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ABSTRACT

Distance to Opportunity: Higher Education Deserts and College Enrollment Choices*

We study how geographic access to public postsecondary institutions is associated with students' college enrollment decisions across race and socioeconomic status. Leveraging rich administrative data, we first document substantial differences in students' local college options, with White, Hispanic, and rural students having, on average, many fewer nearby options than their Black, Asian, suburban, and urban peers. We then show that students are sensitive to the distance they must travel to access public colleges and universities, but there are heterogeneous effects across students. In particular, we find that White and non-economically disadvantaged students respond to living far from public two-year colleges primarily by enrolling in four-year colleges, whereas Black, Hispanic, and economically disadvantaged students respond primarily by forgoing college enrollment altogether. Lastly, in a series of decomposition and simulation exercises to inform public policy efforts to increase college enrollment, especially among underrepresented minorities and low-income students, we find that differences in students' sensitivity to distance, rather than differences in distance to the nearest college, primarily contribute to observed four-year college enrollment gaps across racial and ethnic groups.

JEL Classification: I21, I23, I24

Keywords: college proximity, college accessibility, college choices, college enrollment, two-year colleges, four-year colleges, public postsecondary institutions

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I. INTRODUCTION

In the United States, the economic returns to attending college and completing a postsecondary degree are substantial and tend to increase over one's lifetime (Deming, 2023). For students from low-income and minority backgrounds, in particular, colleges are catalysts of economic mobility that provide substantial value-added in earnings post-graduation (Chetty et al., 2020). Empirical evidence indicates that attending college, whether an elite institution or a public four-year university, boosts earnings for low-income students by 8 to 20 percent (Dale and Krueger, 2002, 2014; Smith, Goodman, and Hurwitz, 2020; Zimmerman, 2014). On average, returns to college also tend to be positive and large for minority students, though there is evidence of substantial heterogeneity in earnings premia across college quality and majors (Andrews, Li, and Lovenheim, 2016).

Despite significant returns, meaningful disparities in college enrollment and completion persist among socioeconomic and racial groups (Cahalan et al., 2021; Reber and Smith, 2023). For instance, as of 2019, 78 percent of 18- to 24-year-olds from high-income households were enrolled in college, while only 48 percent of those from low-income households were. Similarly, in the same year, 62 percent of White and 84 percent of Asian young adults were enrolled in college, while only 57 percent of Black and Hispanic 18- to 24-year-olds were (Cahalan et al., 2021). Furthermore, when they do enroll in college, low-income and underrepresented minority (URM) students are disproportionately more likely to enroll in open-access, public, two-year institutions (i.e., community colleges), as opposed to more selective, four-year institutions. These disparities in college enrollment and institutional choice result in large, persistent gaps in bachelor's degree completion rates across racial groups. As of 2022, 45 percent of White young adults aged 25 to 29 held a bachelor's degree, compared to just 28 percent of Black and 25 percent of Hispanic young adults (Reber and Smith, 2023).

Consequently, higher education scholars have explored the myriad of *determinants* that contribute to the persistent gap in college-going and attainment among low-income and URM students compared to their higher-income and non-URM peers. A large body of literature considers *demand-side* determinants, such as credit constraints, lower levels of academic preparedness, and informational barriers (for comprehensive literature reviews, see, for example, Dynarski et al., 2022 and Dynarski, Page, and Scott-Clayton, 2022). A parallel line of research has also investigated *supply-side* determinants, such as institutional capacity constraints, admissions policies, and public-sector funding (see, for example, Bound and Turner, 2007; Fu, 2014; Bulman and Cunha, 2021; Demings and Walters, 2017; Black., Cortes, and Lincove, 2015; Cortes and Lincove, 2016; Black., Cortes, and Lincove, 2016, Cortes and Lincove, 2019). Building on this prior body of work, our study integrates the role of both supply- and demand-side determinants through the lens of college proximity by investigating the extent to which racial and socioeconomic disparities in college-going can be explained by differences in students' *geographic access* to colleges, as well as differences in students' *sensitivity to distance*.

It is well-documented that colleges and universities in the U.S. are unevenly distributed across space (Hillman, 2016; Hillman and Weichman, 2016), leaving many Americans without local access to higher education. Approximately 3.8 million Americans live in a commuting zone with *no* colleges, while an additional 11.2 million live in a commuting zone with only one college option. The statistics are even more stark when considering access to public colleges and universities, which most students attend: 16.5 million (5 percent) Americans across 41 states live in a commuting zone without a public, two-year college (i.e., a community college) and 35.3 million (11 percent) across 45 states live in a commuting zone without a public, four-year college.[1] Moreover, a large body of literature spanning different contexts and cohorts consistently shows that geographic distance affects whether and where students apply to and attend college (Card, 1995; Long, 2004; Alm and Winters, 2009; Turley, 2009; Doyle and Skinner, 2016; Skinner, 2019; Cortes and Lincove, 2019; Black, Cortes, and Lincove, 2020; Fu et al., 2022; Morales and Cortes, 2022), particularly for students considering attending community colleges (Rouse, 1995; Mountjoy, 2022).[2]

However, existing work has largely not considered how these relationships vary across racial and socioeconomic groups, nor how changes in the spatial distribution of colleges may affect racial and socioeconomic gaps in postsecondary enrollment and attainment, the closing of which is a stated priority for state policymakers (Harnisch and Laderman, 2023). State policymakers' desire to increase college enrollment and attainment for low-income and URM

[1] Author's calculations from 2019 Integrated Postsecondary Education Data System (IPEDS) college location data and U.S. Census Bureau population estimates. In Texas, the setting for this paper, 5.3% of the population lives in a commuting zone without a public two-year college and 7.7% lives in a commuting zone without a public four-year college.

[2] Students may be particularly sensitive to distance in the community college setting because community colleges in 38 states offer lower tuition rates to students who live in their local taxing areas or "districts." Denning (2017) and Acton (2021) show that living in a taxing district increases community college enrollment, in Texas and Michigan, respectively, even after holding distance to a community college campus constant.

students is also evident in the structure of various policies, including those governing higher education financing, particularly in the two-year sector. As of 2020, 30 states have implemented an outcomes-based funding scheme to distribute funds to community colleges, by which institutions are rewarded for making progress toward student success such as persistence, transfers to four-year institutions, and degree attainment (Li, 2020). Considering that minority and low-income students are more likely to interact with the two-year sector, improving outcomes for community college students is likely to have a disproportionate impact on these students and the possibility of addressing equity gaps. Consequently, our study informs the ongoing policy discussions on effective funding models for community colleges as the geographic diffusion of two-year institutions to their nearest four-year universities will moderate how successful outcomes-based funding mechanisms are, and how they may differentially impact students of various racial and ethnic backgrounds.

We leverage rich, student-level, administrative data from Texas to descriptively (a) document disparities in geographic access to public postsecondary institutions, including two-year community colleges and four-year universities[3], by race and socioeconomic status, (b) estimate how access to nearby public postsecondary institutions relates to students' college enrollment choices across racial and socioeconomic groups, and lastly, (c) simulate how changes in geographic access to these postsecondary institutions or sensitivity to distance would affect the number and the characteristics of students enrolling in two-year and four-year colleges in Texas. Texas is an ideal state in which to conduct this analysis because it is large, racially and socioeconomically diverse, and has the nation's largest, and one of the most racially diverse, rural populations (U.S. Census Bureau, 2022), many of whom live far distances from colleges and universities. Moreover, the state maintains a robust longitudinal data system where we can link students' K-12 academic records with their postsecondary education outcomes, including enrollment, course-taking behavior, transfer, and degree completion. Although our results should not be interpreted as causal, this rich dataset allows us to account for some of the confounding factors through student- and school-level controls.

[3] Throughout the text, we use the phrases "community colleges" or "two-year community colleges" or "two-year colleges" to refer to Texas' public community and technical colleges and use the phrases "four-year colleges" or "four-year universities" or "universities" to refer to the state's public universities, as defined by the THECB: http://www.txhighereddata.org/Interactive/Institutions.cfm. All of Texas' public four-year institutions have "university" in their names, though they differ substantially in their research and graduate degree production (see Acton, 2022 for more information on the distinction between colleges and universities.)

We first document that, while there are over 200 public two-year colleges and university campuses in Texas, geographic access to these institutions differs dramatically across the state. Students living in the "Texas Triangle" region surrounding Dallas, Houston, and Austin/San Antonio have access to many more nearby *local* postsecondary institutions than students in the South and West areas of the state. Given the demographic differences between these areas, these disparities in local postsecondary access also appear along racial lines: White and Hispanic students tend to face more limited local college choice sets than their Black and Asian peers, in part, because they tend to live in more rural areas, where local college access is the most limited.

Next, we show that students are sensitive to how far they must travel to reach a college or university campus. Overall, students are less likely to attend two-year colleges – and less likely to attend any public colleges (two-year or four-year) overall – when they live further from a two-year college. They are also less likely to attend a four-year college when they live further from one, but in general, distance to a four-year college does not affect whether a student attends any public college overall. However, these effects are quite different across racial groups and socioeconomic status. Conditional on a student's distance to the nearest four-year institution, White and non-disadvantaged students respond to living far from a two-year college primarily by enrolling in four-year colleges, whereas Black and Hispanic, and economically disadvantaged students primarily respond by not enrolling in any type of college. As a result, when White, non-disadvantaged students live in a "community college desert" – 30 miles or more from the nearest public two-year college – they are no less likely to enroll in a four-year college than comparable peers who do not live in a desert. But when Black, Hispanic, and disadvantaged students do, they are 6-12 percentage points less likely to attend a four-year college in Texas.

Finally, we conduct a series of decomposition and simulation exercises to inform public policy efforts to increase college enrollment and completion, especially among underrepresented groups. In general, results from the decomposition analyses indicate that differences in students' sensitivity to distance, rather than differences in distance to colleges, is a larger contributor to observed four-year college enrollment gaps across groups. Importantly, differences in *how students respond* to distance to two-year colleges, contribute to nearly 12 percent of the four-year college enrollment gap between URM and non-URM students. We further show that the closure of campuses in predominantly Hispanic regions of Texas would have a large effect on Hispanic college enrollment rates, both because these students tend to be more sensitive to distance than their White peers, *and* because they tend to have fewer nearby college options available to them than other underrepresented groups, such as Black students. As a corollary, constructing or expanding campuses in Hispanic regions that currently lack them could be an effective way to increase enrollment rates.

Together, our results contribute to the existing literature on geographic access to public postsecondary institutions along three important dimensions. First, we collect location information for *all* campuses of community college systems – as opposed to only the main campuses that are commonly reported in federal databases – to accurately assess students' access to all public local college options. Doing so is important to understand the true college choice sets students face when deciding whether and where to enroll in postsecondary institutions, and to reduce measurement error in measures of geographic accessibility to those institutions.

Second, we estimate the heterogeneous effects of distance to both two-year and four-year colleges on enrollment outcomes across different racial and socioeconomic groups. In doing so, we document important differences in how URM and economically disadvantaged students respond to distance, compared to their White and non-disadvantaged peers. Specifically, we show that local access to two-year colleges tends to increase – or *democratize* (Rouse, 1995) – overall postsecondary enrollment for URM and disadvantaged students, whereas it tends to *divert* enrollment from four-year colleges for White and non-disadvantaged students. As a result, we may expect different enrollment responses to the closure or opening of new college campuses, depending on the characteristics of the local student population.

Lastly, we directly provide simulations that can inform potential state and local policy initiatives related to the opening, closing, merging, or conversion of college campuses. These simulations are timely as states seek to address various challenges currently facing higher education. For example, states with declining populations and high school cohort sizes have increasingly considered merging or consolidating public colleges (Gardner, 2021; Gretzinger, 2024), which may disparately impact geographic access to college across demographic groups. Meanwhile, other states, such as Kentucky (Blake, 2024) and the University of California system (Waxmann, 2024), are considering opening new colleges or "elevating" community colleges to public four-year college status, which also stand to change students' local college choice sets. Our simulations can provide predictions of how these policy changes will impact college-going behavior, not only overall, but also across demographic groups.

II. PRIOR LITERATURE ON COLLEGE PROXIMITY AND STUDENT OUTCOMES

Understanding the causes and consequences of schooling decisions has long been a question of interest for many scholars. In 1995, David Card proposed using college proximity as an instrument for completed education to estimate the returns to schooling (Card, 1995). He found that growing up in a county with a four-year college increased educational attainment by approximately 0.32 years and earnings by 4.5%, implying a return to education of 12-14% per year. Since Card's pioneering work, several other authors have used the local availability of colleges as an instrument to estimate the labor market returns to education (Kling, 2001; Cameron and Taber, 2004; Carneiro and Lee, 2009' Carneiro et al., 2011; Doyle and Skinner, 2016), or to explore the impact of education on other long-run outcomes, such as health (Currie and Moretti, 2003, and, more recently, Fletcher and Noghanibehambari, 2023 and Cowan and Tefft, 2023). Researchers interested in understanding community college enrollment choices, specifically, have used distance to both two-year and four-year colleges as instruments to study the effects of beginning one's postsecondary career at a community college. Rouse (1995) posited that enrollment at community colleges may increase or decrease educational attainment, as they can "democratize" opportunity by providing educational access to students who otherwise would not have enrolled in postsecondary education, but may also "divert" students away from attending four-year colleges, potentially reducing their years of completed education. She finds that students who are diverted from four-year colleges to community colleges complete fewer years of schooling, but overall, community colleges increase educational attainment. Subsequent research (e.g., Long and Kurlaender, 2009; Mountjoy, 2022) supports this democratization vs. diversion framework, which we also adopt in this paper to understand how proximity to two-year and four-year public colleges in Texas impacts students from different racial groups and of different socioeconomic status (SES).

We focus on distance because a large body of work across a variety of contexts (see, for example, Alm and Winters, 2009; Turley, 2009; Hirschl and Smith, 2020) indicates that distance plays a large role in determining where students will apply to and enroll in college, with some evidence indicating that lower-income students value attending a college close to home more than their high-income peers (Fu et al., 2022).[4] In addition, research exploiting college openings

[4] There is some evidence that students have become less sensitive to distance over time (Hoxby, 1997; Long, 2004; Skinner, 2019), but it remains an important determinant of college choices.

or expansions finds that increased local access to colleges generally increases college-going, educational attainment, and improves longer-run outcomes. For example, Lapid (2018) finds that the construction of new public universities in California increased four-year college attendance for students from local high schools, with larger effects for URM students. In a historical setting, Connolly (2023) finds that the massive expansion of U.S. two-year public colleges between 1920 and 1980 increased educational attainment for children in nearby towns and improved long-run health outcomes.[5]

Most closely related to our work, Miller (2023) finds that the openings of new branch campuses of community colleges in Texas increased community college enrollment among local high school graduates, but reduced enrollment in four-year colleges, generating little overall increase in educational attainment. Our research differs from Miller's in that she studies openings that, on average, changed the driving time to a local community college by approximately 10 minutes, whereas we study the relationship between distance and college-going across all students, including those who live very far from any college campus. In doing so, we contribute to an emerging literature on higher education deserts (Hillman, 2016; Klasik et al., 2018) and provide some of the first evidence on how living in a higher education desert affects college enrollment choices, particularly across race and SES.

III. Data Sources and Overview of Texas Higher Education Landscape

A. Administrative Records from Texas K-12 and Higher Education Sectors

Our analysis leverages longitudinal, student-level records from the Texas Education Agency (TEA) and the Texas Higher Education Coordinating Board (THECB). The TEA records on K-12 school enrollment and high school graduation allow access to student demographic characteristics (e.g., sex, race and ethnicity, immigrant status, economic disadvantage status) and academic background information (e.g., special education and Limited English Proficiency status, and enrollment in gifted and career and technical education programs), as well as standardized test scores in math and reading at the end of 8th grade.[6] We link these data with THECB records that contain information on student enrollment in all of Texas' public two-year

[5] Frenette (2009) and Nimier-David (2023) similarly study the expansion of college campuses in Canada and France, respectively.

[6] We do not observe eighth grade test scores for approximately 11 percent of students. For these students, we impute their test scores to be the mean of their high school and graduation cohort and include a binary variable indicating whether we have imputed their math and/or reading test scores in our regression specifications.

and four-year postsecondary institutions. Throughout our analysis, we define a student as enrolling in a public two-year or four-year institution if they do so within 12 months of their high school graduation date.

Our analytic sample consists of five high school graduation cohorts (2013-2017) who we observe in the higher education enrollment records from 2014-2018.[7] Panel A of Table 1 provides summary statistics on these students, measured in their final year of high school. Our sample is diverse across race and socioeconomic status: 47 percent of students are classified as economically disadvantaged, meaning they are eligible for free and/or reduced-price lunch or other public assistance programs. Forty-eight percent are Hispanic, 33 percent are White, 13 percent are Black, and 4.3 percent are Asian. Black and Hispanic students are more likely to be economically disadvantaged, while Hispanic and Asian students are more likely to be immigrants and identified as Limited English Proficiency. On average, White and Asian students have higher 8th grade test scores than Black and Hispanic students, and non-disadvantaged students have higher test scores than economically disadvantaged students.

Panel B of Table 1 provides college enrollment rates for our analysis sample, both overall and by student subgroup. Overall, 53.2% of students enroll in a Texas public postsecondary institution within one year of high school graduation, with 39.4% of students enrolling in public two-year colleges and 21.4% of students enrolling in public four-year universities.[8] Mirroring national data, Black, Hispanic, and economically disadvantaged students in Texas enroll in college at lower rates than their White, Asian, and non-disadvantaged peers. These disparities in enrollment are particularly stark in the four-year sector, where only 21.8% of Black and 16.9% of Hispanic students enroll within one year of high school graduation, compared to 25.2% of White and 40.6% of Asian students. Similarly, only 15.6% of economically disadvantaged students enroll in a four-year college within one year of high school graduation, whereas 26.6% of non-disadvantaged students do.

[7] Enrollment in a postsecondary institution is captured during the first year following high school graduation. Therefore, dual enrollment is not accounted for in our analysis.

[8] Students who enroll in both a two-year and four-year college within one year of high school graduation (e.g., who transfer from a two-year college to a four-year university, or vice versa, after one semester) are counted in both enrollment rates. Thus, the overall college enrollment rate is less than the summation of the two-year and four-year enrollment rates.

B. Locations and Characteristics of Texas High Schools

We merge our student-level sample with characteristics of Texas high schools from the National Center for Education Statistics (NCES) Common Core of Data (CCD). Within the CCD, we observe a high school's latitude and longitude, urbanicity, overall student enrollment, student-teacher ratio, and indicators for whether a school is a charter school, magnet school, and/or eligible for Title I funding. In addition, we construct school-by-cohort averages of the demographic variables described in Section III.A. Panel C of Table 1 provides information on the high schools our students attend. The typical student in our sample attends a high school that enrolls just under 1900 students, with a student-teacher ratio of 15.6. Thirty-nine percent of students attend a high school in a city, while 33 percent attend one in a suburb, and 28 percent attend one in a town or rural area. On average, urban and suburban schools are larger than rural ones, and suburban students tend to be less disadvantaged and higher-performing in 8th grade than both their urban and rural peers.

C. Locations and Characteristics of Texas College Campuses

To create measures of distance between all Texas high schools and their nearest postsecondary higher education institutions, we obtain information on the locations of all public and private, not-for-profit colleges in both the two-year and four-year sectors from several data sources.[9] First, we collected the latitudes and longitudes of all colleges reported in the Integrated Postsecondary Education System (IPEDS). IPEDS is a comprehensive survey carried out annually by the National Center for Education Statistics under the U.S. Department of Education. This system collects data from all colleges, universities, technical, and vocational institutions involved in federal student financial aid programs. However, institutions often report their data under one primary campus location, rather than disaggregating across campus sites. For example, Houston Community College reports one latitude and longitude to IPEDS, despite having 21 unique campus locations across the Houston metropolitan area. As such, we supplement the IPEDS data with individual campus locations from other sources: (a) the Texas Higher Education

[9] Some community colleges in Texas do award bachelor's degrees, but before a policy change in 2017, fewer than 500 per year were awarded across the state (compared to 80,000 per year or more associate degrees awarded): https://databridge.highered.texas.gov/degree-dashboard/. Thus, for the time frame of our analysis, the primary educational purpose of Texas' community colleges was to offer two-year degrees and certificates and provide transfer pathways to four-year universities.

Coordinating Board (THECB), (b) the American Association of Community Colleges (AACC) website, and (c) the Texas Association of Community Colleges (TACC) website.

These additional sources along with IPEDS enabled us to obtain the precise locations of all two- and four-year postsecondary institution campuses in Texas. Appendix Figure A.1 shows the locations of campuses when we only use IPEDS data (Panel A) versus when we use the supplementary sources (Panel B). In the two-year sector, we obtain the locations of 87 additional community college campuses from our supplementary sources, more than doubling the number of two-year college campuses in the state from 82 to 169.

Leveraging latitude and longitude data spanning the universe of two- and four-year campuses in Texas, we computed the distance in miles from each high school to all college campuses within the state. This enabled us to determine the distance to the nearest institution of higher education by sector. Unsurprisingly, distance in miles corresponds strongly to driving times – an alternative distance measure employed in the literature (e.g., Miller 2023). As shown in Appendix Figure A.2, the correlation between distance and driving times to two- and four-year colleges is remarkably high, with correlation coefficients of 0.96 and 0.98, respectively.

D. *Texas Higher Education Landscape*

The public postsecondary educational landscape in Texas is notable in several features. First, enrollment in public higher education institutions in the state corresponds to nearly 10% of total fall enrollment in degree-granting postsecondary institutions nationwide (National Center for Education Statistics, 2023). Second, over the past decade, the state's demographic landscape has changed rapidly, with more racially and ethnically diverse students graduating from high school. In 2004, Texas became a majority-minority state, with the growth rate of Hispanic, Black, and Asian populations overtaking the growth rate of non-Hispanic Whites. Third, the 254 counties in the state are represented by ten state-defined higher education regions: High Plains (region 1), Northwest (region 2), Metroplex (region 3), Upper East (region 4), Southeast (region 5), Gulf Coast (region 6), Central Texas (region 7), South Texas (region 8), West Texas (region 9), and Upper Rio Grande (region 10). Fourth, there are six distinct public university systems: University of Houston, University of North Texas, University of Texas, Texas A&M University, Texas State University, and Texas Tech University. In total, there are 37 public universities in the state, two of which are Historically Black Colleges and Universities (HBCUs) and 25 of which are Hispanic Serving Institutions (HSI). In addition, there are 50 community college districts serving 249 counties in the state, most of which contain multiple campuses[10] and a public, two-year technical college system (Texas State Technical College) with ten campuses throughout the state. Together, these institutions provide a broad set of postsecondary opportunities for college-bound Texans.

IV. Geographic Access to College and University Campuses

We begin our analysis by documenting the geographic dispersion of college and university campuses in Texas with respect to a variety of county-level demographic characteristics to illustrate the spatial patterns of access to higher education and the demographic groups that are predominantly impacted by disparities in access. We first construct several maps overlaying the location of all public two-year colleges and all public and private, not-for-profit four-year universities in Texas on county demographic characteristics, which we obtain from the U.S. Census. Specifically, we plot the locations of colleges over county-level quartiles of the share of the youth (aged 5-24) population that is White, Black, Hispanic, and Asian, as well as the child poverty rate and the share of households with broadband internet access.

Figure 1 presents these maps. Colleges and universities in Texas are highly concentrated around the "Texas Triangle" – the area formed by the state's largest metropolitan areas of Dallas-Fort Worth, Houston, San Antonio, and Austin, which has experienced some of the nation's largest population and employment growth over the past forty years (Thompson and Hines, 2023). Compared to the state as a whole, these areas tend to have larger Black and Asian populations, have lower rates of child poverty, and have more households with broadband internet, representing a higher degree of urbanization. In contrast, the southern and western areas of the state – which have far fewer postsecondary options – are heavily Hispanic, have higher rates of child poverty, and are more rural, with less broadband internet access.

Appendix Figure A.3 further illustrates the disparities in local college access across the regions of Texas. First, we plot the average number of institutions within 30 and 60 miles of a high school, by region. The average high school in Texas has approximately 6.9 public two-year

[10] Each community college district has a state-defined geographic area, known as a service area, that the college is intended to serve (Baker et al., 2023). These service areas typically constitute a collection of counties, though in some instances they only cover a portion of a given county. As of 2021, there are only five Texas counties that do not belong to any community college service area.

colleges and 1.3 public four-year colleges. However, in the Central (Austin/San Antonio), Metroplex (Dallas-Fort Worth), and Gulf Coast (Houston) regions, an average high school has 8.6 public two-year, 1.9 public four-year, and 3 private four-year colleges within a 30-mile radius. Elsewhere in the state, such as West Texas, an average high school has fewer than 1 college *of any type* within a 30-mile radius and fewer than 3 of *any type* within a 60-mile radius. As a result, students in southern and western areas of the state have to travel much further to reach a postsecondary institution. For example, in the Central, Metroplex, and Gulf Coast regions, the average distance from a high school to the nearest two-year college is 9 miles and the distance to the nearest four-year college is 15.6 miles. In contrast, in West Texas, the average distance to the nearest two-year college is 31 miles and the average distance to the nearest four-year college is 39.3 miles.

Next, Table 2 presents descriptive statistics summarizing the distance to the nearest college by sector across racial and ethnic groups, economic disadvantage status, and school urbanicity status. The average student in our sample lives 7.3 miles from the nearest public two-year college and 17.3 miles from the nearest public four-year university.[11] These distances are similar for economically disadvantaged and non-disadvantaged students but vary across racial groups. Asian students tend to live closest to postsecondary options (4.6 miles to two-year, 13.6 miles to four-year), followed by Black students (5.5 miles to two-year, 14.7 miles to four-year), and then Hispanic (6.6 miles to two-year, 16.2 miles to four-year) and White students (9.2 miles to two-year, 20.8 to four-year). As a result, fewer White and Hispanic students live within 30 or 60 miles of a public institution – of any type – than Black and Asian students. In addition, Hispanic students, on average, live much further from the state's flagship institutions (University of Texas – Austin and Texas A&M University – College Station) – 176.3 miles, compared to 151 miles for White students, 119 miles for Black students, and 117 miles for Asian students.

Figure 2 further shows the differences in students' proximate colleges, by student subgroup, by counting the number of public two-year and four-year colleges located within 30 (Panel A) or 60 (Panel B) miles of a student's high school. Across the two panels, we consistently see that White and Hispanic students have fewer colleges located near them than

[11] Throughout the text, we use the phrase "lives" to refer to how far away a student's high school is from a public postsecondary institution. Data from the National Household Travel Survey indicate that the median high school student in Texas lives 15 minutes away from school. Driving times are comparable for those in urban vs. rural areas (Federal Highway Administration, 2017).

Black or Asian students. These racial differences in geographical accessibility of colleges and universities can be explained, in part, by the fact that White and Hispanic students are more likely to live in rural areas than Black and Asian students, and these areas tend to be located much further from colleges than suburban and urban areas. For instance, only 88 percent of students attending a rural high school have a public, two-year college located within 30 miles of their high school, whereas *all* students in suburban and urban areas do. Even more striking, only 61 percent of students attending a rural high school have a public, four-year college located within 30 miles of their high school, whereas 96 percent of urban and 99 percent of suburban students do. These disparities in geographic access to public four-year colleges could explain why a lower share of students from rural high schools attend Texas public four-year colleges (20.7 percent) than students from urban (21.5 percent) and suburban (22 percent) schools, despite having similar tests scores and economic disadvantage status as suburban schools. In the next section, we begin to explore the effects of distance to public postsecondary institutions on students' college enrollment choices by race and socioeconomic status.

V. Access to Postsecondary Institutions and College Enrollment Choices

In this section, we investigate the relationship between the likelihood of enrolling in a Texas public college, generally and by sector (i.e., two-year and four-year colleges), and a student's geographic access to college campuses. We estimate regression models of the following form:

$$Enroll_{ist} = \alpha + \boldsymbol{Distance}_s \boldsymbol{\Gamma} + \boldsymbol{X}_{it} \boldsymbol{\Pi} + \boldsymbol{Z}_{st} \boldsymbol{\Phi} + \lambda_t + \epsilon_{ist} \quad (1)$$

where $Enroll_{ist}$ is a binary enrollment indicator of interest (e.g., 1 if a student enrolls in a public institution, 0 otherwise) for student i, who graduated from high school s, in year t. Specifically, we consider enrollment in any Texas public institution of higher education, as well as, separately, enrollment in two-year vs. four-year colleges. The vector $\boldsymbol{Distance}_s$ contains measures of the distance between high school s and various college options, such as distance to the nearest two-year and four-year colleges.

While our regressions should *not* be interpreted as the causal effects of distance on postsecondary choices – as distance to college is not randomly assigned across students – we attempt to account for some of the confounding factors that may drive outcome differences across students facing disparities in distance to postsecondary schools by controlling for student- and school-level factors represented in vectors $\boldsymbol{X}_{it}$ and $\boldsymbol{Z}_{st}$, respectively. Some of the individual-level characteristics include sex, race and ethnicity, economic disadvantage, Limited English Proficiency status, and academic performance in reading and math captured by students' end-of-grade assessments in 8th grade. Similarly, some of the school-level factors correspond to school-wide characteristics of the student population (race/ethnicity and economic disadvantage), as well as measures of resources, such as the student-teacher ratio and a school's eligibility for Title I funding. In supplemental specifications, we further control for estimated neighborhood poverty levels surrounding high school campuses and demographic characteristics of school districts (e.g., average household income, percentage of adults with a college degree, etc.) obtained from the American Community Survey (ACS). Finally, λ_t are year fixed effects that account for secular trends in the likelihood of college enrollment over time.

We estimate several regressions following the functional form described in equation (1), where we vary the distance measures captured by the vector $\boldsymbol{Distance}_s$. We assess the relationship between the likelihood of college enrollment and the linear distance to the nearest public two-year and four-year colleges, as well as non-linear effects established by binning the distance to the nearest colleges in 5-mile intervals, and the effects of living in a college "desert" – which we define as living more than 30 miles from a public two-year and/or four-year college. Lastly, to further examine the extent to which students' sensitivity to distance varies across demographic groups and socioeconomic status, we also estimate equation (1) separately by students' race/ethnicity and economic disadvantage status.

A. Linear Effects of Distance on College Enrollment Choices

Table 3 shows the linear effects of distance to a student's nearest two-year and four-year public institution on the likelihood that they enroll in a Texas public two-year college (Panel A), Texas public four-year university (Panel B), or any Texas public postsecondary institution (Panel C). We iteratively add student demographic controls, student test scores, and school-level control variables across the table columns.

Panel A shows that the further a student lives from a public two-year college, the *less* likely they are to attend a public two-year college. Meanwhile, the further they live from a public four-year university, the *more* likely they are to enroll in a public two-year option. These effects persist and are highly statistically significant across specifications, including those that account for additional neighborhood-level and school district demographic characteristics (columns 5-6), indicating that the correlations we observe between distance and enrollment outcomes are largely not driven by differences in observable characteristics between students who live close to versus far away from college campuses. In our preferred specification, shown in column (4), living 10 miles further from a public two-year college is associated with a 2.4 percentage point reduction in the probability of enrolling in a Texas public two-year college, whereas living 10 miles further from a public four-year college is associated with a 1.3 percentage point increase in the probability of enrolling in these colleges – or about half the effect of the two-year distance measure.

Panel B shows a similar effect for public four-year college enrollment: the further a student lives from a public four-year college, the *less* likely they are to enroll in a public four-year college, but the further they live from a public two-year college, the *more* likely they are to enroll in a public four-year. However, these effects are smaller than those on the two-year college margin, suggesting that distance matters more for two-year college enrollment than four-year college enrollment. In our preferred specification in column (4), we find that an increase in distance to a public four-year college of 10 miles is associated with a 0.5 percentage point reduction in the probability of enrollment in public four-year colleges – about a quarter of the size of the "own-distance" effect for two-year colleges. This effect is also only significant at the 10% level. Meanwhile, living 10 miles further from a public two-year college is associated with a 1.5 percentage point increase in the probability of enrollment in a public four-year college.

Finally, Panel C shows the effects of distance to a student's nearest public two-year and four-year institutions on overall enrollment in the Texas public higher education system. These effects are a summation of the *own-distance effect* and the *substitution effect* for each distance measure. For example, the public two-year distance effect on overall enrollment is a summation of its effect on public two-year college enrollment and its effect on public four-year college enrollment. Across specifications, we find that living further from a public two-year college is associated with a reduced likelihood of enrolling in Texas public institutions – meaning, the "own-distance" effect is larger than the substitution effect into four-year colleges. In contrast, we see little effect of four-year distance on overall Texas public enrollment, suggesting that the own-distance and substitution effects for four-year college distance tend to offset one another. Put differently, we find that attending a high school that is far from public four-year universities affects *where* students attend college but not *whether* they do, whereas attending a high school that is far from a public two-year college affects whether students enroll in college at all.

Table 4 then repeats the specifications in column (4) across racial groups and economic disadvantage status. Looking across groups in Panel A, we see broadly similar reductions in public two-year college enrollment as students attend high schools further away from two-year colleges. The only exception to this pattern is Asian students, who do not meaningfully differ in their two-year college enrollment across our distance measure. In Panel B, we see that, across groups, students are less likely to attend public four-year colleges when their distance to these colleges increases, whereas they are more likely to attend public four-year colleges as their distance to two-year colleges increases. However, this effect is much larger for white and non-disadvantaged students than for Black, Hispanic, and economically disadvantaged students. In Panel C, we see the net effect of these disparate responses: attending a high school that is far away from public two-year colleges reduces overall college enrollment for all groups, but to a larger extent for Black, Hispanic, and economically disadvantaged students. That is, White and non-disadvantaged students are more likely to respond to living far from public two-year colleges by substituting towards four-year colleges, whereas Black and Hispanic and economically disadvantaged students are more likely to forgo college enrollment altogether.

B. Non-Linear Effects of Distance on College Enrollment Choices

While our previous results suggest that college enrollment decisions are responsive to the distance to a student's nearest public two-year or four-year institution, it is not obvious that we should expect these responses to be linear. For example, if a college that is 5 or 10 miles away can be easily accessed via public transportation, but a college that is 15 miles away cannot be, we may expect a non-linear response between these distances. We consider these potential non-linear responses by re-estimating equation (1) with our distance measures binned in 5-mile intervals.

Figure 3 considers the non-linear effects of distance for White, Black, and Hispanic students separately. First, in Panel A, we consider how living further from a public two-year college – relative to living within 5 miles of one – affects the likelihood that a student enrolls in a public two-year college, public four-year college, or any public college.[12] For all three groups, we see that students are less likely to attend a public two-year college when they live more than 10 miles from the nearest one and that this response increases with distance, particularly at distances of 30 miles or more. We then see that students are more likely to attend four-year colleges when they live more than 10 miles from a public two-year college – but, as we saw in Table 4, this effect is larger for White students than for non-White students. Combined, these effects produce a larger decrease in any public college enrollment for Black and Hispanic students when they live more than 10 miles from the nearest public two-year college, though the magnitude of the effect increases for all groups as distance increases. In Panel B, we see that White and Hispanic students are more responsive to four-year college distance than Black students. However, for all groups, substitution towards two-year colleges only occurs when students live more than 30 miles from the nearest public four-year college.

Figure 4 then considers the non-linear effects of distance for economically disadvantaged and non-disadvantaged students. In Panel A, we see that economically disadvantaged and non-disadvantaged students are both less likely to attend public two-year colleges when they live further from them, but this effect begins at smaller distances for disadvantaged students. In addition, disadvantaged students are less likely to substitute towards four-year colleges when they live far from two-year colleges, resulting in a larger overall decline in public college enrollment for disadvantaged students when they live further from two-year colleges. However, in Panel B, we see that disadvantaged and non-disadvantaged students respond similarly to living further from public four-year colleges.

C. *Effects of Living in College Deserts*

In both Figures 3 and 4, students appear particularly responsive to living 30 or more miles from a postsecondary institution. We now formally estimate how living this distance away from an institution affects students' enrollment choices by replacing our distance variable in equation (1) with an indicator for living 30 miles or more from a public two-year or four-year

[12] Throughout this analysis, we control for the distance to a student's nearest public four-year college in analogous 5-mile bins. Similarly, when we consider the effects of four-year college distance on students' enrollment outcomes in Panel B, we control for the distance to a student's nearest public two-year college in 5-mile bins.

college – which we refer to as living in a two-year or four-year college desert, respectively.[13] We then add interaction terms between this indicator and a student's URM and/or economic disadvantage status to assess how students' responses vary across both race and socioeconomic status.[14]

Table 5 presents these results for public two-year college deserts. Recall, from Table 2, that, while all urban and suburban students have access to a public two-year college within 30 miles, over 12 percent of rural students do not. In Panel A, we see that, overall, living further than 30 miles from a public two-year college is associated with a 9.9 percentage point reduction in the probability of attending one. However, this effect is 5-8 percentage points larger for URM students and 7-9 percentage points larger for economically disadvantaged students. In Panel B, we more clearly see that non-URM and non-disadvantaged students substitute towards four-year colleges at higher rates when they live far from public two-year colleges. Overall, living 30 or more miles from a public two-year college is associated with a 4.4 percentage point increase in the likelihood of attending a public four-year college, but this effect is about 8 percentage points for non-URM, non-disadvantaged students. Finally, in Panel C, we see that for non-URM, non-disadvantaged students, living in a public two-year college desert has a small to negligible effect on overall college enrollment, but for URM and economically disadvantaged students, it is associated with a decrease in the likelihood of college enrollment by up to 12 percentage points.

Table 6 then repeats the specifications from Table 5 for public four-year college distance. In Panel A, we see that living more than 30 miles from a public four-year college is associated with an increased likelihood of enrolling in public two-year colleges of 7.7 percentage points, though this effect is smaller for economically disadvantaged students. Panel B then shows that, as expected, living more than 30 miles from a public four-year college is associated with a reduced likelihood of attending a public four-year by 2.9 percentage points. On net, we see in Panel C that, conditional on distance to two-year colleges, students who live in a four-year college desert are more likely to enroll in a Texas public college overall (because they are more likely to attend a two-year college), but this effect is smaller for URM and, particularly, economically disadvantaged students.

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[13] In these specifications, we continue to control for the distance to a student's nearest four-year college (or two-year, in Table 6) in 5-mile bins.

[14] For the purposes of this analysis, we define URM students as Black, Hispanic, and "other" students. Non-URM students are White and Asian students.

In summary, our results reveal how both supply-side (i.e., geographic access to colleges) and demand-side determinants (i.e., sensitivity to distance) can contribute to the college enrollment gap for low-income and URM students. Our analysis indicates that (1) students are sensitive to the distance they must travel to reach a college campus; (2) the distance a student must travel to reach a two-year college affects both whether and where a student attends college, whereas the distance a student must travel to reach a four-year college primarily affects where a student will enroll (and to a lesser extent than the two-year distance); and (3) White and non-disadvantaged students respond to living far from two-year colleges by enrolling in four-year colleges, whereas Black and Hispanic and economically disadvantaged students primarily respond by forgoing college enrollment. In the next section, we use these results to conduct simulations of enrollment responses to hypothetical policy changes.

VI. POLICY SIMULATIONS

In the final section, we engage in a series of policy simulation exercises that enable us to make predictions involving changes in the likelihood of postsecondary enrollment by racial group and economic disadvantage status, as well as changes in the college enrollment gap between groups of students. We conduct these analyses under counterfactual policy scenarios that systematically increase or decrease students' distance to college. We note that these estimates assume our regression results reflect a causal relationship between distance and college-going, which we believe is plausible given the stability of our coefficients when we condition on a rich set of observable characteristics. However, we caution that, to the extent to which our results reflect unobserved differences in college-going propensity between students who live far from colleges versus close to colleges, our simulations will generally *overstate* the effect of changes in distances on changes in college enrollment.

A. Oaxaca-Blinder Decomposition

Drawing upon the Oaxaca-Blinder decomposition approach (Blinder, 1973; Oaxaca, 1973), we begin by assessing the extent to which observed gaps in mean college enrollment rates between non-URM and URM students can be attributed to differences between observed and unobserved factors. Specifically, we use an alternative decomposition approach proposed by Neumark (1988) which uses common coefficients estimated from a pooled regression of non-

URM and URM students.[15] We highlight the role of distance to postsecondary institutions as our key observed components, among various other demographic, academic, and school-level controls. Specifically, we estimate the following:

$$\left(\overline{Enroll}^1 - \overline{Enroll}^0\right) = (\bar{D}^1 - \bar{D}^0)\hat{\Gamma}^P + (\bar{X}^1 - \bar{X}^0)\hat{\Pi}^P + \bar{D}^1\left(\hat{\Gamma}^1 - \hat{\Gamma}^P\right) + \bar{D}^0\left(\hat{\Gamma}^P - \hat{\Gamma}^0\right) + \bar{X}^1\left(\hat{\Pi}^1 - \hat{\Pi}^P\right) + \bar{X}^0\left(\hat{\Pi}^P - \hat{\Pi}^0\right) \qquad (2)$$

where $\overline{Enroll}^d$ indicates the average postsecondary enrollment rate for group d, which takes on the value of 1 for the group of URM (or economically disadvantaged) students and 0 otherwise. $\bar{D}$ denotes a measure of the average distance to various college options and $\bar{X}$ is a row vector of all remaining observable characteristics, including demographic variables, academic background, and school-level controls. Lastly, $\hat{\Gamma}$ and $\hat{\Pi}$ are the coefficients obtained from regressions of the form described in equation (1) estimated for the subset of students for a given group, d, as well as estimates from a pooled regression of students across all subgroups, p. Estimates of the first term isolate how much of the enrollment gap is explained by differences in distance to college options between URM and non-URM (or economically disadvantaged and non-disadvantaged) students, while estimates of the third and fourth terms describe the extent to which the enrollment gap can be attributed to differences across students' sensitivity to distance.

We conduct decomposition exercises for three sets of outcomes: enrollment in two-year public colleges, enrollment in four-year public colleges, and enrollment in any public institution in Texas. Moreover, we separately analyze differences by students' race and ethnicity as well as economic disadvantage status. Results from the decomposition analyses are shown in Table 7.

As reported in column 1 of Panel C, there is a 9.6 percentage point disparity in the college enrollment rates between non-URM and URM students in Texas. This gap is largely attributed to differences in observable characteristics, which contribute to 6.4 percentage points of the observed difference. However, the role of the distance components specifically, both in the explained and unexplained proportions, is notably small compared to other observed characteristics such as demographic factors. Indeed, the decomposition results suggest that if URM students faced the same average distance to four-year institutions as their non-URM peers,

[15] This approach, however, has been shown to systematically underestimate the unexplained portion particularly in instances when there is "high power of the covariates in explaining group membership" (Elder et al., 2010).

the enrollment gap would only narrow by 0.2 percentage points. Conversely, differences in access to two-year colleges widen the overall college enrollment gap, which is consistent with our finding that some URM students, namely Black students, have access to multiple institutions of both types within a short distance given that a nontrivial share of them reside near large urban areas. Lastly, we find that differences in the coefficients associated with the distance measures explain small and insignificant shares of the overall college enrollment gap. We observe a similar pattern with respect to differences in community college enrollment, as reported in Panel A: sensitivity to distance is not a statistically significant factor contributing to observed disparities in two-year college enrollment rates.

By contrast, in the context of enrollment rates at four-year colleges specifically, differences in how URM and non-URM students respond to living far away from two-year institutions explain a sizable proportion of the observed gap. As reported in Panel B of Table 7, on average, there is an 8.9 percentage point difference in the four-year college enrollment rates between these student groups. Results from the decomposition analyses indicate a 12.4 percent reduction in this gap if URM students' sensitivity to distance from a two-year institution was that of their non-URM peers.[16] In other words, if URM students substituted going to four-year universities at the same marginal rate as their non-URM counterparts, the four-year college enrollment gap would close by more than 12 percent. By contrast, differences in the observed distances account for only 3.4 percent of the gap. Furthermore, we find notable differences in the relative contribution of sensitivity to distance when considering the four-year enrollment gap across specific pair-wise comparisons, such as White vs. Hispanic and White vs. Black enrollment. We find it to be most salient among Hispanic students in comparison to White students. The decomposition results examining the factors contributing to the four-year college enrollment gaps between these groups attribute nearly 16 percent of the discrepancy to differences in how Hispanic and White students substitute going to four-year colleges when faced with long distances to two-year institutions, whereas differences in the geographic access to community colleges between these groups contribute to 5 percent of the gap.[17]

[16] Differences in sensitivity to distance between URM and non-URM students contribute 0.089 of the 0.011 gap in the four-year college enrollment rate. Hence, 12.4 percent of this gap (0.089/0.011) is attributed to variation in how students respond to living farther away from two-year colleges.

[17] For Black students, differences in the sensitivity to distance and geographic access to college contribute a larger share of the observed gap (which is smaller than the White/Hispanic gap), though in roughly the same proportions: approximately 23 to 25%.

Finally, we also decompose differences in college-going rates by students' economic disadvantage status. Overall, the findings mirror the patterns observed across student race and ethnicity. As shown in Panel C of Table 7, there is a large college enrollment gap between low- and high-income students: 13.3 percentage points. This difference can be attributed to both explained and unexplained factors by roughly equal proportions, with demographic characteristics contributing to a greater extent relative to distance to postsecondary institutions of any type. With respect to enrollment in four-year universities, in particular, we again observe that differences in the sensitivity to distance to two-year colleges play an important role in explaining the gap. Our findings suggest a 7.3 percent reduction in the four-year college enrollment gap if low-income students responded to living far from two-year colleges by enrolling in four-year universities at the same marginal rate as higher-income peers.

B. Simulated College Enrollment Under Campus Closures

Our second simulation approach involves predicting the change in college enrollment rates across demographic groups following the closure of each two-year and four-year college campus in the state, one at a time. As noted in our introduction, several states have closed or merged college campuses in recent years as a response to declining populations and/or financial challenges. Our analyses provide important policy recommendations to the state of Texas if they were to engage in these policy decisions. Specifically, we can identify college closures that would have the largest (or smallest) effect on overall college enrollment, enrollment across college sectors, and enrollment across race and socioeconomic status.

We conduct our analysis in two steps. First, we re-estimate the minimum distance from each high school to the nearest public two-year and public four-year institution following the hypothetical closure of each campus. Using these hypothetical distances, we predict the expected change in college enrollment for each student in our sample using the estimated coefficients from equation (1) capturing sensitivity to distance, $\hat{\boldsymbol{\Gamma}}$. Specifically, we calculate the following:

$$\frac{\partial Enroll}{\partial(\widetilde{\boldsymbol{Distance}})_{st|J-j}} = \hat{\boldsymbol{\Gamma}} \times \widetilde{\boldsymbol{Distance}}_{st|J-j} \qquad (3)$$

where $\widetilde{\boldsymbol{Distance}}_{st|J-j}$ corresponds to the distance between a given high school to the nearest two-year and four-year institution calculated from a subset of colleges, namely $\{J - j\}$ where J denotes the universe of postsecondary campuses in Texas and j indicates a single campus. We evaluate equation (3) separately by student race and ethnicity, and also by economic disadvantaged status, for each simulated campus closure, using the linear estimates we present in Table 4. We then average our effects over all students in a given racial or socioeconomic group.

Figure 5 presents the change in statewide college enrollment rates, by race and ethnicity (Panel A) and economic disadvantage status (Panel B), for the ten two-year campus closures that we estimate would have the largest effect on overall two-year college enrollment. We predict that the closure of Angelina College in east Texas would have the largest effect on two-year enrollment, with larger effects for White and Black students, who make up the majority of students in the local area.[18] However, we predict that White students would substitute towards four-year colleges at a higher rate than Black students, generating larger overall reductions in college enrollment for Black students.

These substitution patterns are also relevant for understanding what we predict would happen if two-year colleges in predominantly Hispanic regions were to close. For example, we predict the largest overall reductions in overall public college enrollment to occur if South Texas College, in the Rio Grande Valley, or Texas Southmost College, in the Gulf Coast, were to close. This is because these colleges serve largely Hispanic populations, who respond strongly to distance to two-year colleges, but substitute towards four-year colleges at low rates.[19] We would also see the largest reductions in overall college enrollment for economically disadvantaged students under these closures due to a similarly large own-distance response, and smaller substitution effect, for the large number of disadvantaged students these colleges tend to serve.

Figure 6 repeats our analysis for the closure of four-year college campuses. Here, we predict that four-year college enrollment would decrease dramatically for Hispanic students and economically disadvantaged students if UT-El Paso or UT-Rio Grande Valley were to close. However, if this were to happen, we would expect to see a large increase in two-year college enrollment for these students, generating an overall increase in enrollment in Texas public

[18] The 5–24-year-old population in Angelina County, where Angelina College is located, is approximately 50 percent White and 18 percent Black.

[19] South Texas College is located in Hidalgo County, whose 5–24-year-old population is 96 percent Hispanic and Texas Southmost College is located in Cameron County, whose 5–24-year-old population is 95 percent Hispanic.

colleges. Outside of these particular closures, we would not expect to see large changes in college enrollment – in the four-year sector or overall – due to the closure of four-year campuses, in part because students tend to be less sensitive to four-year college distance and in part, because Texas' four-year campuses tend to be clustered around the Texas triangle. Thus, if one campus were to close, the distance to the nearest four-year campus would change minimally for many students.

VII. Discussion and Concluding Remarks

Access to higher education is often seen as a pathway to social mobility in the United States (Chetty et al., 2020). However, due to the strikingly uneven distribution of both two- and four-year public colleges across space, many students across the nation, particularly low-income and rural students, find that attending college is simply not an option for them. To understand all of the determinants that contribute to the ongoing disparities in postsecondary access among students in the U.S., scholars and policymakers must also take into account not only the locations of institutions but also how students respond to those locations. Thus, our paper contributes to the growing literature on geographic access to colleges with several important insights. First, we confirm prior work by finding that students' college choices are influenced by the distance they must travel to reach a college or university campus. However, to our knowledge, we are the first to document that the relationship between distance and attendance varies significantly across racial and ethnic lines, and socioeconomic groups as well. When considering a student's proximity to the nearest two-year public institution, White and non-economically disadvantaged students tend to enroll in four-year colleges when they live far away from two-year colleges. In contrast, we observe this "substitution" towards four-year colleges at a much lower rate for Black, Hispanic, and economically disadvantaged students, and they are more likely to forgo college enrollment altogether when they live far from two-year colleges. Our results are particularly striking for students who live in "community college deserts" – we find that White and non-disadvantaged students who live in a desert are no less likely to attend college overall, compared to similar peers who do not live in such areas. However, Black, Hispanic, and economically disadvantaged students who live in these deserts are 6-12 percentage points less likely to attend college overall.

The findings from our regression results, as well as our various policy simulations, could help guide state and local policy initiates regarding the potential *opening*, *closing*, *merging*, or *conversion* of college campuses, and how these policy initiatives could impact who enrolls in the U.S. higher education system. These simulations are particularly salient as institutions across the nation grapple with various challenges confronting the higher education sector, such as states experiencing declining college enrollments and colleges facing budget cuts. Our simulations offer insights into how closing of colleges might impact college enrollment, not just overall, but also among underrepresented demographic groups, which the higher education sector has struggled to recruit, retain, and graduate.

Lastly, all together, our findings tie back to the seminal work of Rouse (1995), where she finds that community colleges have the potential to *democratize* postsecondary education access, by drawing in students who would otherwise not attend college, or to *divert* students away from four-year colleges. We add new nuance to our understanding of these democratization and diversion effects. Specifically, we find that geographic access to community colleges democratizes enrollment for many of the groups that have traditionally been underrepresented in U.S. higher education (Black, Hispanic, and low-income students), but may divert enrollment for White and non-disadvantaged students. As a result, renewed investment in community colleges in racially diverse and low-income areas has the potential to broaden participation in the U.S. higher education system and to further social mobility goals.

REFERENCES

Acton, Riley. “Effects of Reduced Community College Tuition on College Choices and Degree Completion.” *Education Finance and Policy* 16, no.3 (2021): 388-417.

Acton, Riley K. "Is a name change a game change? The impact of college-to-university conversions." *Economics of Education Review* 88 (2022): 102240.

Alm, James, and John V. Winters. “Distance and Intrastate College Student Migration.” *Economics of Education Review* 28, no. 6 (2009): 728-738.

Andrews, R. J., Li, J., and Lovenheim, M. F. (2016). “Quantile treatment effects of college quality on earnings.” *Journal of Human Resources*, *51*(1), 200-238.

Baker, Dominique J., Bethany Edwards, Spencer FX Lambert, and Grace Randall. "Defining the “Community” in Community College: A National Overview and Implications for Racial Imbalance in Texas." *American Educational Research Journal* 60, no. 3 (2023): 588-620.

Black, Sandra E., Cortes, Kalena E., and Lincove, Jane A. “Apply Yourself: Racial and Ethnic Differences in College Application.” *Education Finance and Policy*, Spring 2020, 15(2): 209-240.

Black, Sandra E., Cortes, Kalena E., and Lincove, Jane Arnold. “Academic Undermatching of High-Achieving Minority Students: Evidence from Race-Neutral and Holistic Admissions Policies.” *American Economic Review*, May, 105 no. 5 (2015): 604-610.

Blake, Jessica. “Kentucky Explores Creating New College in ‘Postsecondary Desert’.” *Inside Higher Ed* (2024).

Blinder, A. S. “Wage Discrimination: Reduced Form and Structural Estimates.” *Journal of Human Resources* 8(4) (1973): 436–455.

Bound, J., and Turner, S. (2007). Cohort crowding: How resources affect collegiate attainment. *Journal of public Economics*, *91*(5-6), 877-899.

Bulman, G., and Cunha, J. (2021). Factors shaping college investment and enrollment gaps. In *The Routledge Handbook of the Economics of Education* (pp. 309-342). Routledge.

Cahalan, Margaret W., Marisha Addison, Nicole Brunt, Pooja R. Patel, and Laura W. Perna. “Indicators of Higher Education Equity in the United States: 2021 Historical Trend Report.” *Pell Institute for the Study of Opportunity in Higher Education* (2021).

Card, David. “Using geographic variation in college proximity to estimate the return to schooling.” (1993). In *Aspects of Labour Market Behavior: Essays in Honour of John Vanderkamp*, ed. Christophides, Grant and Swidinsky, 201-222.

Cameron, Stephen V., and Christopher Taber. “Estimation of educational borrowing constraints using returns to schooling.” *Journal of Political Economy* 112, no. 1 (2004): 132-182.

Carneiro, Pedro, and Sokbae Lee. “Estimating distributions of potential outcomes using local instrumental variables with an application to changes in college enrollment and wage inequality.” *Journal of Econometrics* 149, no. 2 (2009): 191-208.

Carneiro, Pedro, James J. Heckman, and Edward J. Vytlacil. "Estimating marginal returns to education." *American Economic Review* 101, no. 6 (2011): 2754-2781.

Chetty, Raj, John N. Friedman, Emmanuel Saez, Nicholas Turner, and Danny Yagan. "Income segregation and intergenerational mobility across colleges in the United States." *The Quarterly Journal of Economics* 135, no. 3 (2020): 1567-1633.

Connolly, Kevin. "How Does Access to College Affect Long-Term Life Outcomes? Evidence from U.S. Openings of Two-Year Public Colleges. Unpublished Manuscript (2023).

Cortes, Kalena E. and Jane Arnold Lincove. "Can Admissions Percent Plans Lead to Better Collegiate Fit for Minority Students?" *American Economic Review*, May 2016, 106(5): 348-54.

Cortes, Kalena E. and Lincove, Jane A. "Match or Mismatch? Automatic Admissions and College Preferences of Low- and High-Income Students." *Educational Evaluation and Policy Analysis*, March 2019, 41(1): 98-123.

Cowan, Benjamin and Tefft, Nathan. "College Access and Adult Health." *American Journal of Health Economics* (2023): forthcoming.

Currie, Janet, and Enrico Moretti. "Mother's education and the intergenerational transmission of human capital: Evidence from college openings." *The Quarterly Journal of Economics* 118, no. 4 (2003): 1495-1532.

Dale, S. B., and Krueger, A. B. (2002). Estimating the payoff to attending a more selective college: An application of selection on observables and unobservables. *The Quarterly Journal of Economics*, *117*(4), 1491-1527.

Dale, S. B., and Krueger, A. B. (2014). Estimating the Return to College Selectivity over the Career Using Administrative Earnings Data. *Journal of Human Resources 49*(2):323–58.

Deming, David J. "Why do wages grow faster for educated workers?." Working Paper No. w31373. National Bureau of Economic Research, 2023.

Deming, D. J., and Walters, C. R. (2017). "The impact of price caps and spending cuts on US postsecondary attainment" (No. w23736). National Bureau of Economic Research.

Denning, Jeffrey T. "College on the Cheap: Consequences of Community College Tuition Reductions." *American Economic Journal: Economic Policy* 9, no. 2 (2017): 155-188.

Doyle, William R., and Benjamin T. Skinner. "Estimating the education-earnings equation using geographic variation." *Economics of Education Review* 53 (2016): 254-267.

Dynarski, Susan, Aizat Nurshatayeva, Lindsay C. Page, and Judith Scott-Clayton. *Addressing non-financial barriers to college access and success: Evidence and policy implications*. Working Paper No. w30054. National Bureau of Economic Research, 2022.

Dynarski, Susan, Lindsay C. Page, and Judith Scott-Clayton. *College costs, financial aid, and student decisions*. Working Paper No. w30275. National Bureau of Economic Research, 2022.

Elder, Todd E., John H. Goddeeris, and Steven J. Haider. “Unexplained Gaps and Oaxaca–Blinder Decompositions.” *Labour Economics* 17.1 (2010): 284-290.

Federal Highway Administration. (2017). National Household Travel Survey. U.S. Department of Transportation. Retrieved from https://nhts.ornl.gov/

Fletcher, Jason, and Hamid Noghanibehambari. “The effects of education on mortality: Evidence using college expansions.” *Health Economics* 33, no. 3 (2024): 541-575.

Frenette, Marc. “"Do universities benefit local youth? Evidence from the creation of new universities."” *Economics of education review* 28, no. 3 (2009): 318-328.

Fu, C. (2014). “Equilibrium tuition, applications, admissions, and enrollment in the college market.” *Journal of Political Economy*, *122*(2), 225-281.

Fu, Chao, Junjie Guo, Adam J. Smith, and Alan Sorensen. “Students’ Heterogeneous Preferences and the Uneven Spatial Distribution of Colleges.” *Journal of Monetary Economics* 129 (2022): 49-64.

Gardner, Lee. “More States Turn to Public-College Mergers, but Easy Fixes May Remain Elusive.” *The Chronicle of Higher Education* (2021).

Gretzinger, Erin. “Wisconsin Is Closing Another 2-Year Campus but Hopes It’s Found a Solution to Its Biggest Challenges.” *The Chronicle of Higher Education* (2024).

Harnisch, Tom and Laderman, Sophia. “State Priorities for Higher Education in 2023: Survey of SHEEOs.” *State Higher Education Executive Officers* (2023).

Hillman, Nicholas. “Geography of College Opportunity: The Case of Education Deserts.” *American Education Research Journal* 53, no. 4 (2016).

Hillman, Nicholas, and Taylor Weichman. *Education deserts: The Continued Significance of” Place” in the Twenty-First Century*. American Council on Education Center for Policy Research and Strategy, 2016.

Hirschl, Noah, and Christian Michael Smith. “Well-placed: The geography of opportunity and high school effects on college attendance.” *Research in Higher Education* 61, no. 5 (2020): 567-587.

Hoxby, Caroline M. “How the changing market structure of US higher education explains college tuition.” National Bureau of Economics Working Paper No. 6323 (1997).

Klasik, Daniel, Kristin Blagg, and Zachary Pekor. "Out of the education desert: How limited local college options are associated with inequity in postsecondary opportunities." *Social Sciences* 7, no. 9 (2018): 165.

Kling, Jeffrey R. “Interpreting instrumental variables estimates of the returns to schooling.” *Journal of Business & Economic Statistics* 19, no. 3 (2001): 358-364.

Lapid, Patrick. “Expanding college access: The impact of new universities on local enrollment.” Unpublished Manuscript (2017).

Li, Amy Y. "Four Decades of Performance Funding and Counting." *Higher Education: Handbook of Theory and Research:* Volume 36 (2020): 1-64.

Long, Bridget Terry. "How Have College Decisions Changed Over Time? An Application of the Conditional Logistic Choice Model." *Journal of Econometrics* 121, no. 1-2 (2004): 271-296.

Long, Bridget Terry, and Michal Kurlaender. "Do community colleges provide a viable pathway to a baccalaureate degree?." *Educational Evaluation and Policy Analysis* 31, no. 1 (2009): 30-53.

Miller, Lois. "Small Distances that Matter: Effects of Local Community College Openings on Enrollment and Degree Completion." Unpublished Manuscript (2023).

Morales, Camila and Kalena E. Cortes. "A Profile of Community College Students in Texas." Texas Commission on Community College Finance, Texas Higher Education Coordinating Board, (2022).

Mountjoy, Jack. "Community Colleges and Upward Mobility." *American Economic Review* 112, no. 8 (2022): 2580-2630.

National Center for Education Statistics. (2023). Table 304.15: Total fall enrollment in degree-granting postsecondary institutions, by control and level of institution: 2000 through 2022. In Digest of Education Statistics. U.S. Department of Education. Retrieved from https://nces.ed.gov/programs/digest/d23/tables/dt23_304.15.asp

Neumark, David. "Employers' Discriminatory Behavior and the Estimation of Wage Discrimination." *Journal of Human Resources* 23 (3) (1988), 279–295.

Nimier-David, Elio. "Local human capital and firm creation: Evidence from the massification of higher education in France." Unpublished Manuscript (2023).

Oaxaca, Ronald. "Male-Female Wage Differentials in Urban Labor Markets." *International Economic Review* 14(3) (1973): 693–709.

Reber, Sarah, and Ember Smith. "College Enrollment Disparities, Understanding the Role of Academic Preparation." *The Brookings Institution* (2023).

Rouse, Cecilia Elena. "Democratization or Diversion? The Effect of Community Colleges on Educational Attainment." *Journal of Business & Economic Statistics* 13, no. 2 (1995): 217-224.

Skinner, Benjamin T. "Choosing College in the 2000s: An Updated Analysis Using the Conditional Logistic Choice Model." *Research in Higher Education* 60 (2019): 153-183.

Smith, J., Goodman, J., and Hurwitz, M. (2020). *The economic impact of access to public four-year colleges* (No. w27177). National Bureau of Economic Research.

Thompson, Jesse and Keighton Hines. "State Output Remains Distinctly Texan, While Jobs Mix Increasingly Resembles the U.S." Federal Reserve Bank of Dallas (2023). https://www.dallasfed.org/research/swe/2023/swe2313.

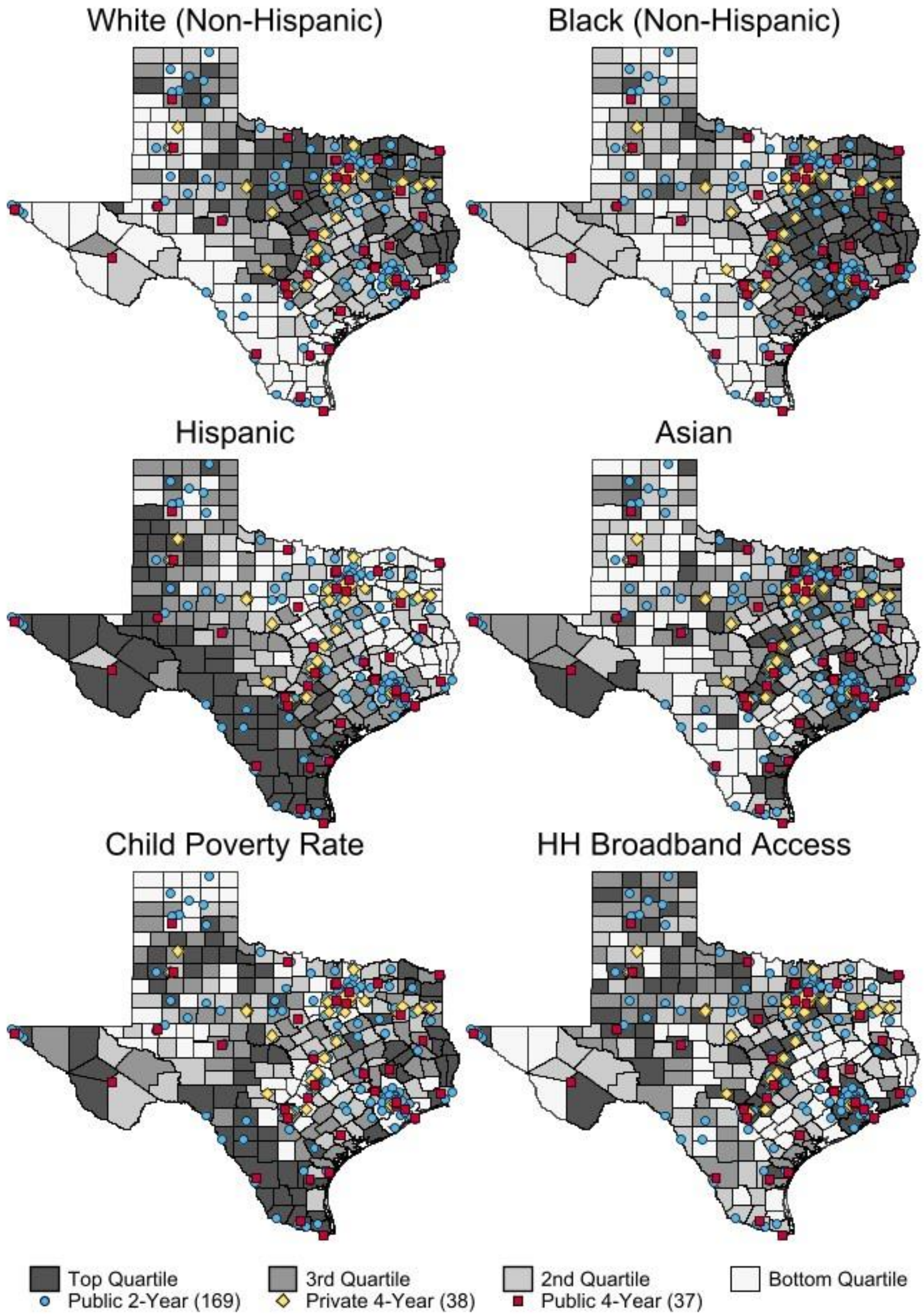
Turley, Ruth N. López. "College Proximity: Mapping Access to Opportunity." *Sociology of Education* 82, no. 2 (2009): 126-146.

U.S. Census Bureau. "Nation's Urban and Rural Populations Shift Following 2020 Census" (2022). https://www.census.gov/newsroom/press-releases/2022/urban-rural-populations.html.

Waxmann, Laura. "University of California Considers S.F. for Expansion in Wake of Mayor Breed's Plea." *San Francisco Chronicle* (2024).

Zimmerman, S. D. (2014). "The returns to college admission for academically marginal students." *Journal of Labor Economics*, *32*(4), 711-754.

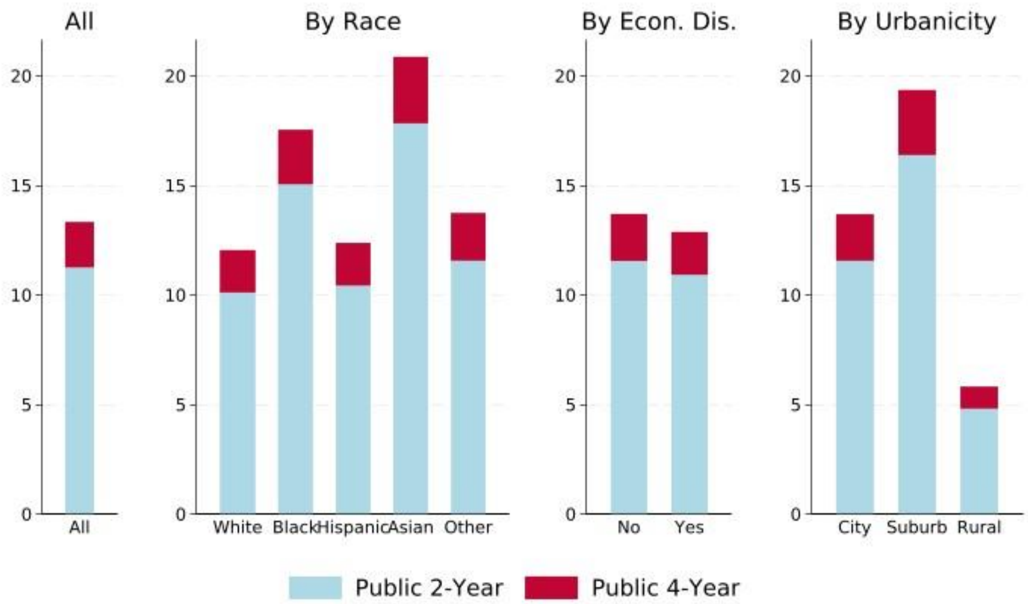
Figure 1: Spatial Distribution of Texas Higher Education Institutions



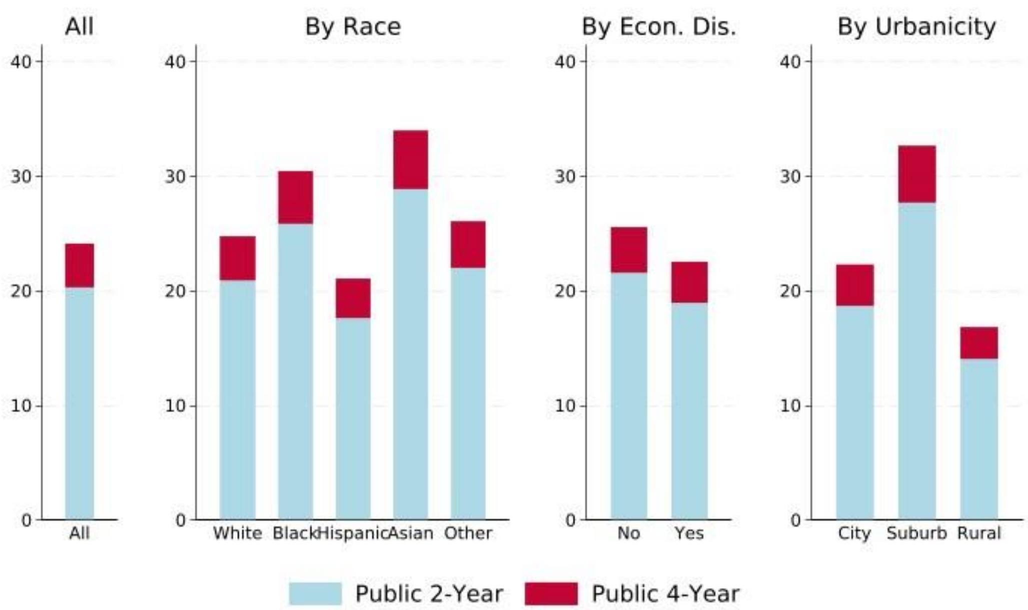
Notes: This figure plots the location of each public two-year, public four-year, and private four-year postsecondary institution campus in Texas. Each subfigure overlays the locations on various county characteristics, which we measure in quartiles.

Figure 2: Number of Proximate Colleges by Demographic Characteristics

Panel A. Colleges Within 30 Miles



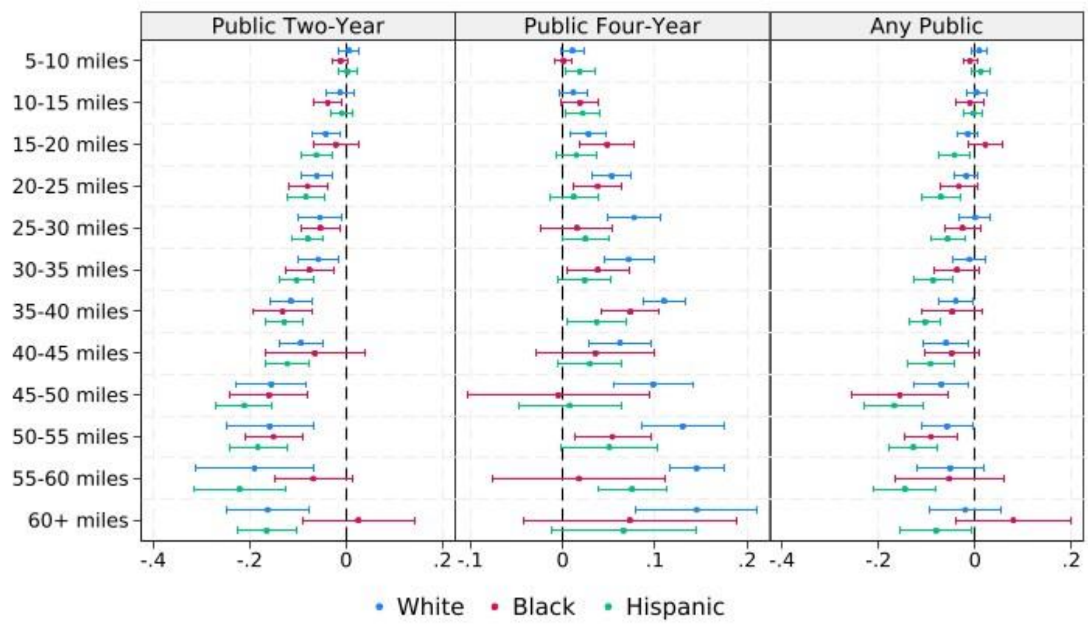
Panel B. Colleges Within 60 Miles



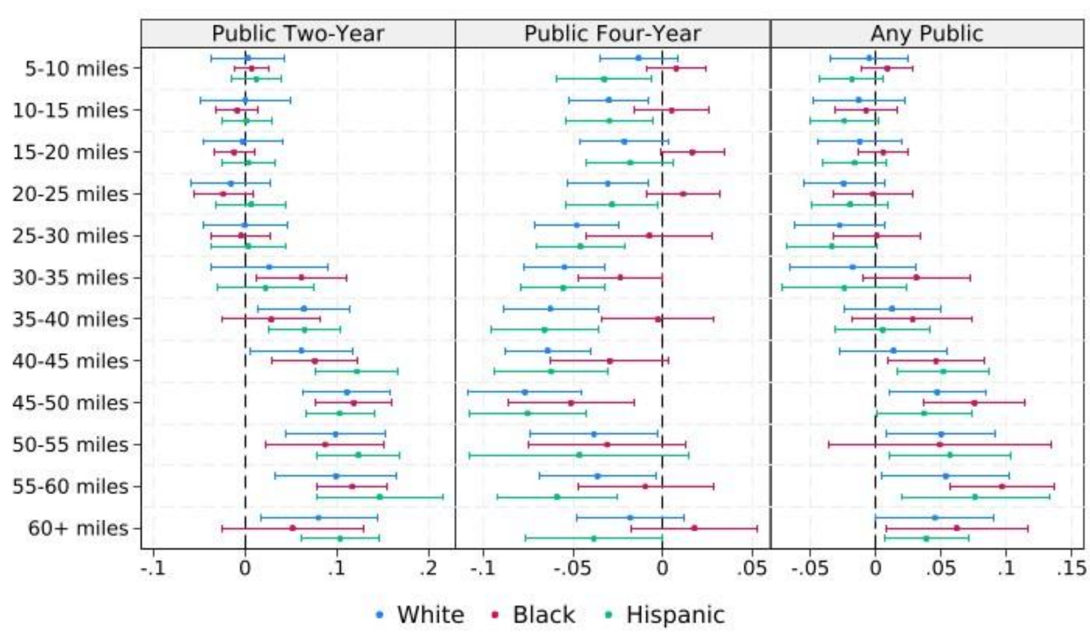
Notes: These figures summarize the number of public two-year and public four-year college campuses within 30 (Panel A) or 60 (Panel B) of a student's high school, averaged over all students and all students of a particular demographic group.

Figure 3: Non-Linear Effects of Distance on Enrollment by Race and Ethnicity

Panel A. Effects of Distance from Nearest Public Two-Year College



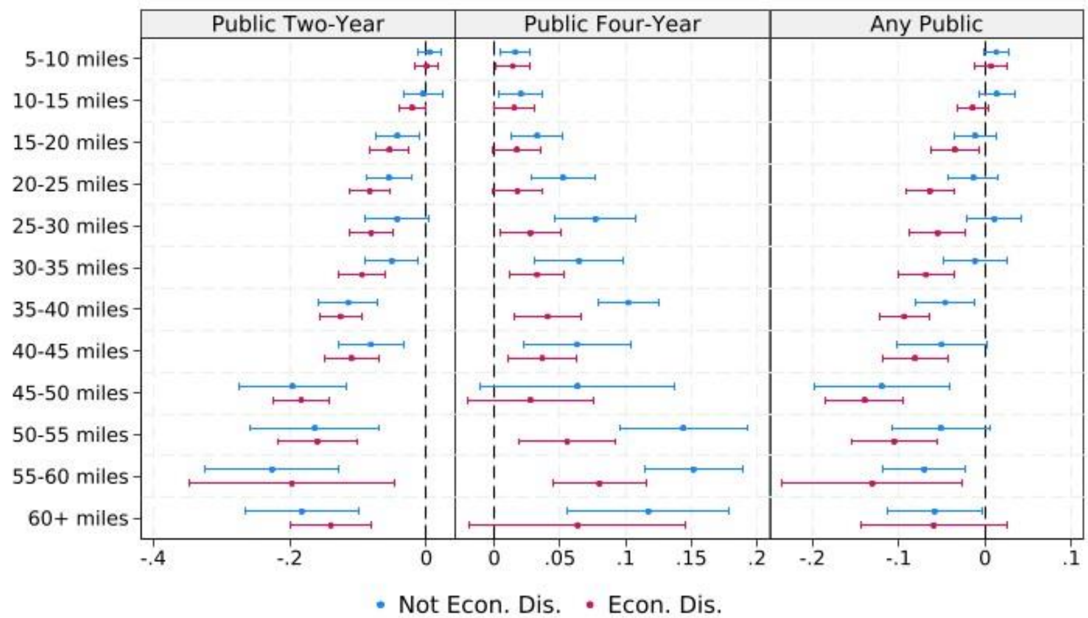
Panel B. Effects of Distance from Nearest Public Four-Year College



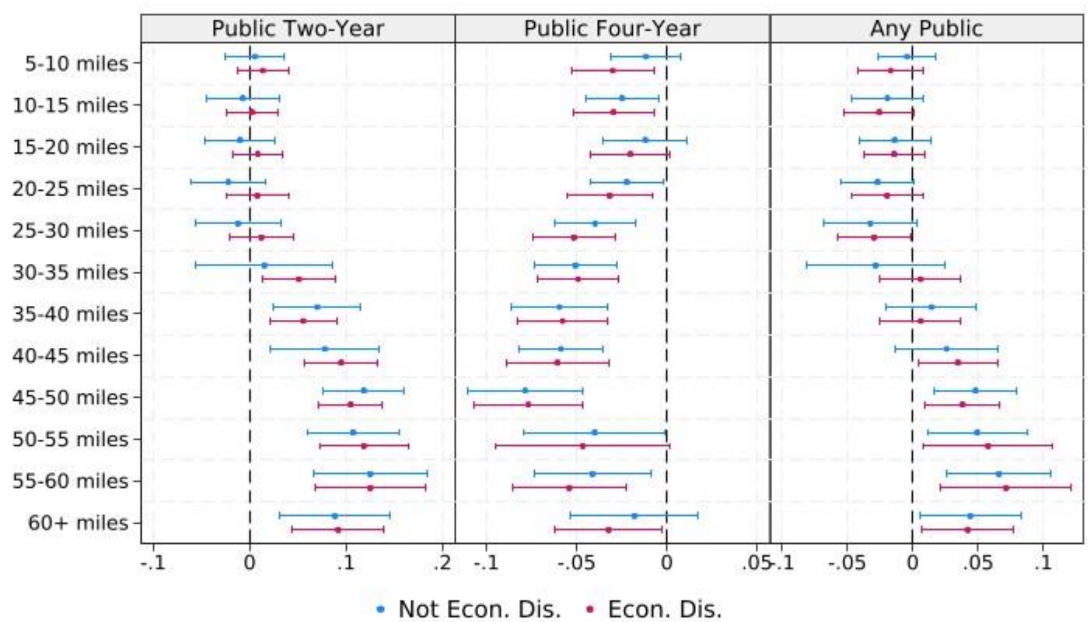
Notes: These figures plot the estimated coefficients from equation (1), where we measure distance to public two-year and four-year colleges in 5-mile intervals. Each regression controls for student demographic characteristics, 8th grade test scores, school-level characteristics, and cohort indicators. Standard errors are clustered at the school district level and we present 95% confidence intervals.

Figure 4: Non-Linear Effects of Distance on Enrollment by Economic Disadvantage Status

Panel A. Effects of Distance from Nearest Public Two-Year College



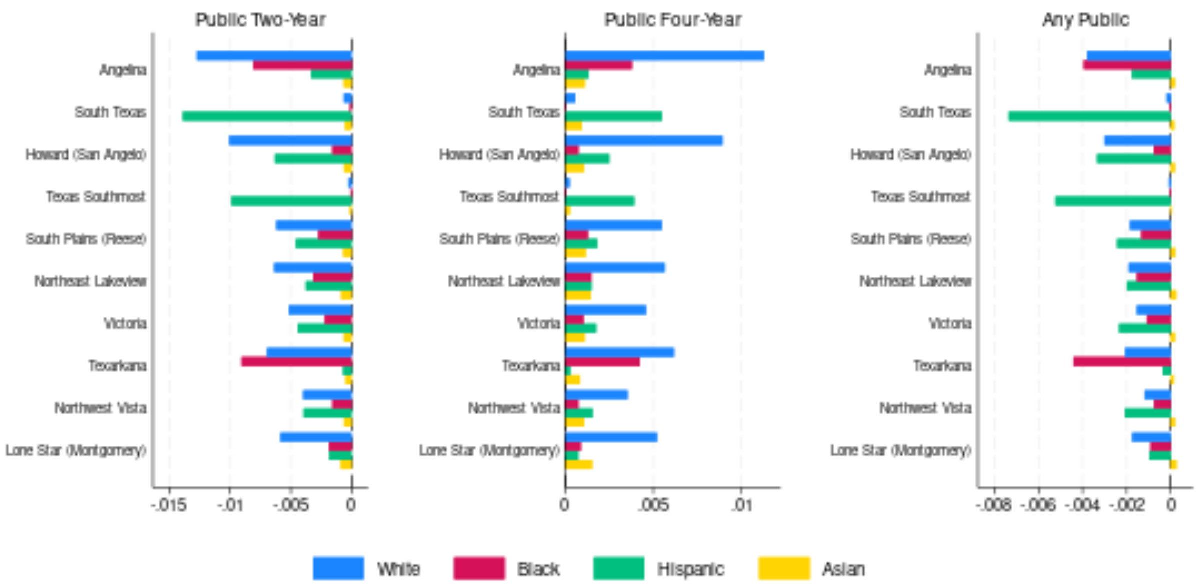
Panel B. Effects of Distance from Nearest Public Four-Year College



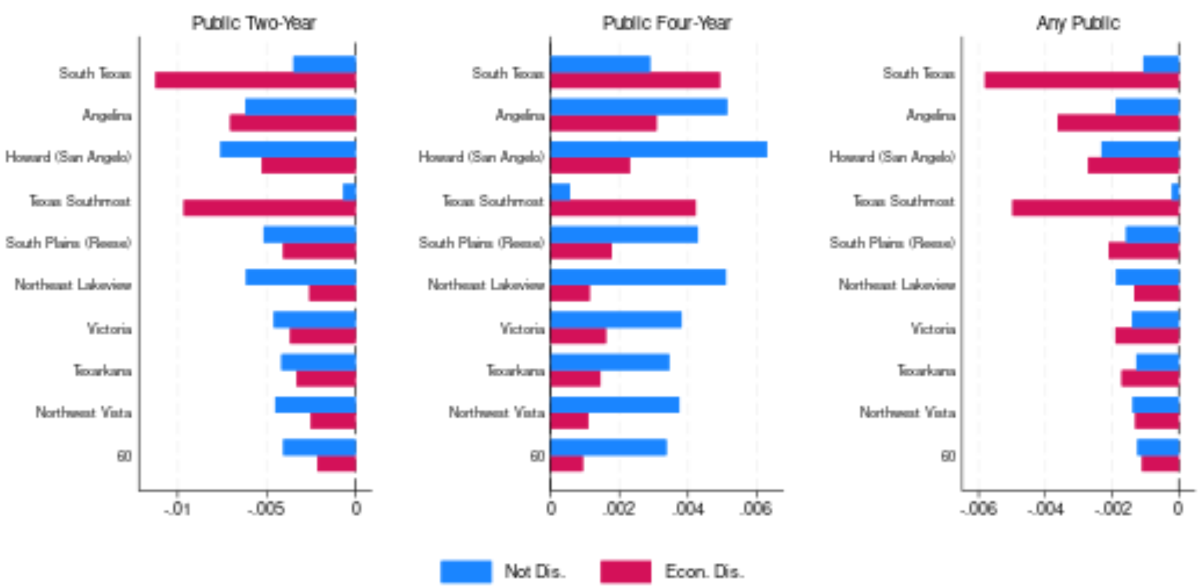
Notes: These figures plot the estimated coefficients from equation (1), where we measure distance to public two-year and four-year colleges in 5-mile intervals. Each regression controls for student demographic characteristics, 8th grade test scores, school-level characteristics, and cohort indicators. Standard errors are clustered at the school district level and we present 95% confidence intervals.

Figure 5: Predicted Enrollment Changes of Two-Year College Campus Closures

Panel A. Predicted Enrollment Changes by Race and Ethnicity



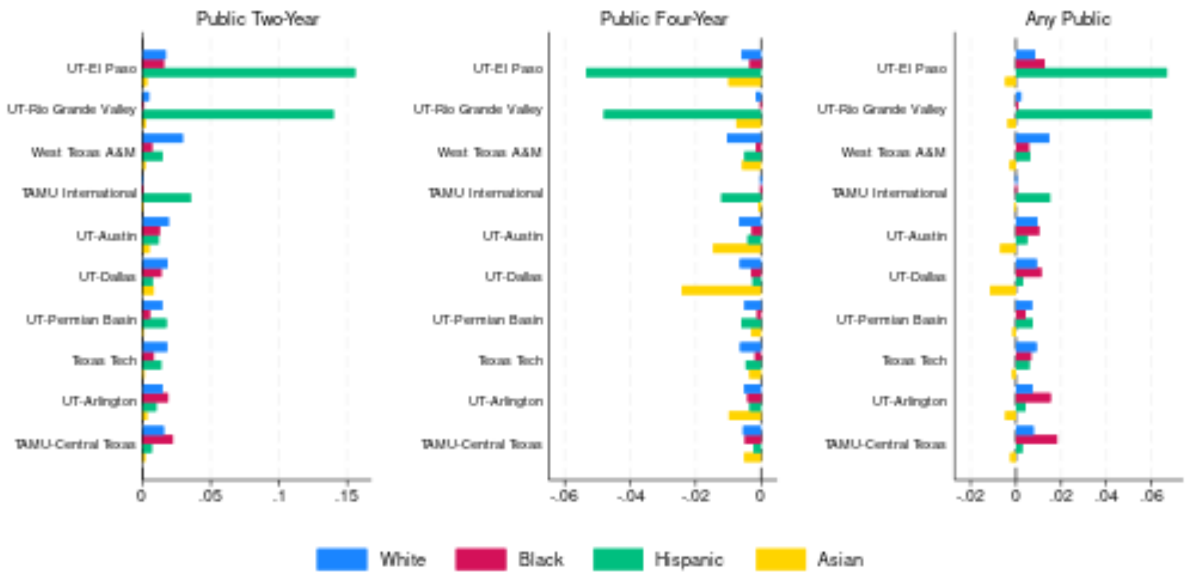
Panel B. Predicted Enrollment Changes by Economic Disadvantage Status



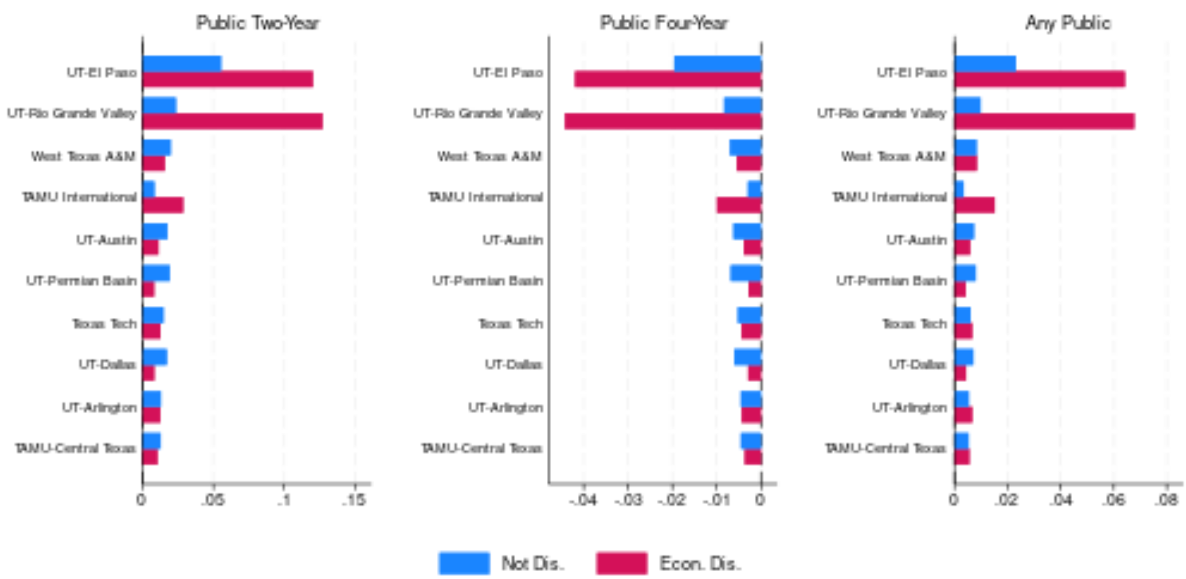
Notes: These figures plot the estimated statewide changes in college enrollment, across race (Panel A) and economic disadvantage status (Panel B) if each listed two-year college campus were to close. Details of the exercise are provided in Section VI.B.

Figure 6: Predicted Enrollment Changes of Four-Year College Campus Closures

Panel A. Predicted Enrollment Changes by Race



Panel B. Predicted Enrollment Changes by Economic Disadvantage Status



Notes: These figures plot the estimated statewide changes in college enrollment, across race (Panel A) and economic disadvantage status (Panel B) if each listed four-year college campus were to close. Details of the exercise are provided in Section VI.B

Table 1: Summary Statistics by Student and High School Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	White	Black	Hispanic	Asian	Econ. Dis.	Not Econ. Dis.	Urban	Suburban	Town/ Rural
Panel A: Student Characteristics										
Economic Disadvantage	0.473	0.187	0.595	0.661	0.310	1.000	0.000	0.541	0.412	0.449
Non-Hispanic White	0.332	1.000	0.000	0.000	0.000	0.131	0.512	0.217	0.349	0.473
Non-Hispanic Black	0.127	0.000	1.000	0.000	0.000	0.159	0.097	0.139	0.147	0.085
Hispanic	0.477	0.000	0.000	1.000	0.000	0.667	0.307	0.578	0.418	0.405
Non-Hispanic Asian	0.043	0.000	0.000	0.000	1.000	0.028	0.056	0.047	0.061	0.015
Non-Hispanic Other	0.021	0.000	0.000	0.000	0.000	0.015	0.027	0.019	0.025	0.022
8th Grade Reading Score	0.114	0.247	0.022	0.030	0.233	0.003	0.213	0.071	0.150	0.132
8th Grade Math Score	0.059	0.194	-0.103	-0.011	0.242	-0.034	0.142	0.015	0.087	0.089
Panel B: College Enrollment										
Public Two-Year Enrollment	0.394	0.435	0.344	0.383	0.357	0.356	0.428	0.361	0.390	0.445
Public Four-Year Enrollment	0.214	0.252	0.218	0.169	0.406	0.156	0.266	0.215	0.220	0.207
Any Public Enrollment	0.532	0.585	0.511	0.489	0.646	0.461	0.595	0.509	0.541	0.552
Panel C: High School Characteristics										
Total Enrollment	1,886	1,751	1,979	1,905	2,417	1,789	1,973	2,019	2,369	1,142
City	0.392	0.256	0.431	0.475	0.435	0.448	0.341	1.000	0.000	0.000
Suburb	0.326	0.343	0.379	0.286	0.465	0.284	0.364	0.000	1.000	0.000
Town/Rural	0.282	0.402	0.190	0.239	0.100	0.268	0.295	0.000	0.000	1.000
Student-Teacher Ratio	15.63	15.22	15.87	15.74	16.72	15.46	15.77	16.34	16.42	13.72
Charter	0.039	0.021	0.047	0.050	0.029	0.055	0.025	0.076	0.019	0.011
Magnet	0.062	0.024	0.113	0.078	0.051	0.085	0.042	0.147	0.014	0.001
Title I	0.737	0.556	0.823	0.865	0.514	0.896	0.594	0.775	0.629	0.809
Observations	1,563,036	518,984	197,844	745,834	66,787	739,326	823,710	612,667	509,801	440,568

Notes: Variables are summarized over our sample of 2013-2017 Texas high school graduates, as measured in their final year of high school. The number of observations shown in columns (2) - (5) do not add up to the number in column (1) because we exclude the "Other race/ethnicity" column (N=33,587). Please refer to Appendix 1 for the summary statistics related to this category.

Table 2: Summary Statistics by College Distance Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	White	Black	Hispanic	Asian	Econ. Dis.	Not Econ. Dis.	Urban	Suburban	Town/ Rural
Panel A: Distance to Nearest Colleges										
Any Public	6.608	8.474	5.007	5.944	4.246	6.329	6.858	3.213	4.513	13.75
Public Two-Year	7.278	9.213	5.484	6.646	4.621	7.004	7.523	3.782	4.583	15.26
Public Four-Year	17.46	20.79	14.67	16.19	13.63	16.84	18.01	10.31	14.36	30.99
Public Flagship	151.2	133.3	118.9	176.3	117.4	165.2	138.7	168.6	131.5	149.9
Panel B: College Presence in 30 Miles										
Any Public	0.972	0.962	0.988	0.972	0.996	0.971	0.973	1.000	1.000	0.901
Public Two-Year	0.966	0.953	0.982	0.968	0.995	0.965	0.967	1.000	1.000	0.879
Public Four-Year	0.868	0.802	0.915	0.892	0.969	0.870	0.865	0.956	0.987	0.607
Public Flagship	0.067	0.086	0.053	0.056	0.080	0.051	0.082	0.081	0.044	0.075
Panel C: College Presence in 60 Miles										
Any Public	0.997	0.998	1.000	0.997	1.000	0.997	0.998	1.000	1.000	0.991
Public Two-Year	0.996	0.997	1.000	0.995	0.999	0.996	0.997	1.000	1.000	0.987
Public Four-Year	0.972	0.968	0.990	0.968	0.995	0.971	0.974	0.990	1.000	0.916
Public Flagship	0.136	0.189	0.119	0.101	0.134	0.096	0.171	0.123	0.104	0.190
Observations	1,563,036	518,984	197,844	745,834	66,787	739,326	823,710	612,667	509,801	440,568

Notes: Variables are summarized over our sample of 2013-2017 Texas high school graduates, as measured in their final year of high school. Distances are calculated using the latitude and longitude of a student's high school. The number of observations shown in columns (2) - (5) do not add up to the number in column (1) because we exclude the "Other race/ethnicity" column (N=33,587). Please refer to Appendix Table A.1 for the summary statistics related to this category.

Table 3: Linear Effects of Distance on Enrollment Choices

	(1) No Controls	(2) + Dem. Char.	(3) + Test Scores	(4) + School Char.	(5) + NCES Poverty	(6) + District ACS
	Panel A: Public Two-Year Enrollment					
Distance to Nearest	-0.006	-0.012***	-0.012***	-0.024***	-0.025***	-0.026***
Two-Year (10 miles)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
Distance to Nearest	0.020***	0.018***	0.017***	0.013***	0.012***	0.008***
Four-Year (10 miles)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
	Panel B: Public Four-Year Enrollment					
Distance to Nearest	0.011***	0.011***	0.011***	0.015***	0.015***	0.016***
Two-Year (10 miles)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Distance to Nearest	-0.008***	-0.008**	-0.008**	-0.005*	-0.005*	-0.003*
Four-Year (10 miles)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
	Panel C: Any Public Enrollment					
Distance to Nearest	-0.003	-0.007**	-0.007**	-0.010***	-0.011***	-0.010***
Two-Year (10 miles)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)
Distance to Nearest	0.007***	0.006**	0.005**	0.006***	0.005***	0.004*
Four-Year (10 miles)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)

Notes: All specifications include year fixed effects (2013-2017). *Demographic student-level controls*: economic disadvantage, race and ethnicity, at-risk for dropout, gifted, immigrant status, Limited English Proficient (LEP) status, sex, special education, Career and Technical Education (CTE) enrollment (all measured in last year of high school). *Test score controls*: 8th grade reading test score (standardized) and 8th grade math test score (standardized). *High school-level controls*: total enrollment, % of each race and ethnicity, % economic disadvantage, % at-risk for dropout, % gifted, % immigrant, % LEP, % special education, % CTE enrollment, city/suburb/rural, student/teacher ratio, charter dummy, magnet dummy, and Title I dummy. *NCES poverty control*: Estimated school neighborhood income-to-poverty ratio. *School district ACS controls:* % single-mother households, % non-English-speaking, % foreign-born, mean family income, % of households receiving SNAP benefits, % of children living below poverty line, % of adults with at least H.S. diploma, % of adults with at least bachelor's degree, mean travel time to work, % of workers in professional occupations. Columns (1) - (5) include 1,563,036 student observations, column (6) includes 1,556,381 student observations, column (7) contains 1,550,751 student observations, and column (8) contains 1,501,790 student observations. Standard errors shown in parentheses are clustered at the school district level. * p<0.10, ** p<0.05, *** p<0.010.

Table 4: Linear Effects of Distance on Enrollment Choices by Race and Economic Disadvantage Status

	(1) All	(2) White	(3) Black	(4) Hispanic	(5) Asian	(6) Not Econ. Dis.	(7) Econ. Dis.
	Panel A: Public Two-Year Enrollment						
Distance to Nearest	-0.024***	-0.028***	-0.022***	-0.022***	-0.008	-0.025***	-0.023***
Two-Year (10 miles)	(0.004)	(0.004)	(0.005)	(0.004)	(0.012)	(0.004)	(0.004)
Distance to Nearest	0.013***	0.014***	0.013***	0.012***	0.003	0.013***	0.013***
Four-Year (10 miles)	(0.003)	(0.004)	(0.004)	(0.002)	(0.008)	(0.003)	(0.002)
Observations	1,556,381	517,147	196,661	742,704	66,442	820,649	735,732
	Panel B: Public Four-Year Enrollment						
Distance to Nearest	0.015***	0.025***	0.010***	0.009***	0.014	0.020***	0.010***
Two-Year (10 miles)	(0.002)	(0.002)	(0.004)	(0.003)	(0.009)	(0.003)	(0.002)
Distance to Nearest	-0.005*	-0.005**	-0.003	-0.004	-0.008	-0.004	-0.005**
Four-Year (10 miles)	(0.002)	(0.002)	(0.003)	(0.003)	(0.005)	(0.003)	(0.002)
Observations	1,556,381	517,147	196,661	742,704	66,442	820,649	735,732
	Panel C: Any Public Enrollment						
Distance to Nearest	-0.010***	-0.008***	-0.011**	-0.012**	0.002	-0.008**	-0.012**
Two-Year (10 miles)	(0.003)	(0.003)	(0.005)	(0.005)	(0.011)	(0.003)	(0.005)
Distance to Nearest	0.006***	0.007***	0.011***	0.005***	-0.004	0.005**	0.007***
Four-Year (10 miles)	(0.002)	(0.003)	(0.003)	(0.002)	(0.006)	(0.003)	(0.002)
Observations	1,556,381	517,147	196,661	742,704	66,442	820,649	735,732

Notes: All regressions shown in columns (1) - (7) control for year fixed effects (2013-2017), demographic student-level characteristics, 8th grade test scores, and high school-level characteristics. See Notes in Table 3 for a detail description of these controls. Standard errors shown in parentheses are clustered at the school district level. * p<0.10, ** p<0.05, *** p<0.010.

Tables 5: Effects of Living in a Community College Desert on Enrollment Choices

	(1)	(2)	(3)	(4)
	Panel A: Public Two-Year Enrollment			
Community College (CC) Desert	-0.099***	-0.058***	-0.056***	-0.037**
	(0.012)	(0.015)	(0.015)	(0.016)
CC Desert × URM Status		-0.079***		-0.054***
		(0.012)		(0.012)
CC Desert × Econ. Dis. Status			-0.088***	-0.069***
			(0.011)	(0.011)
	Panel B: Public Four-Year Enrollment			
Community College (CC) Desert	0.044***	0.069***	0.065***	0.078***
	(0.008)	(0.009)	(0.010)	(0.010)
CC Desert × URM Status		-0.048***		-0.037***
		(0.009)		(0.010)
CC Desert × Econ. Dis. Status			-0.043***	-0.030***
			(0.008)	(0.008)
	Panel C: Any Public Enrollment			
Community College (CC) Desert	-0.061***	-0.020*	-0.022*	-0.001
	(0.010)	(0.011)	(0.012)	(0.012)
CC Desert × URM Status		-0.079***		-0.058***
		(0.011)		(0.011)
CC Desert × Econ. Dis. Status			-0.080***	-0.060***
			(0.010)	(0.010)

Notes: Students are classified as living in a "community college desert" if there is no public two-year college within 30 miles of their high school. Underrepresented Minority (URM) students include all Black, Hispanic, and "Other race/ethnicity" students. All regressions shown in columns (1) - (4) control for year fixed effects (2013-2017), demographic student-level characteristics, 8th grade test scores, and high school-level characteristics. See Notes in Table 3 for a detailed description of these controls. In these specifications, we continue to control for the distance to a student's nearest four-year college in 5-mile bins. Columns (1) - (4) include 1,556,381 student observations. Standard errors shown in parentheses are clustered at the school district level. * $p<0.10$, ** $p<0.05$, *** $p<0.010$.

Tables 6: Effects of Living in a Four-Year College Desert on Enrollment Choices

	(1)	(2)	(3)	(4)
	Panel A: Public Two-Year Enrollment			
Four-Year College Desert	0.077***	0.093***	0.108***	0.110***
	(0.015)	(0.019)	(0.022)	(0.023)
Four-Year Desert × URM Status		-0.032***		-0.007
		(0.012)		(0.009)
Four-Year Desert × Econ. Dis. Status			-0.069***	-0.066***
			(0.016)	(0.014)
	Panel B: Public Four-Year Enrollment			
Four-Year College Desert	-0.029***	-0.017***	-0.021***	-0.015**
	(0.007)	(0.007)	(0.007)	(0.007)
Four-Year Desert × URM Status		-0.022***		-0.018**
		(0.008)		(0.008)
Four-Year Desert × Econ. Dis. Status			-0.017***	-0.011**
			(0.006)	(0.005)
	Panel C: Any Public Enrollment			
Four-Year College Desert	0.040***	0.056***	0.062***	0.067***
	(0.011)	(0.014)	(0.017)	(0.017)
Four-Year Desert × URM Status		-0.032***		-0.015*
		(0.010)		(0.008)
Four-Year Desert × Econ. Dis. Status			-0.051***	-0.045***
			(0.013)	(0.012)

Notes: Students are classified as living in a four-year college desert if there is no public four-year college within 30 miles of their high school. Underrepresented Minority (URM) students include all Black, Hispanic, and "Other race/ethnicity" students. All regressions shown in columns (1) - (4) control for year fixed effects (2013-2017), demographic student-level characteristics, 8th grade test scores, and high school-level characteristics. See Notes in Table 3 for a detailed description of these controls. In these specifications, we continue to control for the distance to a student's nearest two-year college in 5-mile bins. Columns (1) - (4) include 1,556,381 student observations. Standard errors shown in parentheses are clustered at the school district level. * p<0.10, ** p<0.05, *** p<0.010.

Table 7: Oaxaca-Blinder Decomposition

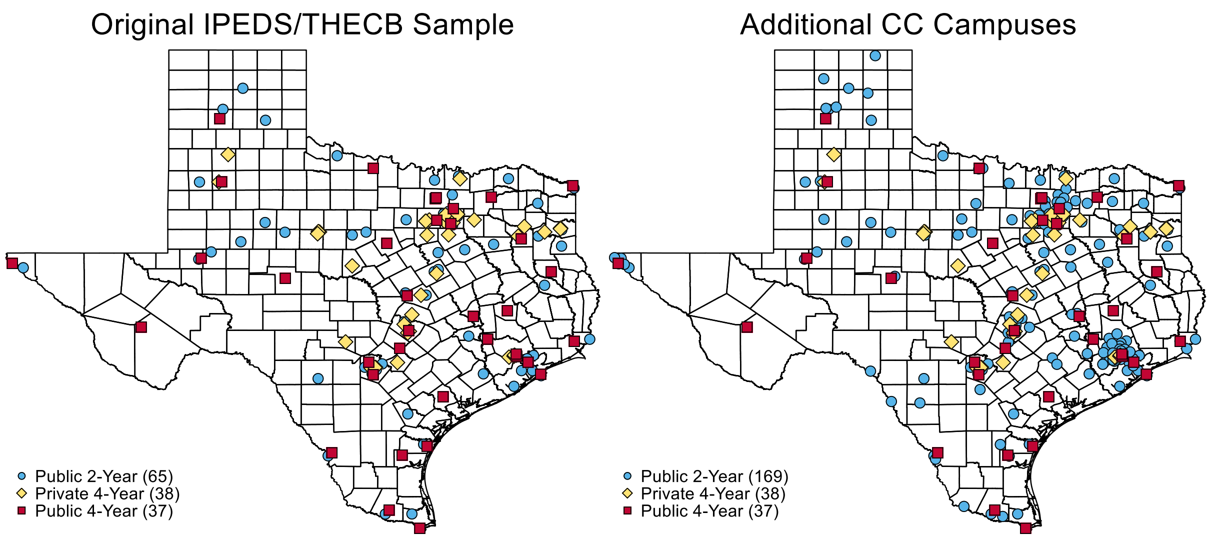
	Difference	Characteristics: Distance to Nearest Two-Year	Characteristics: Distance to Nearest Four-Year	Coefficients: Distance to Nearest Two-Year	Coefficients: Distance to Nearest Four-Year
	Panel A: Public Two-Year Enrollment				
Non-URM v. URM	0.051***	-0.006***	0.005***	-0.003	0.002
	(0.007)	(0.001)	(0.002)	(0.004)	(0.005)
White v. Hispanic	0.052***	-0.006***	0.006***	-0.004	0.003
	(0.007)	(0.001)	(0.002)	(0.004)	(0.006)
White v. Black	0.092***	-0.010***	0.008***	-0.003	0.002
	(0.008)	(0.002)	(0.003)	(0.003)	(0.005)
By Econ. Dis. Status	0.072***	-0.001	0.001	-0.001	-0.001
	(0.007)	(0.001)	(0.001)	(0.003)	(0.004)
	Panel B: Public Four-Year Enrollment				
Non-URM v. URM	0.089***	0.003***	-0.002*	0.011***	-0.001
	(0.006)	(0.001)	(0.001)	(0.002)	(0.005)
White v. Hispanic	0.084***	0.004***	-0.002*	0.013***	-0.001
	(0.007)	(0.001)	(0.001)	(0.003)	(0.005)
White v. Black	0.035***	0.009***	-0.003**	0.008***	-0.003
	(0.007)	(0.001)	(0.001)	(0.002)	(0.004)
By Econ. Dis. Status	0.110***	0.001	-0.001	0.008***	0.000
	(0.005)	(0.000)	(0.000)	(0.002)	(0.003)
	Panel C: Any Public Enrollment				
Non-URM v. URM	0.096***	-0.002***	0.002**	0.003	0.002
	(0.007)	(0.001)	(0.001)	(0.004)	(0.005)
White v. Hispanic	0.095***	-0.003***	0.003**	0.003	0.003
	(0.008)	(0.001)	(0.001)	(0.004)	(0.005)
White v. Black	0.074***	-0.003**	0.005***	0.001	-0.006
	(0.008)	(0.001)	(0.002)	(0.003)	(0.004)
By Econ. Dis. Status	0.133***	-0.001	0.001	0.003	-0.003
	(0.007)	(0.000)	(0.000)	(0.004)	(0.004)

Notes: Regressions control for year fixed effects (2013-2017), demographic student-level characteristics, 8th grade test scores, and high school-level characteristics. See Notes in Table 3 for a detail description of these controls. Standard errors shown in parentheses are clustered at the school district level. * p<0.10, ** p<0.05, *** p<0.010.

Appendix Figures and Tables

Appendix Figure A.1:

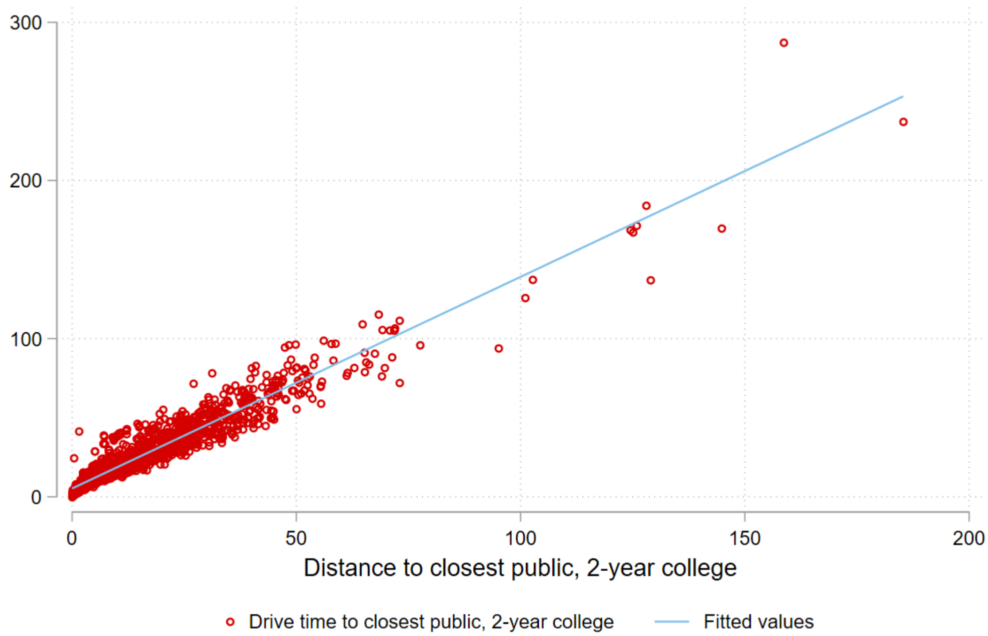
Additional Community College Campuses



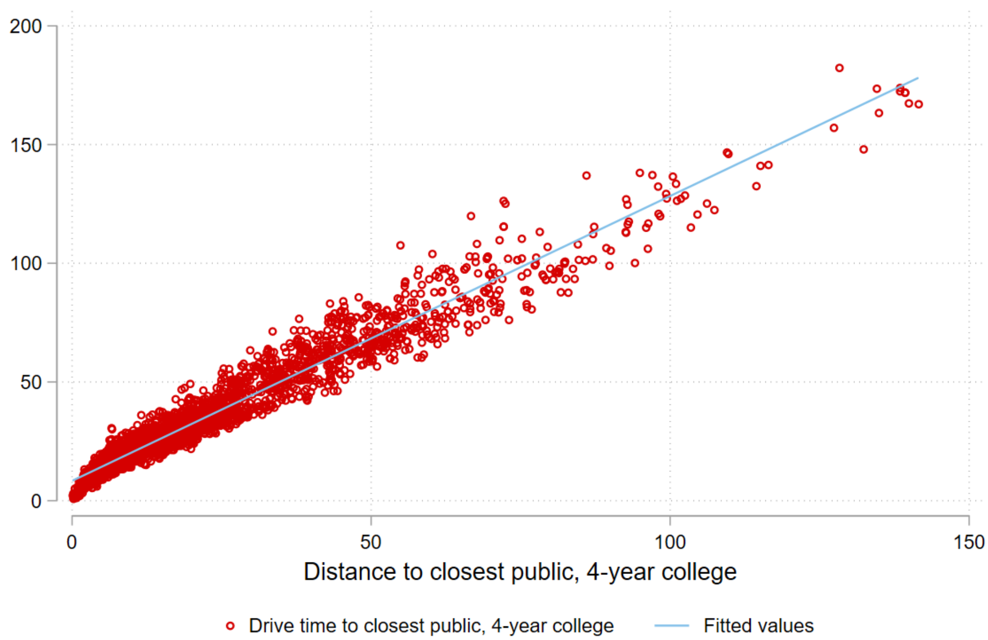
Notes: These figures show the locations of public two-year, public four-year, and private four-year college campuses in Texas. The figure on the left only uses geographic information in the Integrated Postsecondary Education System (IPEDS), while the panel on the right uses additional supplementary sources described in the text.

Appendix Figure A.2: Correlation Between Linear Distance and Driving Time

Panel A. Distance to Public, Two-Year Colleges

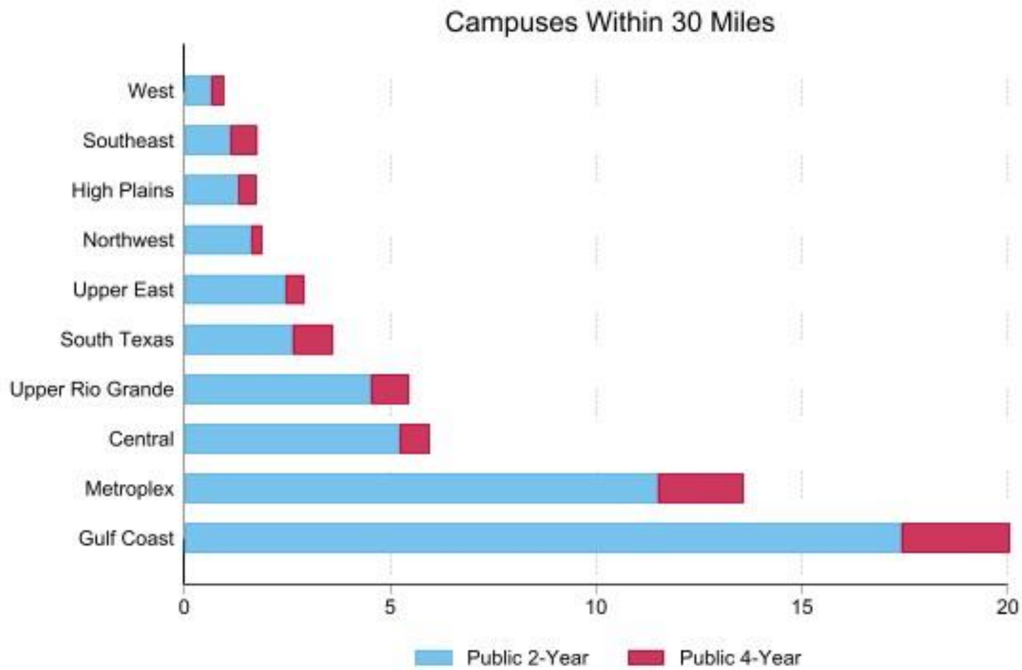


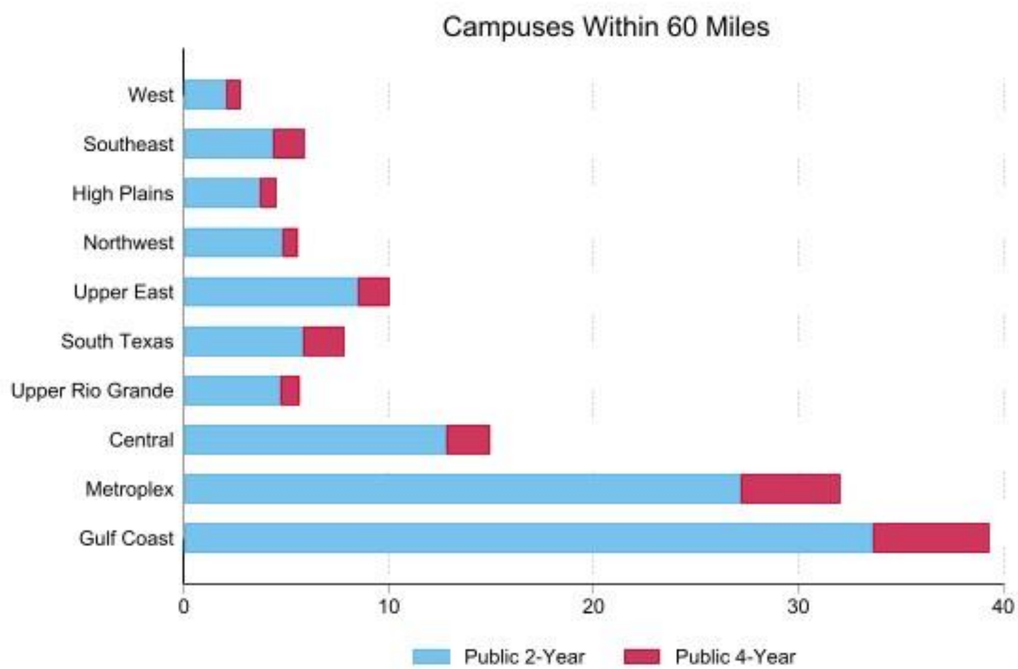
Panel B. Distance to Public, Four-Year Colleges



Notes: These figures show the distance from each Texas high school to its nearest public two-year (Panel A) and public four-year (Panel B) college campus, measured in miles on the x-axis and driving time on the y-axis. The correlation in Panel A is 0.964 and the correlation in Panel B is 0.975. See Miller (2023) for details on the calculation of driving times.

Appendix Figure A.3: Higher Education Access by Texas Region





Notes: These figures summarize the number of public two-year and four-year college campuses within 30 (Panel A) or 60 (Panel B) of Texas high schools, averaged over high schools in each Texas higher education region.

Appendix Table A.1: Summary Statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	All	**White**	**Black**	**Hispanic**	**Asian**	**Other**	**Econ. Dis.**	**Not Econ. Dis.**	**Urban**	**Suburban**	**Town/ Rural**
Panel A: Student Characteristics											
Economic Disadvantage	0.473	0.187	0.595	0.661	0.310	0.329	1.000	0.000	0.541	0.412	0.449
Non-Hispanic White	0.332	1.000	0.000	0.000	0.000	0.000	0.131	0.512	0.217	0.349	0.473
Non-Hispanic Black	0.127	0.000	1.000	0.000	0.000	0.000	0.159	0.097	0.139	0.147	0.085
Hispanic	0.477	0.000	0.000	1.000	0.000	0.000	0.667	0.307	0.578	0.418	0.405
Non-Hispanic Asian	0.043	0.000	0.000	0.000	1.000	0.000	0.028	0.056	0.047	0.061	0.015
Non-Hispanic Other	0.021	0.000	0.000	0.000	0.000	1.000	0.015	0.027	0.019	0.025	0.022
Underrepresented Minority (URM)	0.625	0.000	1.000	1.000	0.000	1.000	0.841	0.432	0.736	0.590	0.512
At-Risk for Dropout	0.426	0.275	0.524	0.526	0.236	0.340	0.558	0.307	0.476	0.399	0.387
Gifted	0.098	0.130	0.050	0.078	0.202	0.114	0.065	0.127	0.108	0.095	0.086
Immigrant	0.009	0.002	0.005	0.011	0.046	0.004	0.012	0.006	0.011	0.009	0.005
Limited English Proficient (LEP)	0.057	0.005	0.009	0.103	0.109	0.014	0.096	0.022	0.077	0.052	0.034
Male	0.501	0.507	0.495	0.497	0.512	0.491	0.492	0.508	0.494	0.502	0.508
Special Education	0.081	0.075	0.123	0.079	0.025	0.074	0.102	0.061	0.081	0.072	0.090
Career & Technical Education (CTE)	0.782	0.771	0.780	0.802	0.667	0.759	0.805	0.762	0.748	0.756	0.860
Early College High School	0.055	0.014	0.025	0.094	0.020	0.016	0.092	0.023	0.071	0.047	0.040
8th Grade Reading Score	0.114	0.247	0.022	0.030	0.233	0.222	0.003	0.213	0.071	0.150	0.132
8^{th} Grade Math Score	0.059	0.194	-0.103	-0.011	0.242	0.105	-0.034	0.142	0.015	0.087	0.089
Observations	1,563,036	518,984	197,844	745,834	66,787	33,587	739,326	823,710	612,667	509,801	440,568

Notes: As in Table 1, variables are summarized over our sample of 2013-2017 Texas high school graduates, as measured in their final year of high school.

Appendix Table A.1: Summary Statistics (continued)

	(1) All	(2) White	(3) Black	(4) Hispanic	(5) Asian	(6) Other	(7) Econ. Dis.	(8) Not Econ. Dis.	(9) Urban	(10) Suburban	(11) Town/ Rural
Panel B: High School Characteristics											
Total enrollment	1,886	1,751	1,979	1,905	2,417	1,946	1,789	1,973	2,019	2,369	1,142
Percent White	0.332	0.541	0.248	0.202	0.356	0.433	0.223	0.430	0.217	0.349	0.473
Percent Black	0.127	0.095	0.298	0.101	0.153	0.135	0.138	0.116	0.139	0.147	0.085
Percent Hispanic	0.477	0.291	0.379	0.653	0.322	0.338	0.593	0.374	0.578	0.418	0.405
Percent Asian	0.043	0.046	0.051	0.029	0.141	0.055	0.030	0.054	0.047	0.061	0.015
Percent Other	0.021	0.028	0.023	0.015	0.028	0.038	0.017	0.026	0.019	0.025	0.022
Percent Economic Disadvantage	0.473	0.317	0.516	0.587	0.332	0.363	0.606	0.354	0.541	0.412	0.449
Percent At-risk	0.426	0.340	0.468	0.485	0.325	0.375	0.493	0.365	0.476	0.399	0.387
Percent Gifted	0.098	0.100	0.090	0.096	0.124	0.098	0.092	0.103	0.108	0.095	0.086
Percent Immigrant	0.009	0.007	0.009	0.010	0.014	0.008	0.009	0.008	0.011	0.009	0.005
Percent LEP	0.057	0.027	0.054	0.080	0.046	0.037	0.078	0.038	0.077	0.052	0.034
Percent Special Education	0.081	0.079	0.087	0.082	0.064	0.080	0.086	0.076	0.081	0.072	0.090
Percent CTE	0.782	0.781	0.771	0.792	0.720	0.766	0.795	0.771	0.748	0.756	0.860
Percent Early College High School	0.068	0.031	0.038	0.103	0.030	0.034	0.100	0.038	0.079	0.075	0.044
City	0.392	0.256	0.431	0.475	0.435	0.338	0.448	0.341	1.000	0.000	0.000
Suburb	0.326	0.343	0.379	0.286	0.465	0.375	0.284	0.364	0.000	1.000	0.000
Town/Rural	0.282	0.402	0.190	0.239	0.100	0.286	0.268	0.295	0.000	0.000	1.000
Student-Teacher Ratio	15.63	15.22	15.87	15.74	16.72	15.67	15.46	15.77	16.34	16.42	13.72
Charter	0.039	0.021	0.047	0.050	0.029	0.027	0.055	0.025	0.076	0.019	0.011
Magnet	0.062	0.024	0.113	0.078	0.051	0.043	0.085	0.042	0.147	0.014	0.001
Title I	0.737	0.556	0.823	0.865	0.514	0.618	0.896	0.594	0.775	0.629	0.809
Observations	1,563,036	518,984	197,844	745,834	66,787	33,587	739,326	823,710	612,667	509,801	440,568

Notes: As in Table 1, variables are summarized over our sample of 2013-2017 Texas high school graduates, as measured in their final year of high school.

Appendix Table A.1: Summary Statistics (continued)

	(1) All	(2) White	(3) Black	(4) Hispanic	(5) Asian	(6) Other	(7) Econ. Dis.	(8) Not Econ. Dis.	(9) Urban	(10) Suburban	(11) Town/ Rural
Panel C: College Enrollment											
Public Two-Year Enrollment	0.394	0.435	0.344	0.383	0.357	0.387	0.356	0.428	0.361	0.390	0.445
Public Four-Year Enrollment	0.214	0.252	0.218	0.169	0.406	0.231	0.156	0.266	0.215	0.220	0.207
Any Public Enrollment	0.532	0.585	0.511	0.489	0.646	0.543	0.461	0.595	0.509	0.541	0.552
Panel D: Distance to Nearest Colleges											
Any Public	6.608	8.474	5.007	5.944	4.246	6.662	6.329	6.858	3.213	4.513	13.75
Public 2-Year	7.278	9.213	5.484	6.646	4.621	7.247	7.004	7.523	3.782	4.583	15.26
Public 4-Year	17.46	20.79	14.67	16.19	13.63	18.06	16.84	18.01	10.31	14.36	30.99
Public Flagship	151.2	133.3	118.9	176.3	117.4	128.2	165.2	138.7	168.6	131.5	149.9
Panel E: College Presence in 30 Miles											
Any Public	0.972	0.962	0.988	0.972	0.996	0.977	0.971	0.973	1.000	1.000	0.901
Public 2-Year	0.966	0.953	0.982	0.968	0.995	0.971	0.965	0.967	1.000	1.000	0.879
Public 4-Year	0.868	0.802	0.915	0.892	0.969	0.863	0.870	0.865	0.956	0.987	0.607
Public Flagship	0.067	0.086	0.053	0.056	0.080	0.092	0.051	0.082	0.081	0.044	0.075
Panel F: College Presence in 60 Miles											
Any Public	0.997	0.998	1.000	0.997	1.000	0.999	0.997	0.998	1.000	1.000	0.991
Public 2-Year	0.996	0.997	1.000	0.995	0.999	0.999	0.996	0.997	1.000	1.000	0.987
Public 4-Year	0.972	0.968	0.990	0.968	0.995	0.976	0.971	0.974	0.990	1.000	0.916
Public Flagship	0.136	0.189	0.119	0.101	0.134	0.199	0.096	0.171	0.123	0.104	0.190
Observations	1,563,036	518,984	197,844	745,834	66,787	33,587	739,326	823,710	612,667	509,801	440,568

Notes: As in Table 1, variables are summarized over our sample of 2013-2017 Texas high school graduates, as measured in their final year of high school. Distances are calculated using the latitude and longitude of a student's high school.