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Conceptualizing Racial Segregation in Higher Education: Examining Within- and Between-Sector Trends in California Public Higher Education, 1994-2014

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Conceptualizing and measuring levels of segregation in higher education is difficult as both vertical and horizontal sorting is prevalent and patterns vary across racial groups. In this paper, we measure various trends in racial segregation in California for 20 years. We find that the most selective four-year campuses are the least segregated and that the community college sector is the most segregated. This fact has remained relatively stable over time. We also find that observed levels of Latinx-White segregation are lower than the hypothetical levels we would see if college choice were determined exclusively by geography. However, observed Asian-White segregation is higher than it would be if college attendance were determined exclusively by geography.

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Conceptualizing Racial Segregation in Higher Education: Examining Within- and Between-Sector Trends in California Public Higher Education, 1994-2014

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1. Introduction

Though racial segregation in American K-12 schools was deemed "inherently unequal" (U.S. Supreme Court *Brown v. Board of Education* decision) in 1954, and much research and policy in the decades since has focused on racial sorting in elementary and high schools, little attention has been paid to segregation in higher education. Additionally, the prevailing arguments about the importance of racial diversity in higher education have narrowly focused on highly selective schools (see, for example, Supreme Court decisions such as *Regents of the University of California v. Bakke* and *Grutter v. Bollinger* and the research literature on academic match). Few research endeavors and policy decisions have focused on racial segregation patterns at the less-selective two- and four-year institutions that educate the vast majority of college students.

A number of plausible reasons explain the lack of attention to segregation in higher education—particularly at broad-access schools—in prior research. First, we regard college students as autonomous adults who actively make choices about their own education. However, in reality, the narrative of an informed, unrestricted, nation-wide college search with wide and varied options applies only to the most privileged students. Indeed, recent evidence suggests that most college students are geographically restricted and that higher education options are dictated by residence (Hillman, 2016; Iloh, 2018; Turley, 2009). The median distance between a student's home and college is a mere 13 miles (Hillman & Weichman, 2016).

Second, Americans generally consider college to be a sorting mechanism, believing that the most selective institutions accept the students with the greatest ability. Indeed, stratification is a "signal feature" of higher education (Clotfelter, Ladd, & Vigdor, 2015, p. 9). Colleges and universities are viewed as having a decidedly different form and function than K-12 schools, and

demographic differences in higher education are not seen as inherently inequitable. However, recent research suggests that the American ideal of a meritocracy is nearly mythical and that sorting into college is a function of socio-economic status as much as—if not more than—a function of student ability (Autor, 2014).

And finally, there is also a prevalent narrative that institutions of higher learning are not plagued by the same patterns of segregation that elementary and high schools are:

> "Part of what's happening is that we live very segregated lives. Schools are very segregated, neighborhoods are very segregated, and that's where a lot of fear is coming from. The college classroom may be the only shot for some students to be around students who do not look like them. ***The college classroom is where diversity shines its light*** *[emphasis ours]*." -Stella Flores, *Chronicle of Higher Education*, 3/17/17

But the extent to which this is true is relatively untested. In fact, recent evidence suggests that there is a lack of diversity in higher education (e.g. Chetty, Friedman, Saez, Turner, & Yagan, 2017; Baker, Klasik, & Reardon, 2018), which challenges the common assumption that college fosters greater interaction between students from diverse backgrounds than do the environments in which they grow up.

Research in this area is relatively thin. The extant research has focused primarily on racial differences in attendance between sectors, such as between two- and four-year schools, (e.g., Carnevale & Strohl, 2013) and between levels of selectivity, such as highly competitive and broad-access four-year schools (e.g., Posselt, Jaquette, Bielby, & Bastedo, 2012). Such research does not allow us to examine how this sorting across sectors (i.e., vertical stratification) compares to sorting within sectors (i.e., horizontal stratification). Horizontal stratification in higher education has received little attention; in fact, there have been explicit calls for such examinations (see, for example, Reardon & Owens, 2014).

Examining sorting within sectors is important. While the relationship between college selectivity and academic and economic outcomes has been well documented (e.g., Hoekstra, 2009; Long, 2008), more recent research has found differential outcomes tied to schools that are seemingly quite similar. Even among selective schools, some produce better outcomes in terms of promoting upward social mobility among low-income students (Chetty et al., 2017), and within certain sectors, such as community colleges, there are differences in school quality that are associated with transfer rates and degree completion (Kurlaender, Carrell, & Jackson, 2016).

In this paper, we aim to fill gaps in our understanding of segregation in higher education using the public colleges of California as an illustrative case. We provide 20-year trends of racial segregation in California public higher education. We focus on segregation patterns within and across three sectors: the very selective University of California (UC) system, the moderately selective California State University (CSU) system, and the broad access California Community College (CCC) system. As a way of contextualizing our findings, we compare observed levels to the levels of segregation across California high schools and we investigate whether the levels of segregation are more or less extreme than we would expect them to be if students were entirely place-bound (e.g., if they attended the college nearest their high school).

2. Relevant Literature

2.1 The Importance of Racially Diverse Environments

The potential avenues through which a racially and ethnically diverse student body can yield beneficial effects, for individual students and for society, are theoretically compelling. Many arguments in support of campus diversity are based on the idea that race wields an enduring influence over individuals' experiences and perspectives (e.g. Ladson-Billings, 1998); the "unique experience of being a racial minority in a society, like our own, in which race still

unfortunately matters…is likely to affect an individual's views" (Opinion of the Court, *Grutter v. Bollinger et al, 539 U.S. 306*). Since people tend to rely on familiar, practiced patterns of thinking (we are "comfortable cognitive misers" according to Hurtado (2007, p. 189)), exposure to new perspectives from other groups can disrupt these patterns and spur growth. College campuses can thus provide students with Piaget's idea of environments of "disequilibrium," which can encourage experimentation and growth (Piaget, 1971; Ruble, 1994) and reduce racism and discrimination (Nieto & Bode, 2008; Tatum, 1997).

While a range of racially/ethnically diverse environments across the lifespan could encourage development, college is an especially promising setting for at least two reasons. First, because late adolescence is an important time for developing a personal and social identity, college is an ideal time to capitalize on such exposure (Erikson, 1946; Erikson, 1956). Second, for many students, college provides both social and academic experiences. These varied experiences provide opportunities for both informal interactional exposure to diversity and structured curricular exposure to diversity (Gurin, Dey, Hurtado, & Gurin, 2002).

Indeed, the potential benefits of rich and diverse environments is reflected in public statements of support for policies that strive to increase racial diversity in higher education. U.S. Supreme Court Justice Lewis Powell, in the 1978 *Regents of the University of California vs. Bakke* decision, stated that, "it is not too much to say that the nation's future depends upon leaders trained through wide exposure to the ideas and mores of students as diverse as this Nation of many peoples" (p. 2760). The Association of American Colleges and Universities (1985) states that one of the primary goals of a college education is to, "break down the narrow certainties and provincial vision with which we are born" (p. 22) and prominent scholars have

noted that it is "the promise of American higher education [to advance] social progress [and to] end America's discomfort with race and social difference" (Hurtado, 2007, p. 186).

While studies with strong causal warrants are relatively rare,[1] consistent and strong correlational studies provide an evidentiary foundation for these theoretical claims. A number of researchers have shown that more frequent interactions with students of different race/ethnicities is related to benefits for individual students, for the colleges in which they enroll, and in the broader economy and society (e.g. Milem & Hakuta, 2000; Pascarella & Terenzini, 1991; Terenzini, Springer, Pascarella & Nora, 1994). A meta-analysis (Bowman, 2010) concluded that experiences with diverse peers in college are associated with cognitive development for students. Gurin, Dey, Hurtado, & Gurin (2002), using single- and multi-institutional survey data, find that both informal out-of-class and classroom-based diversity are associated with learning outcomes and "democracy" outcomes such as civic engagement and racial/cultural engagement. Chang, Denson, Saenz & Misa (2006) find that the average level of cross-racial interaction on a campus is related to individual students' academic and psychosocial growth.

Work examining K-12 segregation finds similar relationships between segregation and academic, social, and economic outcomes. For example, school segregation is strongly correlated with racial achievement gaps (Reardon, 2016) and Black students who have more non-Black students in their grade have higher reading and math scores (Hanushek, Kain, & Rivkin, 2009). In addition to this correlational work, some more recent work has been able to identify the causal effects of racial K-12 segregation on longer-term outcomes. Many of these studies have leveraged the phased implementation of lifting court-ordered desegregation.[2] The end of court-ordered desegregation was found to lead to an increase in dropout rates among Black and Latinx students (Guryan, 2004; Liebowitz, 2018; Johnson, 2011) and to an increase in pre-term births

among Black mothers (Shen, 2018). Additionally, several studies show that increased exposure to school desegregation improves Black adult males' educational attainment and earnings, reduces the odds of poverty, decreases the probability of deviant behavior, arrests, and incarceration, and increases the odds of working white-collar jobs, while having no effects on White students (Ashenfelter, Collins & Yoon., 2006; Johnson, 2011; Weiner, Lutz, & Ludwig, 2009). Thus, theoretical and strong correlational work in higher education, and causal work in K-12 schooling, support the importance of racially diverse educational environments.

2.2 Segregation in Higher Education

Given the potential importance of diverse student bodies on college campuses, examining how students of different races are sorted across schools is critical. This topic has not received wide research attention, and most work has focused broadly on racial sorting (mostly Black-White sorting) without examining sorting within sectors. Hinrichs (2015) documents patterns of segregation between Blacks and Whites across four-year colleges in the U.S. since the 1960s. He concludes that overall segregation at the college level declined over this period, indicating that Black students have been increasingly exposed to White students, and offers some evidence that this might partially be explained by Black students attending historically black college and universities (HBCUs) at a lower rate. He also finds variation by region—for example, Maryland and Delaware include colleges that are particularly segregated—and by type of institution.

These broad findings align with recent studies that have shown that over the past 20 years Black and Latinx students have attended college at increasing rates but are increasingly attending different schools than White students (Carnevale & Strohl, 2013). Black and Latinx college-goers are more likely than their White and Asian peers to attend two- (rather than four-) year

institutions, and among students who attend four-year schools, Black and Latinx students attend less selective colleges (Baker, Klasik, & Reardon, 2018).

Past work leaves open many avenues for continued study. For example, segregation within bands of selectivity (such as California's community colleges) has received very little attention, and nuanced examinations of segregation within single states are also lacking (one exception is Clotfelter et al, 2015 in North Carolina). Additionally, little work has been done to contextualize patterns of segregation in higher education and compare trends to patterns in related phenomena such as K-12 segregation. This paper seeks to fill these gaps by examining trends in segregation within and across sectors of higher education in one state, California.

2.3 The Importance of Single State Studies

This focus on a single state can provide a more nuanced and informative examination than a multi-state analysis for a few reasons. First, even more so than K-12 education, higher education in the United States varies tremendously between states. State higher education systems differ in terms of number, selectivity, diversity, affordability, and geographic structure of offerings (McLendon, Hearn, & Mokher, 2009). Across states, students do not face similar options so examining the ways in which geography and selectivity are related to racial sorting is more informative at the state, than at the national, level.

Second, demographic trends and policy changes vary across states. Most policy reforms are not coordinated across states; changes to admissions and tuition policies, for example, do not follow similar timetables across states (Hemelt & Marcotte, 2011; Hinrichs, 2012). Similarly, shifts in demographic composition vary across states; economic and immigration patterns create varied trends in racial and socio-economic sorting across states. National demographic trends do

not mirror the experience of individual states (Wright, Ellis, Holloway, & Wong, 2014) and nationwide trends likely mask important state or regional trends.

Third, students largely stay in state to attend college. In 2016, 78% of first-time degree-seeking undergraduates who graduated from high school in the preceding 12-months attended college in their home state.[3] In California, 90% of these students attended college in-state.[4] Relatively few students are considering a nation-wide (or even out-of-state) college choice set (Hillman, 2016; Iloh, 2018). The relevant question then, is not how students are sorted across colleges across the country, but how students are sorted across schools in individual states.

Lastly, systems of public colleges within a state create ecosystems, and it is only by examining the full system, that one can fully understand the forces at play. Hamilton and Nielson (in progress) describe the relationships between schools within a system as "co-opetition" – a mixture of cooperation and competition (p. 1); it is often the system-level, not individual school, statistics that matter. For example, states often tout the overall racial composition of their student body, rather than the composition of individual campuses. In this way, individual campuses can enroll high numbers of underrepresented minority students and do "the diversity work" of the system in exchange for the financial and reputational support of the full system (Hamilton and Nielson, in progress). While such arrangements may benefit all schools within a system, they can mask important patterns of segregation and sorting. For these reasons, explorations within a single state system can provide important insight into the lived experiences of students.

3. Research Questions and Hypotheses

3.1 Research Questions

In this paper we broadly examine levels of and trends in racial segregation in California public higher education. Specifically, we ask:

1. How segregated are California's public colleges and how has this changed over time?

As a way of contextualizing these broader trends, we ask more specific questions:

a) How does the segregation in California's higher education compare to segregation in California's public high schools?
b) How much of the overall segregation is due to sorting within (as opposed to across) sectors and within (as opposed to across) geographic regions?
c) Do levels of within-sector segregation vary between the CCCs, CSUs, and UCs?
d) How do observed levels of segregation in California higher education compare to levels of segregation if students were sorted entirely by geography?

And finally, we ask:

2. How do these trends vary across various race comparisons?

3.2 Hypotheses

In this section we synthesize research examining a number of factors that could affect segregation in higher education and use these findings to formulate hypotheses for our research questions. This task is not simple; summary measures of segregation in higher education capture a number of processes. For example, state systems of higher education could be segregated due to extreme vertical (between sector) segregation: different race groups could attend different sectors of education (e.g. all Latinx students attend UC campuses, all White students attend CCC campuses). High levels of segregation could also be due to extreme horizontal (within sector) segregation: different race groups attend entirely different campuses within the same sector (e.g. within the UC system, Asian students attend only UCLA and UC, Santa Cruz while Black students attend only UC Berkeley and UC San Diego). Additionally, high levels of segregation could be driven by certain race groups. For example, perhaps Latinx and Asian students attend similar schools, but White and Latinx students attend very different schools. Due to these complexities, the same phenomenon could affect different measures of segregation in opposite ways. For example, increased college going rates could decrease within-sector segregation while

increasing between-sector segregation. Given the complexity of this topic, we do not offer a single hypothesis regarding trends in segregation in California public higher education, but discuss specific factors related to college sorting and predict how they might be related to various conceptualizations of segregation.

3.2.1 Predicting Levels of Overall and Within Sector Segregation

It is not clear how to predict how much racial/ethnic segregation to expect across colleges within a state. While expectations for the racial/ethnic diversity of a K-12 school are derived from the population of the residential area from which it draws, which can lead to predictions for segregation between schools, the reference point for any given college is not clear. Additionally, the expected diversity of colleges that are geographically quite close can differ depending on the characteristics of the schools, such as selectivity (Wright et al, 2014). But even if absolute segregation within a sector is difficult to predict, one can use research from other areas to predict relative levels of segregation across sectors. We present two competing hypotheses regarding relative levels of segregation in public K-12 and higher education in California.

Research in K-12 education suggests that larger school districts are associated with less racial segregation, both because larger districts entail larger residential catchment areas and because more fragmentation (smaller districts) give parents more choices. Clotfelter (2011) finds that district consolidation was associated with declines in segregation between Black and non-Black students and Bischoff (2008) finds that school district fragmentation is associated with more between-district racial segregation. These findings indicate that the public education sectors with the most units will have the most segregation; high schools will be more segregated than community colleges, which will be more segregated than the CSUs, which will be more segregated than the UCs. Also, given that there only three sectors and they are of very different

sizes (113 CCCs, 23 CSUs, and 9 undergraduate serving UCs), we predict that within-sector sorting will explain more of the overall sorting than between-sector sorting.

However, the mechanisms by which students are sorted into colleges could reverse these predictions. High school attendance is usually dictated entirely by residence, but many more factors—interests, achievement, preferences, familial constraints—affect if and where a student attends college. Many of these factors, such as measured achievement, geographic preferences, and financial constraints, have been found to be strongly correlated with race (e.g. Kurlaender, 2006; NCES, 2019; Oliver & Shapiro, 2013; Reardon, 2011). Thus, it is not a priori clear which sectors will be the most segregated, nor is it clear how actual levels of segregation will compare to the levels of segregation one would observe if students were sorted entirely by geography.

3.2.2. Predicting Trends in Segregation

K-12 segregation. Despite being the most racially diverse state within the nation, K-12 schools in California are quite segregated (Kuscera, Siegel-Hawley, and Orfield, 2015) and segregation (particularly Latinx-White) in California public high schools has increased slightly over the time period of this study.[5] There are a number of mechanisms through which K-12 segregation could affect segregation in higher education. First, since K-12 segregation reflects residential segregation (Denton, 1995; Bischoff, 2008), and because many students—particularly students of color and those with ties to their community—are place-bound, (Hillman, 2016) segregation in higher education segregation likely mirrors K-12.

Residential and K-12 segregation could also affect segregation in higher education through channels other than through straight geographic preferences and constraints. Poor Americans—especially poor Black and Latinx Americans—increasingly live in poor places (Reardon & Bischoff, 2011; Lichter, Parisi & Taquino, 2014) and average neighborhood socio-

economic status affects students' educational opportunities and college options (e.g. Burdick-Will, et al, 2011; Reardon, 2016; Reardon & Owens, 2014; Rumberger & Palardy, 2005).

Finally, students who are raised in segregated settings and attend segregated schools might not seek out diverse settings later in life. Braddock (1980) hypothesized that students who attend segregated K-12 schools might lack the kinds of experiences that could lead them to seek out diverse experiences later in life. This theory has been partially validated in empirical work (e.g. Butler, 2010). Since overall K-12 segregation in California (particularly Latinx-White segregation), has increased slightly we predict similar increases in segregation, both overall and within sectors, in higher education, particularly between Latinx and White students.

Increasing college attendance rates. College attendance rates are increasing across all racial groups, and particularly quickly for Black and Latinx students (Baker, Klasik, & Reardon, 2018). In line with the theory of effectively maintained inequality – that as quantitative differences disappear, socioeconomically advantaged groups maintain advantages by securing qualitative differences such as degrees from more selective schools (Lucas, 2001) – and because resources are correlated with race (Kochhar & Fry, 2014), we should expect to see increasing differences in the kinds of college degrees earned by different racial groups (Posselt et al, 2012). These trends would forecast both increased racial segregation between sectors and within sectors in which there is clear differentiation between schools, particularly between Black and White and Latinx and White students.

Opening new colleges. Eight new colleges opened in California during the period of our study. The effect of this kind of expansion on inequality has been richly debated and examined in the literature (e.g. Arum, Gamoran, & Shavit, 2007). Since adding a new college will narrow the natural catchment areas for nearby schools and will offer increased differentiated choice, each

additional school within a sector should increase racial segregation within that sector. Thus, we predict that the addition of eight public colleges in our sample period will lead to increased racial segregation within sectors.

However, we expect that these new colleges will reduce between sector racial segregation. New public colleges in California are usually placed in areas that have traditionally been underserved. Thus, each new school represents access to a new type of school for students in a given region. For example when UC, Merced opened in the Central Valley in 2006, it gave students in that region access to a nearby, selective four-year college. As there are high levels of residential racial segregation in California (the Central Valley is heavily Latinx), and students are often geographically bound, this development should predict a shift of Latinx students from the CCC system into the UC system, which could reduce segregation between sectors.

Proposition 209. In 1996 the use of race in college admissions in California was prohibited by Proposition 209. The dismantling of affirmative action policies in California's higher education system should predict greater segregation, both between the state's two four-year sectors colleges (the CSUs and UCs) and within the UC system, if minority students who would have been admitted to selective four-year schools instead attended less selective four-year schools in the UC system. Though we note that if selective colleges found ways to work around the affirmative action bans, such as by implementing targeted recruitment policies (e.g. Mohr & Lee, 2000), we should expect no significant changes racial sorting.

Racial achievement gaps in K-12. Students' prior achievement partially explains how students sort into colleges. As competition for spots in the most selective schools has increased (Bound, Hershbein & Long, 2009), including the selective UC schools,[6] prior achievement is increasingly predictive of where students attend college (Alon & Tienda, 2007; Bastedo &

Jaquette, 2011; Posselt et al, 2012). Thus, examining trends in race/ethnic achievement gaps could help to predict trends in racial segregation between schools. In California, Black-White test score gaps have remained relatively steady and Hispanic-White test score gaps have decreased slightly, though the change is not statistically significant.[7] These mostly steady gaps predict steady trends in racial segregation in higher education, both within and between sectors.

Most evidence from other sectors and from policy changes suggests that overall segregation will have gotten stronger over the period of our study, though predictions for specific measures and for specific groups are less clear.

4. Research Background & Data

4.1 Study Context – California

California is a particularly important case study for understanding racial segregation in higher education because of its size, demographic composition, and structure of higher education. First, it is a large and diverse state. Among 18-24 year olds in California in 2015, 46% were Latinx, 31% White, and 13% Asian. On Fox Business' list of the 15 "Most Diverse Public Universities in the US" ten are in California: six UC campuses and four CSU campuses (Fox Business, September 16, 2019).[8] As the United States is shifting towards a majority-minority nation (it is projected that by 2044, more than half of all Americans will belong to a group other than non-Hispanic White (Colby & Ortman, 2015)), examining trends in California can help to predict trends in other states. However, even though diversity and segregation are often assumed to be mirror images of one another (Wright et al, 2014), a diverse state does not necessarily mean an integrated state; diversity and segregation can jointly exist, and examining what happens to segregation as diversity increases is important.

Second, California's higher education system is uniquely informative. California's public higher education system enrolls roughly 1.7 million full-time-equivalent students annually, and it houses the largest public two-year college system in the nation.[9] In addition to its large size, the structure of California colleges is also informative. The 1960 "California Master Plan for Higher Education," established California's three tiers of higher education, allowing for both broad access and excellence, and made California a model across the country. While most research and discourse has historically focused on differences in selectivity and quality across the three sectors, more recently the focus has been on differences in quality *within* the three sectors. Recent research has indicated that there is wide variation in selectivity, quality, and outcomes across colleges both across and within the three systems of higher education in California. For example, Kurlaender et al. (2016) find a positive relationship between community college quality in California and student outcomes such as the probability of persisting to the second year in college and transferring to a four-year institution. Among the CSU's, less than 60% of freshman graduated after six years at 13 of the 23 campuses. The most selective CSU's, however, graduated over 75% of their students in the same timeframe.[10] Graduation rates in the UC system are similarly variable; the six-year graduation rates across the UC system are almost 85%, though they range from 69% to 91%.[11]

Finally, over this period higher education in California experienced a number of changes that could be informative for other states. Like a number of other large states, California has faced legal challenges to its race-conscious admissions policies. Proposition 209, approved in 1996, amended the state constitution to prohibit governmental institutions, including colleges and universities, from considering race and ethnicity in admissions decisions. Also, a number of new schools have opened over this time period (five new CCCs, two new CSUs, and one new

UC campus). This expansion mirrors growth in public higher education systems across the country (e.g. New York, Florida, Texas), and increased college attendance rates overall have increased competition at the more selective UC campuses.[12] While the focus of this paper is not to explicitly test the effects of these changes on segregation, California's changing ecology can be broadly informative.

For these reasons—the importance of examining sorting within state systems, California's overall diversity and regional segregation, the varied outcomes both across and within systems in California, and California's policy environment—we focus our analyses on racial sorting in public colleges in California.

4.2 Data

We use data from multiple publicly available datasets, described in detail below, to answer our research questions. For each of these datasets, we pull from school-level fall enrollment counts by year from 1994 to 2014 for each ethnic/racial group. Across the three data sets we use, we have consistent and comparable data for these 21 years.[13]

Data for both the CCCs and the CSUs were publicly available from the state systems through their data portal websites. We gathered data on the 113 community colleges in California from the California Community College Chancellor's Office.[14] Data on the 23 California State Universities were collected from the CSU Office of the President.[15] We downloaded enrollment data for the 9 UC campuses from The Integrated Postsecondary Education Data System (IPEDS) from the National Center for Education Statistics.[16] We rely on IPEDS rather than collecting data directly from the UC system for two reasons: the University of California Office of the President (UCOP) does not publicly release enrollment data prior to 1998, and UCOP's data report only 12-month, not fall, enrollment.[17]

Finally, we collected data on the 1,330 California traditional public high schools (California public, non-charter, high schools) from the California Department of Education (CDE).[18] In addition to enrollment data by year by race, the CDE data include information on (1) the proportion of twelfth graders of each race in each school that successfully graduate from the HS and (2) the proportion of twelfth graders of each race in each school that are eligible to enroll in a CSU or UC. UC and CSU eligibility is determined based on the completion of seven sets of required courses with a passing grade of "C" or better.[19] We use these data to examine observed levels of segregation against hypothetical counterfactuals, described in section 5.3.

In addition to looking at patterns of segregation across and within sectors, we also look at patterns of racial segregation across and within geographic regions. Such analyses allow us to explore how much of observed segregation is due to regional differences in attendance patterns across groups of students. We use the seven regions defined by the California Community Colleges Chancellor's Office (CCCCO). These regions, defined to be similar in terms of industry sectors and economic factors, are large enough to capture multiple colleges from multiple sectors but are also small enough to capture reasonable commuting areas with similar labor market conditions.

4.3 Descriptive Statistics

Figure 1 shows the racial composition of schools within the California public education systems, high school and the three higher education sectors, in 1994 and in 2014. In both public high schools and colleges, there has been an increase in the proportion of Latinx students. Among the higher education sectors, the growth in the Latinx population is most concentrated in the CCC and CSU systems. Growth in the Asian student population has also been uneven across

sectors; the proportion of Asian students in the CCC and CSU sectors remained relatively constant between 1994 and 2014 and increased in the UC system, although by a small amount.

As a way of examining differences in institutions within sectors, we further breakdown our analysis to examine the racial composition of each school within each of the three higher education sectors, and to examine the average racial/ethnic composition of a student's school based on his/her own race/ethnicity, in Appendix A. These simple analyses, as well as the more sophisticated analyses we describe below, allow us to move from examining vertical stratification (sorting across sectors) to horizontal stratification (sorting within sectors).

5. Methodology

In this paper, we estimate measures of segregation that allow us to quantify the extent of segregation and to describe how patterns of segregation have changed over time. We first provide summary measures of the overall levels of segregation between all four race groups we study and then for three specific pairwise comparisons.

5.1 Included Race/Ethnic Groups

With increasing racial diversity in the U.S. population, and in California, studying segregation from the traditional two group methods (e.g., Black – White segregation) is not sufficient. In this study we include in our analysis the four groups for whom we have sufficient sample sizes in all sectors of California public higher education (Latinx, Black, White, and Asian). While this necessarily limits the scope of our investigation, it allows us to make comparisons across sectors, which is one of the main aims of our paper.[20]

The diversity of the state and this sample leads to many ways of thinking about and measuring segregation (e.g., Asian-Black, Latinx-White, Latinx-all other, etc.).We examine

segregation between these four groups in four sets of comparisons: multigroup (the distribution of all four groups), Black-White, Latinx-White, Asian-White.

The multigroup measures allow for an exploration of the interactive relationships among multiple groups, which can be lost in pairwise comparisons, and provides a summary view of segregation. The pairwise comparisons allow for targeted examination of specific trends that might be driving larger patterns and provide insight into minority-White interactions. As past research has shown that the causes and consequences of segregation vary for different groups, looking explicitly at trends for specific groups is important (Iceland, Wienberg, & Steinmetz, 2002; Logan, Stults & Farley, 2004).

The decision to include pairwise comparisons only for Black/Latinx/Asian and White was informed by the two factors. First, with four groups of students, the number of potential comparisons numbers in the dozens. For simplicity and clarity, we have limited this to three. Second, this decision mirrors much of the past work on segregation (e.g., Kuscera et al., 2015) and provides information on minority access to resources. Examining the uneven distribution of White students in a region can give an indication of an unequal distribution of, and access to, educational resources, networks, and outcomes (e.g. Kuscera et al., 2015). Measures of exposure to dominant groups can also provide a sense of the potential effects of racial segregation, as peer or compositional effects, or mechanisms correlated with peer composition, are one way that segregation can affect individual outcomes. Future work could certainly build on this by looking at patterns of segregation between different groups of students in certain regions (e.g., Latinx-Asian segregation in Southern California).

5.2 Segregation Measures

Following previous work on racial segregation in higher education (e.g., Hinrichs, 2015), we use two different conceptualizations or segregation: the distribution of racial groups across schools (the dissimilarity index), and a decomposable measure of evenness based on the distribution of multiple racial groups simultaneously (the Theil index). These measures, described in more detail in Appendix B, reduce complicated, multi-dimensional information (multiple groups across multiple schools across multiple sectors) into statistics that can be examined over time and, further, they shed light on possible reasons for these trends.

5.3 Hypothetical Counterfactuals

As a final way of conceptualizing the amount of segregation we see, we provide one potential point of reference: the levels of segregation we would observe if students were sorted entirely by geography. We ask: How do observed levels of segregation compare to the levels we would see if students are sorted entirely by geography (i.e., going to the nearest college)? How do the levels of segregation compare to the levels we would see if students went to the nearest school that matched their level of achievement (very high achieving students went to the nearest UC, high achieving students went to the nearest CSU, all other graduates went to the nearest CCC)?

To make these comparisons, we calculated the hypothetical levels of segregation using the dissimilarity index in a number of steps. First, we identified the closest CCC, CSU, and UC to each public California high school. We accomplished this by calculating both the distance and travel time from each high school to each public college in California using the latitude and longitude of each school.[21] For these analyses, we rely on travel time, rather than distance, as our measure of proximity to account for the fact that travel time likely influences college decisions

more than absolute distance (Jepsen & Montgomery, 2007). Using these data, we computed two different versions of the hypothetical counterfactual:

(1) In which we send each graduating student from each high school to the nearest college, regardless of the sector to which that college belongs. For example, the nearest college to University High School in Irvine is the University of California, Irvine, so in this hypothetical world we send all graduating students from University High School to UCI.

(2) In which we send graduating seniors to the nearest college *of a given sector*. Our goal with this analysis is to sort students by geography within bands of achievement; we want to send students to the nearest college in the most selective sector that they are qualified to attend. Data availability presents a considerable limitation in creating this hypothetical counterfactual; we do not have individual-level information on the schools to which students would be admitted had they applied, nor do we have other information that could be used to proxy admission rates (such as student-level standardized test scores or GPAs with race information attached). To overcome this barrier, we use the CDE data that details what percent of students of a given race in a given high school met the qualifications for attending either a CSU or a UC based on having a passing grade of "C" or higher on A-G required courses for these sectors. We then send ⅓ of these eligible students to the nearest UC and the other ⅔ to the nearest CSU. We send all remaining graduates to the nearest CCC. These ratios used are consistent with those listed in the master plan for the state of California higher education and roughly match actual enrollment numbers. While this is a crude measure, it does allow us to examine a slightly more reasonable counterfactual than the counterfactual outlined in (1).

We use these new hypothetical enrollments to create the fictional universe of public California colleges that would exist if students actually were sorted exclusively by geography (or

by geography within bands of selectivity). We then compare the actual segregation and these two calculations of hypothetical levels of segregation to get a sense of how observed levels of segregation compare to the levels of segregation we would expect to observe if students decided where to attend based solely on geography and provide a way of putting our findings into context.

6. Results

6.1 Overall Patterns of Racial Segregation

The dissimilarity index, plotted in Figure 2, provides a measure of overall segregation; higher values indicate greater levels of segregation. The gray line with triangular markers shows that the dissimilarity index for California public higher education hovered around 0.30 between 1994 and 2014. There is a slight indication of decreased segregation between 2000 and 2014, but the decrease is modest. As noted earlier, because it is difficult to predict how much segregation to expect in colleges, we provide a measure of segregation in California public high schools as well. Across our sample period, segregation is consistently about 40% lower in California colleges than it is in California high schools.

As a way of understanding these patterns of sorting, we provide two other analyses that look at more specific patterns of sorting across all four race groups. First, we decompose the Theil index in two separate ways: the percent of total segregation due to segregation within (as opposed to between) sectors and the percent of total segregation due to within (as opposed to between) geographic regions.

Figure 3 shows these two decompositions. Nearly all (over 90% across our sample period) of the sorting is due to students of different race groups attending different schools within the same sector (solid black line in Figure 3), which means that less than 10% of overall

sorting is due to students of different race groups attending different sectors. Most (about 75%) of sorting during this time period is due to students of different races attending different schools within the same geographic region (dashed gray line in Figure 3).These findings indicate that racial segregation in California public higher education is largely not due to students of different races attending schools in different sectors (e.g. Latinx students attending UC campuses and White students attending CSU campuses) nor is it largely due to students of different races attending schools in different geographic regions (e.g. Asian students attending colleges in the Los Angeles metro region and Black students attending colleges in the Bay Area).

Next, we examine the levels of segregation (dissimilarity index) across all four race groups within each of the three sectors of public higher education in California in Figure 4. Segregation is lowest in the UC system and highest in the CCCs. This figure also shows that segregation in each of the systems remained relatively steady between 1994 and 2014, with a slight decrease in the UC system.

6.1 Patterns of Racial Segregation for Specific Groups

We next turn to an examination of these patterns for our three pairwise race comparisons. Because the causes and consequences of racial sorting vary across race groups, and because California has undergone significant demographic changes in the past few decades, these analyses allow for a more nuanced understanding of what might be driving the overall patterns we observe and if patterns vary across different race groups.

In Figure 5, we present the percent of segregation that is due to segregation within (as opposed to between) sectors for each of our pairwise race comparisons. This figure shows that almost all (more than ninety-five percent) of the Latinx-White and Black-White segregation in California is due to students attending different schools *within* the same sector. The same is not

true for Asian-White segregation. Asian-White segregation is partially and increasingly due to students attending schools in different sectors; over the course of this study, the percent of Asian-White segregation in California public higher education due to between sector sorting more than doubled, increasing from about 5% to 12%.

Given this finding, that almost all of the racial sorting is occurring within sectors, we next examine race-specific patterns of sorting within each of the three sectors using the dissimilarity index. Figures 6-8 show whether segregation varies by race group within each sector of education and provide a more nuanced understanding of the degree to which subgroups are evenly distributed within each sector. Even though all three race comparisons (White-Black, White-Asian, and White-Latinx) are relatively close to each other, in each of the three sectors White-Latinx segregation is the lowest of the three race groups we examine.

We also have seen moderate changes in the dissimilarity index over time in regard to White-Latinx dissimilarity, particularly in the CSU and UC system. In the CSU system, the Latinx-White dissimilarity increased 3.3 percentage points between 1994 and 2014, an increase of 15%. In the UC system, the Latinx-White dissimilarity index decreased 4.7 percentage points between 1994 and 2006 and then increased 6.5 percentage points between 2006 and 2014.

In contrast to the increasing levels of segregation as measured by the White-Latinx dissimilarity index, the Asian-White and Black-White dissimilarity index has remained constant in the CCC and CSU systems and decreased in the UC system over our sample period. Between 1994 and 2014, the Black-White dissimilarity index decreased 8.8 percentage points in the UC system (a decrease of 35%) and Asian-White dissimilarity decreased 8.9 percentage points (a decrease of 34%). Within the UC system, White and Black and White and Asian students are increasingly attending similar schools.

In figure 9 we examine the percent of overall segregation that is due to sorting within (as opposed to between) geographic regions for each of our three pairwise comparisons. Some notable differences between race groups emerge from Figure 9. The Asian-White and Latinx-White lines are much lower than the Black-White line; more of the Asian-White and Latinx-White segregation is due to students going to schools in different geographic regions than it is for Black-White segregation. While the percent of segregation due to sorting within the same geographic region has increased over the past 20 years for Asian-White segregation, it has decreased for Latinx-White segregation. Latinx and White students are increasingly going to schools in different parts of the state, while Asian and White students are increasingly going to schools in the same parts of the state.

6.4 Comparing Actual Segregation to Hypothetical Counterfactuals

These patterns in the amount of segregation that is due to geographic sorting lead to our final analysis: examining what the levels of segregation would be if attendance were entirely bound by geography. This hypothetical counterfactual provides another way of putting observed levels of segregation into perspective, as it is hard to know how much segregation we should expect in higher education.

Figure 10 presents the actual levels of segregation (solid black line with circular markers) and the estimated levels that would occur if students attended the nearest college (light gray line with plus-sign markers) or the nearest college within a given level of selectivity (dark gray line with x markers) across all four racial groups. We see that the actual levels of segregation are lower than what we would observe if students were sorted entirely by geography or by geography within a level of selectivity. This figure indicates that the actual way that students sort themselves (a mixture of geography, achievement, preferences, finances, etc.) leads to less

segregated schools than what we could expect if college of attendance was determined exclusively by absolute geography or geography within sector.

However, these patterns are not as clear when we examine hypothetical vs. actual segregation between specific racial groups. Figure 11 presents the observed vs. hypothetical Black-White, Asian-White, and Latinx-White dissimilarity indices for California's public colleges. The three groups exhibit very different patterns of segregation. Levels of segregation between Black and White students are quite similar to what would they would be if students went to the nearest school at a given level of selectivity. Latinx and White students are far less segregated than they would be if they went to the nearest school at a given level of selectivity. In contrast, Asian and White students are *more* segregated than they would be if they went to the nearest school at a given level of selectivity.

7. Discussion & Conclusion

This paper provides a framework for examining segregation in higher education and presents one of the first nuanced looks at levels of racial segregation in higher education across and within sectors in one state. The distribution of students across colleges has a number of critical implications; racial segregation can have consequences for individuals and for society and there are important differences in college quality, even among schools in the same sector. Thus, this examination allows us to begin to answer questions about the role that higher education may play in ameliorating or exacerbating the effects of segregation in K-12 and residential areas (Clotfelter et al., 2015).

7.1 Overall patterns of segregation

We find that California public higher education is less segregated than California public high schools; the dissimilarity indices for each of the sectors of higher education is lower than

the dissimilarity index for California high schools. This supports the hypothesis that sectors with more units are more segregated than sectors with fewer units and that larger catchment areas lead to less segregation. On average, students in California experience more racially diverse environments in college than they did in high school; higher education serves to counteract the high levels of racial residential and K-12 segregation (and might, in fact, be an arena in which "diversity shines its light" (Stella Flores, *Chronicle of Higher Education*, 3/17/17)). This is in contrast to Clotfelter et al (2015), who find that, on average, students in North Carolina are more racially segregated in colleges than in high schools. This highlights the importance of analyses of specific states, as the college contexts vary significantly across states (for example, North Carolina has a number of historically black colleges and universities, while California does not).

The finding that the CCCs are more segregated than both the CSUs and the UCs lends support to the idea of Matthew effect: the most accomplished, highest achieving students attend schools with the most racial diversity. To the extent that having access to diverse peers is an advantage (e.g. Antonio et al., 2004; Milem & Hakuta, 2000), the most advantaged students are experiencing increased advantage in college. This finding highlights the importance of successfully implementing transfer policies between CCC and four-year institutions.

With a few exceptions, we find that various measures of segregation in California higher education are remaining mostly stable. The level of overall segregation in California higher education, and within the CCC and CSU systems, is quite stable. This is notable, given that most of the factors related to segregation in higher education (K-12 segregation, college attendance rates) increased over the period of study.

Even though past research has shown that Proposition 209 affected which UC campuses minority students attended (Hinrichs, 2012), we do not see evidence of changes in segregation

within or between sectors. This could partially be explained by the fact that the affirmative action ban was met with various institutional strategies to encourage minority enrollment in selective UCs (Mohr & Lee, 2000, Hinrichs, 2012) and thus had a muted effect overall.

7.2 Segregation for specific groups

While the overall trends are stable, this is not the case for specific race comparisons, specifically Latinx-White and Asian-White. First, we see that Latinx-White segregation increased in the CSU system and in the UC system. Latinx students are the fastest growing subgroup in California higher education, and these trends provide evidence that they are increasingly segregated in the four-year sectors.

The increase in Latinx-White segregation in the UC system, which started in 2006, provides evidence to support our hypothesis that opening a new college will increase segregation in that sector.[22] The increase in Latinx-White segregation, which coincided with decreases in Black-White and Asian-White segregation, indicates that opening a four-year college in the Central Valley increased sorting between White and Latinx students in that sector. Figure 5 shows that the proportion of Latinx-White sorting that was due to within sector sorting increased around 2005. This provides suggestive evidence in favor of our hypothesis that opening a new campus in a racially segregated area of the state can decrease segregation between sectors. While providing access to a selective four-year college to students in this education desert is a positive development, these analyses provide some suggestive evidence of an unintended consequence.

We see some interesting differences in the proportion of segregation that is due to across geographic region sorting. For Latinx and White segregation; the proportion of overall segregation that is due to students attending schools in different geographic regions increased about 10 percentage points over our sample period. This reflects the findings that Latinx and

White communities are increasingly segregated in California (Orfield & Ee, 2014). As the Latinx population grows in California, and continues to live in residentially segregated areas, we will continue to see racial segregation across regions in higher education.

In examining how much segregation is due to within-sector and within-region sorting, we find interesting patterns for Asian-White segregation; an increasing proportion of the segregation between White and Asian students is between sectors (White and Asian students are attending increasingly different kinds of schools) and a decreasing amount is due to between region sorting. Descriptive results indicate that this is mainly due to an increase in Asian students attending UC campuses. As Asian students are the highest achieving group in California K-12 education,[23] this aligns with Hoxby's (2009) finding that well qualified students are increasingly motivated by school resources and decreasingly bound by geography.

7.3 Actual segregation versus hypothetical segregation

Our segregation simulations also show mixed results across race groups. While, on average, observed segregation is lower than it would be if students went to the college school to their high school, this is not true across the board. Specifically, observed Latinx-White segregation is much lower than hypothetical segregation based on geography alone and observed Asian-White segregation is higher than it would be were it based entirely on geography.

These opposite findings could reveal important differences between these groups. Asian and White students are opting into colleges that are more different than they would be if students went to the nearest college. Factors other than geography -- finances, achievement, preferences, etc. -- are exacerbating sorting. The opposite is true for Latinx and White students, in which we consistently see observed levels of segregation that are lower than what we would observe if students sorted entirely based on geography. This finding could be explained by the fact that

geography differentially affects access for various race groups. If Latinx students in California are more likely to live in education deserts (Hillman, 2016), they will need to travel farther than their nearest school to attend a four-year college. This difference in geographic opportunity could explain this finding.

7.4 Limitations

These descriptive analyses present a number of intriguing findings, but there are some notable limitations. First, our study only measures levels of and trends in structural diversity and can tell us little about students' lived experiences in college. Structural diversity – the presence of racial/ethnic diversity within a student body–is a necessary but insufficient condition for interactional diversity and classroom diversity (informal interactions in and outside of class and learning about diversity in academic settings) which can lead to a broadening of perspectives (Gurin et al, 2002; Park, Bowman, Denson & Eagan, 2018). Analyses that examine students' lived experiences (particularly non-residential students) and racial sorting at the course or major level will add important nuance to these analyses.

Also, it is not clear that more racial/ethnic structural diversity is necessarily beneficial for all students. Indeed, in order for students to benefit from diverse peers, a number of conditions (such as pursuit of common goals, cooperation, and support from authorities) must be met (Allport, 1954; Chang, et al 2006). More diversity, which inherently means fewer same race peers, could be detrimental for some groups of students (Hurtado, 2007; Tatum, 1997).

Due to data constraints, the race measures we use in this study are both crude and non-exhaustive. The coarse race categories we use in this study could belie important differences within groups. For instance, by using one omnibus "Asian" category, we potentially obscure important heterogeneity between the many groups that make this category. Past work has found

differences in the college choice behavior among the Asian American Pacific Islander ethnic communities, noting that regardless of socioeconomic standing, Southeast Asian American students and placed more emphasis on attending an institution close to home compared to their Japanese and Korean counterparts (Teranishi, Allen & Solrzano, 2004;). And, as Posselt et al (2012) note, intersecting race with other important factors, like gender, urbanicity, and immigrant status, will provide a much more nuanced understanding of what different forms and levels of segregation actually mean for students' experiences.

Our calculations of segregation under hypothetical geography-only conditions are quite crude due to data limitations. We do not have the necessary student-level data to determine which students would qualify for CSU or UC attendance, let alone to which schools each student would be accepted (Bastedo & Flaster, 2014). Since we do not have access to student-level grades and test scores, we can noisily approximate which students could attend either a CSU or UC, but we cannot determine which sector, let alone which specific school, students would attend. Our calculations of the hypothetical levels of segregation that we would observe if students were sorted entirely by geography are thus quite blunt and should be interpreted merely as a rough suggestion of what might occur under different sorting regimes.

Finally, our sample inclusion rules have important implications. Since we only include public colleges, our analyses cannot speak to the experiences of California high school students who attend private colleges in California or colleges out of state. Recent data show that among California public high school students who enroll in college, 4% enroll in private in-state colleges and 11% enroll in out-of-state institutions (Kurlaender, Reed, Cohen, Naven, Martorell, Carrell, 2018). Also, we include out-of-state students in our analyses, as they are included in the enrollment-by-race counts for each of the sectors. While there are relatively few out-of-state

students in California public higher education (6.5% of undergraduate enrollments in the UC system[24]), the inclusion of these students makes direct comparisons between our observed and hypothetical segregation measures even more difficult.

7.5 Future Work

This work suggests a number of productive avenues for future work. For example, future studies could conduct similar analyses using reliable measures of income or wealth to examine segregation by socioeconomic status. The share of undergraduate college students who come from poor families has increased substantially over the past 20 years but their growth at selective institutions has been less pronounced (Pew Research Center, 2019). Current statistics show that California mirrors national trends. About half of the students at California's community colleges, are from California's lowest-income families, compared to about one in four in the CSU and UC system. As access to better resourced peers can affect student outcomes, both through peer effects and through effects on institutional resources (Epple & Romano, 2011; McEwan, 2003), future work should examine income segregation within and across sectors of higher education. Also, given that race and class are linked, future work that considers segregation of race-by-income groups might provide a different —and most likely more pronounced—story of within- and between-sector segregation trends.

There are a number of recent and ongoing policy and programmatic changes that could affect racial and ethnic sorting in higher education. For example, many schools, particularly broad access two- and four-year colleges, are offering more and more classes and full programs online (Seaman, Allen, & Seaman, 2018). In 2019, California launched a fully online community college, Calbright. As propensity to enroll in online classes and programs differs across race/ethnicity (Ortagus, 2018; Wladis, Hachey, & Conway, 2015), growth in online offerings

could affect racial segregation. Studies examining the effects of various policy changes on racial segregation offer an important extension to this work.

7.6 Conclusion

Racial segregation in social and educational environments has important implications for society and for individuals, and colleges are arguably one of the most important contexts for examining such sorting. While past studies have examine sorting across sectors (such as across two- and four- year schools), no studies have explicitly examined patterns of sorting within sectors or compared levels of segregation across various pairwise comparisons. In this study we outline a number ways in which one could examine racial segregation in higher education. We find that overall levels of segregation are lower in California's colleges than they are in California's high schools. However, we find that California's community colleges – the schools the serve the most students and the populations that have been least well served by their K-12 education – are much more segregated than California's four-year colleges and this has remained relatively stable over time.

We also find important differences between race groups. We see that most Latinx-White and Black-White segregation is due to students attending different schools within the same sector, while Asian-White segregation is increasingly due to students attending schools in different sectors. We also find evidence that policy and structural changes, such as opening a new campus, can affect patterns of segregation across and within sectors. These findings highlight the need for continued examinations in multiple states and over time, as the policy landscape changes. As there are important differences in quality across schools within the same sector, examining which students attend which schools is imperative.

Notes

[1]A few relatively small-scale experimental studies have proven that diverse environments do affect students' patterns of thinking. For example, Antonio, Chang, Hakuta, Kenny, Levin & Milem (2004) showed, through a randomized experiment, that the presence of a Black student in an otherwise all-White discussion section led to greater complex thinking.

[2]Though Reardon and Owens (2014) note that these studies could conflate the effects of desegregation itself – such as increased feelings of enfranchisement – and not just the effects of school.

[3]Data retrieved from https://nces.ed.gov/programs/digest/d17/tables/dt17_309.20.asp

[4]Data retrieved from https://nces.ed.gov/programs/digest/d17/tables/dt17_309.20.asp

[5]Based on author's calculations using data from the California Department of Education. Data retrieved from https://www.cde.ca.gov/ds/sd/sd/filesgradaf.asp .

[6]Data retrieved from: https://www.universityofcalifornia.edu/infocenter/freshman-admissions-summary

[7]Eighth grade test score gaps in Reading and Math from The Educational Opportunity Monitoring Project at Stanford's Center for Education Policy Analysis: https://cepa.stanford.edu/educational-opportunity-monitoring-project/achievement-gaps/race/#fourth

[8]Retrieved from: https://www.foxbusiness.com/features/top-15-most-diverse-public-universities-us

[9]Retrieved from: https://lao.ca.gov/reports/2018/3748/higher-ed-analysis-021518.pdf

[10]Data retrieved from: http://asd.calstate.edu/dashboard/graduation-success.html

[11]Data retrieved from: https://www.universityofcalifornia.edu/infocenter/ug-outcomes

[12]Data retrieved from: https://www.universityofcalifornia.edu/infocenter/freshman-admissions-summary

[13]IPEDS provides fall enrollment counts by race/ethnicity beginning fall 1994.

[14]Data retreived from https://datamart.cccco.edu/students/FTES_Summary.aspx

[15]Data retrieved from http://www.calstate.edu/as/stat_reports/ethnicity.shtml

[16]Data retrieved from https://nces.ed.gov/ipeds/datacenter/SelectVariables.aspx?stepId=1

[17]We chose not to use IPEDS data for all three sectors of higher education because some key groups of students are not included in IPEDS enrollment counts. Students who are enrolled "exclusively in courses that cannot be applied toward a formal award," students enrolled only in ESL programs, students enrolled exclusively in continuing education, and students exclusively auditing classes are not included in IPEDS enrollment counts. These groups of students make up a substantial proportion of CCC, and a non-negligible proportion of CSU, enrollments. For example, in Fall, 2014 over 10% students enrolled in CCCs were enrolled in non-credit bearing courses. As our study examines sorting across schools to examine potential contact between students, we felt it was important to include all students.

[18]Data retrieved from https://www.cde.ca.gov/ds/sd/sd/filesgradaf.asp

[19]The A-G requirements provide guidance on the content and length of required enrollment in seven categories of study (e.g., History/Social Science, English, Laboratory Science, etc.) that students must complete for admission into either the UC or CSU system. More information about UC eligibility can be found here: https://hs-articulation.ucop.edu/guide/a-g-subject-requirements/a-history-social-science/

[20]Notably, this decision means that we are not including Native American/American Indian students (the next largest race group in all three sectors) or students who identify as multi-racial. Native Americans make up 1 percent of UC's student population system-wide and less than 1 percent of the student population across the CSU and CCC systems. This small sample would make for very noisy estimates for this group. Multi-racial was not collected across our entire sample period (for example, the CCC system started offering "Multi-Ethnicity" only in 2009). We also do not include international students, as they are counted as a separate group and their race/ethnicity is not recorded.

[21]We computed these distances using the HERE API plug-in for Stata (–georoute–) (Weber & Peclat, 2016). The HERE API computes travel time between two coordinates in normal traffic conditions.

[22]We do not see visual evidence of an increase in within-sector segregation in the CCCs and CSUs after new schools opened in those sectors. We believe that this is because those sectors are much bigger, so the addition of one new school has less of an overall effect than the addition of a new school in the UC system. In additional analyses in which we look at within sector sorting *within* geographic regions (available from the authors upon request), we do see some suggestive evidence of increased segregation in the CCC sector when a new school opens.

[23]Data retrieved from: https://caaspp.cde.ca.gov/sb2018/Search

[24] Data retrieved from: https://www.universityofcalifornia.edu/infocenter/fall-enrollment-glance

References

Allport, G. (1954). *The nature of prejudice.* Cambridge, MA: Addison-Wesley.

Alon S., & Tienda, M. (2007). Diversity, opportunity, and the shifting meritocracy in higher education. *American Sociological Review*, *72*, 487–511.

Antonio, A. L., Chang, M. J., Hakuta, K., Kenny, D. A., Levin, S., & Milem, J. F. (2004). Effects of racial diversity on complex thinking in college students. *Psychological Science*, *15*(8), 507-510.

Arum, R., Gamoran, A., & Shavit, Y. (2007). More inclusion than diversion: Expansion, differentiation, and market structure in higher education. *Stratification in higher education: A comparative study*, 1-35.

Ashenfelter, O., Collins, W. J., & Yoon, A. (2006). Evaluating the role of Brown v. Board of Education in school equalization, desegregation, and the income of African Americans. *American Law and Economics Review*, *8*(2), 213-248.

Association of American Colleges and Universities. (1985). Integrity in the college curriculum. Washington, DC.

Autor, D. H. (2014). Skills, Education, and the Rise of Earnings Inequality among the "Other 99 Percent." Science, 344, 843-851.

Baker, R., Klasik, D., & Reardon, S. F. (2018). Race and stratification in college enrollment over time. *AERA Open*, *4*(1).

Bakke & Grutter vs. Bollinger Citations: Harvard University et al 2003 WL 399220 US Supreme Court Amicus Brief

Bastedo, M. N., & Flaster, A. (2014). Conceptual and methodological problems in research on college undermatch. *Educational Researcher*, *43*(2), 93-99.

Bastedo, M. N., & Jaquette, O. (2011). Running in place: Low-income students and the dynamics of higher education stratification. *Educational Evaluation and Policy Analysis*, *33*(3), 318-339.

Bischoff, K. (2008). School district fragmentation and racial residential segregation: How do boundaries matter?. *Urban Affairs Review*, *44*(2), 182-217.

Bound, J., Hershbein, B., & Long, B. T. (2009). Playing the admissions game: Student reactions to increasing college competition. *Journal of Economic Perspectives*, *23*(4), 119-46.

Bowman, N. A. (2010). College diversity experiences and cognitive development: A meta-analysis. *Review of Educational Research*, *80*(1), 4-33.

Brown v. Board of Educ., 347 U.S. 483 (1954).

Braddock, J. (1980). The perpetuation of segregation across levels of education: A behavioral assessment of the contact-hypothesis. *Sociology of Education* 53(3): 178-86.

Burdick-Will, J., Ludwig, J., Raudenbush, S. W., Sampson, R. J., Sanbonmatsu, L., & Sharkey, P. (2011). Converging evidence for neighborhood effects on children's test scores: An experimental, quasi-experimental, and observational comparison. *Whither opportunity*, 255-276.

Butler, D. (2010). Ethno-racial composition and college preference: Revisiting the perpetuation of segregation hypothesis. *The ANNALS of the American Academy of Political and Social Science*, *627*(1), 36-58.

Carnevale, A. & Strohl, J. (2013). White flight goes to college. *Poverty & Race*, *22*(5), 1-2.

Chang, M. J., Denson, N., Saenz, V., & Misa, K. (2006). The educational benefits of sustaining cross-racial interaction among undergraduates. *The Journal of Higher Education*, *77*(3), 430-455.

Chetty, R., Friedman, J. N., Saez, E., Turner, N., & Yagan, D. (2017). *Mobility report cards: The role of colleges in intergenerational mobility* (No. w23618). National Bureau of Economic Research.

Clotfelter, C. T. (2011). *After Brown: The rise and retreat of school desegregation*. Princeton University Press.

Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2015). *Public universities, equal opportunity, and the legacy of Jim Crow: Evidence from North Carolina* (No. w21577). National Bureau of Economic Research.

Colby, S., & Ortman, J. (2015). Projections of the size and composition of the US Population: 2014-2060. United States Census Bureau.

Denton, N. A. (1995). The persistence of segregation: Links between residential segregation and school segregation. *Minn. L. Rev., 80,* 795.

Epple, D., & Romano, R. E. (2011). Peer effects in education: A survey of the theory and evidence. In *Handbook of social economics* (Vol. 1, pp. 1053-1163). North-Holland.

Erikson, E. (1946). Ego development and historical change. *Psychoanalytic Study of the Child, 2,* 359–396.

Erikson, E. (1956). The problem of ego identity. *Journal of American Psychoanalytic Association, 4,* 56–121.

Grutter v. Bollinger 539 US 306 (2003)

Gurin, P., Dey, E., Hurtado, S., & Gurin, G. (2002). Diversity and higher education: Theory and impact on educational outcomes. *Harvard educational review, 72*(3), 330-367.

Guryan, J. (2004). Desegregation and black dropout rates. *American Economic Review*, *94*(4), 919-943.

Hamilton, Laura, and Kelly Nielsen. Manuscript in Progress. "Institutional Diversity Work." In *Broke: The Racial Consequences of Underfunding the New University.* University of Chicago Press.

Hanushek, E. A., Kain, J. F., & Rivkin, S. G. (2009). New evidence about Brown v. Board of Education: The complex effects of school racial composition on achievement. *Journal of Labor Economics*, *27*(3), 349-383.

Hemelt, S. W., & Marcotte, D. E. (2011). The impact of tuition increases on enrollment at public colleges and universities. *Educational Evaluation and Policy Analysis*, *33*(4), 435-457.

Hillman, N. W. (2016). Geography of college opportunity: The case of education deserts. *American Educational Research Journal*, *53*(4), 987-1021.

Hillman, N., & Weichman, T. (2016). Education deserts: The continued significance of "place" in the twenty-first century. *Viewpoints: Voices from the Field*.

Hinrichs, P. (2012). The effects of affirmative action bans on college enrollment, educational attainment, and the demographic composition of universities. *Review of Economics and Statistics*, *94*(3), 712-722.

Hinrichs, P. (2015). An empirical analysis of racial segregation in higher education. (NBER Working Paper No. 21831). Cambridge, MA: National Bureau of Economic Research.

Hoekstra, M. (2009). The effect of attending the flagship state university on earnings: A discontinuity-based approach. *Review of Economics and Statistics*, *91*(4), 717–724.

Hoxby, C. M. (2009). The changing selectivity of American colleges. *Journal of Economic perspectives*, *23*(4), 95-118.

Hurtado, S. (2007). Linking diversity with the educational and civic missions of higher education. *The Review of Higher Education*, *30*(2), 185-196.

Iceland, J., & Weinberg, D. H. (2002). *Racial and ethnic residential segregation in the United States 1980-2000*. Bureau of Census.

Iloh, C. (2018). Toward a new model of college "choice" for a twenty-first-century context. *Harvard Educational Review*, *88*(2), 227-244.

Jepsen, C., & Montgomery, M. (2009). Miles to go before I learn: The effect of travel distance on the mature person's choice of a community college. *Journal of Urban Economics, 65*(1), 64–73.

Johnson, R. C. (2011). *Long-run impacts of school desegregation & school quality on adult attainments* (No. w16664). National Bureau of Economic Research.

Kochhar, R., & Fry, R. (2014). Wealth inequality has widened along racial, ethnic lines since end of Great Recession. *Pew Research Center*, *12*(104), 121-145.

Kurlaender, M. (2006). Choosing community college: Factors affecting Latino college choice. *New Directions for Community Colleges*, *2006*(133), 7-16.

Kurlaender, M., Carrell, S., & Jackson, J. (2016). The promises and pitfalls of measuring community college quality. *Russell Sage Foundation Journal of the Social Sciences, 2*(1), 174–190.

Kurlaender, M., Reed, S., Cohen, K., Naven, M., Martorell, P., & Carrell, S. (2018). Where California high school students attend college. *Policy Analysis for California Education*.

Kucsera, J. V., Siegel-Hawley, G., & Orfield, G. (2015). Are we segregated and satisfied? Segregation and inequality in southern California schools. *Urban Education, 50*(5), 535-571.

Ladson-Billings, G. (1998). Just what is critical race theory and what's it doing in a nice field like education?. *International journal of qualitative studies in education, 11*(1), 7-24.

Lichter, D. T., Parisi, D., & Taquino, M. C. (2012). The geography of exclusion: Race, segregation, and concentrated poverty. *Social Problems*, *59*(3), 364-388.

Liebowitz, D. D. (2018). Ending to what end? The impact of the termination of court-desegregation orders on residential segregation and school dropout rates. *Educational Evaluation and Policy Analysis*, *40*(1), 103-128.

Logan, J. R., Stults, B. J., & Farley, R. (2004). Segregation of minorities in the metropolis: Two decades of change. *Demography*, *41*(1), 1-22.

Long, M. C. (2008). College quality and early adult outcomes. *Economics of Education Review*, *27*(5), 588–602.

Lucas, S. R. (2001). Effectively maintained inequality: Education transitions, track mobility, and social background effects. *American journal of sociology*, *106*(6), 1642-1690.

McEwan, P. J. (2003). Peer effects on student achievement: Evidence from Chile. *Economics of education review*, *22*(2), 131-141.

McLendon, M. K., Hearn, J. C., & Mokher, C. G. (2009). Partisans, professionals, and power: The role of political factors in state higher education funding. *The Journal of Higher Education*, *80*(6), 686-713.

Milem, J. F., & Hakuta, K. (2000). The benefits of racial and ethnic diversity in higher education. *Minorities in higher education: Seventeenth annual status report*, 39-67.

Mohr, J. W., & Lee, H. K. (2000). From affirmative action to outreach: Discourse shifts at the University of California. *Poetics*, *28*(1), 47-71.

Nieto, S., & Bode, P. (2008). Affirming Diversity: *The sociopolitcal context of multicultural education*. Boston: Pearson Education.

Oliver, M., & Shapiro, T. (2013). *Black wealth/white wealth: A new perspective on racial inequality*. Routledge.

Orfield, G., & Ee, J. (2014). Segregating California's future: Inequality and its alternative 60 years after Brown v. Board of Education. *Civil Rights Project.* UCLA.

Orfield, G., & Lee, C. (2007). Historic reversals, accelerating resegregation, and the need for new integration strategies. *Civil Rights Project*. UCLA.

Orfield, G., & Yun, J. T. (1999). Resegregation in American schools. *Civil Rights Project*. Harvard University.

Ortagus, J. C. (2018). National evidence of the impact of first-year online enrollment on postsecondary students' long-term academic outcomes. *Research in Higher Education*, *59*(8), 1035-1058.

Park, J., Bowman, N., Denson, N., & Eagan, K. (2018). Race and class beyond enrollment: The link between socioeconomic diversity and cross-racial interaction. *The Journal of Higher Education*, 1-25.

Pascarella, E. T., & Terenzini, P. T. (1991). *How college affects students: Findings and insights from twenty years of research*. San Francisco: Jossey-Bass Inc.

Piaget, J. (1971). The theory of stages in cognitive development. In D. R. Green, M. P. Ford, & G. B. Flamer (Eds.), Measurement and Piaget (pp. 1–111). New York: McGraw-Hill.

Posselt, J. R., Jaquette, O., Bielby, R., & Bastedo, M. N. (2012). Access without equity: Longitudinal analyses of institutional stratification by race and ethnicity, 1972–2004. *American Educational Research Journal*, *49*(6), 1074-1111.

Reardon, S. F. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. *Whither opportunity*, 91-116.

Reardon, S. F. (2016). School segregation and racial academic achievement gaps. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, *2*(5), 34-57.

Reardon, S. F., & Bischoff, K. (2011). Income inequality and income segregation. *American Journal of Sociology*, *116*(4), 1092-1153.

Reardon, S. F., Grewal, E. T., Kalogrides, D., & Greenberg, E. (2012). Brown fades: The end of court-ordered school desegregation and the resegregation of American public schools. *Journal of Policy Analysis and Management*, *31*(4), 876-904.

Reardon, S. F., & Owens, A. (2014). 60 years after Brown: Trends and consequences of school segregation. *Annual Review of Sociology*, *40*, 199-218.

Reardon, S. F., Yun, J. T., & Eitle, T. M. (2000). The changing structure of school segregation: Measurement and evidence of multiracial metropolitan-area school segregation, 1989–1995. Demography, 37(3), 351-364.

Regents of University of California v. Bakke 438 US 265 (1978)

Ruble, D. (1994). Developmental changes in achievement evaluation: motivational implications of self-other differences. *Child Development, 65,* 1095–1110.

Rumberger, R. W., & Palardy, G. J. (2005). Does segregation still matter? The impact of student composition on academic achievement in high school. *Teachers College Record*, *107*(9), 1999.

Shapiro, D., Dundar, A., Huie, F., Wakhungu, P., Yuan, X., Nathan, A & Hwang, Y., A. (2017, April). *A National View of Student Attainment Rates by Race and Ethnicity – Fall 2010 Cohort* (Signature Report No. 12b). Herndon, VA: National Student Clearinghouse Research Center.

Shen, M. (2018). The association between the end of court-ordered school desegregation and preterm births among Black women. *PloS one*, *13*(8), e0201372.

Tatum, B. D. (1997). *Why are all the Black kids sitting together in the cafeteria?: And other conversations about race*. Basic Books.

Teranishi, R., Allen, W. R., & Solrzano, D. G. (2004). Opportunity at the Crossroads: Racial Inequality, School Segregation, and Higher Education in California. *Teachers College Record*, *106*(11), 2224-2245.

Terenzini, P. T., Springer, L., Pascarella, E. T., & Nora, A. (1995). Influences affecting the development of students' critical thinking skills. *Research in higher education*, *36*(1), 23-39.

Turley, R. N. L. (2009). College proximity: Mapping access to opportunity. *Sociology of Education*, *82*(2), 126-146.

Weiner, D. A., Lutz, B. F., & Ludwig, J. (2009). *The effects of school desegregation on crime* (No. w15380). National Bureau of Economic Research.

Wladis, C., Hachey, A. C., & Conway, K. M. (2015). The representation of minority, female, and non-traditional STEM majors in the online environment at community colleges: A nationally representative study. *Community College Review*, *43*(1), 89-114.

Wright, R., Ellis, M., Holloway, S. R., & Wong, S. (2014). Patterns of racial diversity and segregation in the United States: 1990–2010. *The Professional Geographer*, *66*(2), 173-182.

Figures

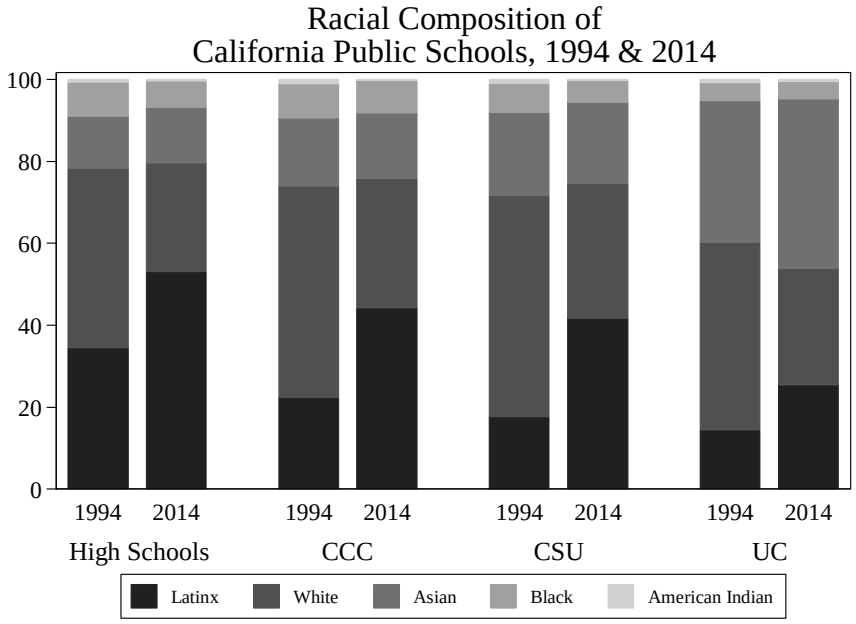


Figure 1. Racial Composition of California Public Schools, 1994 & 2014. Data from California Department of Education, California Community College Chancellor's Office, California State University Institutional Research, and Integrated Postsecondary Education Data System.

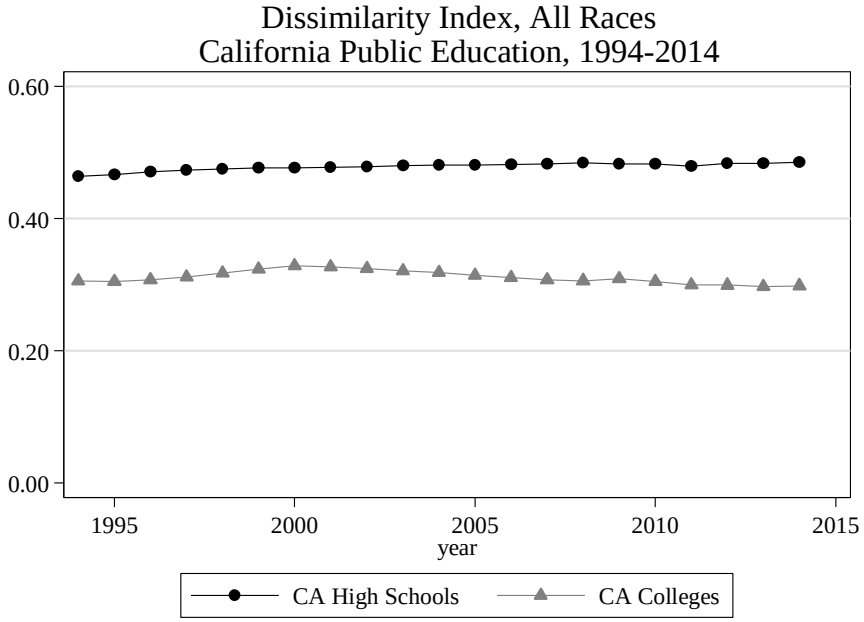


Figure 2. Dissimilarity Index, California High Schools and Public Colleges. Included race groups: Asian, Black, Latinx, & White. Authors' calculations. Data from California Department of Education, California Community College Chancellor's Office, California State University Institutional Research, and Integrated Postsecondary Education Data System.

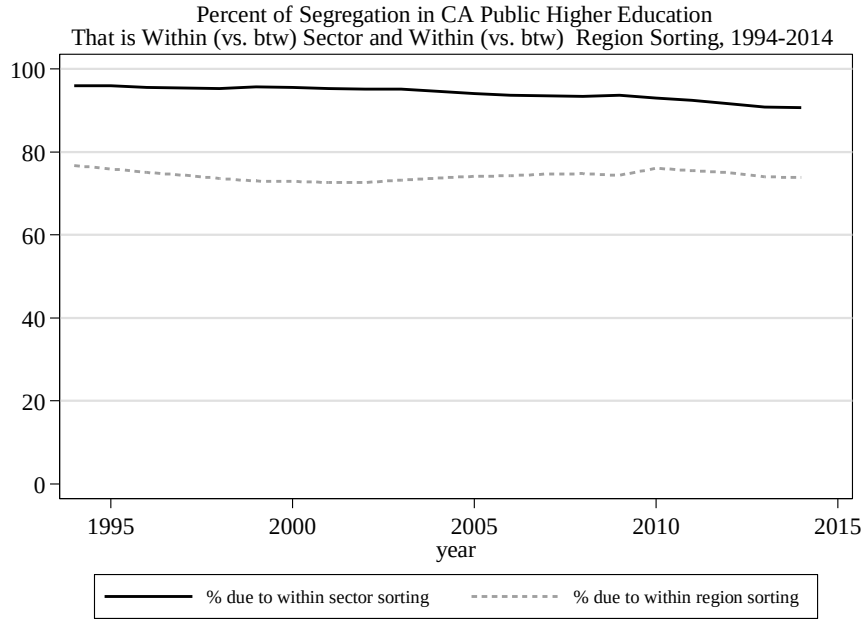


Figure 3. Decomposition of Theil Index into within/between sector and within/between region for segregation in California public higher education. Authors' calculations. Data from California Community College Chancellor's Office, California State University Institutional Research, and Integrated Postsecondary Education Data System.

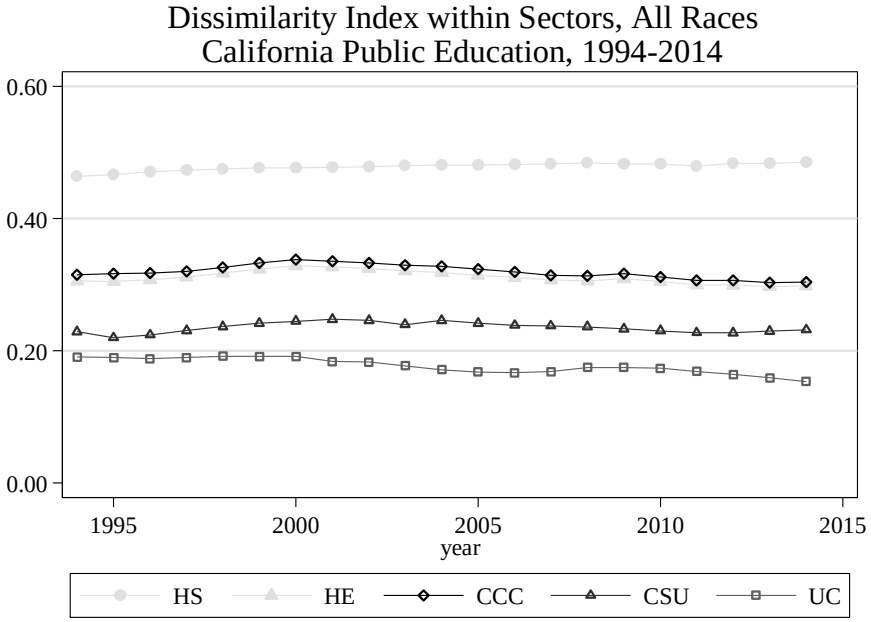


Figure 4. Dissimilarity Index, California High Schools and Public Colleges by Sector. Included race groups: Asian, Black, Latinx, & White. Authors' calculations. Data from California Department of Education, California Community College Chancellor's Office, California State University Institutional Research, and Integrated Postsecondary Education Data System.

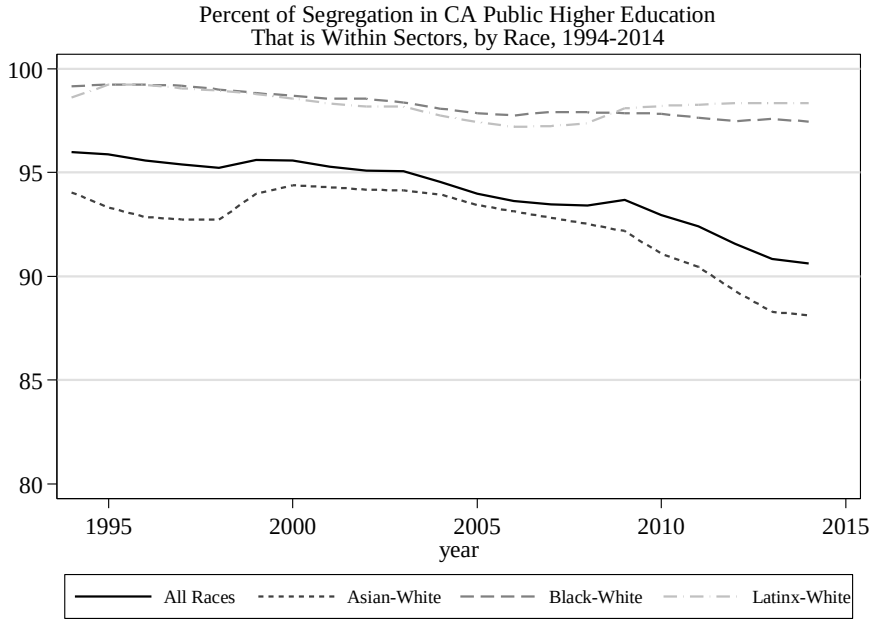


Figure 5. Decomposition of Theil Index into within/between sector for Asian-White, Black-White, and Latinx-White segregation in California public higher education. Authors' calculations. Data from California Community College Chancellor's Office, California State University Institutional Research, and Integrated Postsecondary Education Data System.

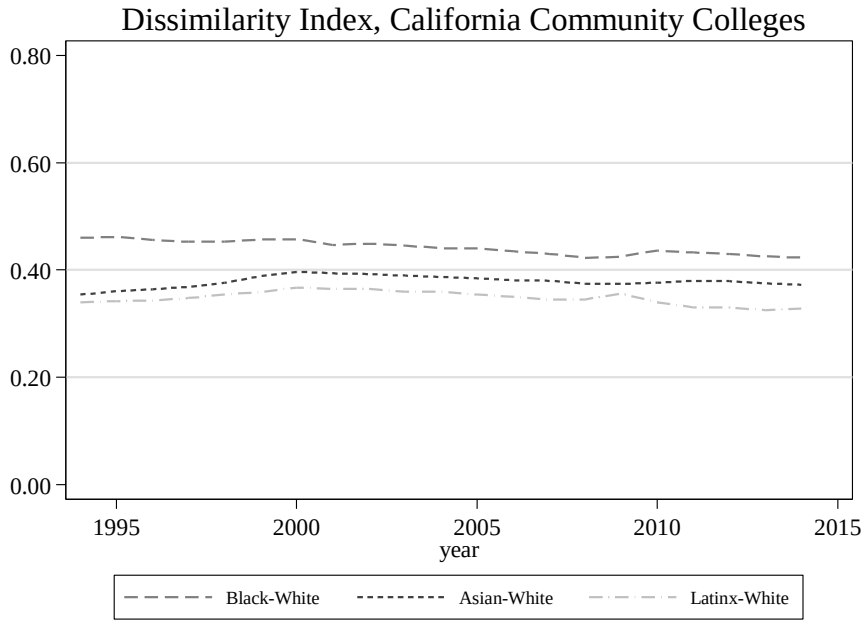


Figure 6. Black-White, Asian-White, and Latinx-White Dissimilarity Indices for California Community Colleges. Authors' calculations. Data from California Community College Chancellor's Office.

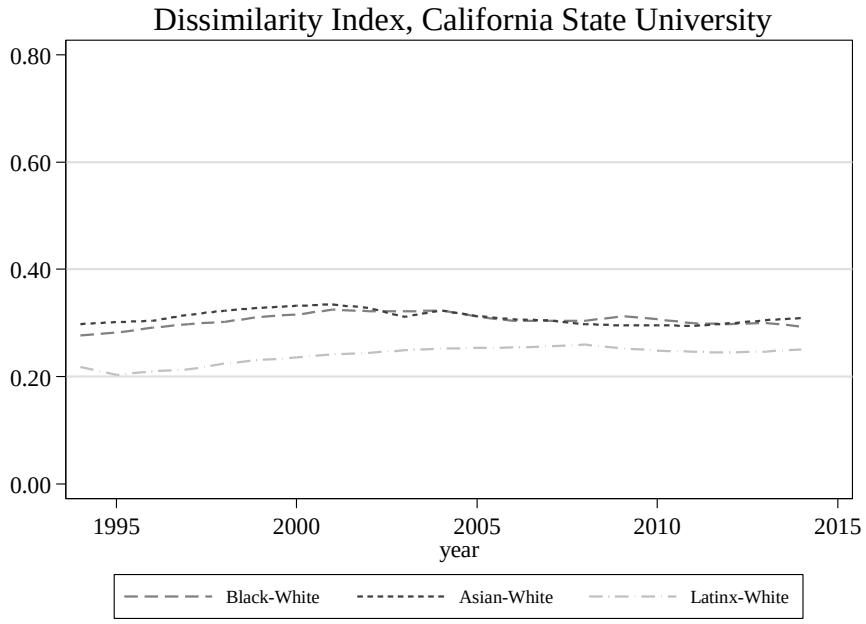


Figure 7. Black-White, Asian-White, and Latinx-White Dissimilarity Indices for California State University. Authors' calculations. Data from California State University Institutional Research.

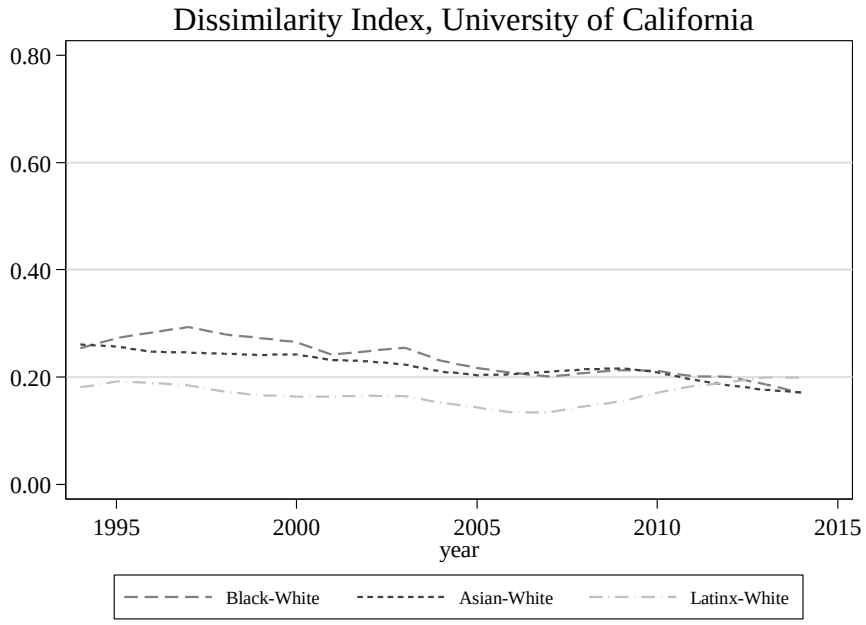


Figure 8. Black-White, Asian-White, and Latinx-White Dissimilarity Indices for University of California. Authors' calculations. Data from Integrated Postsecondary Education Data System.

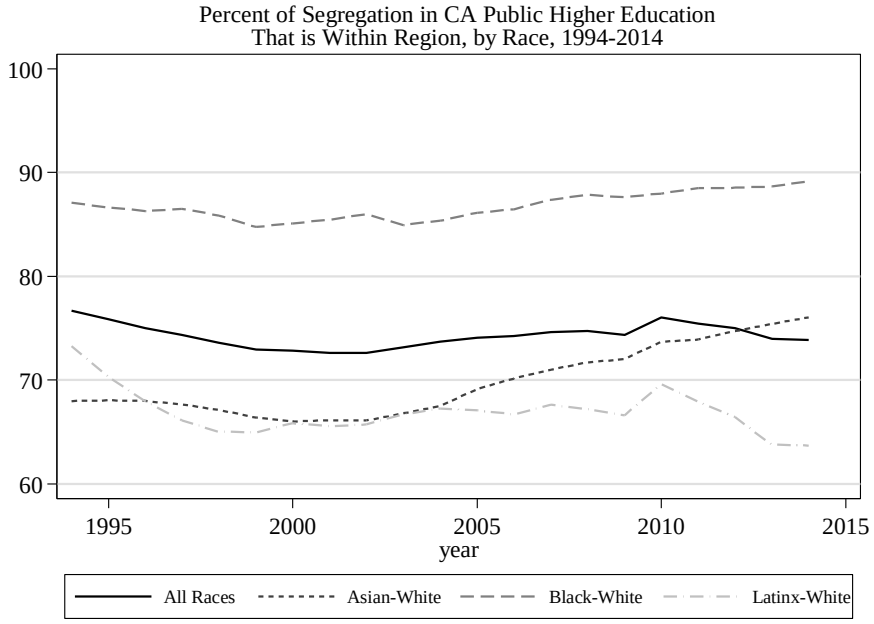


Figure 9. Decomposition of Theil Index into within/between geographic region for Asian-White, Black-White, and Latinx-White segregation in California public higher education. Authors' calculations. Data from California Community College Chancellor's Office, California State University Institutional Research, and Integrated Postsecondary Education Data System.

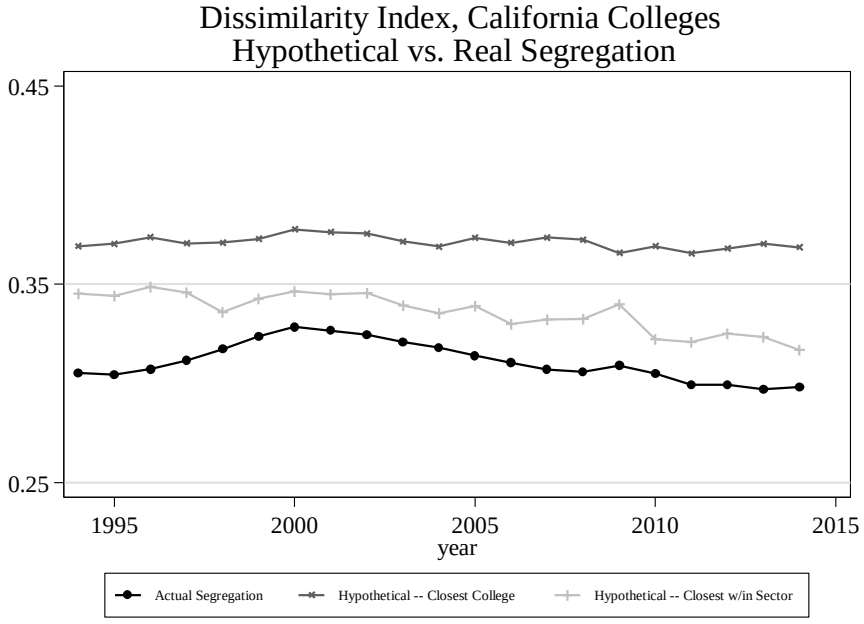


Figure 10. Actual Dissimilarity Index and Hypothetical Dissimilarity Index in California Public Colleges, Assuming Students Attend Either the Closest College or the Closest College within a Given Sector, for Asian, Black, Latinx and White Students. Authors' calculations. Data from California Department of Education, California Community College Chancellor's Office, California State University Institutional Research, and Integrated Postsecondary Education Data System.

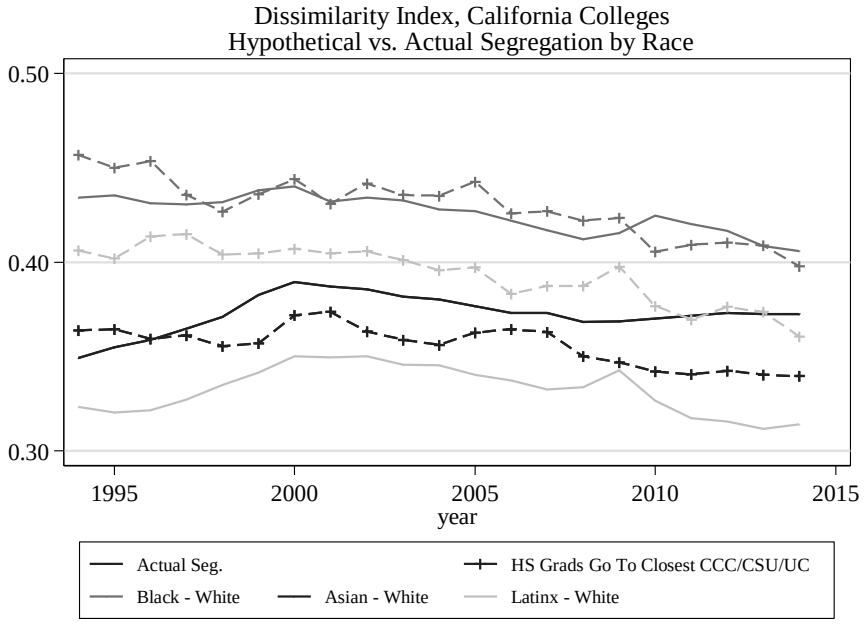


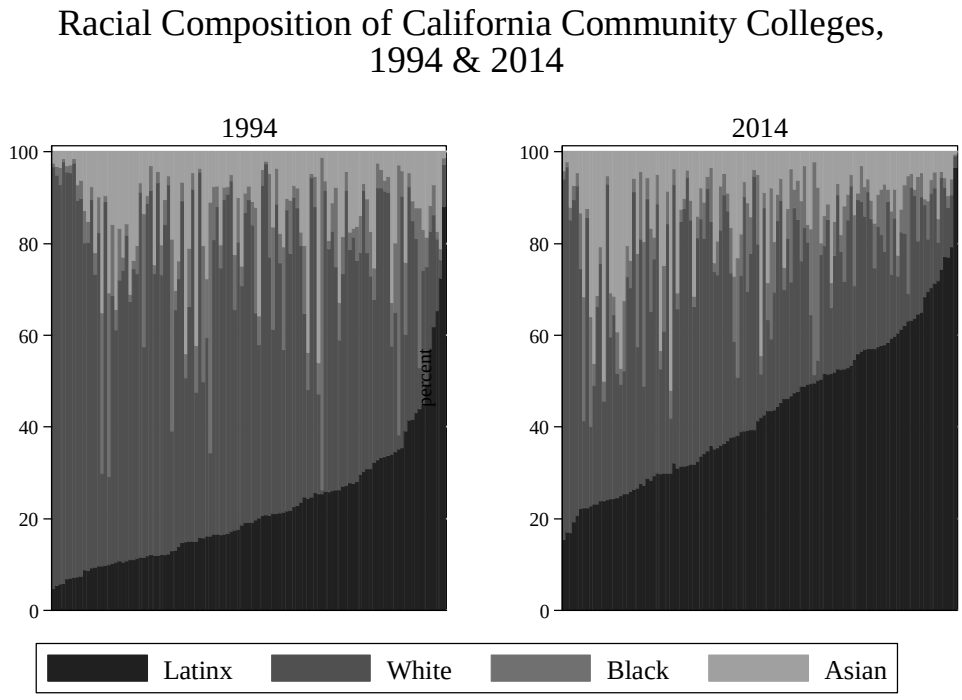
Figure 11. Actual and Hypothetical (Assuming Students Attend the Closest College) Black-White, Asian-White, and Latinx-White Dissimilarity Indices in California Public Colleges. Data from California Department of Education, California Community College Chancellor's Office, California State University Institutional Research, and Integrated Postsecondary Education Data System.

Appendix A – Descriptions of Student Sorting Across Schools

In this appendix we visually examine if demographic changes between 1994 and 2014 are evenly distributed across schools within each sector and how the race of students' peers differs across races. We examine these questions for our two bookend years: 1994 and 2014.

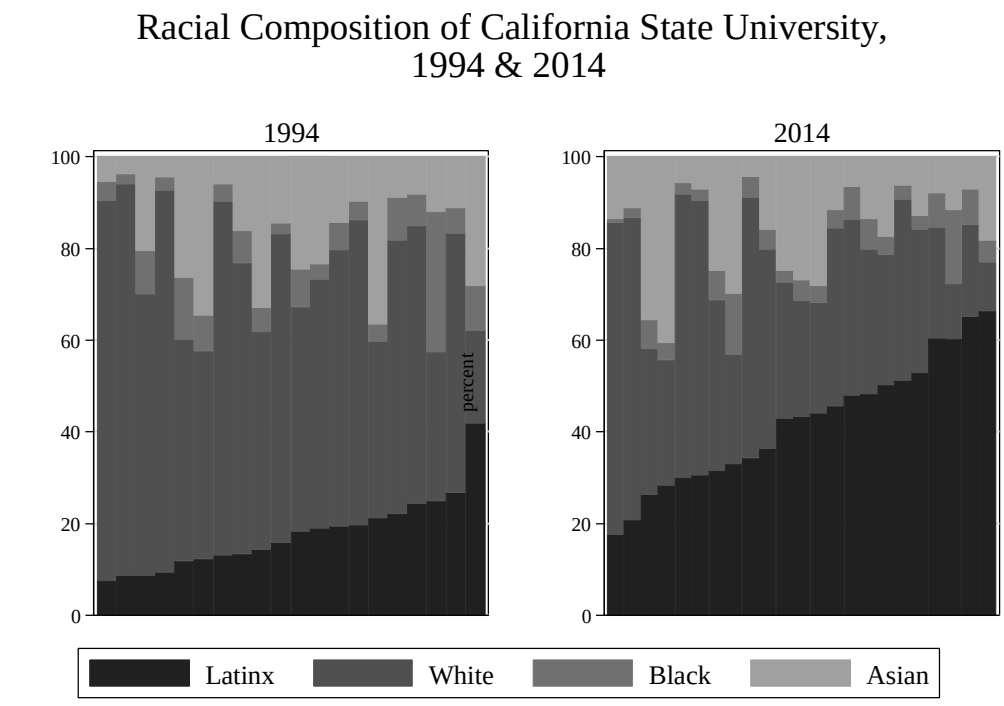
Figure A1 (CCC), Figure A2 (CSU), and Figure A3 (UC) provide the racial composition for each school within each sector. In these figures, each column represents a single school. The columns are ordered by the percent of students in each school who identify as Latinx, as Latinx students are the fastest growing subgroup in the state. These figures thus provide a simple visual description of the distribution of Latinx students across schools, though the graphs could be re-oriented to focus on any other race group.

In this description, we focus on the community college sector (Figure A1), though all three figures can be interpreted similarly. The increase in the proportion of students who identify as Latinx is clear in this graph; the area of the graph that is blue is larger in 2014 than it was in 1994. This graph also allows us to examine how Latinx students are distributed across schools. If each school had the same proportion of students of any given race (for example, if 50% of students attending CCCs identified as Latinx, and each school within the CCC system also had 50% of students who identified as Latinx), each graph would consist of horizontal bands of color. This is not the case. The steep slope of the edge of the blue region shows that Latinx students are not evenly represented across schools. Comparing these slopes between 1994 and 2014 also allows us to examine how this sorting has changed over time (we examine this question using more sophisticated techniques in the main text).



Each column represents one school.

Figure A1



Each column represents one school.

Figure A2

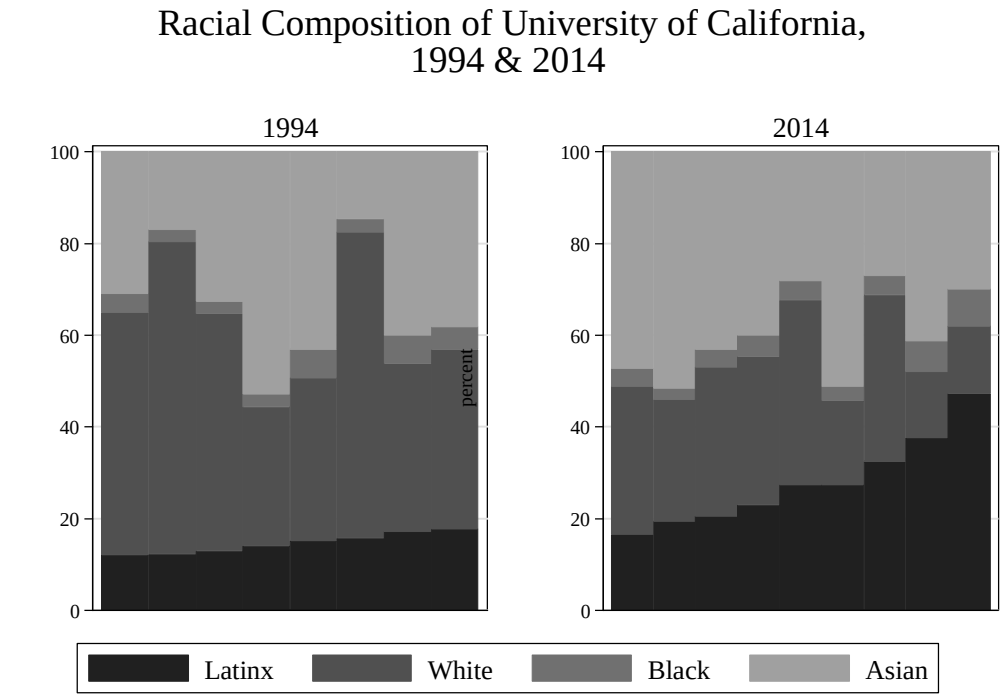


Figure A3

As the demographic composition of the state has changed, so too have these patterns of racial sorting. Across all racial groups and all sectors, students are attending schools that are more heavily Latinx and less heavily White.

The distribution of students by race within sectors imply that students of different races are unlikely to experience similar school compositions; the average Latinx student is likely to attend a school with far more Latinx peers than the school of the average White student, for example. We examine this question in Appendix A graphs 4-6. Across all sectors, Latinx and Black students go to schools with the highest proportions of Latinx students. White students attend schools with the highest proportion of White students.

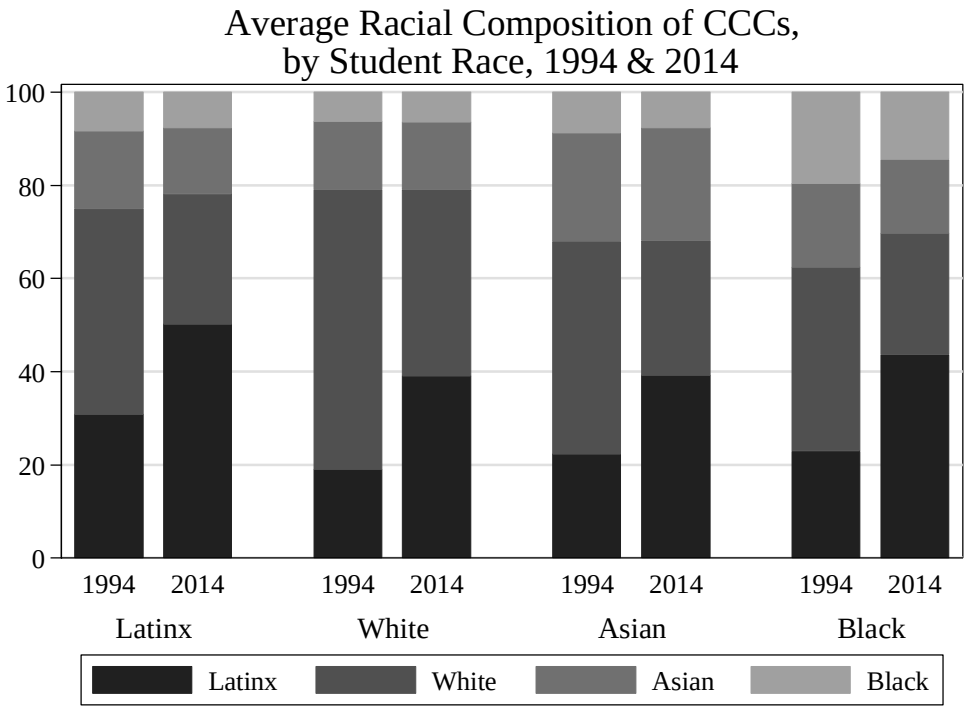


Figure A4

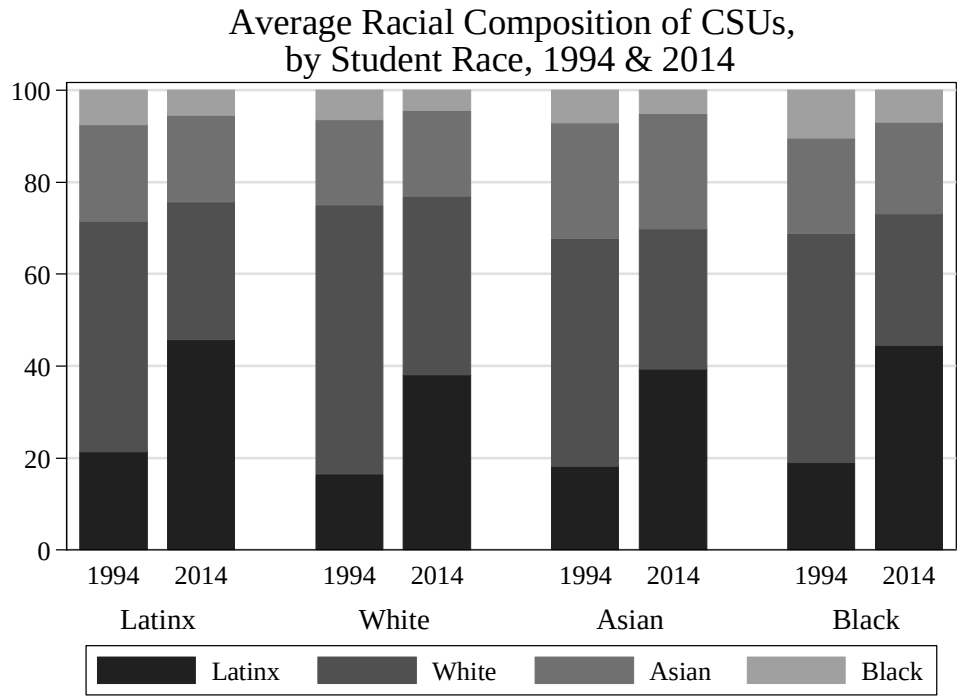


Figure A5

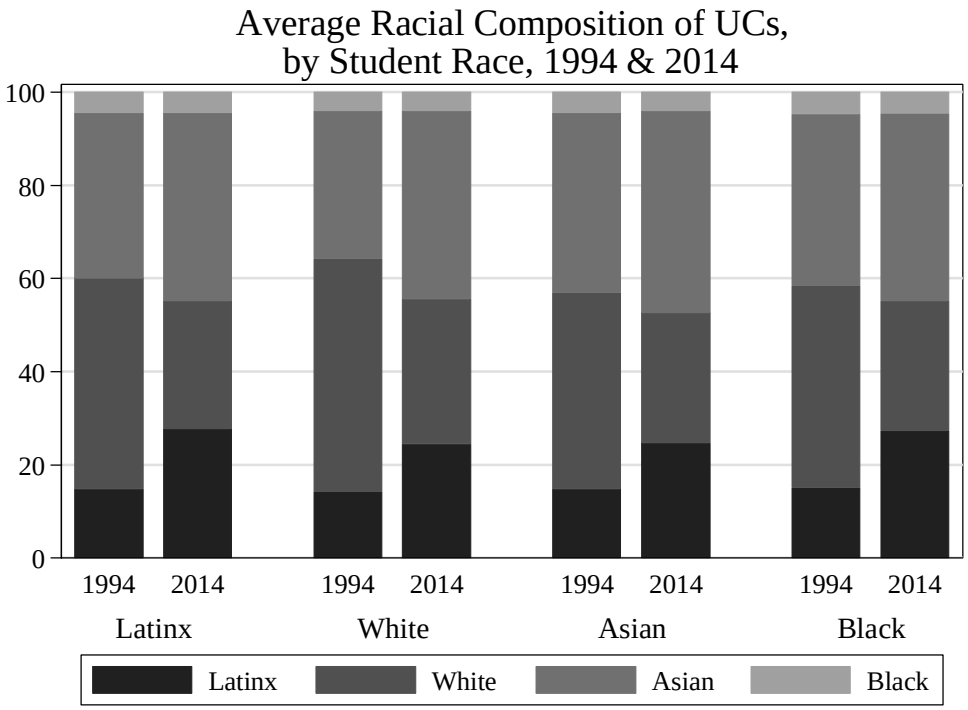


Figure A6

These simple descriptive figures provide evidence that students of different racial backgrounds are not evenly distributed across schools; the racial/ethnic composition of a student's peers is related to the student's own race/ethnicity. Together, the figures in this appendix provide motivation for the more sophisticated analyses in the main text.

Appendix B – Segregation Measures

Dissimilarity Index. The dissimilarity index is not sensitive to changes in the overall size of each racial group and thus provides a measure of segregation that can be tracked over time, even as the proportion of each race in the population changes. It compares the actual distribution of students by race to what it would be if students were distributed evenly across schools by race. For example, in a world in which only students of two races attended the CSUs (25% Asian, 75% White) the dissimilarity index would provide a measure of how close, on average, each school is to this 25%/75% split. It is calculated as follows:

$$D_{bw} = \frac{1}{2}\sum_{i=1}^{n}\left|\frac{w_i}{W_T} - \frac{b_i}{B_T}\right|$$

in which D_{bw} is the dissimilarity index between Black and White students, w_i is the number of White students in school *i*, W_T is the total number of White students, b_i is the number of Black students in school *i*, and B_T is the total number of Black students.

The interpretation of the dissimilarity index is intuitively simple: it indicates the proportion of students of one race who would have to change schools to reach equal representation across schools. For example, a dissimilarity index of 0.50 indicates that half of the students of one race would have to switch schools in order for each school to match the overall population ratio. Past work has used a cutoff of .60 to indicate high segregation and a value of .30 to indicate low segregation (Ayscue, Flaxman, Kucsera, Siegel-Hawley, 2013).

Theil Index. While the dissimilarity index tells us the evenness of the distribution of racial groups across campus, it does not allow us to determine which components are contributing to the observed patterns of segregation (Reardon, Yun, Eitle, 2000). The Theil index is a measure of redundancy, or lack of diversity and provides a measure of the evenness with

which different groups are distributed among units. Importantly, this measure can be used to decompose racial segregation to understand which components are the main driving forces behind patterns of racial segregation.

Such a decomposition is not a causal exercise, but it does allow us to examine potential channels through which changes in segregation occur and could sharpen our understanding of the patterns that lead to racial sorting, thus leading to clearer implications for address the sorting. For example, segregation that is primarily due to sorting within sectors has different policy implications that sorting that is due to students attending schools in different sectors.

The Theil Index is derived from measures of entropy. The overall entropy is defined as

$$E = P \cdot ln\frac{1}{P} + (1 - P) \cdot ln\frac{1}{1 - P}$$

Where $P = \frac{B}{B+W}$; B is the number of Black students overall and W is the number of White students overall. The entropy at a specific school is defined as:

$$E_i = p_i \cdot ln\frac{1}{p_i} + (1 - p_i) \cdot ln\frac{1}{1 - p_i}$$

Where $p_i = \frac{b_i}{b_i+w_i}$, b_i is the number of Black students at school i and w_i is the number of White students at school i. The Theil index is an enrollment-weighted average of how entropy at particular colleges differs from overall entropy:

$$H = 100 \cdot \sum_{i=1}^{N} \left(\frac{b_i + w_i}{B + W}\right)\frac{E - E_i}{E}$$

The Theil index ranges from 0.0 to 1.0. Higher levels of the Theil index indicate higher levels of segregation; 0.0 indicates that the diversity of each college within a sector matches the diversity of the sector overall and 1.0 indicates that each college contains only one race/ethnic

group. In general, trends in segregation as measured by the Theil index are similar to trends in segregation as measured by the Dissimilarity index.

In this paper, we decompose the total amount of segregation into the amount due to segregation within sectors and the amount due to segregation within geographic regions. As an example of how this decomposition works, we provide an example of decomposing the overall Theil index into the within-region component and the between-region component. If we let H_r refer to the Theil index within region *r*, E_r refer to the entropy within region *r*, B_r refer to the number of Black students attending college within region *r*, and W_r refer to the number of White students attending college within region *r*, the Theil Index can be written as:

$$H = H_R + \sum_{r=1}^{6} \left(\frac{B_r + W_r}{B + W}\right) \frac{E_r}{E} \cdot H_r$$

The first term on the right-hand side (H_R) is the between-region component, and the second term is the sum of the within-region components for each region. The decomposition analyses are weighted by the overall enrollment in the region (or the sector for our within-sector analyses). Because it is hard to know how much segregation we should expect in higher education we use a number of analytic techniques to more closely examine racial sorting. As noted earlier, we examine segregation between specific race pairs and within and between sectors. These supplementary analyses provide relevant points of comparison and to allow us to examine various mechanisms that could help us to understand the levels of and trends in racial segregation in California's public higher education.