Mismatch at the University of California before Proposition 209

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Much of the academic literature on affirmative action has focused on the Mismatch Hypothesis, which holds that more-selective university enrollment harms some lower-testing students. Arcidiacono et al (2014) and Arcidiacono, Aucejo, and Hotz (2016) present evidence of mismatch in the context of the University of California's 1990s affirmative action policy, while Sander and Taylor (2012) argue that Proposition 209 – which banned affirmative action at UC starting in 1998 – reduced mismatch among Black and Hispanic UC enrollees. However, Bleemer (2020) shows that ending UC's affirmative action policy did not improve the educational outcomes of Black and Hispanic UC applicants, implying that the Black and Hispanic students targeted by UC's affirmative action had not been mismatched. This brief reconciles each prior study with Bleemer (2020)'s baseline findings.

1 Introduction

This brief reconciles the findings of Bleemer (2020), who shows that banning race-based affirmative action at public California universities caused educational and wage deterioration among college-bound Black and Hispanic Californians, with earlier evidence that some Black and Hispanic Californians would have been better off enrolling at less-selective universities than they attended as a result of affirmative action. Using more-detailed administrative data than previous studies, I show that upon further interrogation, these prior evidence should not be interpreted as being in tension with the conclusion that affirmative action provided substantial average educational and wage benefits to targeted University of California (UC) applicants.

The first section below shows that an early table in Arcidiacono et al. (2014) that could be interpreted to suggest that Prop 209 increased underrepresented minority (URM) UC students' degree attainment instead primarily reflects UC's changed URM student composition after the end of its affirmative action policy. Section 3 discusses the structural assumptions that differentiate the predictions of Arcidiacono, Aucejo, and Hotz (2016) regarding STEM degree attainment under affirmative action – namely, that affirmative action leads some 'mismatched' Black and Hispanic students to become less likely to earn STEM majors – with the reduced-form findings in Bleemer (2020). Finally, Section 4 shows that the descriptive statistics presented by Sander and Taylor (2012) are misleadingly interpreted to suggest that Prop 209 had negative ramifications for young URM Californians, when in fact the statistics are mostly artifacts of UC's changed student composition after Prop 209 as well as race-neutral shifts in UC's selectivity and total enrollment throughout the 1990s and 2000s.

This brief does not take a stance on the general prevalence of 'mismatch' in higher education, defined as the negative ramifications of more-selective university enrollment that may be experienced by some less-academically-prepared college students. Instead, it focuses on whether affirmative action generated mismatch *at the mean* (that

This brief extends Bleemer (2020); see that paper for acknowledgements. The author was employed by the University of California in a research capacity throughout the period during which the study was conducted. Remaining errors are my own.

is, on average among UC applicants or UC enrollees) prior to California's Proposition 209.

2 Selection on Unobservables in Arcidiacono et al. (2014)

The baseline estimates presented in Tables 3 and A-14 of Bleemer (2020) show that Prop 209 caused a small and statistically-noisy decline in six-year Bachelor's degree attainment among URM UC applicants relative to academically-comparable non-URM applicants, with a relatively-precise null effect among UC enrollees. Arcidiacono et al. (2014) (hereafter AACH) present evidence that suggests a near-opposite finding, showing that Prop 209 increased the likelihood with which URM UC enrollees earned university degrees within five years.[1] There are several differences in the research design used in these two studies, the most consequential being a difference in available data. While I observe a comprehensive database containing largely complete applications for all 1994-2002 California-resident freshman applicants to any UC campus, AACH employ a highly-censored UC *enrollee* database with binned years (by 3; e.g. 1995-1997), binned high school GPA (4 bins) and SAT scores (7 bins each, with no SAT II scores) and no high school information. They do observe a continuous weighted average of HSGPA and SAT scores referred to as students' "Academic Index", though it differs from UC's most common contemporaneous AI; I will refer to this index as AI'.[2] Using these data, AACH present a summary table that they argue provides direct evidence that Prop 209 increases URM graduation rates. They employ a single-difference design estimated separately for URM and white 1995-2000 UC freshman California-resident enrollees:

$$GRAD_{iy} = \alpha + \beta_{q_i} POST_y + \gamma X_i + \epsilon iy \qquad (1)$$

where $GRAD_{iy}$ indicates five-year graduation and $POST_y$ indicates 1998 or later entry to university (after Prop 209). AACH present estimates in their Table 3 for various specifications of X_i, from null up to their "Full AACH Controls" (referred to in AACH as "Extended Controls 2") in which X_i contains binned intended major indicators, binned family income indicators, and the parental education index all interacted with AI'. They present estimates for a uniform q_i and allowing q_i to indicate AI' quartiles, with the first through third quartiles estimated relative to the top quartile. Quartiles are defined separately for each ethnicity.

I replicate AACH's Table 3 in Table 1.[3] AACH show that when X_i is null, URM students are estimated to graduate with 4.4% greater likelihood after 1998, while white students are estimated to graduate with 2.5% greater likelihood. These estimates fall once the full set of controls have been added, to 3.0% for URM and 1.4% for white, suggesting that URM students' likelihood of graduation increased more than that of white students after Prop 209. Finally, when split by AI' quartile, they show that these graduation gains are enjoyed by only the bottom three quartiles of URM students, but by all four quartiles of white students, which AACH suggest reflects "students in the lower quartiles are attending campuses that better match their levels of preparation" after 1998.

Table 1 adds a new specification to those discussed in AACH, replacing AI' in X_i with the components of AI (as in the main specification above), without otherwise adjusting the interacted effects. This change substantially attenuates the estimates – to 0.8 percent for URM and 0.7% for white students – and eliminates the ethnicity gap. I also re-estimate the model by AI' quartile, showing that the top and bottom quartiles of URM students face no change in graduation rate, though some evidence of relative increases for the third quartile of URM students remains.[4] Finally, I estimate the same model for *all* non-URM students, including Asian students and students who decline to report ethnicities, obtaining a β estimate of 1.1 percent.

While these estimates remain importantly different from Bleemer (2020)'s preferred specifications – which include high school fixed effects, restricts the analyzed years to 1996-1999, and expands the sample to all UC applicants (and the outcome to degree attainment at *any* university) – the comparison between the resulting URM versus non-URM estimates here appears highly similar to those reported in Panel D of that study's Table A-12, with a tightly-estimated null effect of Prop 209 on graduation among URM UC enrollees. The increase in UC enrollees' degree attainment can be largely explained by students' greater academic preparedness, reflecting the positive selection of URM students after Prop 209 as well as UC's

[1] I focus only on AACH's analysis of the effects of Proposition 209 on student outcomes, though the paper continues on to employ a structural model to investigate the nature of pre-1998 mismatch at UC campuses.

[2] $AI' = (SAT - 400)/2.4 + (HSGPA \times 102.459)$, which results in an index with 500 points each from SAT I and HS GPA. In contrast, $AI = min(HSGPA, 4) \times 1,000 + SATI + SATIIs$, including both SAT I components (math and verbal) and three SAT II scores: writing, math, and a third of the student's choosing. The difference between "academic indices" results from an anachronism: Arcidiacono et al. (2014) use data provided by the University of California in 2008, by which time "academic index" generally referred to AI' instead of the AI of the 1990s.

[3] Unfortunately, I do not observe the specific weighted high school GPA used to produce AI', and instead construct a highly-similar index (with the same weights between HS GPA and SAT score) using my observed weighted GPA. The resulting estimates closely replicate those presented in AACH.

[4] Following AACH, AI quartiles are estimated separately by ethnicity, prohibiting cross-ethnicity coefficient comparisons.

Table 1: *Replication of Table 3 in Arcidiacono et al. (2014) with New Specifications: "Pre- to Post-Prop 209 Changes in Graduation Rates: Without & with Controls"*

	Estimates Reported in AACH (2014)				Replication			
Dep. Var:	*POST*	*POST*× *Q1(AI′)*[1]	*POST*× *Q2(AI′)*	*POST*× *Q3(AI′)*	*POST*	*POST*× *Q1(AI′)*	*POST*× *Q2(AI′)*	*POST*× *Q3(AI′)*
Panel A: Underrepresented Minority								
No Controls	0.044**				0.044**			
AACH Controls[2]	0.030**				0.031**			
Add AI Comp.[3]					0.008			
AACH Controls	0.005	0.035*	0.037**	0.035**	0.005	0.032*	0.037**	0.035**
Add AI Comp.					-0.010	0.014	0.027*	0.034**
Panel B: White								
No Controls	0.025**				0.025**			
AACH Controls	0.014**				0.015**			
Add AI Comp.					0.007†			
AACH Controls	0.011†	-0.002	0.001	0.002	0.011†	0.002	0.014†	0.001
Add AI Comp.					0.006	-0.002	0.009	-0.006
Panel C: Non-URM								
No Controls					0.028**			
AACH Controls					0.018**			
Add AI Comp.					0.011**			
AACH Controls					0.008†	0.008	0.018**	0.011*
Add AI Comp.					0.005	0.003	0.015**	0.005

Note: Single-difference OLS regression coefficient estimates across all 1995-2000 UC undergraduate enrollees (excluding transfer and out-of-state students), differencing across post-1998. The outcome is an indicator for earning a UC degree within five years of admission (measured in UC data). Models are estimated independently by ethnicity category and include listed covariates. Coefficients by AI' quartile are estimated simultaneously relative to the top quartile. Students with missing standardized test scores are omitted. This table replicates and augments Table 3 in Arcidiacono et al. (2014). [1]As in Arcidiacono et al. (2014), AI' quartiles are based on pre-Prop 209 enrollees and are subgroup-specific. See footnote 2 for the definition of AACH's AI'. [2]The same as "Extended Controls 2" in Arcidiacono et al. (2014): controls include AI' interacted with parental education indicators, binned family income indicators, and indicators for intended major. [3]The same controls as in *AACH Controls*, adding the components of UC's Academic Index (see footnote 2). Statistical significance: † 10 percent, * 5 percent, ** 1 percent. Source: UC Corporate Student System.

increasing selectivity in the period.[5]

3 Explaining Estimation Differences with Arcidiacono, Aucejo, and Hotz (2016)

Arcidiacono, Aucejo, and Hotz (2016), hereafter AAH, present a structural model estimated on anonymized University of California applicant data to argue that under UC's affirmative action policies, "less prepared minorities at higher ranked campuses had lower persistence rates in science ... [and] less prepared minority students at top ranked campuses would have had higher science graduation rates had they attended lower ranked campuses". They restrict the applicant sample to 1995-1997 freshman UC enrollees and estimate a model of binary major choice (Science or Nonscience) in which students of two types – also "Science" and "Nonscience", determined by the intended major reported on their UC application – are endowed with major-specific academic preparation and decide on their degree attainment by optimizing rewards from degree attainment and costs from switching to the other major type. Both returns and costs vary by student type and academic preparation, and returns include a campus-specific linear term in academic preparation: different campuses provide differently-scaling returns to higher- or lower-preparation students by type. AAH estimate this model in a nested logit

[5]Chingos (2013) also points out that selection on observables may explain the correlations presented by AACH.

Table 2: *Share of Students Graduating in Five Years (Percent) by Intro. STEM Course Enrollment*

	Enr. In STEM?	URM Students UCB	UCSB	UCD	UCSC	UCR	All 5	Non-URM Students UCB	UCSB	UCD	UCSC	UCR	All 5
Prospective STEM Majors													
STEM Degree	Y	19.9	17.9	16.2	12.1	16.0	17.0	46.2	24.3	32.8	17.6	29.4	32.6
	N	1.9	1.1	3.4	3.5	0.8	2.1	6.3	1.9	5.5	3.0	1.2	4.2
Non-STEM Degree	Y	21.0	18.2	15.9	9.8	18.6	17.4	21.2	23.3	20.2	17.0	21.6	20.9
	N	23.1	19.0	16.6	24.4	19.0	19.9	10.5	18.3	13.3	24.4	9.3	14.1
No Degree	Y	19.3	30.7	21.8	21.6	23.3	23.3	11.4	24.8	16.3	21.2	29.5	19.0
	N	14.9	13.1	26.1	28.6	22.3	20.3	4.3	7.5	11.9	16.8	9.0	9.2
Annual Stud.		720	636	820	315	511	3,002	3,301	2,583	4,346	1,260	1,817	13,307
Prospective Non-STEM Majors													
STEM Degree	Y	2.4	1.0	3.9	2.6	2.2	2.2	12.1	3.7	11.3	3.2	4.9	7.2
	N	1.1	0.2	1.4	1.2	0.6	0.9	2.0	0.8	1.2	2.0	0.9	1.3
Non-STEM Degree	Y	6.7	5.7	10.2	4.5	2.8	6.0	16.0	10.4	18.8	5.5	8.2	12.4
	N	57.1	53.7	40.9	50.7	51.3	52.1	54.7	57.7	46.0	53.7	43.4	52.3
No Degree	Y	4.3	6.7	8.6	5.3	3.6	5.5	4.7	5.9	7.3	4.8	10.0	6.2
	N	28.4	32.7	35.0	35.7	39.5	33.2	10.6	21.5	15.5	30.7	32.6	20.6
Annual Stud.		1,508	1,203	697	661	778	4,847	3,730	5,435	4,125	3,015	1,911	18,216

Note: This table presents UC students' degree attainment by ethnicity and whether the student is a prospective STEM major and/or took an introductory STEM course in their first year. It reveals that URM prospective STEM majors were about twice as likely to not take an introductory STEM course as non-URM prospective STEM majors, and that more than a quarter of STEM degrees are awarded to prospective non-STEM majors. The share of prospective STEM and non-STEM URM and non-URM UC students at five UC campuses partitioned by whether they earned a degree in STEM, earned a degree in non-STEM, or did not earn a degree within five years of UC matriculation and whether they enrolled in an introductory STEM course in their freshman year. The sample is restricted to 1995-1997 UC enrollees at the five campuses where detailed course data are available: UC Berkeley, UC Santa Barbara, UC Davis, UC Santa Cruz, and UC Riverside. Percentage points sum to 100 for each campus-ethnicity-prospective major group. 'Annual students' reports the average 1995-1997 student population in each group. Following AAH, students are defined as prospective STEM majors if they reported prospective STEM majors to at least half of the UC campuses to which they applied. Introductory STEM courses are defined in Bleemer (2020)'s Appendix H, adding the first two mathematics courses in calculus. STEM degree-earners who did not take introductory STEM courses are largely engineering and mathematics majors who tested out of the introductory mathematics curriculum. Source: UC-CHP Database (Bleemer, 2018).

framework and present simulations suggesting that low-preparation science students are more likely to persist at less-selective UC campuses, implying that the end of racial preferences would increase science persistence among URM UC students.

These conclusions stand in stark contrast with the STEM persistence and attainment results presented in Sections 4.2 and 6 of Bleemer (2020), which provide quasi-experimental evidence showing that when UC's URM applicants actually enrolled at less-selective institutions after Prop 209, their STEM performance, persistence, and attainment remained unchanged or declined. The differences may arise for several reasons. First, AAH restrict their estimation to UC campuses and do not observe STEM major choice at the other institutions where URM students enrolled after Prop 209; however, Bleemer (2020)'s Table A-12 shows that STEM degree attainment did not rise even among academically-comparable URM UC enrollees following Prop 209.[6] Second, AAH estimate their model strictly on pre-1998 data, which places substantial weight on their model's structural assumptions; institutional changes (like changed peer effects after Prop 209) could partly

[6]The two studies use highly similar definitions of Science/STEM – as shown by comparing AAH's Table A-1 with Bleemer (2020)'s Tables A-1 and A-2 – though the present study categorizes a far wider variety of (non-UC) majors.

explain the discrepancy.

There is also an important difference in the definition of science "persistence" between the two studies. AAH define persistence by the science degree attainment rate among UC students whose "initial major" (to use their term) is in the sciences. However, this notion of persistence may stretch the informativeness of UC's "initial major". Better termed a "prospective major", applicants listed these majors on their college application to each UC campus. More than one-third of 1995-2000 UC enrollees listed their prospective major as "Undeclared," a category which AAH include in their definition of Nonscience. This was permissible because most prospective majors were non-binding; except for some engineering and professional fields, enrolled students' prospective majors did not limit (or play any role in) their eventual major choice. Instead, prospective majors' primary role was as a low-cost signal to admissions officers, who employed them as part of each campus's admissions process.

As a result, while prospective majors may have signaled applicants' intended major choice in some cases, many applicants likely provided strategic responses to 'game' admission to UC campuses. For example, about one-quarter of 1995-2000 UC enrollees reported prospective STEM majors at one campus and prospective non-STEM majors at another campus. A majority – and perhaps a large majority – of UC enrollees did not earn degrees in their prospective majors. Given the important role of ethnicity in UC campuses' admissions before 1997, incentives around strategic reporting of prospective majors may have differed by ethnicity and campus.

This highlights three additional important differences between AAH's findings and the present study. The first is potential misspecification in the AAH structural model arising from cross-student variation in the strategic use of prospective major choice. Table 2 extends AAH's Table 2 – used by AAH to emphasize that "nonminorities who begin in the sciences are much more likely to graduate with a degree in the sciences than minorities" – adding information on which students ever enrolled in introductory STEM courses at several UC campuses. While URM prospective STEM majors were less likely to earn STEM majors than their non-URM peers, that difference masks an important difference between URM and non-URM prospective STEM majors who do not earn STEM degrees. Among such URM students, less than half took *any* introductory STEM courses in their first year, whereas more than 60 percent of such non-URM prospective STEM majors did so.[7] URM prospective STEM students were almost twice as likely to never enroll in a freshman introductory STEM course as non-URM prospective STEM students, overall and at UC Berkeley.[8] This suggests that URM students may have been reporting strategic prospective STEM majors to a greater degree than non-URM students, implying that the AAH model likely selectively misclassifies URM students as "initial STEM majors" when they may have never actually had such intentions.

The second difference is highlighted in the bottom half of Table 2. While prospective non-STEM majors are much less likely to earn STEM degrees than prospective STEM majors, they are also substantially more numerous, with almost twice as many URM prospective non-STEM majors (including "undeclared" students) as URM prospective STEM majors. As a result, it would be easy to miss that more than 25 percent of STEM degrees are awarded to prospective *non-STEM* majors. A full accounting of changes in STEM major completion should include these degrees, but AAH do not report changes in STEM major completion among prospective non-STEM majors.

Finally, the present study defines persistence by students' continuing to enroll and complete courses along introductory STEM sequences at UC campuses, rather than conditioning on UC applicants' selecting a STEM field as their (non-binding) prospective major. It shows that URM Berkeley students' observed STEM persistence (relative to academically-comparable non-URM students at that campus, or in comparison with other campuses) decreases following the end of UC's affirmative action policy.

These five differences in sample, research design, and outcome measures likely explain why AAH argue that affirmative action likely decreases low-preparation URM students' science persistence and attainment, whereas the present study shows that *ending* affirmative action had a negligible effect on URM students' science persistence but decreased their undergraduate and graduate STEM attainment, especially among low-preparation URM students.

4 Prop 209 in *Mismatch* (Sander and Taylor, 2012)

Mismatch (Sander and Taylor, 2012, hereafter ST) presents a comprehensive argument favoring the "Mismatch Hypothesis" in higher education.[9] The book's centerpiece is a before-after analysis of Prop 209, with

[7] Introductory STEM courses are defined in biology, chemistry, physics, mathematics, or computer science; see Bleemer (2020)'s Appendix H, adding the first two mathematics courses in calculus.

[8] "Enrollment" entails earning a letter grade in the course, including failing grades but excludes students who withdrew from the course before each campus's 'add/drop' date.

[9] In those authors' words, the Mismatch Hypothesis states that affirmative action leads targeted students to "learn less ... than had they gone to less competitive but still quite good schools ... [driving] these students to drop out of school, flee rigorous courses, or abandon aspirations to be scientists or scholars" (4).

chapters devoted to the politics leading up to and following the proposition (7 and 10), changes in URM application and matriculation rates (8), and changes in first-year grades, STEM degree attainment, and graduation (9). These chapters mischaracterize the effect of Prop 209 on student outcomes. Because several of ST's conclusions are directly in tension with Bleemer (2020)'s baseline findings, this appendix carefully considers each of ST's empirical claims as they relate specifically to applicant and student outcomes of Prop 209.

Chapter 8: The Warming Effect

Chapter 8 of ST presents evidence of increased application and yield rates among URM students to argue that "black and Hispanic students would like to have choices among elite colleges that use smaller preferences or none at all" (142). Their argument for increased yield rates, which draws heavily on Antonovics and Sander (2013), is consistent with the findings discussed above (and presented in Bleemer (2020)'s Table A-7). Their argument for increased application rates among Black and Hispanic students is inconsistent with the findings above. They present five pieces of evidence to support their conclusion:

1. Black and Hispanic UC applications increased 1 and 7 percent, respectively, in 1998 (relative to 1997). Total applications increased by 7 percent (133).
2. "Black applications rose at seven of the eight UC campuses, and Hispanic applications rose at all eight" (133).
3. The proportion of high-SAT Black Berkeley applicants, and Black Berkeley applicants with a high likelihood of being admitted to Berkeley (based on SAT scores), increased in 1998 (133).
4. Card and Krueger (2005) "robustly" showed that "after the ban on racial preferences took effect, applications to UC schools from these very highly qualified blacks and Hispanics rose slightly, relative to whites and Asians" (136).
5. "From 1995-1997 to 1998-2000, score sending by academically gifted, out-of-state Hispanics to UC schools went up 12 percent. The number of gifted blacks sending scores went up 48 percent" (139).

Points (1) and (2) note that URM applications rose at UC in 1998, which should be expected as a result of California's population growth and the increased popularity of UC enrollment throughout the 1990s.[10] But the number of Hispanic CA high school graduates grew by 7 percent in 1998, compared to 4 percent among all other groups, suggesting that UC applications could have been expected to grow *more* among Hispanic students than among non-URM students. As shown in Bleemer (2020)'s Figure 7, which accounts for changes in the composition of California high school graduates by ethnicity and academic index, the number of Black and Hispanic UC applicants declined by over 1,000 in 1998 (compared to 1994-1995) relative to what would have been expected given the steadily-growing number of non-URM UC applications.[11]

Points (3) and (4) rely on proxying UC applications with data showing which SAT-takers sent their standardized test scores to UC. While 'score sends' are a necessary step in applying to UC, they are not sufficient, and the decision to send scores is typically made before actual college application. As shown in Bleemer (2020)'s Appendix F, 'score sends' proved an unreliable measure of university applications in the years after Prop 209, and the results presented by Card and Krueger (2005) do not hold when 'score sends' are replaced with actual applications: in fact, the relative likelihood of high-testing URM SAT-takers applying to at least one UC campus declined in 1998.

Point (5) ignores that the number of *non-URM* out-of-state UC applications increased by 63 percent over the same period, part of a steady increase in out-of-state UC applications as UC's national reputation improved and American college applicants warmed to out-of-state universities (Hoxby, 2009). Table 3 catalogs several similarly-misleading cases in which ST report changes in URM student growth without comparison to the observed change for non-URM students. Many such changes over time are better explained by longer-run ethnicity-neutral trends (like the steady growth of UC campuses) than by Prop 209.

I conclude that Black and Hispanic application rates declined following Prop 209, suggesting that URM applicants did not broadly 'warm' to UC campuses after Prop 209.

Chapter 9: Mismatch and the Swelling Ranks of Graduates

Chapter 9 of ST presents evidence of several apparently-positive trends for URM UC students following Prop 209: increased numbers of URM graduates, improved first-year grades, increased graduation rates and STEM degree attainment, and decreased time to degree. While short sections discuss UC transfer students' admission and graduation rates after Prop 209, the chapter largely focuses

[10] The number of CA high school graduates increased by 5 percent from 1997 to 1998, and the percent of graduates who applied to UC increased by 2 percent. The number of Hispanic graduates increased from 82,000 to 88,000 from 1997 to 1998.

[11] Hadley (2005) similarly underestimates the effect of Prop 209 URM UC enrollment by ignoring UC campuses' overall growth in the late 1990s and early 2000s.

Table 3: *Context for the Growth of UC URM Students and Degrees after Prop 209 Reported in Mismatch*

	Cohort Years		URM	Change for		Page in
	Initial	Final	Sample	URM	Non-URM	*Mismatch*
Chapter 9 Summary Statistics						
Freshman UC Enrollees	95-97	00-03	Black Hisp.	**-2%** **+22%**	+30%	154
UC Degrees	98-01[1]	04-07[1]	Black Hisp.	**+11%** **+33%**	+33%	154
Freshman UC Four-Year Degrees Freshman UC Four-Year STEM Deg. Freshman UC Four-Year >3.5 GPA Deg.	95-97	01-03	All All All	**+55%** **+51%** **+63%**	+70% +70% +85%	154
Additional Statistics						
UC Degrees	93-97	98-02	All	∼**0%**	+26%	8
In-State Freshman Applicants	1997	1998	Black Hisp.	**+1%** **+7%**	**+7%**	133
Out-of-State Freshman High-*AI* Appl.	95-97	98-00	Black Hisp.	**+48%** **+12%**	+63%	139
Freshman UC Four-Year Degrees	92-94	98-00	Hisp.	**+78%**	+78%	147
UCLA Degrees	98-01[1]	2006[1]	Black All	**-20%** ∼**0%**	+29%	162

Note: Only the estimates in ***bold*** *were reported in* Mismatch.

Note: While the number of URM UC applicants, enrollees, and degree recipients of various subgroups increased after Prop 209, as reported by ST, the number of such *Non-URM* students usually grew at even higher rates (as a result of broad UC expansion), suggesting that URM growth may have been higher if not for Prop 209. Percent changes in the number of UC applicants, enrollees, or degree recipients by subgroup after the 1998 implementation of Prop 209. Bolded statistics are as reported in *Mismatch*, and most can be closely replicated; non-bolded statistics measured by the author. "Chapter 9 Summary Statistics" includes the full set of summary statistics presented to conclude ST's chapter on post-209 student outcomes, while "Additional Statistics" catalogs other presented statistics; the last column indicates the page on which the statistic was reported. Following ST, "URM" refers only to Black and Hispanic students, but I define "non-URM" as all students who are not Black, Hispanic, or Native American. 'Initial' and 'final' years indicate the pre- and post-209 comparison cohorts. "STEM" follows the definition of STEM used in the UC data analyzed by ST. I define High-*AI* (referred to as "academically gifted" by ST) by *AI* at or above 620, the 95-97 URM median. "On-time" freshman degrees are earned within four years. "> 3.5" indicates that graduates earned college grades above a 3.5 GPA; because of data availability, the non-URM estimate uses a 3.4 threshold. [1]These are the years the degrees were *awarded*, not the cohorts of degree recipients. Source: Sander and Taylor (2012) and UC Corporate Student System.

on the California-resident freshman-admit student body analyzed in the present study. ST's conclusions regarding graduation rates and STEM degree attainment conflict with this study's baseline findings, and are discussed below in turn.[12]

ST provide four sets of statistics supporting their conclusion that Prop 209 increased URM students' likelihood of graduation:

1. "The total number of black and Hispanic students receiving bachelor's degrees was the same for the five classes after Prop 209 as for the five classes before" (8).
2. UC URM graduation rates increased after Prop 209. "Even though the number of black freshmen in the UC system fell almost 20 percent from 1997 to 1998, the number of black freshmen who obtained their degrees in four years barely dipped for this class, and the entering class of 2000 produced, four years later, a record number of blacks graduating on time"

[12]ST also state that "Before Prop 209, racial preferences at Berkeley at UCLA were very large (and close to national norms), whereas preferences at the less elite UC campuses were generally modest" (145). Figure 1 in Bleemer (2020) suggests otherwise, though it confirms ST's claim that URM students maintained an admissions advantage relative to similar-*AI* non-URM students following Prop 209 (ST 145).

(146).
3. The number of Hispanic freshman on-time graduates increased from 2,005 total in 92-94 to 3,577 in 98-00 (147).
4. Arcidiacono et al. (2014) show an increase in URM graduation rates relative to academically-similar non-URM graduation rates (147).

Point 4 is discussed in detail above, and can be explained by selection bias: Black and Hispanic graduation rates appeared to increase because lower-AI URM students were excluded from UC after Prop 209, mechanically increasing average UC URM graduation rates. Points 1, 2, and 3 can be explained by ethnicity-neutral growth in UC's student body, generally-improved UC student outcomes, and selection bias. For example, Table 3 shows that while the number of URM UC degrees awarded in 98-02 was similar to the number awarded in 93-97, the number of non-URM UC degrees awarded in that period increased by 26 percent, suggesting that URM degree attainment would have likely substantially increased absent Prop 209. The number of 1998 Black UC freshmen who earned degrees in four years increased by 3 percent from 1997 to 2000, but the number of non-URM UC freshmen who did so increased 42 percent. Table 3 shows similar patterns for several other related statistics.

ST provide four sets of statistics supporting their conclusion that Prop 209 increased URM students science persistence:

1. "UC-wide, the number of black and Hispanic students graduating with STEM degrees steadily increased after the admissions reforms of 1998, and the number of science-interested students never graduating steadily fell" (150).
2. "The share of black and Hispanic students majoring in STEM fields rose as well" (150).
3. "Marc Luppino, Roger Bolus, and one of us (Sander) completed an analysis of the UCOP data ... [and] measured substantial mismatch effects for a variety of science outcomes" (150).
4. "The number of UC black and Hispanic freshmen who went on to graduate in four years with STEM degrees rose 51 percent from 1995-1997 to 2001-2003" (154).

Points 1, 2, and 4 each follow the same patterns described in the previous paragraphs, and likely result from UC's 1990s growth and general improvement and selection bias among URM students. For example, the number of *non-URM* UC freshmen who earned STEM degrees in four years rose 70 percent from 95-97 to 01-03, compared to a 51 percent increase among URM students (see Table 3). Point 3 cannot be confirmed – I am unaware of any study by Luppino, Bolus, and Sander and it does not appear to be publicly available – but its estimates likely exhibit selection bias as a result of data censorship in their available UCOP data (as in Arcidiacono et al. (2014)).

Table A-20 in Bleemer (2020) shows that URM students' grades in introductory UC Berkeley courses improved following Prop 209, though this improvement can be wholly explained by differential selection (with the remaining students having higher AIs). In sum, I conclude that the evidence presented in Sander and Taylor (2012) provides no reason to doubt that Prop 209 *decreased* URM UC students' degree attainment and STEM major choice, as evidenced in the main text, as opposed to ST's Mismatch Hypothesis claiming the opposite.

Conclusion

Bleemer (2020) shows that banning affirmative action in at public California universities caused long-run average educational and labor market deterioration for the young URM Californians who lost access to the University of California. This brief shows that the evidence presented in prior research on UC's affirmative action policy (Arcidiacono et al., 2014; Arcidiacono, Aucejo, and Hotz, 2016) and Prop 209 (Sander and Taylor, 2012) does not stand in tension with Bleemer (2020)'s conclusions.

References

Antonovics, Kate and Richard Sander. 2013. "Affirmative Action Bans and the "Chilling Effect"." American Law and Economics Review 15 (1):252—-299. URL Link.

Arcidiacono, Peter, Esteban Aucejo, Patrick Coate, and V Joseph Hotz. 2014. "Affirmative action and university fit: Evidence from Proposition 209." IZA Journal of Labor Economics 3 (7). URL Link.

Arcidiacono, Peter, Esteban Aucejo, and V. Joseph Hotz. 2016. "University Differences in the Graduation of Minorities in STEM Fields: Evidence from California." American Economic Review 106 (3):525–562. URL Link.

Bleemer, Zachary. 2018. "The UC ClioMetric History Project and Formatted Optical Character Recognition." Center for Studies in Higher Education Research Paper Series 18 (3). URL Link.

———. 2020. "Affirmative Action, Mismatch, and Economic Mobility after California's Proposition 209." Manuscript URL Link.

Card, David and Alan Krueger. 2005. "Would the elimination of affirmative action affect highly qualified minority applicants? Evidence from California and Texas." Industrial and Labor Relations Review 58:416—-434. URL Link.

Chingos, Matthew M. 2013. "Are Minority Students Harmed by Affirmative Action?" Brown Center on Education Policy at Brookings URL Link.

Hadley, Eryn. 2005. "Did the Sky Really Fall? Ten Years After California's Proposition 209." Brigham Young University Journal of Public Law 20 (1):103–138.

Hoxby, Caroline M. 2009. "The Changing Selectivity of American Colleges." Journal of Economic Perspectives 23 (4):95–118. URL Link.

Sander, Richard and Stuart Taylor. 2012. Mismatch: How Affirmative Action Hurts Students It's Intended to Help, and Why Universities Won't Admit It. New York: Basic Books.