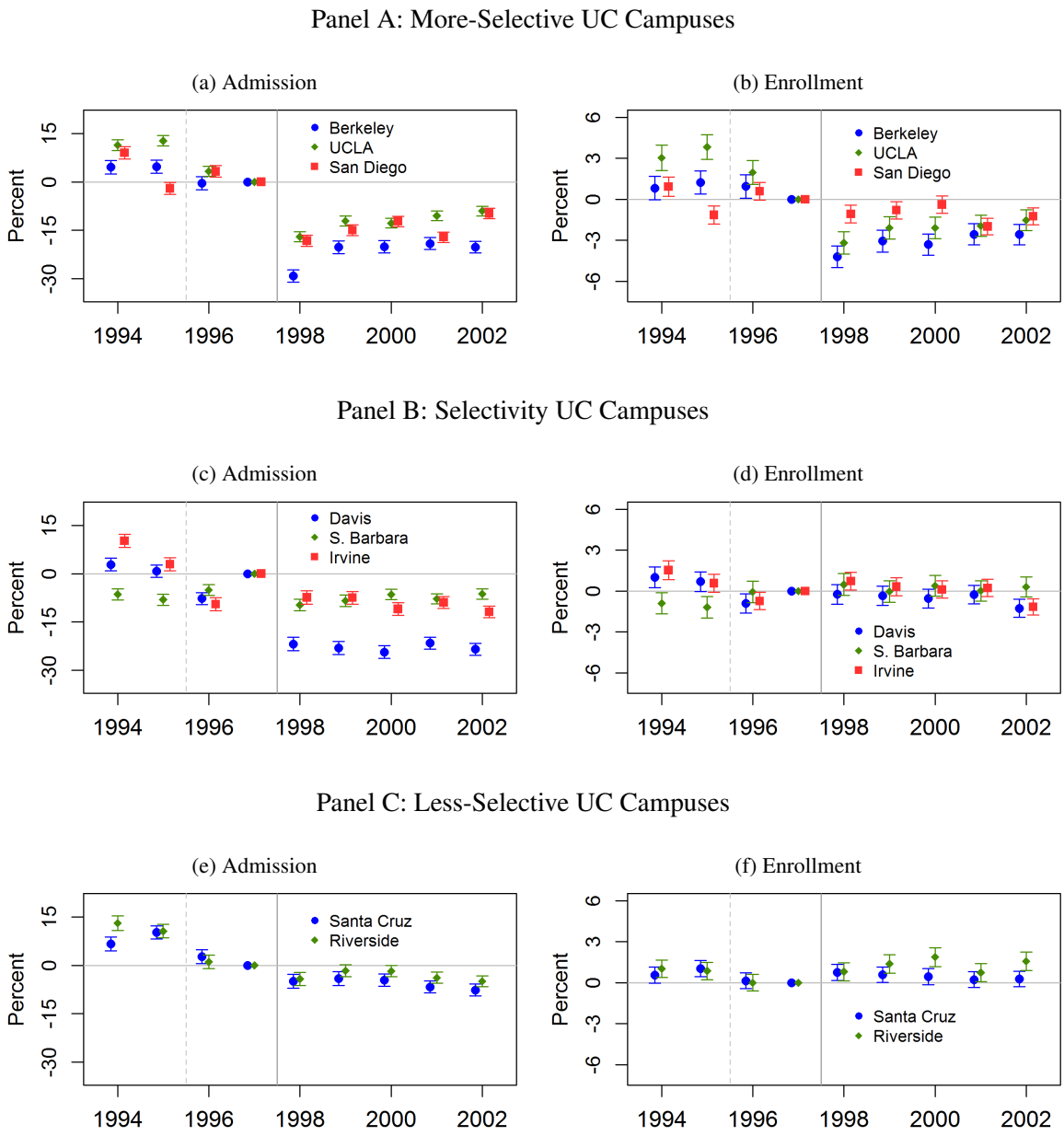
G California residents

H Domestic non-residents

I Foreign applicants

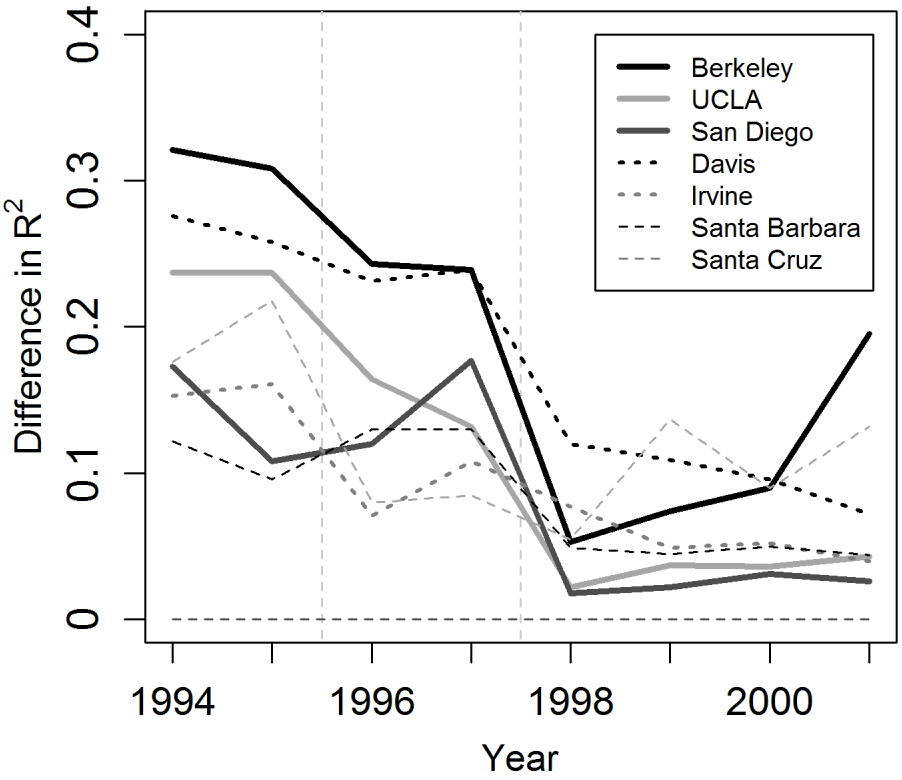
Note: This figure presents an example of UC Berkeley's pre-1998 admissions policy. The table shows that the university guaranteed admission to all applicants above a designated Academic Index threshold, where that threshold was set every year to admit 50 percent of all Berkeley admits. The university then set lower AI guarantee thresholds for other groups of students, including disadvantaged ethnic groups, disabled students, and students with "low socio-economic status", though it is unclear how the latter were defined. The specific numbers presented at the top of the page do not match the admissions data in any specific year, suggesting that this document (found with minimal context in UC Berkeley's Bancroft Library) was presented as an example rather than a specific year's policy. Further archival documentation suggests that most other campuses used highly-comparable admissions rules. Source: UC Berkeley Bancroft Library: CU-558, Box 2, Page 8-942.

Figure A-4: Annual Difference-in-Difference Estimates of Post-1998 URM Admissions by UC Campus



Note: This figure shows that URM UC applicants' admissions likelihood sharply and persistently declined at every UC campus in exactly 1998, but that some campuses also exhibited declines in 1996. OLS difference-in-difference coefficient estimates of the change in URM applicants' likelihood of admission or enrollment at each UC campus relative to non-URM applicants' respective likelihood, compared to the 1997 baseline. Campuses are ordered by their mid-1990s admissions rate. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Bars show 95-percent confidence intervals from robust standard errors. Admission is conditional on applying to that campus; enrollment is conditional on applying to any UC campus. Source: UC Corporate Student System.

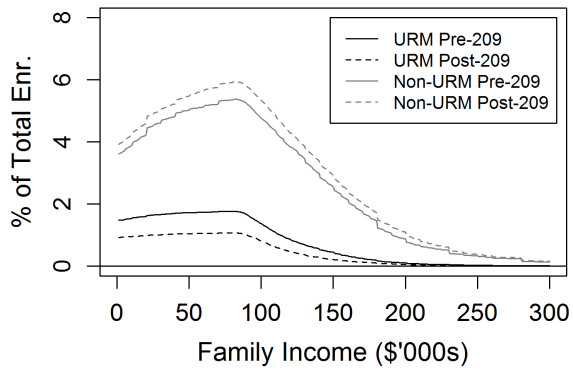
Figure A-5: Estimated Annual First-Order Contribution of Ethnicity to UC Campuses' Admissions Decisions



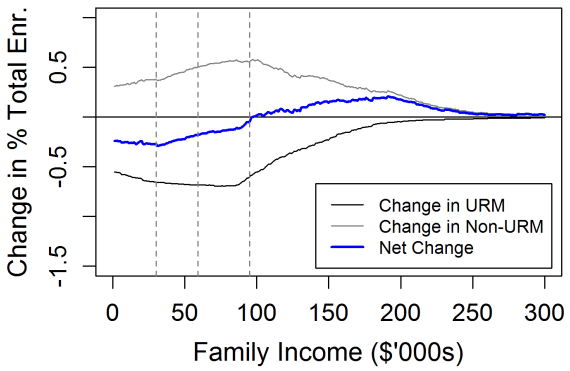
Note: This figure shows that the share of variation in admissions at each UC campus that could be explained by ethnicity (above that explained by AI) fell across all campuses in 1998, though it had begun to fall at some campuses by 1996. Each point measures the difference in R^2 coefficients between two linear models of admission to each respective UC campus among 'normal' UC applicants. The first model predicts admission based on the leave-one-out likelihood of admission for students with the same academic index and ethnicity, which explains 40-70 percent of variation in most campuses' admissions decisions before 1996. The second model predicts admission based on the leave-one-out likelihood of admission for all students with the same academic index. The models are visualized separately in Figure A-1. The difference can be understood as a proxy for the annual magnitude of the first-order contribution of ethnicity to UC admission by campus. 'Normal' applicants are freshman fall California-resident applicants who (a) were UC-eligible, which means that they satisfactorily completing the required high school coursework, and (b) who selected intended majors that did not have special admissions restrictions (e.g. engineering at some campuses). UC Riverside admitted all such applicants. Source: UC Corporate Student System.

Figure A-6: Average Family Income of Berkeley and UCLA Students by Ethnicity Before and After Prop 209

(a) Distribution of Incomes



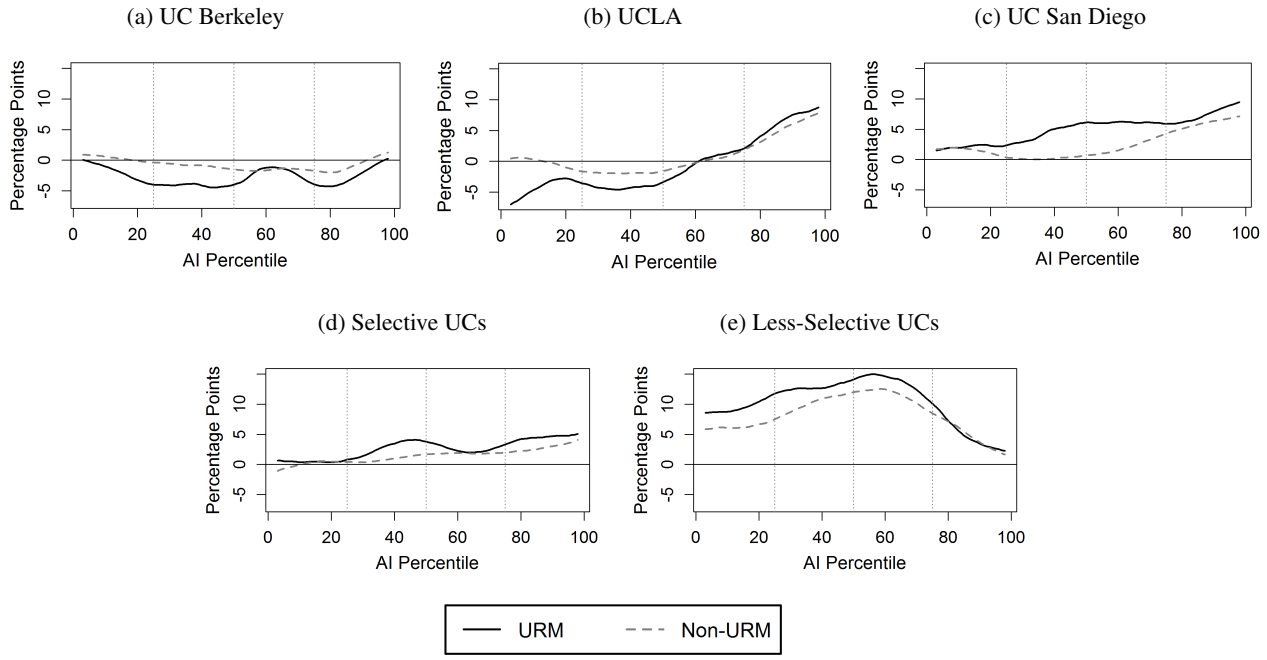
(b) Change in Distributions After Prop 209



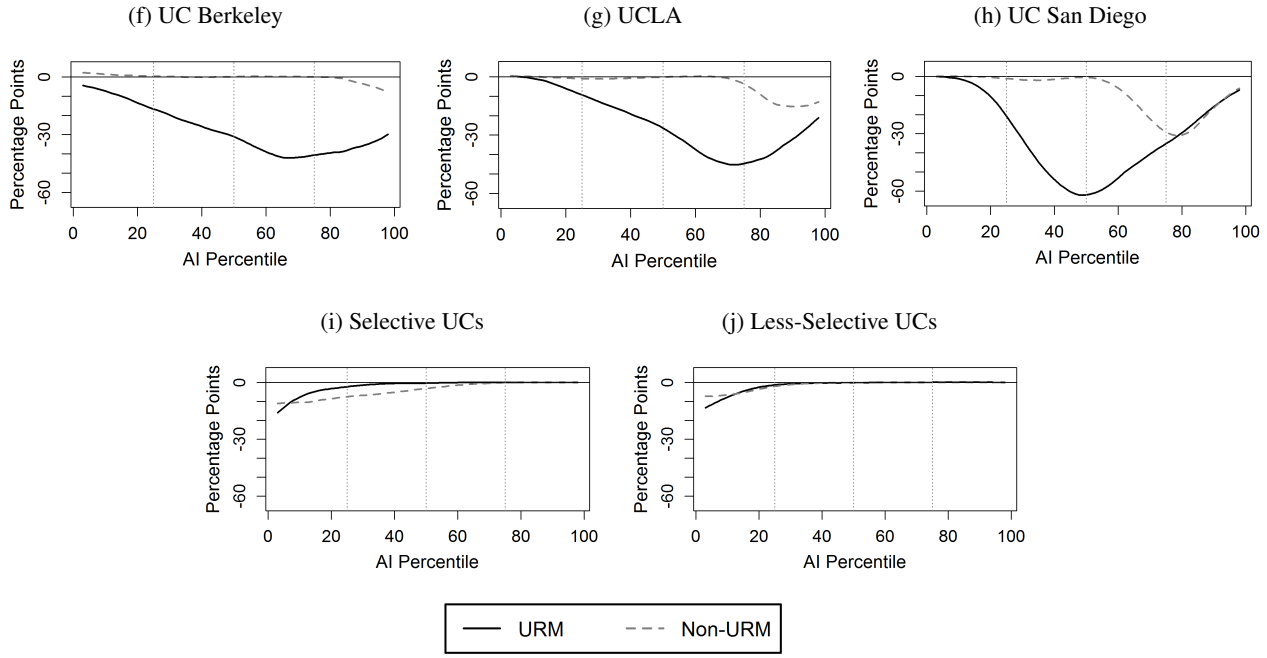
Note: This figure shows that the URM students who enrolled at UC Berkeley and UCLA under affirmative action had lower average incomes than the non-URM students who crowded into those campuses following Prop 209, leading to a net shift of students from the bottom three income quartiles (fixed in '96-97) to the top quartile after 1998. Shares of 1996-1999 UC Berkeley and UCLA students by income and ethnicity before and after Prop 209, differences of those shares by income and ethnicity, and the summed net enrollment change by income. The y-axis is scaled per $10,000 for readability; e.g. there was a net decline in UC Berkeley and UCLA students with family incomes of ∼$30,000 by about 0.5 percent of total enrollment after Prop 209. Dashed lines in Panel (b) show the 25th, 50th, and 75 percentiles of in-sample '96-97 family incomes. Figures are smoothed by a uniform kernel with bandwidth $20,000. Family incomes are not reported by 15 percent of the sample, increasing from 11 percent in '96-97 to 18 percent in '98-99; I impute incomes for these students by OLS regression of log family income on high school indicators, Zip code indicators, parental occupation indicators, max parental education indicators, standardized test scores, and gender in the full '96-97 CA-resident freshman UC applicant pool with observed family incomes. Imputed incomes are available for 95 percent of students with missing income; the regression's adjusted R^2 is 0.48, and the predicted values have a correlation with observed in-sample family income of 0.59. The distribution of predicted incomes among non-reporters is highly similar to the reported income distribution, with true (predicted) moments first quartile $29,500 ($41,100), median $60,000 ($60,200), mean $74,200 ($68,000), and third quartile $100,000 ($90,000). Source: UC Corporate Student System.

Figure A-7: Changes in UC Application and Admission after Prop 209 by Ethnicity and AI Percentile

Panel A: Changes in UC Campus Application Likelihood by AI and Ethnicity, Among UC Applicants

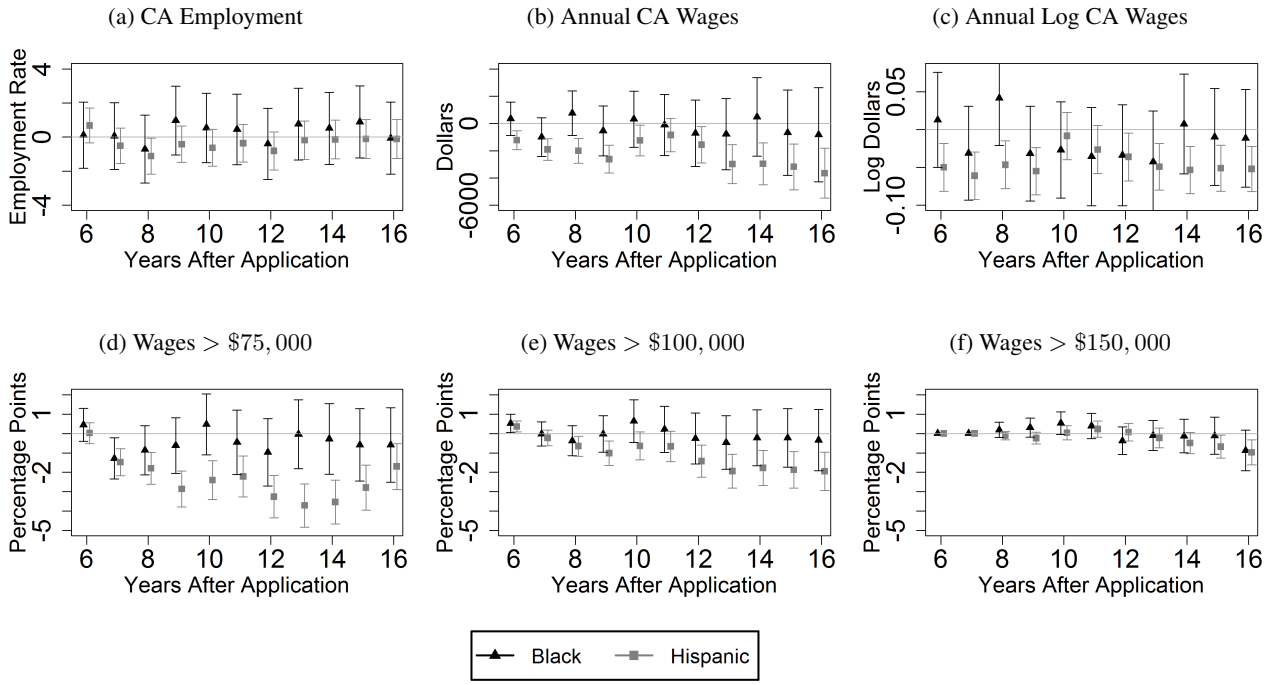


Panel B: Changes in UC Campus Admission Likelihood by AI and Ethnicity, Among Applicants



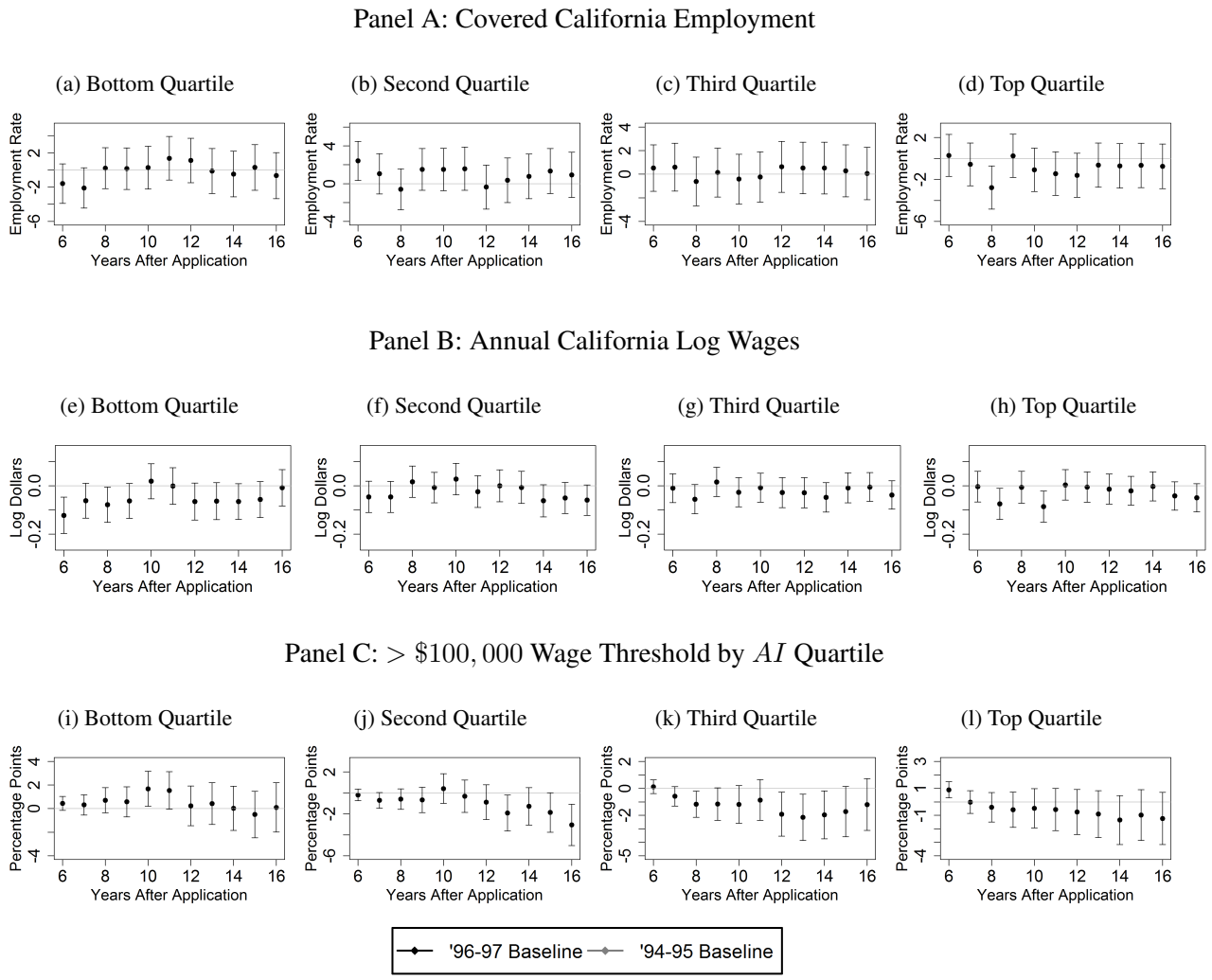
Note: This figure shows that changes in application patterns among URM UC applicants did not closely mirror changes in those applicants' UC admissions likelihood following Prop 209; for example, high-AI URM applicants were (relatively) no less likely to apply to UCLA after Prop 209 despite sharp declines in admissions likelihood at that campus. Difference in the percent of UC applicants who apply to or are admitted to each UC campus(es) between 1998-1999 and 1996-1997, by URM status and by percentile of academic index (AI) measured among all 1996-1999 URM UC applicants. Admit statistics are conditional on application to that campus. Statistics are smoothed with a triangular kernel with bandwidth 15. Source: UC Corporate Student System.

Figure A-8: Difference-in-Difference Estimates of Black and Hispanic UC Applicants' Post-1998 Wage Outcomes



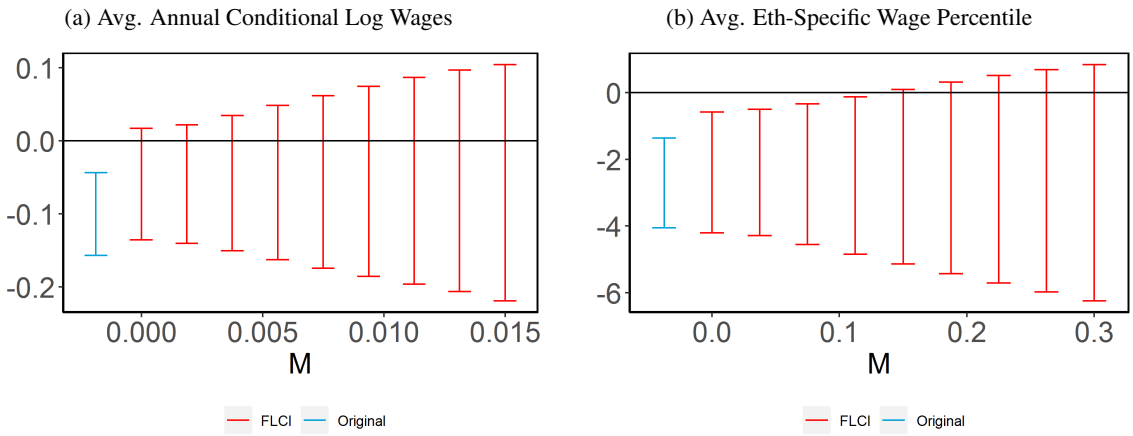
Note: This figure shows that Hispanic UC applicants faced persistent labor market deterioration following Prop 209, while estimates for Black UC applicants' wage deterioration are noisy but generally appear smaller. Estimates of β_0 and $\beta_{\cdot 98-99}$ from an extension Equation 1 splitting the URM indicator into separate Black and Hispanic indicators interacted with post-209. The model is an OLS difference-in-difference model of 1996-1999 URM and Asian UC freshman California-resident applicants' educational outcomes compared to other non-URM students' outcomes after the 1998 end of UC's affirmative action program. Outcomes defined as non-zero California wages ("CA Employment"), California wages in dollars and log-dollars (omitting 0's), and unconditional indicators for having wages above specified wage thresholds ($75,00, $100,000, and $150,000) as measured in the California Employment Development Department database, which includes employment covered by California unemployment insurance. Coefficients in each year after UC application are estimated independently. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Academic Index (AI) is defined in footnote 6; models by AI quartile are estimated independently, with quartiles defined by the AI distribution of 96-97 URM UC applicants. Annual wages CPI-adjusted to 2018 and winsorized at top and bottom 1 percent. Robust 95-percent confidence intervals shown. Source: UC Corporate Student System and the California Employment Development Department.

Figure A-9: Difference-in-Difference Estimates of URM UC Applicants' Post-1998 Labor Market Outcomes



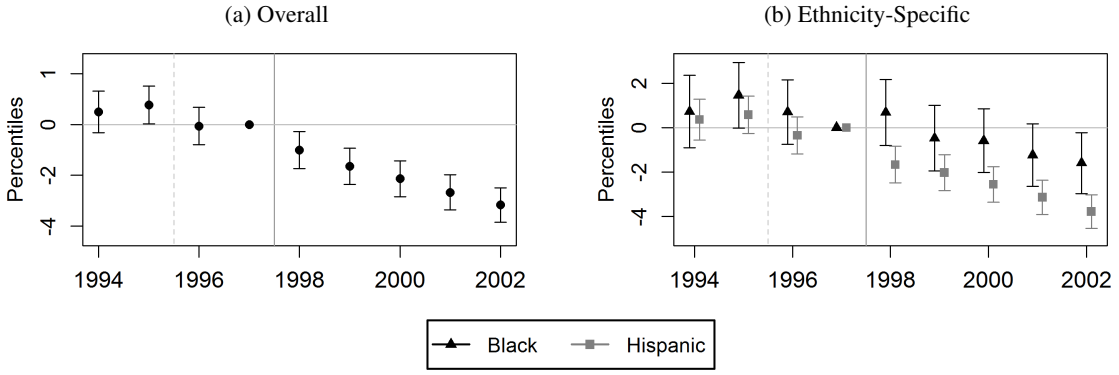
Note: This figure shows that URM applicants' California employment was largely unchanged among all four AI quartiles, but that all experienced log wage declines and all but the bottom quartile became less likely to earn at least $100,000 annual California wages, with larger estimated declines relative to the '94-95 baseline. Estimates of $\beta_{\cdot 98-99}$ from Equation 1, an OLS difference-in-difference model of 1996-1999 URM UC freshman California-resident applicants' wage outcomes compared to non-URM outcomes after the 1998 end of UC's affirmative action program. Outcomes defined as non-zero California wages ("CA Employment"), average log wages (excluding zeroes), and unconditional indicators for having wages above specified wage thresholds ($75,00, $100,000, and $150,000) as measured in the California Employment Development Department database, which includes employment covered by California unemployment insurance. Coefficients in each year after UC application are estimated independently. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Academic Index (AI) is defined in footnote 6; models by AI quartile are estimated independently, with quartiles defined by the AI distribution of 96-97 URM UC applicants. Panel C replaces the 1996-97 pre-209 UC applicants with 1994-95 UC applicants, showing coefficients from both sets of models. Annual wages CPI-adjusted to 2018 and winsorized at top and bottom 1 percent. Robust 95-percent confidence intervals shown. Source: UC Corporate Student System and the California Employment Development Department.

Figure A-10: Difference-in-Difference Robustness to Non-Parallel Trends



Note: This figure shows that while the difference-in-difference log wage estimates are sensitive to loosening the parallel trends assumption, replacing wages with ethnicity-specific wage percentiles generates estimates relatively insensitive to assumptions allowing bounded pre-trends of up to almost 0.15 percentiles per year. Estimates of $\beta_{\cdot 98-99}$ from Equation 1, an OLS difference-in-difference model of 1996-1999 URM UC freshman California-resident applicants' wage outcomes compared to non-URM outcomes after the 1998 end of UC's affirmative action program, by varying assumptions over the maximal annual degree to which the parallel trends assumption may be violated (following Rambachan and Roth, 2020). The blue bars show the baseline estimates; the black bars present fixed length confidence intervals permitting $\Delta^{SD}(M)$ (the x-axis) deviations from the parallel trends assumption. Source: UC Corporate Student System and the California Employment Development Department.

Figure A-11: Difference-in-Difference Percentile Estimates with Fixed 2017 Wage Distributions

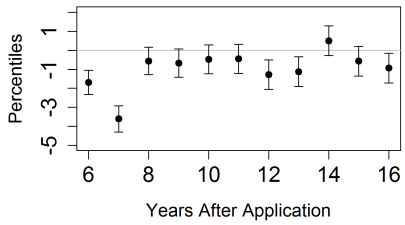


Note: This figure shows that downward-slowing pre-trends in URM students' relative conditional average wages persist when their wages are transformed into ethnicity-specific wage percentiles using a fixed year's wage distribution, implying that the parallel trends assumption for Figure IV(f) (with time-varying wage percentiles) is satisfied as a result of its accounting for ethnicity-specific wage dynamics in California (as suggested by Juhn et al., 1991), not the percentile transformation per se. OLS difference-in-difference coefficient estimates of Equation 1, the change in URM UC applicant outcomes relative to non-URM applicants, compared to the 1997 baseline. The outcome is defined as the average ethnicity-specific wage percentile between 6 and 16 years after UC application, omitting zero-wage years; percentiles are defined relative to the 2017 empirical distribution of wages earned by same-ethnicity (URM, Asian, or White/Other) college-educated California ACS respondents born between 1974 and 1978, few of whom were directly impacted in university enrollment by Prop 209. Models include high school fixed effects, ethnicity indicators, and the components of UC's Academic Index (see footnote 21). Annual wages are CPI-adjusted to 2018. Bars show robust 95-percent confidence intervals. Source: UC Corporate Student System, California Employment Development Department, and the American Community Survey (Ruggles et al., 2018).

Figure A-12: Difference-in-Difference Estimates of URM UC Applicants' Post-1998 Labor Outcomes

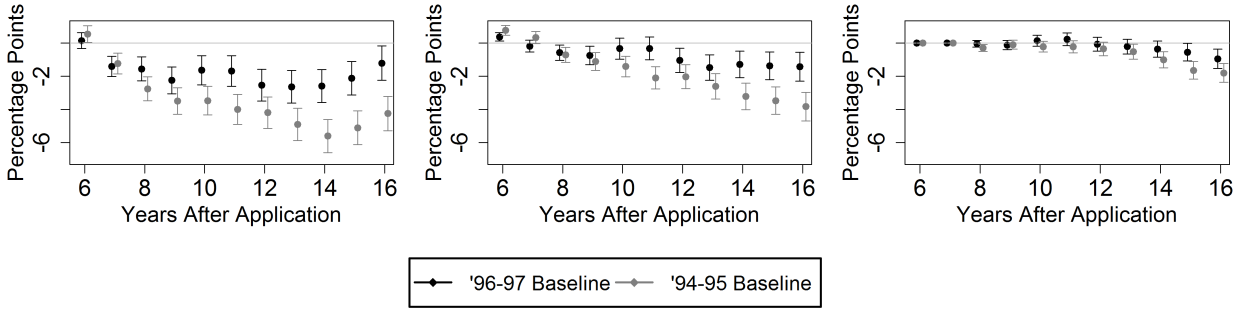
Panel A: Annual Differences in Eth-Specific Wage Percentile

(a) Wage Percentile



Panel B: Wage Threshold Estimates Using '96-97 and '94-95 Baselines

(b) Wages $> \$75,000$ (c) Wages $> \$100,000$ (d) Wages $> \$150,000$



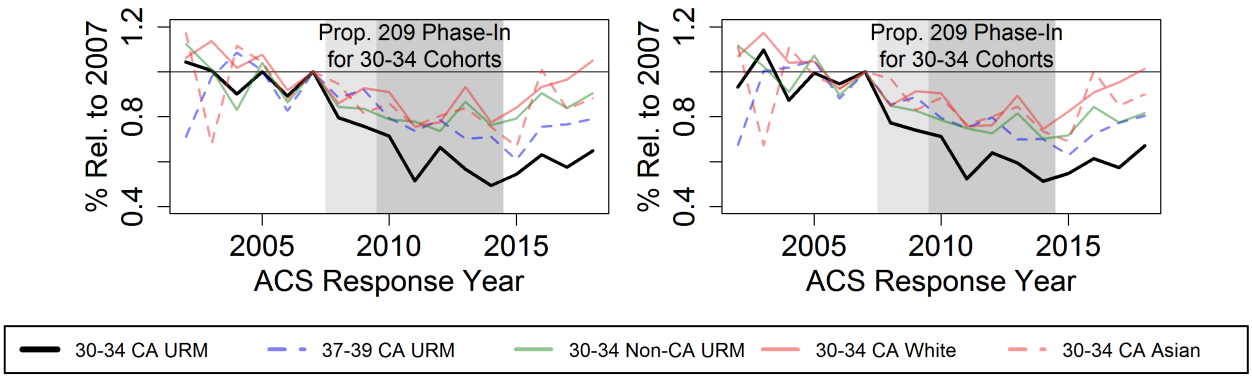
Note: This figure shows that URM UC applicants faced a long-run decline in their average wage percentile relative to same-ethnicity college-educated workers not impacted by Prop 209, and that URM UC applicants' likelihood of attaining various high-earning thresholds declined after Prop 209, and moreso relative to a '94-95 baseline. Estimates of β_{98-99} from Equation 1, an OLS difference-in-difference model of 1996-1999 URM UC freshman California-resident applicants' wage outcomes compared to non-URM outcomes after the 1998 end of UC's affirmative action program. The outcome in Panel A is defined as the average annual ethnicity-specific wage percentile between 6 and 16 years after UC application, omitting zero-wage years; percentiles are defined relative to the empirical distribution of wages earned in that year by same-ethnicity (URM, Asian, or White/Other) college-educated California ACS respondents born between 1974 and 1978, few of whom were directly impacted in university enrollment by Prop 209. Outcomes in Panel B defined as annual unconditional indicators for having wages above specified wage thresholds ($75,00, $100,000, and $150,000) as measured in the California Employment Development Department database, which includes employment covered by California unemployment insurance. Coefficients in each model and year after UC application are estimated independently. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Academic Index (AI) is defined in footnote 6. The gray estimates replace the 1996-97 baseline with with 1994-95 UC applicants. Annual wages CPI-adjusted to 2018 and winsorized at top and bottom 1 percent. Robust 95-percent confidence intervals shown. Source: UC Corporate Student System, the California Employment Development Department, and the American Community Survey (Ruggles et al., 2018).

Figure A-13: Share of $> \$100,000$ Workers among Rolling Cohorts Before and After Prop 209's Impact

Panel A: Rolling Cohorts Age 30-34

(a) All Workers

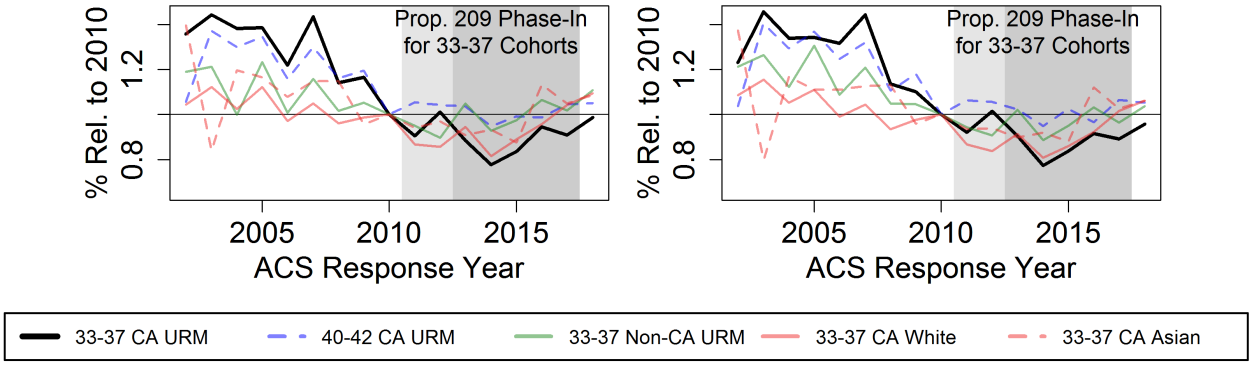
(b) College Enrollees



Panel B: Rolling Cohorts Age 33-37

(d) All Workers

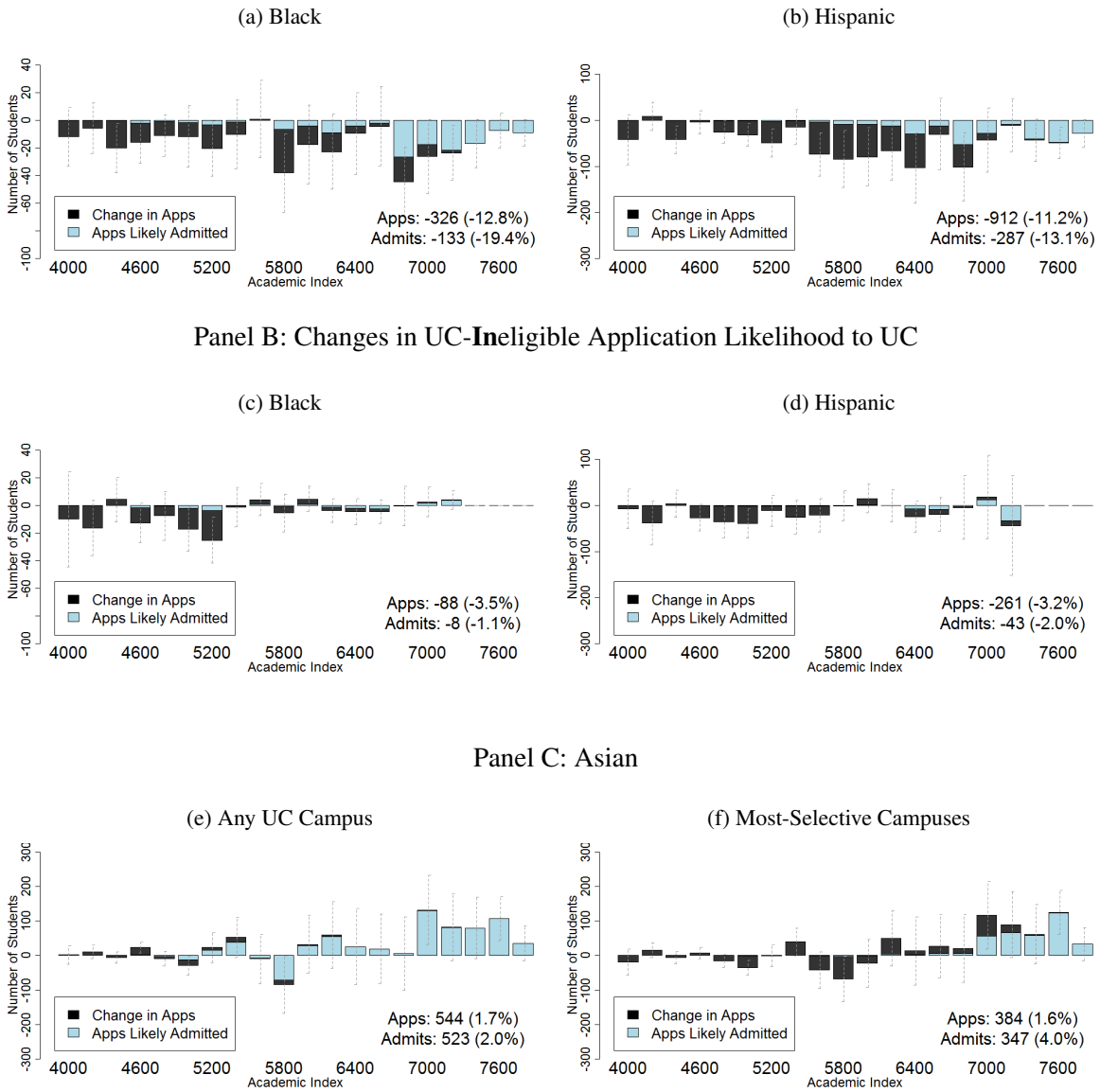
(e) College Enrollees



Note: This figure shows that early-career URM Californians ten to twenty years after Prop 209 were less likely to achieve high wages than a variety of reasonable comparison groups (like non-URM Californians and URM non-Californians), and that the gaps (across rolling cohorts) seem to originate and widen in the years when URM workers of that age would have been first impacted by Prop 209 (hitting age 18 around 1998). The fraction of ACS respondents earning at least $100,000 per year in wages by ethnicity, contemporaneous age range, and either California birth or contemporaneous California residency status, normalized to 1 in 2007 or 2010 for each group. Grey lines denote the years 2010-2014 (2013-2017) in which the age 30-34 (33-37) URM cohort would have largely switched from people who graduated high school before the 1998 implementation of Prop 209 to those who graduated after implementation, assuming graduation at age 18. Some public universities began phasing out affirmative action two years earlier (in 1996), justifying the 2007 baseline. Wages are in 2018 CPI-adjusted dollars. All statistics are two-year moving averages. Source: 2001-2017 American Community Survey (Ruggles et al., 2018)

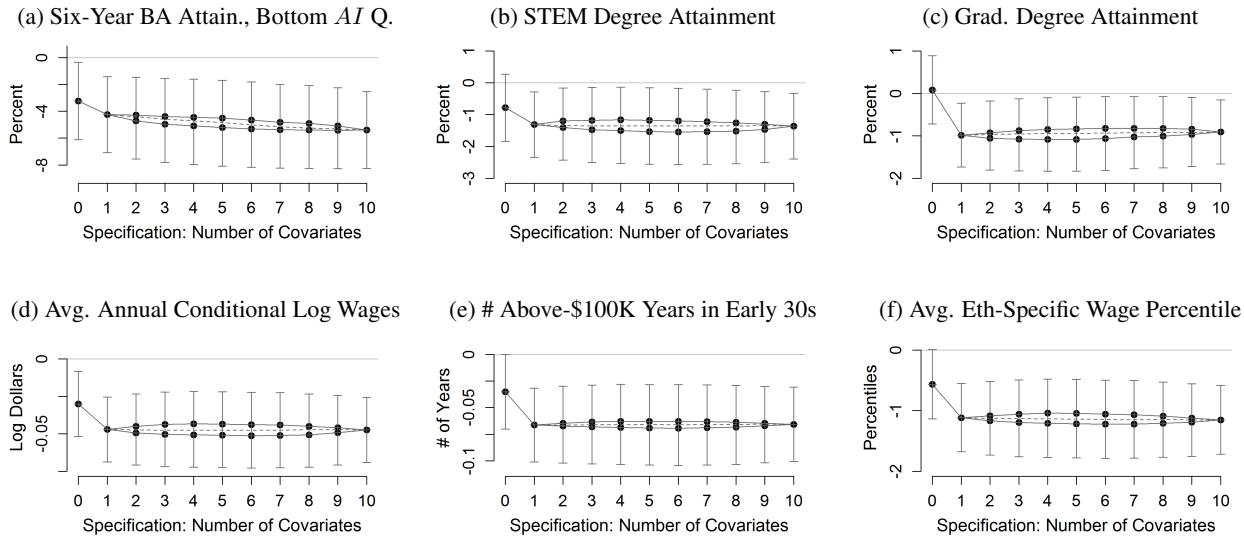
Figure A-14: Further Estimated Declines in 1998-99 Application and Admission by Ethnicity

Panel A: Changes in UC-Eligible Application Likelihood to Most-Selective UC Campuses



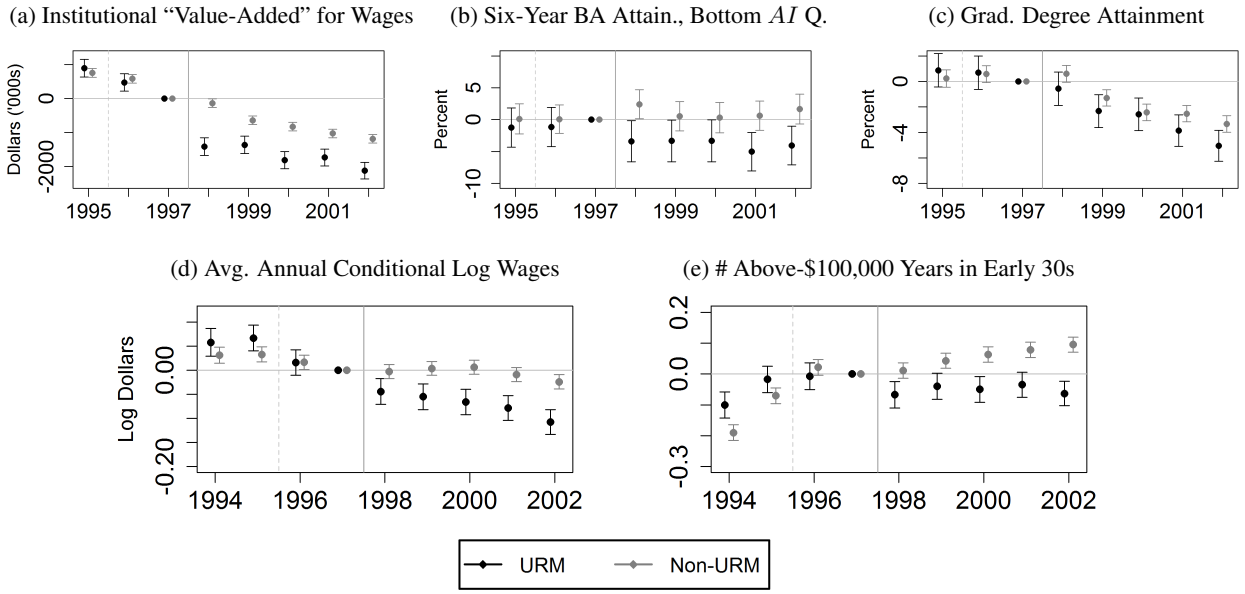
Note: This figure shows that URM application declines to the Berkeley and UCLA campuses can explain up to 20 percentage points of the decline in URM enrollment at those campuses, while application rates only slightly declined among UC-ineligible students and only slightly increased among Asian students relative to applications among white students (a sort of placebo test). Estimates of the change in the number of UC applicants (and admits) in 1998-1999 by ethnicity (e) and 200-point AI bin, relative to 1994-1995. The height of each black bar is the product of $\beta_{e,98-99,a}$ (estimated in Equation 2) and $\sum_s UC_{s,98-99,e}$, the average number of UC-eligible California public high school graduates of ethnicity e in 1998-1999. The height of each overlaying blue bar is the product of the black bar and the percent of 1998-1999 UC-eligible e UC applicants in that AI range admitted to at least one UC campus. The statistics in the bottom right sum the bars across all AI and report the sums as a share of all e UC applicants. Panel A and half of Panel C re-estimate Equation 2 restricting to applicants to UC Berkeley or UCLA. Panels A and C are restricted to UC-eligible high school graduates and UC applicants; Panel B re-estimates Equation 2 for UC-ineligible graduates and applicants. 95-percent confidence intervals on the black bars from $\beta_{e,98-99,a}$ robust standard errors. Source: UC Corporate Student System and the California Department of Education.

Figure A-15: Alternative Covariate Specifications of URM UC Applicants' Post-1998 Estimated Outcomes



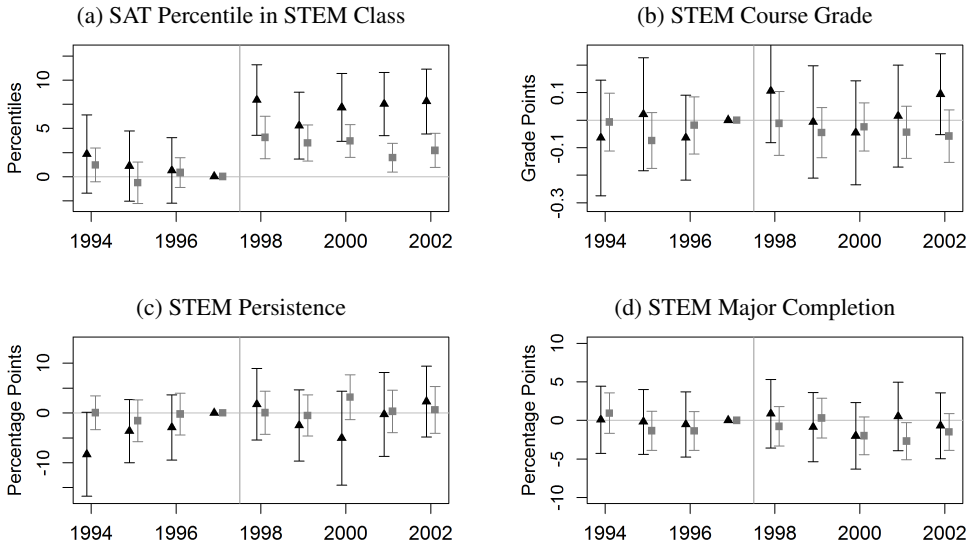
Note: This figure shows the results of a Monte Carlo exercise evincing the stability of the baseline estimates in the presence of detailed additional covariates. Estimates of $\beta_{\cdot 98-99}$ from Equation 1, an OLS difference-in-difference model of the change in six '96-99 CA-resident freshman URM UC applicant outcomes after Prop 209 relative to non-URM applicants, with different specifications of the covariate matrix X_{iy}. Specification 0 sets X_{iy} to be null, while Specification 1 includes the components of UC's Academic Index (see footnote 21). Specifications 2-10 add additional sets of covariates progressively, presenting the highest and lowest $\beta_{\cdot 98-99}$ estimates from models including 1-9 additional sets of covariates, respectively: gender indicator, log family income, (7) highest parental education indicators, (289) parents' occupation indicators, high school GPA rank, number of 12th-grade honors courses, UC eligibility indicator, and Heckit control functions constructed using two estimates of p: $\frac{A_{s_i ye a}}{UC_{s_i ye}}$ (see Equation 2) and the leave-one-out percent of UC-eligible graduates who applied to UC that year in i's school, gender, and ethnicity. For details on outcomes, see notes to Table III and IV. Panel (a) restricts the sample to the bottom AI quartile as measured among '96-97 URM UC applicants. Bars show the union of the robust 95 percent confidence intervals of the two presented estimates. Source: UC Corporate Student System, National Student Clearinghouse, and California Employment Development Department.

Figure A-16: Annual Single-Difference Estimates of URM UC Applicants' Post-1998 Outcomes



Note: This figure shows single-difference analogues to the baseline estimates, showing that the estimated effects appear largely driven by immediate 1998 declines in enrollment value-added and outcomes among URM students, not 1998 increases among non-URM students. OLS difference-in-difference coefficient estimates of the change in four URM applicant outcomes relative to non-URM applicants, compared to the 1997 baseline. Outcomes include six-year Bachelor's degree attainment in the NSC, graduate degree attainment in the NSC, average annual conditional (omitting 0's) log California covered wages 6-19 years after UC application, and the number years (6-19 years after UC application) in which California covered wages exceed $75,000. Bars show 95-percent confidence intervals from robust standard errors. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Panel (a) restricts the sample to the bottom AI quartile as measured among '96-97 URM UC applicants. Source: UC Corporate Student System, National Student Clearinghouse, and California Employment Development Department.

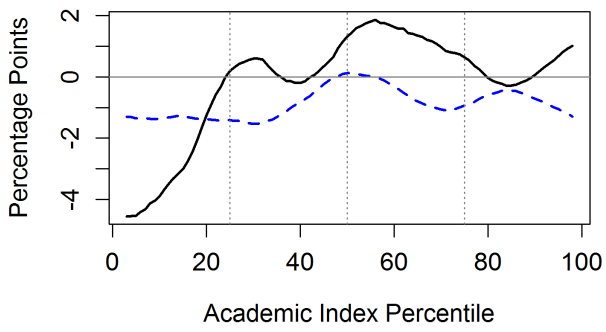
Figure A-17: Difference-in-Difference Estimates of URM UC Enrollees' STEM Outcomes by Ethnicity



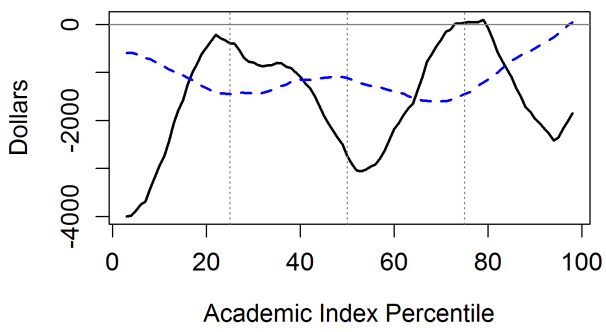
Note: Difference-in-difference WLS regression coefficient estimates of UCB, UCSB, UCD, UCSC, and UCR enrollees' introductory STEM course performance or persistence, differencing across URM status following Equation 3 and interacting β_t with Black and Hispanic indicators to separately identify outcomes by URM ethnicity, relative to 1997. In Panels (a)-(c) each observation is a CA-resident freshman student-course pair in an introductory biology, chemistry, physics, or computer science course (see Appendix H) taken within 2.5 years of matriculation, stacking over courses and weighted evenly across observed students. SAT percentile is the fraction of other 1994-2002 freshman CA-resident peers who have lower SAT scores than the student; persistence indicates completing the subsequent course in the introductory STEM course sequence; and course grade is the grade points received in completed courses. In Panel (d) each observation is a student; the outcome indicates completing any UC STEM degree. Models include high school fixed effects, ethnicity indicators, and the components of UC's Academic Index (see footnote 21). UCSC is omitted from the GPA model because it did not mandate letter grades in the period. 95-percent confidence intervals are two-way clustered by student and course sequence level (e.g. second chemistry course). Source: UC Corporate Student System and UC-CHP Database (Bleemer, 2018).

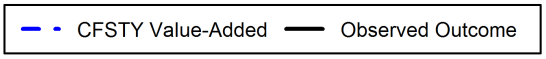
Figure A-18: Difference-in-Difference Changes in Inst. Value-Added and Outcome by AI Quantile

(a) Six-Year Degree Attainment



(b) Wages in Early 30s





Note: This figure plots unadjusted difference-in-difference averages for both VA and actual degree attainment and early-30s wages, showing that the two lines poorly mirror each other, suggesting both that VA poorly-explains and substantially underestimates the observed labor market effects of Prop 209. Raw difference-in-difference statistics of average six-year degree attainment, early-30s wages, and corresponding "CFSTY" institutional value-added measures from students' first enrollment institution, differenced among UC freshman applicants between 1998-1999 and 1996-1997 and by URM status for each percentile of academic index (AI) measured among 1996-1999 URM UC applicants. Statistics are smoothed with a triangular kernel with bandwidth 15. First enrollment measured in NSC up to six years after UC application; university groups partition possible enrollments. See note to Table II for value-added definition. Average wages measured as mean observed wages between 12 and 16 years after UC application, when most students are 30-34; VA wages are measured 15 years after UC application. Six-year degree attainment measured in the union of UC and NSC degree attainment. Source: UC Corporate Student System, National Student Clearinghouse, and the California Employment Development Department.

Table A-1: STEM Majors in Main NSC Sample

Major	#	Major	#
BIOLOGICAL SCIENCES	8,008	EXERCISE BIOLOGY	267
BIOLOGY	6,382	ZOOLOGY	264
COMPUTER SCIENCE	6,113	STRUCTURAL ENGINEERING	251
ELECTRICAL ENGINEERING	5,110	MATERIALS SCIENCE AND ENGINEERING	250
MECHANICAL ENGINEERING	4,942	AQUATIC BIOLOGY	238
MOLECULAR AND CELL BIOLOGY	3,505	ECOLOGY BEHAVIOR & EVOLUTION	227
MATHEMATICS	3,076	INDUSTRIAL ENGINEERING AND OPERATIONS RESEARCH	225
CIVIL ENGINEERING	2,649	EARTH SCIENCES	222
CHEMISTRY	2,516	INFORMATION SYSTEMS	221
COMPUTER ENGINEERING	2,347	NUTRITIONAL SCIENCES	216
BIOCHEMISTRY	2,167	PHARMACOLOGICAL CHEMISTRY	216
PHYSICS	1,624	COMPUTER INFORMATION SYSTEMS	209
MANAGEMENT SCIENCE	1,578	CONSTRUCTION MANAGEMENT	203
GENERAL BIOLOGY	1,537	APPLIED ECOLOGY	201
CHEMICAL ENGINEERING	1,509	ASTROPHYSICS	201
ELECTRICAL ENGINEERING AND COMPUTER SCIENCES	1,502	BIOCHEMISTRY AND MOLECULAR BIOLOGY	195
BIOCHEMISTRY AND CELL BIOLOGY	1,487	MATHEMATICS/ECONOMICS	186
INFORMATION AND COMPUTER SCIENCE	1,481	COMPUTER INFO SYSTEMS	170
PSYCHOLOGY AND SOCIAL BEHAVIOR	1,462	BIOLOGICAL SYSTEMS ENGINEERING	167
PSYCHOBIOLOGY	1,451	COMPUTER ENGINEERING AND COMPUTER SCIENCE	167
INTEGRATIVE BIOLOGY	1,263	ECOLOGY AND EVOLUTION	166
COGNITIVE SCIENCE	1,088	MATERIALS ENGINEERING	165
PHYSIOLOGICAL SCIENCE	1,006	CELL AND DEVELOPMENTAL BIOLOGY	160
MICROBIOLOGY	879	ENVIRONMENTAL ENGINEERING	160
ANIMAL PHYSIOLOGY & NEUROSCI	833	BIOMEDICAL SCIENCES	159
NEUROSCIENCE	810	PHYSIOLOGY	144
MOLECULAR CELL AND DEVELOPMENTAL BIOLOGY	803	EVOLUTION AND ECOLOGY	141
BIOENGINEERING	786	MOLECULAR ENVIRONMENTAL BIOLOGY	139
APPLIED MATHEMATICS	750	ARCHITECTURAL ENGINEERING	137
AEROSPACE ENGINEERING	718	PHARMACOLOGY	136
HUMAN BIOLOGY	712	MECHANICAL ENGINEER	133
NEUROBIOPHYSIOLOGY & BEHAVIOR	639	COGN SCI W/SPECIALIZ NEUROSCI	130
GENETICS	582	ELECTRICAL ENGINEERING AND COMPUTER SCIENCE	128
COMPUTER SCIENCE AND ENGINEERING	570	GEOLOGICAL SCIENCES	127
COMPUTER SCIENCE & ENGINEERING	472	NUTRITION SCIENCE	126
BIOCHEM & MOLECULAR BIOLOGY	445	MATHEMATICS-COMPUTER SCIENCE	124
MICROBIOLOGY IMMUNOLOGY AND MOLECULAR GENETICS	403	ENGINEERING PHYSICS	122
ENGINEERING	387	BIOENGINEERING (BIOTECHNOLOGY)	119
MOLECULAR BIOLOGY	387	CLINICAL NUTRITION	117
BIOMEDICAL ENGINEERING	382	HEALTH SCIENCES	116
MATHEMATICS/APPLIED SCIENCE	350	COGN SCI W/SPEC HUM COMP INTER	115
MARINE BIOLOGY	348	ECONOMICS-MATHEMATICS	111
GEOLOGY	334	NEUROBIOLOGY	111
BIOTECHNOLOGY	332	NEUROSCIENCE AND BEHAVIOR	107
BIOLOGICAL SCIENCE	331	BIOLOGY-PHYSIOLOGY	105
INDUSTRIAL ENGINEERING	300	NATURAL SCIENCE	102
STATISTICS	295	MGMT SCI & ENGINEERING	99
BIOENGINEERING: PRE-MEDICAL	289	INDUSTRIAL AND SYSTEMS ENGINEERING	91
MICROBIOLOGY AND MOLECULAR GENETICS	288	MATHEMATICAL SCIENCES	87
BIOCHEMISTRY/CHEMISTRY	287	GENERAL ENGINEERING	85

Note: This table shows the 100 most common STEM majors earned by 1994-2002 freshman UC applicants. The 100 most common majors categorized as STEM (following the procedure described in footnote 13) among those earned by 1994-2002 freshman UC applicants at any four-year institution as reported to the National Student Clearinghouse, and the number of in-sample students who report that major. Each student is permitted up to three majors. Source: UC Corporate Student System and National Student Clearinghouse.

Table A-2: Non-STEM Majors in Main NSC Sample

Major	#	Major	#
PSYCHOLOGY	22,896	ASIAN AMERICAN STUDIES	729
BUSINESS ADMINISTRATION	17,406	COMMUNICATIONS	709
POLITICAL SCIENCE	15,964	DESIGN	699
ECONOMICS	14,652	WOMEN'S STUDIES	682
SOCIOLOGY	12,560	LINGUISTICS	676
ENGLISH	11,634	GOVERNMENT	663
HISTORY	10,216	SOCIAL WELFARE	654
COMMUNICATION	6,964	COMPARATIVE LITERATURE	632
BUSINESS ECONOMICS	4,939	POLITICAL ECONOMY OF INDUSTRIAL SOCIETIES	626
LIBERAL STUDIES	3,878	ART STUDIO	623
ANTHROPOLOGY	3,423	INTERNATIONAL BUSINESS	622
SPANISH	3,196	ETHNIC STUDIES	576
PHILOSOPHY	2,683	ACCOUNTANCY	542
HUMAN DEVELOPMENT	2,493	RHETORIC	525
INTERNATIONAL RELATIONS	2,171	BIOPSYCHOLOGY	517
COMMUNICATION STUDIES	2,154	AMERICAN LITERATURE AND CULTURE	511
NURSING	1,966	DRAMA	497
ART	1,923	GENERAL STUDIES	493
FINANCE	1,819	ENVIRONMENTAL SCIENCES	485
MARKETING	1,786	CINEMA-TELEVISION	483
MANAGERIAL ECONOMICS	1,781	DANCE	472
ACCOUNTING	1,587	VISUAL ARTS (MEDIA)	461
INTERNATIONAL STUDIES	1,552	POLITICAL SCI/INTNTL RELATIONS	456
ARCHITECTURE	1,534	SOCIAL ECOLOGY	456
MUSIC	1,480	ENVIRONMENTAL ANALYSIS AND DESIGN	445
ART HISTORY	1,404	SOCIAL WORK	441
AMERICAN STUDIES	1,358	THEATRE ARTS	437
CRIMINOLOGY LAW AND SOCIETY	1,302	FILM AND TELEVISION	435
GLOBAL STUDIES	1,212	PHARMACY	435
LIBERAL ARTS	1,208	THEATER	416
LEGAL STUDIES	1,199	AGRICULTURAL BUSINESS	414
LAW AND SOCIETY	1,167	BUSINESS ADMINISTRATION (MARKETING)	414
SOCIAL SCIENCE	1,166	EXERCISE SCIENCE	412
ENVIRONMENTAL STUDIES	1,156	CREATIVE STUDIES	404
INTERDISCIPLINARY STUDIES	1,129	GRAPHIC DESIGN	398
MASS COMMUNICATIONS	1,097	INTERDISC COMPUTING & THE ARTS	381
KINESIOLOGY	1,070	CRIMINAL JUSTICE ADMINISTRATION	368
THEATRE	1,032	INTERNATIONAL DEVELOPMENT STUDIES	367
FILM STUDIES	999	SOCIAL SCIENCES	366
JOURNALISM	953	ECONOMICS/INTERNATIONAL AREA STUDIES	365
CRIMINAL JUSTICE	910	LATIN AMERICAN STUDIES	352
MANAGEMENT	906	CHICANO STUDIES	332
GEOGRAPHY	895	DRAMATIC	325
POLITICS	894	JAPANESE	319
FRENCH	882	LAW	312
ANIMAL SCIENCE	813	FILM AND DIGITAL MEDIA	306
BUSINESS MANAGEMENT ECONOMICS	780	LANDSCAPE ARCHITECTURE	302
RELIGIOUS STUDIES	778	HISTORY OF ART	297
STUDIO	764	SPEECH COMMUNICATION	294
CHILD DEVELOPMENT	745	INDUSTRIAL TECHNOLOGY	291

Note: This table shows the 100 most common Non-STEM majors earned by 1994-2002 freshman UC applicants. The 100 most common majors **not** categorized as STEM (following the procedure described in footnote 13) among those earned by 1994-2002 freshman UC applicants at any four-year institution as reported to the National Student Clearinghouse, and the number of in-sample students who report that major. Each student is permitted up to three majors. Source: UC Corporate Student System and National Student Clearinghouse.

Table A-3: Descriptive Statistics of 1990s UC Admissions by Ethnicity

	Application			Admission			Enrollment		
	'94-5	'96-7	'98-9	'94-5	'96-7	'98-9	'94-5	'96-7	'98-9
Panel A: Non-URM Applicants									
Average Number or Percent of Applicants									
Berkeley	14,452	17,478	19,814	37.3	32.3	30.8	15.1	14.0	13.8
UCLA	16,738	20,272	23,965	44.3	37.3	33.9	15.3	13.3	13.5
San Diego	15,787	19,072	23,008	63.0	60.0	48.3	15.3	12.9	12.2
Davis	13,434	15,131	17,189	71.1	72.0	67.7	18.8	19.7	17.9
Irvine	11,734	13,198	16,134	76.2	71.2	64.1	19.8	19.4	17.5
Santa Barbara	12,946	14,819	18,750	84.5	74.9	57.7	18.5	18.4	14.7
Santa Cruz	7,506	8,174	9,984	85.3	85.4	81.0	16.7	18.8	17.5
Riverside	6,996	7,480	10,211	82.0	85.6	88.0	14.7	17.9	17.4
All UCs	33,602	37,972	42,268	84.8	83.5	83.9	49.6	49.4	49.6
Average SAT Score									
Berkeley	1250	1255	1262	1371	1375	1368	1344	1348	1338
UCLA	1209	1214	1228	1316	1333	1343	1262	1283	1299
San Diego	1212	1213	1222	1274	1298	1307	1224	1250	1260
Davis	1180	1184	1187	1232	1231	1230	1171	1176	1169
Irvine	1146	1151	1161	1185	1194	1213	1127	1137	1159
Santa Barbara	1141	1144	1166	1162	1182	1224	1122	1156	1189
Santa Cruz	1156	1154	1157	1177	1173	1180	1152	1151	1154
Riverside	1114	1114	1119	1137	1134	1136	1095	1091	1092
All UCs	1182	1187	1194	1207	1212	1216	1196	1208	1217
Panel B: URM Applicants									
Average Number or Percent of Applicants									
Berkeley	3,570	3,892	3,944	54.7	48.7	23.9	19.7	19.2	10.4
UCLA	4,872	5,152	5,395	55.8	42.8	24.8	21.5	16.8	11.3
San Diego	3,088	3,296	3,976	59.7	57.9	32.5	12.1	11.8	8.3
Davis	2,586	2,616	2,822	84.1	83.7	62.5	21.9	18.5	17.2
Irvine	2,884	2,752	3,238	73.4	62.7	54.8	15.7	12.9	14.3
Santa Barbara	3,197	3,542	4,008	77.0	77.2	54.3	16.3	18.1	15.4
Santa Cruz	2,235	2,096	2,291	83.7	81.3	72.9	16.0	14.5	15.6
Riverside	2,222	2,304	3,222	79.5	77.1	79.5	19.7	18.3	20.2
All UCs	9,478	9,498	9,922	81.3	79.4	73.4	47.0	44.3	39.6
Average SAT Score									
Berkeley	1072	1087	1102	1151	1168	1200	1130	1138	1143
UCLA	1030	1048	1066	1119	1155	1185	1089	1118	1140
San Diego	1059	1069	1082	1124	1151	1196	1088	1118	1163
Davis	1048	1056	1067	1083	1091	1108	1050	1070	1067
Irvine	996	1012	1025	1042	1071	1097	1004	1026	1062
Santa Barbara	1008	1021	1042	1045	1059	1102	999	1023	1075
Santa Cruz	1011	1017	1030	1033	1042	1059	990	1013	1039
Riverside	958	968	982	983	996	1009	963	960	968
All UCs	1025	1039	1048	1054	1071	1081	1052	1071	1077

Note: This table shows campus-specific descriptive statistics mirroring Table I. Count and mean average descriptive statistics of 1994-1999 California-resident freshman UC applicants who are or are not underrepresented minorities (URM). URM includes African-American, Hispanic, Chicano/a, and Native American applicants. SAT score includes the Math and Verbal components and was on the 1600 scale. Percent admitted and percent enrolled are conditional on applying to that campus. Source: UC Corporate Student System.

Table A-4: Descriptive Statistics of 1990s UC Admissions by Ethnicity

	Application			Admission			Enrollment		
	'94-5	'96-7	'98-9	'94-5	'96-7	'98-9	'94-5	'96-7	'98-9
Panel A: Black Applicants									
Average Number or Percent of Applicants									
Berkeley	1,020	1,078	1,048	50.2	50.1	23.2	17.7	20.6	10.3
UCLA	1,230	1,318	1,234	53.1	40.6	23.8	20.5	15.7	11.0
San Diego	600	681	802	50.6	53.3	23.7	8.5	9.0	5.1
Davis	608	660	666	76.6	75.5	52.9	19.1	14.7	13.7
Irvine	540	546	605	65.6	50.9	46.3	11.9	9.6	12.1
Santa Barbara	523	608	710	76.3	71.8	48.6	17.6	17.5	12.5
Santa Cruz	364	376	386	78.8	76.5	64.3	13.7	11.0	13.1
Riverside	486	490	703	74.2	67.1	71.4	19.2	16.5	18.6
All UCs	2,104	2,130	2,116	75.2	72.1	64.0	42.8	40.9	34.0
Average SAT Score									
Berkeley	1031	1049	1068	1122	1131	1157	1084	1088	1074
UCLA	1013	1027	1050	1103	1142	1176	1073	1106	1121
San Diego	1031	1040	1056	1119	1136	1210	1072	1104	1188
Davis	1009	1015	1030	1058	1064	1092	998	1015	1042
Irvine	978	994	1005	1031	1074	1090	986	1014	1048
Santa Barbara	983	999	1026	1018	1044	1096	967	979	1045
Santa Cruz	1000	1008	1027	1028	1036	1062	980	990	1019
Riverside	951	963	979	978	1006	1014	958	959	967
All UCs	1006	1018	1032	1043	1062	1078	1032	1052	1056
Panel B: Hispanic Applicants									
Average Number or Percent of Applicants									
Berkeley	2,406	2,684	2,763	55.8	47.6	24.2	20.0	18.5	10.4
UCLA	3,512	3,682	3,987	56.0	43.1	25.1	21.5	16.9	11.6
San Diego	2,338	2,470	3,006	60.8	58.3	34.8	12.7	12.1	9.2
Davis	1,821	1,830	2,002	86.3	86.3	65.6	22.3	19.2	18.2
Irvine	2,257	2,123	2,529	74.8	65.5	56.6	16.5	13.9	14.8
Santa Barbara	2,512	2,754	3,110	76.9	78.2	55.6	16.1	17.9	16.0
Santa Cruz	1,760	1,620	1,796	84.7	82.2	74.5	16.3	15.0	16.0
Riverside	1,690	1,763	2,440	81.0	79.9	81.6	19.9	18.9	20.8
All UCs	6,984	7,000	7,416	82.8	81.2	75.9	47.8	44.8	41.2
Average SAT Score									
Berkeley	1083	1098	1110	1158	1180	1212	1141	1158	1164
UCLA	1031	1051	1066	1121	1156	1184	1090	1117	1143
San Diego	1060	1072	1084	1120	1152	1189	1084	1117	1153
Davis	1054	1064	1072	1083	1094	1106	1056	1075	1069
Irvine	995	1013	1025	1039	1067	1094	1001	1025	1061
Santa Barbara	1007	1020	1040	1044	1057	1099	1001	1028	1076
Santa Cruz	1006	1012	1024	1028	1036	1052	982	1004	1036
Riverside	956	966	979	981	991	1005	962	958	965
All UCs	1025	1040	1048	1052	1068	1077	1051	1071	1077

Note: This table shows separate descriptive statistics for Black and Hispanic UC applicants, showing that the former make up only 20 percent of URM students and tend to have somewhat lower average test scores. Count and mean average descriptive statistics of 1994-1999 California-resident freshman Black and Hispanic UC applicants. SAT score includes the Math and Verbal components and was on the 1600 scale. Percent admitted and percent enrolled are conditional on applying to that campus. Source: UC Corporate Student System.

Table A-5: Descriptive Statistics of 1990s UC Admissions for White and Asian Applicants

	Application			Admission			Enrollment		
	'94-5	'96-7	'98-9	'94-5	'96-7	'98-9	'94-5	'96-7	'98-9
Panel A: White Applicants									
Average Number or % of Applications									
Berkeley	5,928	7,244	7,440	39.9	34.1	31.9	13.9	12.4	12.2
UCLA	6,612	8,294	9,156	43.9	38.0	33.1	13.9	13.5	13.2
San Diego	7,586	9,137	9,887	61.8	59.7	47.4	15.1	12.9	11.9
Davis	6,876	7,576	7,675	73.4	74.8	69.8	18.8	19.8	18.1
Irvine	3,671	3,916	4,392	79.9	74.7	69.9	14.8	15.0	15.1
Santa Barbara	7,780	9,541	10,444	86.6	75.7	59.0	21.5	21.3	17.3
Santa Cruz	4,527	5,015	5,169	88.0	87.9	83.9	19.6	21.8	20.4
Riverside	2,152	2,280	3,186	84.2	87.1	91.8	17.0	19.4	15.7
All UCs	17,060	19,486	19,304	85.4	83.0	83.8	44.9	45.4	45.1
Average SAT Score									
Berkeley	1267	1271	1277	1361	1367	1365	1332	1340	1333
UCLA	1224	1224	1239	1318	1324	1341	1268	1280	1302
San Diego	1221	1218	1229	1281	1298	1307	1248	1265	1273
Davis	1202	1202	1206	1245	1238	1242	1211	1203	1204
Irvine	1166	1169	1176	1193	1200	1208	1161	1169	1170
Santa Barbara	1160	1158	1180	1177	1196	1232	1138	1169	1196
Santa Cruz	1183	1179	1183	1198	1193	1200	1174	1169	1173
Riverside	1136	1132	1141	1151	1147	1151	1125	1120	1128
All UCs	1197	1198	1206	1217	1221	1226	1209	1217	1228
Panel B: Asian Applicants									
Average Number or % of Applications									
Berkeley	7,516	8,955	11,041	35.6	31.1	30.1	16.0	15.3	15.0
UCLA	8,970	10,548	13,200	44.8	36.8	34.3	16.4	13.0	13.7
San Diego	7,182	8,703	11,752	64.2	60.3	49.0	15.6	13.1	12.6
Davis	5,690	6,558	8,464	69.1	69.4	65.9	19.0	20.2	17.6
Irvine	7,211	8,237	10,577	74.4	69.6	61.7	22.3	21.6	18.6
Santa Barbara	4,489	4,550	7,432	81.5	73.7	56.2	13.8	13.1	11.4
Santa Cruz	2,558	2,694	4,296	81.2	81.4	78.0	11.9	13.9	14.6
Riverside	4,240	4,502	6,217	80.7	84.8	86.3	13.4	17.3	18.5
All UCs	14,488	16,148	20,548	84.4	84.3	84.1	55.1	54.1	53.6
Average SAT Score									
Berkeley	1238	1245	1254	1379	1382	1370	1352	1354	1341
UCLA	1199	1209	1223	1314	1340	1344	1258	1283	1298
San Diego	1202	1207	1218	1266	1295	1306	1201	1236	1249
Davis	1156	1166	1172	1214	1221	1219	1125	1147	1139
Irvine	1136	1143	1155	1181	1190	1215	1115	1127	1157
Santa Barbara	1112	1117	1150	1139	1156	1214	1080	1116	1177
Santa Cruz	1113	1114	1131	1139	1137	1158	1099	1102	1129
Riverside	1102	1105	1109	1128	1126	1129	1072	1074	1079
All UCs	1167	1177	1184	1196	1203	1209	1184	1198	1210

Note: This table shows descriptive statistics for white and Asian UC applicants before and after Prop 209, showing minimal evidence of differential trends among the two groups after Prop 209 (though Asian applicants' SAT scores were lower but rising faster throughout the period). Count and mean average descriptive statistics of 1994-1999 California-resident freshman non-URM UC applicants who report being either white or Asian. SAT score includes the Math and Verbal components and was on the 1600 scale. Percent admitted and percent enrolled are conditional on applying to that campus. Source: UC Corporate Student System.

Table A-6: Difference-in-Difference Estimates of Post-1998 URM Application and Enrollment by UC Campus

Campus:	UCB	UCLA	UCSD	UCSB	UCI	UCD	UCSC	UCR	Total
Application conditional on UC application (%)									
URM	11.4	8.7	-3.7	-4.8	-9.8	-4.3	-2.9	-6.3	
	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)	(0.3)	
URM × Prop 209	-2.2	-3.8	0.7	-1.0	0.4	0.7	0.3	3.5	
	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.4)	
$\bar{Y}$	45.3	55.0	49.5	41.3	35.4	37.9	22.6	23.3	
Obs.	199,321	199,321	199,321	199,321	199,321	199,321	199,321	199,321	
Enrollment conditional on application (%)									
URM	13.6	8.0	2.4	0.7	-5.4	0.2	-4.9	-4.1	3.6
	(0.6)	(0.4)	(0.5)	(0.6)	(0.6)	(0.6)	(0.7)	(0.7)	(0.4)
URM × Prop 209	-9.3	-5.9	-3.3	1.6	2.8	0.2	2.1	1.8	-5.8
	(0.6)	(0.5)	(0.5)	(0.7)	(0.7)	(0.8)	(0.9)	(0.8)	(0.5)
$\bar{Y}$	16.8	14.1	12.3	16.8	17.8	18.9	17.8	18.1	50.1
Obs.	90,254	109,566	98,705	82,240	70,643	75,518	45,087	46,434	199,321
Enrollment conditional on **admission** (%)									
URM	-16.9	-17.0	-16.9	-8.1	-15.9	-14.9	-8.5	-7.0	-1.5
	(1.1)	(0.9)	(0.8)	(0.7)	(0.8)	(0.8)	(0.8)	(0.9)	(0.5)
URM × Prop 209	7.3	6.5	9.9	5.8	6.5	9.1	4.7	4.4	-2.2
	(1.5)	(1.3)	(1.2)	(1.0)	(1.1)	(1.1)	(1.1)	(1.0)	(0.6)
$\bar{Y}$	44.9	39.1	24.9	25.6	27.0	27.4	21.7	21.7	60.6
Obs.	28,755	38,037	48,268	53,513	46,299	51,777	36,850	38,581	163,967

Note: This table shows that URM students were discouraged from applying to Berkeley and UCLA after Prop 209 (though remained more likely than similarly-academically-prepared non-URM students), that URM applicants' likelihood of enrollment declined at the more-selective UCs and increased at the less-selective UCs, and that URM yield rates increased at all UCs after Prop 209 (as shown in Antonovics and Sander (2013)). OLS coefficient estimates of β_0 and $\beta_{\cdot 98-99}$ from Equation 1, a difference-in-difference model of 1996-1999 URM UC freshman California-resident applicants' UC applications and enrollment compared to non-URM applicants after the 1998 end of UC's affirmative action program. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21), and are estimated independently by campus or "Total" (all applicants to any UC campus). Robust standard errors in parentheses. Source: UC Corporate Student System and National Student Clearinghouse.

Table A-7: Difference-in-Difference Estimates of URM UC Applicants' Post-1998 Enrollment

	UC Campuses by Selectivity				Comm.		CA	Non-CA	Not in
	Most	Middle	Least	CSU	Coll.	Ivy+	Priv.	Univ.	NSC
Panel A: Difference-in-Difference Coefficients									
URM	10.4	-4.6	-2.8	-3.6	-3.7	2.5	1.3	-0.2	0.7
	(0.4)	(0.3)	(0.2)	(0.3)	(0.3)	(0.1)	(0.3)	(0.2)	(0.2)
URM × Prop 209	-7.6	1.8	1.8	1.9	1.1	0.3	0.8	1.1	-0.9
	(0.4)	(0.4)	(0.3)	(0.4)	(0.4)	(0.2)	(0.3)	(0.3)	(0.3)
$\bar{Y}$	21.9	19.6	6.5	13.8	12.1	2.7	9.3	8.5	6.2
Obs.	199,321	199,321	199,321	199,321	199,321	199,321	199,321	199,321	199,321
Panel B: Estimates of URM × Prop 209 by AI Quartile									
Bottom Quartile	-1.7	-4.9	-0.6	3.4	2.2	-0.1	1.4	0.4	-0.0
	(0.6)	(0.9)	(0.8)	(1.4)	(1.2)	(0.1)	(0.8)	(0.7)	(0.8)
Second Quartile	-12.6	4.4	3.2	3.1	1.0	-0.1	1.5	2.3	-2.4
	(0.8)	(1.1)	(0.8)	(1.0)	(0.9)	(0.1)	(0.8)	(0.6)	(0.6)
Third Quartile	-16.8	13.0	2.2	-1.4	0.3	-0.1	1.6	1.3	-0.0
	(1.0)	(1.0)	(0.6)	(0.7)	(0.7)	(0.2)	(0.8)	(0.6)	(0.6)
Top Quartile	-4.5	1.0	0.5	0.3	0.4	1.1	0.6	0.3	0.1
	(1.1)	(0.7)	(0.4)	(0.5)	(0.5)	(0.6)	(0.7)	(0.6)	(0.6)
Panel C: Difference-in-Difference Coefficients (versus 1995)									
URM	10.2	-4.4	-1.8	-5.2	-2.6	2.9	0.8	-1.1	1.3
	(0.5)	(0.5)	(0.3)	(0.4)	(0.4)	(0.2)	(0.3)	(0.3)	(0.4)
URM × Prop 209	-7.8	1.5	0.9	3.7	0.4	-0.1	1.3	2.0	-1.7
	(0.5)	(0.5)	(0.3)	(0.5)	(0.4)	(0.2)	(0.4)	(0.4)	(0.4)
$\bar{Y}$	22.0	19.4	6.4	14.0	11.7	2.8	8.8	8.6	6.8
Obs.	148,980	148,980	148,980	148,980	148,980	148,980	148,980	148,980	148,980

Note: This table summarizes URM UC applicants' changed university enrollment following Prop 209, with aggregate flows from the more-selective UC campuses cascading to all other sectors of higher education, particularly among second- and third-AI-quartile applicants, and slightly larger flows compared to the '94-95 baseline. Estimates of β_0 and $\beta_{\cdot 98-99}$ from Equation 1, an OLS difference-in-difference model of 1996-1999 URM UC freshman California-resident applicants' enrollment outcomes compared to non-URM outcomes after the 1998 end of UC's affirmative action program. Outcomes defined as the first institution of enrollment by college or university type within six years of graduating high school, as measured in the NSC. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Panel C omits the years 1996-1997 because some universities preemptively curtailed their affirmative action programs in those years. "Ivy+" universities include the Ivy League, MIT, Stanford, and the University of Chicago; private and non-CA universities exclude those institutions. Academic Index (AI) is defined in footnote 6; models by AI quartile are estimated independently, with quartiles defined by the AI distribution of 96-97 URM UC applicants. Robust standard errors in parentheses. Source: UC Corporate Student System and National Student Clearinghouse.

Table A-8: Difference-in-Difference Estimates of URM UC Applicants' Post-1998 Enrollment, cont.

	UC Campuses by Selectivity				Comm.		CA	Non-CA	Not in
	Most	Middle	Least	CSU	Coll.	Ivy+	Priv.	Univ.	NSC
Panel D: Estimates with Separate Coefficients for Black and Hispanic Applicants									
Black	17.0	-7.6	-4.7	-6.2	-8.1	3.7	0.9	4.3	0.8
	(0.7)	(0.5)	(0.3)	(0.6)	(0.5)	(0.3)	(0.5)	(0.5)	(0.5)
Hispanic	7.9	-3.8	-2.2	-2.6	-2.1	2.1	1.8	-1.8	0.8
	(0.4)	(0.4)	(0.2)	(0.4)	(0.3)	(0.2)	(0.3)	(0.2)	(0.3)
Black × Prop 209	-10.6	1.9	1.8	3.2	0.5	0.7	1.7	2.5	-1.5
	(0.8)	(0.7)	(0.5)	(0.8)	(0.7)	(0.4)	(0.7)	(0.7)	(0.6)
Hispanic × Prop 209	-6.3	1.8	1.9	1.4	0.9	0.1	0.4	0.8	-0.9
	(0.5)	(0.5)	(0.3)	(0.5)	(0.4)	(0.2)	(0.4)	(0.3)	(0.3)
$\bar{Y}$	21.9	19.6	6.5	13.8	12.1	2.7	9.3	8.5	6.2
Obs.	197,804	197,804	197,804	197,804	197,804	197,804	197,804	197,804	197,804
Panel E: Estimates of Black × Prop 209 by Black AI Quartile									
Bottom Quartile	-1.2	-5.9	-0.7	5.7	2.7	0.0	1.3	1.1	-2.3
	(1.4)	(1.6)	(1.3)	(3.0)	(2.4)	(0.0)	(1.6)	(2.0)	(1.6)
Second Quartile	-12.4	2.0	3.7	4.8	-2.3	-0.6	0.1	3.9	0.8
	(1.8)	(2.1)	(1.5)	(2.0)	(1.7)	(0.4)	(1.7)	(1.6)	(1.2)
Third Quartile	-23.4	15.1	1.2	0.4	-1.2	0.2	4.7	4.5	-0.9
	(2.2)	(2.0)	(1.2)	(1.3)	(1.3)	(0.6)	(1.7)	(1.6)	(1.1)
Top Quartile	-14.5	3.2	2.1	-0.0	2.3	2.9	4.6	1.7	-1.9
	(2.3)	(1.4)	(0.8)	(0.9)	(1.0)	(1.5)	(1.5)	(1.6)	(1.2)
Panel F: Estimates of Hispanic × Prop 209 by Hispanic AI Quartile									
Bottom Quartile	-1.3	-5.0	0.1	2.9	2.0	-0.0	0.7	0.9	-0.2
	(0.6)	(1.0)	(0.9)	(1.5)	(1.3)	(0.0)	(0.8)	(0.6)	(0.9)
Second Quartile	-11.2	6.0	3.0	1.8	1.3	0.0	1.3	1.2	-3.0
	(0.9)	(1.2)	(0.9)	(1.1)	(1.0)	(0.1)	(0.9)	(0.6)	(0.7)
Third Quartile	-14.9	11.7	2.5	-1.2	0.1	0.2	0.8	0.9	-0.1
	(1.1)	(1.2)	(0.7)	(0.9)	(0.8)	(0.2)	(0.9)	(0.6)	(0.6)
Top Quartile	-2.8	1.0	0.5	0.2	-0.1	0.3	0.3	-0.4	0.8
	(1.2)	(0.9)	(0.4)	(0.6)	(0.6)	(0.7)	(0.8)	(0.7)	(0.7)

Note: This table shows that Black UC applicants were more likely to exit the more-selective UC campuses than Hispanic applicants following Prop 209, though they were also more likely to instead enroll at Ivy+ and non-California universities, especially among higher-AI applicants. This table extends Table A-7. Estimates of β_0 and $\beta_{\cdot 98-99}$ from an extension Equation 1 splitting the URM indicator into separate Black and Hispanic indicators interacted with post-209. The model is an OLS difference-in-difference model of 1996-1999 URM UC freshman California-resident applicants' enrollment outcomes compared to non-URM outcomes after the 1998 end of UC's affirmative action program. Outcomes defined as the first institution of enrollment by college or university type within six years of graduating high school, as measured in the NSC. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Models omit Native American applicants. "Ivy+" universities include the Ivy League, MIT, Stanford, and the University of Chicago; private and non-CA universities exclude those institutions. Academic Index (AI) is defined in footnote 6; models by AI quartile are estimated independently, with quartiles defined separately for each ethnicity by the AI distribution of 96-97 URM UC applicants. Robust standard errors in parentheses. Source: UC Corporate Student System and National Student Clearinghouse.

Table A-9: Estimated Change in UC URM Enrollment, '94-95 to '98-99

	Change in App. Pool	Change in Adm. and Yield		
UC Campus	Decrease	Increase†	Decrease†	Total
Berkeley	-93	4	-327	-415
UCLA	-122	0	-496	-618
San Diego	-35	127	-41	50
Santa Barbara	-32	341	-25	284
Irvine	-36	150	-50	64
Davis	-53	91	-140	-103
Santa Cruz	-46	11	-85	-119
Riverside	-38	103	-7	61
Total	-456	827	-1173	-800

Note: This table exploits year-over-year changes in URM and non-URM UC application and enrollment at each UC campus by AI bin to estimate that URM UC enrollment fell by 450 students as a result of application dissuasion and 350 students as a result of changes in UC campuses' URM admissions and yield rates (with particularly-large declines at Berkeley and UCLA), resulting in a net decline in URM UC enrollment of 800 students, or 14 percent of UC's '98-99 URM enrollment. **Change in App. Pool**: For each campus, these estimates show the sum across 200-point AI bins of the positive (increase) and negative (decrease) products of (1) the change in the number of UC applicants by AI bin (see Figure VII) and (2) the raw difference-in-difference in URM UC applicants' enrollment at each campus by AI bin (smoothed across bins as in Figure III), where post-209 enrollment is set to 0 (since these students did not apply to UC). **Change in Adm. and Yield**: The sum across AI centiles of the positive (increase) and negative (decrease) products of (1) the number of '98-99 URM UC applicants in each bin, and (2) the raw difference-in-difference in URM UC applicants' enrollment at each campus by AI bin, smoothed across bins. **Both**: Baseline is defined as '94-95 applicants and post-209 defined as '98-99 applicants, with 1994 omitted from the difference-in-difference estimates since '94 NSC data are unreliable. Estimates reported as annual changes in '98-99. The first column is always 0 because URM UC applications declined in every relevant AI bin, resulting in enrollment increases at no campuses. † Estimates of increased and decreased URM enrollment should be interpreted as lower-bound estimates biased toward 0 by overlap in the AI distribution between students exiting and entering each campus. Source: UC Corporate Student System, National Student Clearinghouse, and the California Department of Education.

Table A-10: Difference-in-Difference Estimates of URM UC Applicants' Post-1998 Univ. Characteristics

	First Four-Year Institution			First Institution of Enrollment			
	Adm. Rate (%)	Avg. SAT	6 Yr. Rate (%)	"MH" VA[1] BA (%)	"MH" VA[1] Earn ($)	"CFSTY" VA[1] BA (%)	"CFSTY" VA[1] Earn ($)
Panel C: Difference-in-Difference Coefficients (versus 1995)							
URM	-7.2	39.8	4.1	1.7	1,910	2.8	2,923
	(0.3)	(1.5)	(0.2)	(0.2)	(101)	(0.2)	(115)
URM × Prop 209	3.9	-24.1	-2.5	-0.5	-463	-1.1	-1,085
	(0.3)	(1.7)	(0.2)	(0.2)	(114)	(0.2)	(130)
$\bar{Y}$	51.0	1,188	68.3				
Obs.	128,957	127,138	125,319	131,214	128,628	130,261	128,417
Panel D: Estimates with Separate Coefficients for Black and Hispanic Applicants							
Black	-11.0	52.8	5.4	3.4	3,149	5.2	4,815
	(0.3)	(2.1)	(0.3)	(0.2)	(142)	(0.2)	(154)
Hispanic	-6.1	31.6	2.9	1.5	1,560	2.1	2,305
	(0.2)	(1.2)	(0.2)	(0.1)	(85)	(0.1)	(95)
Black × Prop 209	4.6	-24.7	-2.6	-0.8	-455	-1.5	-1,128
	(0.5)	(2.9)	(0.4)	(0.3)	(197)	(0.3)	(214)
Hispanic × Prop 209	3.3	-17.9	-1.4	-0.5	-328	-0.7	-811
	(0.3)	(1.5)	(0.2)	(0.2)	(103)	(0.2)	(117)
Obs.	172,661	170,293	168,684	176,026	172,571	174,769	172,290

Note: This table shows that the impact of Prop 209 on proxies of UC URM applicants' university quality are generally somewhat larger when compared to the '94-95 baseline, and that Black and Hispanic UC applicants faced similar-magnitude declines in proxies of university quality after Prop 209. This table extends Table II. **Panel C**: Estimates of β_0 and $\beta_{\cdot 98-99}$ from Equation 1, a difference-in-difference model of 1995 and 1998-1999 URM UC freshman California-resident applicants' outcomes compared to non-URM outcomes after the 1998 end of UC's affirmative action program. The years 1996-1997 are omitted in Panel C because some universities preemptively curtailed their affirmative action programs in those years. **Panel D**: Estimates of β_0 and $\beta_{\cdot 98-99}$ from an extension Equation 1 splitting the URM indicator into separate Black and Hispanic indicators interacted with post-209. The model is an OLS difference-in-difference model of 1996-1999 URM UC freshman California-resident applicants' outcomes compared to non-URM outcomes after the 1998 end of UC's affirmative action program. Models omit Native American applicants. **All**: For details on outcomes and specification, see Table II. Robust standard errors in parentheses. Source: UC Corporate Student System, National Student Clearinghouse, the California Employment Development Department, and the Integrated Postsecondary Education Data System (IPEDS).

Table A-11: Difference-in-Difference Estimates of URM UC Applicants' Post-1998 Educational Outcomes

	Earn Bach. Degree		Earn STEM Degree		Earn Grad. Degree		
	5-Year	6-Year	Uncondit.	Condit.	All	STEM	JD
Panel C: Difference-in-Difference Coefficients (versus 1995)							
URM	-1.15	-2.46	0.09	-0.46	5.48	1.43	1.18
	(0.55)	(0.55)	(0.42)	(0.58)	(0.36)	(0.13)	(0.15)
URM × Prop 209	-1.84	-0.91	-0.61	0.25	-3.51	-2.06	-1.03
	(0.62)	(0.62)	(0.47)	(0.65)	(0.48)	(0.18)	(0.19)
$\bar{Y}$	47.33	74.23	22.37	27.43	27.99	4.30	3.76
Obs.	148,980	148,980	148,980	110,588	190,540	190,540	190,540
Panel D: Estimates with Separate Coefficients for Black and Hispanic Applicants							
Black	2.06	-0.77	3.63	4.10	12.87	1.45	3.24
	(0.74)	(0.75)	(0.53)	(0.75)	(0.78)	(0.27)	(0.38)
Hispanic	-3.14	-3.08	-0.71	-0.90	2.15	0.39	0.17
	(0.47)	(0.46)	(0.35)	(0.47)	(0.48)	(0.19)	(0.20)
Black × Prop 209	-0.83	-0.15	-1.54	-1.05	-1.50	-0.05	-0.56
	(0.99)	(1.01)	(0.70)	(1.00)	(1.05)	(0.38)	(0.49)
Hispanic × Prop 209	-0.82	-0.79	-0.62	-0.37	-1.02	-0.73	-0.06
	(0.58)	(0.57)	(0.43)	(0.58)	(0.59)	(0.23)	(0.23)
Obs.	197,804	197,804	197,804	147,795	197,804	197,804	197,804

Note: This table shows that the impact of Prop 209 on URM UC applicants' educational outcomes generally appears somewhat larger when compared to the '94-95 baseline, and that Black and Hispanic UC applicants faced similar relative declines in educational outcomes following Prop 209. This table extends Table III. Estimates of β_0 and $\beta_{\cdot 98-99}$ from Equation 1, an OLS difference-in-difference model of 1996-1999 (or, in Panel C, 1995 and 1998-1999) URM UC freshman California-resident applicants' educational outcomes compared to non-URM outcomes after the 1998 end of UC's affirmative action program. For details on outcomes and specification, see Table III. The years 1996-1997 are omitted in Panel C because some universities preemptively curtailed their affirmative action programs in those years; 1994 is omitted because NSC records from that year are unreliable. Panel D interacts the two coefficients with Black and Hispanic coefficients to separately estimate effects for each group; Native American applicants are omitted. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Academic Index (AI) is defined in footnote 6. Robust standard errors in parentheses. Source: UC Corporate Student System and National Student Clearinghouse.

Table A-12: Difference-in-Difference Estimates of URM UC Applicants' Post-1998 Educational Outcomes

	Earn Bach. Degree		Earn STEM Degree	
	5-Year	6-Year	Uncondit.	Condit.
Panel E: Coefficients measured with only NSC data				
URM	-0.98	-1.33	0.34	0.12
	(0.41)	(0.41)	(0.28)	(0.46)
URM × Prop 209	-1.01	-1.06	-0.93	-0.43
	(0.51)	(0.51)	(0.35)	(0.57)
$\bar{Y}$	45.86	71.60	18.36	28.93
Obs.	199,321	199,321	199,321	126,481
Panel F: Coefficients in UC data, condit. on UC enrollment				
URM	-5.99	-2.31	0.26	0.24
	(0.63)	(0.57)	(0.52)	(0.60)
URM × Prop 209	-1.02	0.07	-0.50	-0.27
	(0.82)	(0.74)	(0.68)	(0.77)
$\bar{Y}$	46.81	80.39	29.31	29.81
Obs.	94,469	94,469	94,469	75,943

Note: This table shows that the impact of Prop 209 on URM UC applicants' undergraduate degree attainment generally appears somewhat larger when measured in NSC alone, as a result of imperfect UCSC reporting, and shrinks when the sample is restricted to UC enrollees before and after Prop 209 measured only in UC data). This table extends Table III. Estimates of β_0 and $\beta_{\cdot 98-99}$ from Equation 1, an OLS difference-in-difference model of 1996-1999 URM UC freshman California-resident applicants' educational outcomes compared to non-URM outcomes after the 1998 end of UC's affirmative action program. For details on outcomes and specification, see Table III. Outcomes are measured in NSC alone in Panel D and in UC administrative data alone in Panel E (excluding applicants who do not enroll at a UC campus). Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Academic Index (AI) is defined in footnote 6. Robust standard errors in parentheses. Source: UC Corporate Student System and National Student Clearinghouse.

Table A-13: Difference-in-Difference Estimates of URM UC Applicants' Post-1998 Earned Majors

Major	Baseline	β_{98-99}	(s.e.)	Major	Baseline	β_{98-99}	(s.e.)
Biology	4.4	0.62	(0.25)	Economics	2.0	-0.39	(0.17)
Other Humanities	2.7	0.30	(0.18)	History	2.4	-0.32	(0.17)
International Stud.	1.2	0.23	(0.14)	Mathematics	0.9	-0.29	(0.11)
Film	0.9	0.22	(0.11)	Electrical Eng.	0.8	-0.23	(0.11)
English	3.3	0.18	(0.20)	Law	0.7	-0.20	(0.09)
Biochemistry	0.5	0.17	(0.09)	Sociology	5.0	-0.20	(0.24)
Architecture	0.3	0.15	(0.08)	Computer Science	0.7	-0.18	(0.12)
Criminology	1.0	0.14	(0.11)	Political Science	4.2	-0.18	(0.23)
Chemistry	0.4	0.13	(0.08)	Communications	2.5	-0.17	(0.18)
Environmental Stud.	0.3	0.08	(0.07)	Computer Eng.	0.3	-0.17	(0.07)

Note: This table shows the fields of study that relatively increased and decreased with greatest likelihood among URM UC applicants after Prop 209, with a mix of STEM and non-STEM fields both increasing and decreasing. Estimates of β_{98-99} from Equation 1, an OLS difference-in-difference model of 1996-1999 URM UC freshman California-resident applicants' unconditional likelihood (in percentage points) of earning a major in each major group compared to non-URM outcomes after Prop 209. The ten major groups with the largest and smallest β_{98-99} estimates are presented, along with the "baseline" proportion of 1996-1997 URM UC applicants who earned a major in each group. Major choice is measured only in NSC. NSC majors are categorized by the author; full categorization available upon request. The sum across all major groups' baseline values is 61.1 (reflecting URM UC applicants' likelihood of degree attainment); the sum across all major groups' β_{98-99} estimates is -1.24, reflecting the change in NSC-measured graduation after 1998. Source: UC Corporate Student System and National Student Clearinghouse.

Table A-14: Difference-in-Difference Est. of URM UC Applicants' Post-1998 CA Wage Outcomes, cont.

	Average 6-16 Years after UC App.				Average 12-16 Years after UC App.			
	# Years CA Emp.	Total Wages	Log Wages	# > $100K Wages	# Years CA Emp.	Total Wages	Log Wages	# > $100 Wages
Panel C: Estimates of URM × Prop 209 by AI Quartile								
Bottom Quartile	-0.02	-1,095	-0.06	0.06	0.00	-1,964	-0.09	0.00
	(0.11)	(995)	(0.03)	(0.06)	(0.06)	(1,430)	(0.04)	(0.04)
Second Quartile	0.10	-1,824	-0.05	-0.11	0.03	-1,935	-0.04	-0.09
	(0.10)	(936)	(0.03)	(0.06)	(0.05)	(1,361)	(0.03)	(0.04)
Third Quartile	0.02	-1,595	-0.03	-0.14	0.02	-2,077	-0.02	-0.09
	(0.09)	(935)	(0.02)	(0.06)	(0.05)	(1,374)	(0.03)	(0.04)
Top Quartile	-0.10	-1,468	-0.02	-0.06	-0.04	-2,024	-0.03	-0.05
	(0.09)	(1,041)	(0.02)	(0.06)	(0.05)	(1,553)	(0.03)	(0.04)
Panel D: Difference-in-Difference Coefficients (versus 1995)								
URM	0.19	343	0.04	-0.00	0.11	-387	0.01	0.02
	(0.04)	(391)	(0.01)	(0.02)	(0.02)	(580)	(0.01)	(0.01)
URM × Prop 209	-0.22	-2,555	-0.08	-0.19	-0.11	-3,184	-0.07	-0.15
	(0.05)	(462)	(0.01)	(0.03)	(0.02)	(676)	(0.01)	(0.02)
$\bar{Y}$	7.05	61,107	10.69	1.39	3.07	79,331	10.90	0.95
Obs.	190,540	158,989	158,989	190,540	190,540	136,341	136,341	190,540

Note: This table shows that the labor market deterioration faced by URM UC applicants following Prop 209 was somewhat-larger among low-AI applicants and somewhat-larger when estimated relative to the '94-95 baseline. This table extends Table IV. Estimates of β_0 and $\beta_{\cdot 98-99}$ from Equation 1, an OLS difference-in-difference model of 1996-1999 (or, in Panel D, 1994-1995 and 1998-1999) URM UC freshman California-resident applicants' educational outcomes compared to non-URM outcomes after the 1998 end of UC's affirmative action program. Outcomes are defined as number of years of non-zero California wages, average wages and log wages across years with non-zero wages, and number of years with wages above $100,000, among the years 6-16 or 12-16 years after initial UC application. Outcomes measured in the California Employment Development Department database, which includes employment covered by California unemployment insurance. The years 1996-1997 are omitted in Panel D because some universities preemptively curtailed their affirmative action programs in those years. Models include high school fixed effects and the components of UC's Academic Index (see footnote 21). Academic Index (AI) is defined in footnote 6; models by AI quartile are estimated independently, with quartiles defined by the AI distribution of 96-97 URM UC applicants. Annual wages CPI-adjusted to 2018 and winsorized at top and bottom 1 percent. Robust standard errors in parentheses. Source: UC Corporate Student System and the California Employment Development Department.

Table A-15: 1994-2001 Change in UC Application Rates in Public CA High Schools by Ethnicity

		All Campuses			Most-Selective Campuses		
		Unweighted	Weighted		Unweighted	Weighted	
Black	1995	0.034	0.023	0.014	0.021	0.016	0.011
		(0.021)	(0.014)	(0.014)	(0.019)	(0.013)	(0.013)
	1996	-0.024	-0.005	-0.012	-0.038	-0.011	-0.011
		(0.021)	(0.015)	(0.015)	(0.019)	(0.013)	(0.013)
	1997	-0.011	-0.016	-0.020	-0.014	-0.025	-0.033
		(0.022)	(0.015)	(0.015)	(0.020)	(0.014)	(0.013)
	1998	-0.013	-0.008	-0.014	-0.029	-0.031	-0.031
		(0.021)	(0.014)	(0.014)	(0.019)	(0.013)	(0.013)
	1999	0.003	-0.024	-0.026	-0.034	-0.054	-0.053
		(0.022)	(0.016)	(0.015)	(0.020)	(0.014)	(0.013)
	2000	-0.005	-0.013	-0.012	-0.018	-0.037	-0.035
		(0.021)	(0.015)	(0.015)	(0.019)	(0.013)	(0.013)
	2001	-0.000	-0.019	-0.023	-0.025	-0.051	-0.051
		(0.021)	(0.016)	(0.015)	(0.019)	(0.013)	(0.013)
Hispanic	1995	0.006	-0.004	-0.004	0.002	-0.005	-0.009
		(0.013)	(0.011)	(0.010)	(0.012)	(0.009)	(0.009)
	1996	-0.016	-0.020	-0.026	-0.011	-0.010	-0.012
		(0.013)	(0.011)	(0.011)	(0.012)	(0.010)	(0.009)
	1997	-0.018	-0.033	-0.035	-0.014	-0.029	-0.036
		(0.014)	(0.011)	(0.011)	(0.013)	(0.009)	(0.009)
	1998	-0.021	-0.026	-0.022	-0.031	-0.029	-0.027
		(0.014)	(0.011)	(0.010)	(0.012)	(0.009)	(0.009)
	1999	-0.036	-0.040	-0.037	-0.051	-0.048	-0.046
		(0.014)	(0.011)	(0.011)	(0.012)	(0.009)	(0.009)
	2000	-0.021	-0.028	-0.029	-0.037	-0.039	-0.036
		(0.014)	(0.011)	(0.011)	(0.013)	(0.010)	(0.009)
	2001	-0.029	-0.026	-0.024	-0.027	-0.029	-0.029
		(0.014)	(0.012)	(0.011)	(0.012)	(0.010)	(0.010)
Asian	1995	0.046	0.018	0.018	0.023	0.002	0.009
		(0.016)	(0.012)	(0.011)	(0.014)	(0.010)	(0.010)
	1996	0.010	0.022	0.021	0.019	0.025	0.026
		(0.017)	(0.012)	(0.011)	(0.014)	(0.010)	(0.010)
	1997	0.018	0.021	0.020	0.029	0.014	0.015
		(0.016)	(0.012)	(0.012)	(0.014)	(0.010)	(0.010)
	1998	0.036	0.025	0.024	0.035	0.009	0.015
		(0.017)	(0.012)	(0.012)	(0.015)	(0.011)	(0.010)
	1999	0.032	0.016	0.009	0.023	-0.004	-0.000
		(0.017)	(0.012)	(0.011)	(0.015)	(0.011)	(0.010)
	2000	0.042	0.017	0.025	0.045	0.004	0.015
		(0.017)	(0.012)	(0.011)	(0.015)	(0.011)	(0.010)
	2001	0.043	0.026	0.029	0.052	0.024	0.025
		(0.017)	(0.012)	(0.012)	(0.015)	(0.012)	(0.011)
HS×Eth.		X	X	X	X	X	X
HS×Year		X	X	X	X	X	X
by Eth.×Gender				X			X
R^2	0.72	0.90	0.82	0.72	0.90	0.83	
Obs.	20,311	20,311	37,622	21,191	21,191	39,008	

Note: This table provides the underlying regression statistics (estimated at the annual level) behind Figure VII, showing that URM application rates following Prop 209 declined by between 4 and 6 percent of all UC-eligible URM public high school graduates while Asian application rates remained unchanged after Prop 209 in the main 'weighted' specifications. Estimates of the change in the proportion of California public high school graduates by ethnicity who applied to UC or to UC's more-selective Berkeley and UCLA campuses, relative to 1994. Coefficients are estimates of $\beta_{e,y,a}$ from different specifications of Equation 2, with annual coefficients and across all AI bins. Columns 1 and 4 are unweighted, columns 2 and 5 are weighted by the number of graduates in each high-school-year (main specification), and columns 3 and 6 disaggregate observations by gender (as well as school-year-ethnicity) and weight by number of graduates. Standard errors in parentheses clustered by high school. Source: UC Corporate Student System and the California Department of Education.

Table A-16: Difference-in-Difference Estimates of URM Students' Post-1998 STEM Grades and Persistence

	SAT %tile	GPA	Persist.	STEM Deg.	SAT %tile	GPA	Persist.	STEM Deg.
URM	-19.0	-0.42	-11.2	-10.3	-7.3	-0.06	-2.0	0.1
	(1.7)	(0.06)	(1.5)	(0.6)	(1.2)	(0.05)	(1.6)	(0.6)
URM × Prop 209	2.7	0.02	1.5	1.2	4.0	-0.01	0.6	-0.1
	(1.4)	(0.05)	(1.7)	(0.9)	(0.9)	(0.04)	(1.5)	(0.8)
AI Cov. And HS FE					X	X	X	X
$\bar{Y}$	48.9	2.59	59.3	26.0	48.9	2.59	59.3	26.0
# of Obs.	109,489	105,550	85,206	56,160	109,489	105,550	85,206	56,160

Note: This table shows that URM students across five UC campuses had lower STEM class rank, performance, persistence, and STEM major completion before Prop 209, but that these latter three gaps are fully explained by the students' prior academic opportunities and preparation; ending affirmative action had no estimable impact on any of them. Difference-in-difference WLS regression coefficient estimates of 1996-1999 UC enrollees' introductory STEM course rank, performance, or persistence, differencing across URM status and post-1998 following Equation 3. In all but the 'STEM Deg' columns, each observation is a student-course pair in an introductory biology, chemistry, physics, or computer science course (see Appendix H) taken within 2.5 years of matriculation, stacking over courses and weighted evenly across observed students. SAT percentile is the fraction of other 1994-2002 freshman CA-resident peers who have lower SAT scores than the student; persistence indicates completing the subsequent course in the introductory STEM course sequence; and course grade is the grade points received in completed courses. In the 'STEM Degree' models each observation is a student; the outcome indicates completing any UC STEM degree. Academic preparation covariates include high school fixed effects, and the components of UC's Academic Index (see footnote 21); all models include cohort fixed effects. The sample is restricted to CA-resident freshmen students at UCB, UCSB, UCD, UCSC, or UCR. UCSC is omitted from the GPA model because it did not mandate letter grades in the period. Standard errors (in parentheses) are two-way clustered by student and course, or robust ('STEM Deg'). Source: UC Corporate Student System and UC-CHP Database (Bleemer, 2018).

Table A-17: Difference-in-Difference Estimates of URM UC Enrollees' Post-1998 STEM Outcomes

	Chemistry				Biology		Physics		Comp. Science		
	1	2	3	4	1	2	1	2	1	2	3
Grade in Course (if earned grade)											
URM	0.06	-0.11	-0.22	-0.09	-0.02	-0.18	-0.06	0.04	-0.11	0.15	0.12
	(0.02)	(0.04)	(0.05)	(0.06)	(0.04)	(0.06)	(0.04)	(0.07)	(0.09)	(0.15)	(0.15)
URM × Prop 209	-0.09	0.08	0.27	0.07	-0.02	0.09	-0.00	-0.18	-0.02	-0.29	0.01
	(0.03)	(0.05)	(0.07)	(0.08)	(0.05)	(0.08)	(0.06)	(0.09)	(0.13)	(0.22)	(0.22)
Acad. Prep.	X	X	X	X	X	X	X	X	X	X	X
$\bar{Y}$	2.53	2.54	2.49	2.65	2.46	2.65	2.73	2.91	2.57	2.61	2.89
Obs.	22,330	14,415	10,632	7,610	12,436	7,639	11,719	6,059	6,027	3,708	2,975
Indicator for Persistence to Next Course (%)											
URM	-1.7	5.1	-10.2		-4.1		-6.3		-8.4	4.1	
	(1.4)	(1.7)	(2.1)		(1.9)		(2.1)		(3.5)	(5.0)	
URM × Prop 209	1.5	-2.9	8.7		-0.9		5.1		-3.2	-2.9	
	(1.8)	(2.3)	(2.9)		(2.5)		(2.7)		(4.6)	(6.9)	
Acad. Prep.	X	X	X		X		X		X	X	
$\bar{Y}$	59.9	64.6	68.1		54.0		48.5		55.3	68.7	
Obs.	23,384	14,933	10,954		12,858		12,291		6,638	4,148	

Note: This table shows course-specific regression coefficients mirroring the sixth and seventh columns of Table A-16, showing that URM students at the five observed UC campuses tended to earn lower grades in most STEM courses following Prop 209, with both positive and negative estimates on persistence across different courses. Difference-in-difference OLS regression coefficient estimates across 1996-1999 CA-resident freshman UCB, UCSB, UCD, UCSC, or UCR enrollees' introductory STEM courses, differencing across URM status and post-1998 using Equation 3. Persistence indicates completing the subsequent course in the introductory STEM course sequence; course grade is the grade points received in completed courses. Academic covariates include high school fixed effects and the components of UC's Academic Index (see footnote 21). Standard errors (in parentheses) are robust. The specific courses comprising each sequence can be seen in Appendix H; courses taken after the first 2.5 years of matriculation are omitted. UCSC is omitted from the GPA model because it did not mandate letter grades in the period. Source: UC Corporate Student System and UC-CHP Database (Bleemer, 2018).

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