HBCU Enrollment and Longer-Term Outcomes

Ashley Edwards
Justin Ortagus
Jonathan Smith
Andria Smythe

I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

HBCU Enrollment and Longer-Term Outcomes

Ashley Edwards
College Board

Jonathan Smith
Georgia State University and IZA

Justin Ortagus
University of Florida

Andria Smythe
Howard University

ABSTRACT

HBCU Enrollment and Longer-Term Outcomes*

Using data from nearly 1.2 million Black SAT takers, we estimate the impacts of initially enrolling in an Historically Black College and University (HBCU) on educational, economic, and financial outcomes. We control for the college application portfolio and compare students with similar portfolios and levels of interest in HBCUs and non-HBCUs who ultimately make divergent enrollment decisions - often enrolling in a four-year HBCU in lieu of a two-year college or no college. We find that students initially enrolling in HBCUs are 14.6 percentage points more likely to earn a BA degree and have 5 percent higher household income around age 30 than those who do not enroll in an HBCU. Initially enrolling in an HBCU also leads to $12,000 more in outstanding student loans around age 30. We find that some of these results are driven by an increased likelihood of completing a degree from relatively broad-access HBCUs and also relatively high-earning majors (e.g., STEM). We also explore new outcomes, such as credit scores, mortgages, bankruptcy, and neighborhood characteristics around age 30.

JEL Classification:	I2, J1
Keywords:	returns to college, college choice, HBCUs

Corresponding author:
Jonathan Smith
Andrew Young School of Policy Studies
Georgia State University
P.O. Box 3992
Atlanta, GA 30302-3992
USA
E-mail: jsmith500@gsu.edu

1   Introduction

College completion rates are relatively low for students of every race and ethnicity and for most types of postsecondary institutions in the U.S. (Arum and Roksa, 2011; Tinto, 2012), but the issue is especially acute for Black students. For example, 64 percent of White students starting at a four-year college earned a BA within 6 years of initial enrollment, compared to 40 percent of Black students. As of 2020, only 28 percent of Black persons aged 25 to 29 in the U.S. have a bachelor's degree, compared to 45 percent of White persons – a 17 percentage point gap. These gaps contribute to other documented racial disparities, including earnings, credit scores, and the ability to repay student loans (e.g., Hillman, 2015; Daly et al., 2017; Choi et al., 2019). A fundamental question facing researchers and policymakers is whether the type of college where Black students apply and initially enroll can narrow completion gaps and impact longer-term outcomes.

We examine whether Historically Black Colleges and Universities (HBCUs) improve the educational, economic, and financial outcomes of Black students in the U.S. There are approximately 100 HBCUs making up 3 percent of postsecondary education institutions, yet close to 40 percent of Black students apply to at least one HBCU[1] and 10 percent of all Black college students enroll in HBCUs.[2]

HBCUs also perform an outsized role in society and the economy. Among their graduates are 50 percent of Black lawyers, 80 percent of Black judges, 40 percent of Black engineers, 40 percent of Black Congress-members, 50 percent of Black teachers at public schools, 50 percent of Black faculty at predominantly White research universities,[3] and about 27 percent of the nation's Black STEM undergraduates.[4] These statistics not only demonstrate the breadth of HBCUs, but they highlight that HBCUs are potentially important sources of economic and social mobility for marginalized communities in furtherance of a more equitable America.

We study the individual returns and impacts of initially enrolling in an HBCU for the nearly 1.2 million Black students who took the SAT between 2004 and 2010. The SAT data are linked to National Student Clearinghouse (NSC) postsecondary educational data and TransUnion credit bureau data. Collectively, these data contain information on pre-college academics and demographics, college enrollment and completion, estimated household income, credit scores, student loan balances and repayment, mortgages, and zip code of residence measured around age 30. Our rich set of controls and outcomes make this one of the first papers to catalogue the longer-term impacts of enrolling in an HBCU with such comprehensive individual-level data, along with highlighting some of the mechanisms behind those impacts.

To estimate the impact of beginning college at an HBCU, we control for the college application portfolio (Dale and Krueger, 2002; Mountjoy and Hickman, 2021). This method compares students with the same academics, demographics, and high school who also apply to the exact same set of colleges (including the same set of HBCUs). The key difference is that some students enroll at an HBCU and others do not. By using this selection-on-observables approach, we account for many of the variables related to college choice that often lead to selection bias.[5]

---

[1] Authors' calculation from SAT data.

[2] https://uncf.org/the-latest/by-the-numbers-how-hbcus-stack-up. Accessed 12/15/21.

[3] https://www.tmcf.org/about-us/member-schools/about-hbcus/

[4] U.S. Department of Education, "FACT SHEET: Spurring African-American STEM Degree Completion" (2016), available at https://www.ed.gov/news/press-releases/fact-sheet-spurring-african-american-stem-degree-completion.

[5] In the manuscript and appendix, we test the assumptions of the identification strategy. We also primarily, but not exclusively, rely on Dale and Krueger's "self-revelation" model, which controls on statistics about

We find that initially enrolling in an HBCU increases the probability of earning a college degree by 12 percentage points (30 percent), driven entirely by a large increase in bachelor's degree completion (15 percentage points) coupled with a small reduction in associate degree completion. We also find that students beginning at an HBCU are 10 percentage points more likely to have student loans as of 2017, averaging almost $12,000 more than their non-HBCU counterparts. This is likely explained by HBCU enrollees attending more expensive colleges than students who do not enroll in HBCUs, HBCU enrollees enrolling for longer periods (that culminates in a degree), and degree completion being a requirement to attend most graduate schools where additional loans may be needed.

Additionally, we find that students who initially enroll in an HBCU have a 5 percent higher estimated household income around age 30. Our measure of income departs from previous work that typically relies on earnings, whereas our measure includes all sources of taxable income (e.g., investments, unemployment compensation, alimony, etc.). This modest difference in estimated household income comes at a point in the former students' careers whereby HBCU enrollees have much less labor market experience than non-HBCU enrollees because of their additional years of schooling. Additionally, wage growth is the highest for those with little experience (Rubinstein and Weiss, 2006). These points imply that the difference in wages around age 30 has the potential to grow over time.

Considering other outcomes in which there are documented racial gaps, we find no substantial differences in credit scores around age 30 as a result of enrolling in an HBCU. However, there is a 0.5 percentage point (7 percent) decrease in the probability of having a mortgage and 0.5 percentage point (30 percent) decrease in the probability of bankruptcy around age 30. We explore several other financial outcomes as well.

Despite the economically meaningful impacts of some of our outcomes, we find no strong evidence that HBCU and non-HBCU enrollees live in measurably different zip codes around age 30. Measures include demographics, economic characteristics, and crime. We are perhaps the first paper to explore the impacts of HBCU enrollment on the characteristics of the zip code of residence around age 30.

Our analyses of heterogeneous effects show that it is not the most-selective HBCUs driving the positive results. Rather, we find that the impacts are largest for students with SAT scores below the median (about 870 in the sample), who tend to enroll in less-selective HBCUs. These results suggest that relatively broad-access HBCUs are improving the educational and labor market outcomes of their enrollees. In fact, even after controlling for institutional characteristics, such as the average SAT of enrollees and level of institution, we still find that initially enrolling in an HBCU improves students' longer-term outcomes. In other words, something about HBCUs appears to positively impact our outcomes of interest above and beyond common measures of institutional selectivity. Researchers occasionally refer to this as the 'secret sauce' (e.g., Price and Viceisza, 2023) of HBCUs.

We show that no college and two-year colleges are common counterfactuals to HBCU enrollment and represents a primary mechanism behind our results. In addition, the impacts of enrolling in an HBCU are much larger for students who have less-selective counterfactuals, as measured by their application portfolios, relative to their peers. For example, students who apply to fewer four-year colleges have larger positive impacts of enrolling in an HBCU than those who applied to more four-year colleges. The former of the two is more likely to enroll in a less selective college, two-year college, or no college (Smith, 2014), sharpening the distinction between the counterfactual and the four-year HBCU. We split the sample by other measures of counterfactual selectivity and find the same results. Taking this one step further, we still find that the counterfactual matters after controlling for the characteristics of the college to which students enroll. This

the college application portfolio, not a college application fixed effect.

2

analysis of mechanisms disentangles the impact of the counterfactual from the characteristics of enrolled institution, which are highly correlated.

We also find that students' choice of major is an important mechanism. Students who initially enroll in HBCUs are more likely to choose and complete relatively higher-earning majors and less likely to choose and complete lower-earning majors. This finding contributes to our results on estimated household income and demonstrates that HBCUs produce Black students with degrees in fields of study they may not otherwise pursue, as indicated by a 3 percentage point (100 percent) increase in their probability of earning a STEM degree.

We make several other contributions to several literature. First, Our analysis of the counterfactual enrollment as a mechanism represents a key contribution of our paper, only made possible by both the size and richness of our data. We find that no college and two-year colleges are common counterfactuals to HBCU enrollment and, moreover, that the counterfactual has a direct impact on the estimated treatment effect. In the HBCU literature, data limitations often make it impossible to consider these counterfactuals and thus previous literature often compare the impacts of HBCUs to other four-year colleges. For example, Price et al. (2011) use propensity score matching on college graduates. Elu et al. (2019) use College Scorecard data and match colleges similar to HBCUs. Fryer Jr and Greenstone (2010) use datasets with samples ranging from 173 to 364 HBCU graduates. The comparisons made in these papers, while adjusting for covariates, may miss some important differences in the students who applied, enrolled, and graduated from these colleges. For example, many Black students at non-HBCUs do not even consider HBCUs as a good fit, based on our college application data, and do not apply to a single HBCU. And, many HBCU graduates would not have attended or graduated from a four-year college had they not attended an HBCU. Our detailed analysis on the counterfactuals serves as both a comment on past work and a path for future work on the impacts of college choice, even outside the HBCU context.

Second, there is a deep, mostly qualitative literature on the historical, legal, and theoretical frameworks of HBCUs, which we discuss in the next section. We add to the empirical literature on the impacts of HBCUs on student outcomes, which is currently small but growing. This strand of literature consistently finds that, after controlling for student characteristics, HBCUs are more successful in graduating Black students than non-HBCUs (e.g., Ehrenberg and Rothstein, 1993; Nichols and Evans-Bell, 2017; Richards and Awokoya, 2012; Franke and DeAngelo, 2018; Gordon et al., 2021). There is also a small literature on the economic returns to enrolling in an HBCU (e.g., Constantine, 1995; Price et al., 2011; Elu et al., 2019). These papers mostly focus on labor market returns with mixed findings. For example, Robinson and Albert (2008) find no effect in the teacher labor market, Price et al. (2011) find positive effects, and Fryer Jr and Greenstone (2010) find positive effects for the 1970s and negative effects for the 1990s.

Third, our paper provides a broader sense of the impacts of HBCU enrollment by considering a host of new and important outcomes relative to the existing body of research. Similar to other work, we assess college completion and major, albeit with many more students and a richer set of controls. But our measure of household income better reflects a person's earning power than previous work. Moreover, our financial variables around age 30 are new to the HBCU literature despite documented inequities by race in other bodies of literature (e.g., credit scores, student loans, and home ownership). We know of no other studies in this space that use zip code of residence at age 30, allowing us to test whether HBCUs influence geographic mobility and all that comes with living in a neighborhood (e.g., crime rates, school quality, inter-generational mobility, etc.).

Fourth, our individual-level dataset of nearly 1.2 million Black students allows us to improve on methods

3

used to answer this question to date. The number of students and control variables available to us, described more in a later section, allow us to address common unobservables that can lead to biased estimates on the impact of attending an HBCU (e.g., interest in an HBCU). It also represents an improvement in statistical precision relative to other HBCU work. Our sample size also allows us to precisely examine heterogeneous effects by students' academic and socioeconomic backgrounds in addition to HBCU characteristics.

Fifth and finally, there is a long literature on the returns to college (e.g., Card, 1999), which has more recently turned to the returns to college choice (e.g., Lovenheim and Smith, 2022). A major focus of the literature is on the returns to college selectivity, attending a two-year versus four-year institution (e.g., Dale and Krueger, 2002; Zimmerman, 2014; Goodman et al., 2017; Smith et al., 2020), and specific fields or disciplines (e.g., Altonji et al., 2016). While we draw on these studies, primarily for methods, we add to this strand of literature with a focus on the returns to college choice for Black students and the impact of HBCU attendance, in particular. In addition, much of the research on the effects of HBCUs focus on graduates from the 1970s to 1990s. We study outcomes for individuals who turned 30 between 2014 and 2020, which quantifies outcomes for modern-day graduates of these institutions.

2   Background and Conceptual Framework

2.1   HBCUs: Past, Present, and Future

The first HBCU, Cheyney University in Pennsylvania, was founded in 1837 with the expressed mission of teaching literacy, numeracy skills, and skills for gainful employment for African Americans. In the period immediately following the Civil War, between 1865 and 1890, over 200 institutions geared towards educating Blacks were founded, funded primarily by external groups, such as the American Missionary Association, the Freedmen's Bureaus, and Southern state governments (Brown and Davis, 2001).

Most of today's public HBCUs were founded with the passage of the second Morrill Act in 1890. The act mandated that southern states provide equal access to higher education for Blacks in order to access funds for the states' land grant colleges. Many states responded by creating separate institutions rather than integrating Black students and increasing access to the White institutions. For over a century after the Emancipation Proclamation, public and private Black-serving institutions filled the need to educate the Black population and increased the number of Black professionals in the economy.

The Higher Education Act of 1965 designated these Black-serving institutions as Historically Black Colleges and Universities. The Act defines an HBCU as: "... any historically black college or university that was established prior to 1964, whose principal mission was, and is, the education of black Americans, and that is accredited by a nationally recognized accrediting agency or is making reasonable progress toward accreditation." Title III of the Higher Education Act of 1965, which was devoted to "Strengthening Developing Institutions," is interpreted as primarily referring to HBCUs.

The Higher Education Act of 1965 strengthened the position of HBCUs. However, the NAACP continued a legal strategy of attacking the dual educational system based on race. In the 1973 case, Adams v. Richardson, (D.C. Cir. 1973), the NAACP asked the U.S. Department of Health, Education, and Welfare to enforce the Civil Rights Act of 1964 and prohibit Southern states from operating a segregated higher education system. The courts sided with the NAACP and states were required to develop desegregation strategies by pursuing a better racial mix of students, faculty, and staff in public colleges, increasing access and retention of minorities at all levels of higher education. Importantly, the decision clarified that states

could not meet their mandates by closing HBCUs, leading to increased funding for HBCUs. One of the aims of this infused funding was to make HBCUs acceptable postsecondary options for any college student, including White students (Sum et al., 2004; Fryer Jr and Greenstone, 2010).

The fight over segregated higher education and separate and unequal policies continued into the 1990s, 2000s, and even today. In 1992, the Supreme Court decided U.S. v. Fordice, a case brought by a Black litigant represented by the NAACP with the chief aim of removing structural differences between HBCUs and predominantly White institutions (PWIs). While the plaintiff was concerned about fiscal and academic equity, the court ruled that it would be wasteful to maintain the dual system that had been erected during the *de jure* segregation era. Some interpreted the court's order to find "educational justification for the continued existence" of the parallel education systems as potentially detrimental to the survival of HBCUs. If states determine that HBCUs are no longer necessary or fail to provide a unique benefit for Black students, they may find justification to reduce funding or even close them permanently. States may also decide to integrate HBCUs, which would undermine their unique missions. Alternatively, states may view HBCUs as an important, indispensable option in the choice set of Black college students that should be bolstered (Moore, 1999; Fryer Jr and Greenstone, 2010). This underscores the importance of continued research on access to and efficacy of HBCUs.

2.2   Institutional Contexts and Potential Mechanisms

A rich strand of conceptual research on the impacts of HBCUs highlights a range of factors, such as the characteristics of the institutions and their students, as well as the people, policies and practices associated with HBCUs. First, the characteristics and history of HBCUs may contribute to several positive outcomes. Their unique historical mission makes them attractive to some Black students, thereby attracting students with a range of academic and non-academic backgrounds. Previous work outside of HBCUs shows the importance of college peers in college success (e.g., Sacerdote, 2001; Carrell et al., 2009; Michelman et al., 2022) and even views on race (Carrell et al., 2019).

At the same time, HBCUs are primarily located in the south. Black students living in the south tend to have lower family income, and the presence of HBCUs gives these students access to this important group of higher education institutions without having to travel very far or out of state. Also, a majority of these institutions (over 85 percent)[6] are four-year not-for-profit institutions. Students attending four-year and non-profit institutions tend to have better outcomes than students at two-year colleges or four-year for-profit colleges. These characteristics of HBCUs give Black students, especially Black students in the south, access to postsecondary institutions they otherwise might not consider. This motivates our exploration into the counterfactual enrollment of HBCU enrollees, which tends to be a two-year public college, sometimes no college, and, to a lesser extent, a for-profit college. The counterfactual enrollment of HBCU students also motivates our analyses into mechanisms behind our results. We do find that some of the measurable improvements to degree completion (and beyond) can be attributed to some of the observed HBCU characteristics (e.g., four-year college), but a lot is left unexplained and can be characterized as "the HBCU effect, net of observable college characteristics." We return to this shortly.

Second, accessibility and tuition policies at HBCUs may play a distinct role in the longer-term outcomes of Black students (Arroyo and Gasman, 2014; Winkle-Wagner et al., 2020). The average acceptance rate at HBCUs is approximately 50 percent (see Appendix Table 1) but some HBCUs are nearly open access

---

[6]See Appendix Table 1

and others are not.[7] In terms of prices, tuition at HBCUs are nearly 30 percent lower, on average, than comparable institutions (Johnson et al., 2015). The average cost of attendance at four-year HBCUs in 2019-20 was \$25,412 compared to \$35,049 for four-year non-HBCUs.[8]. While students deciding among four-year colleges may find HBCUs relatively affordable, the many Black students who also consider two-year public colleges would face much lower tuition at non-HBCU two-years. The admissions and tuition policies of HBCUs mean students with interest in HBCUs have adequate access to affordable four-year college options. We find that many Black students consider both two-year and four-year colleges and public and private colleges. So, we are particularly interested in the tuition prices HBCU enrollees pay relative to non-enrollees in addition to their student loan balances around age 30.

Third, the nature of students attending HBCUs may impact our outcomes. As of 2013, 85 percent of students at HBCUs were Black, compared with 10 percent at non-HBCU institutions. In 2011-12, 72 percent of students at HBCUs received Pell grants relative to 38 percent of students at non-HBCUs (Johnson et al., 2015). Entering students at HBCUs also have lower average SAT and ACT scores than students at non-HBCU four-year institutions (See Appendix Table 1), contributing to lower completion rates at HBCUs than other institutions (See Appendix Table 1). Moreover, HBCUs have lower funding, endowments, and expenditures per student than similar colleges.[9] HBCUs spend less on total instructional, student service, and support expenses per student. Among the four year-colleges, HBCUs spend about \$4,500 less per student (See Appendix Table 1). This also means HBCUs have an increased reliance on tuition dollars to cover operational expenses, which likely places students under greater financial pressures and student debt burdens. Lower funding and lower spending per student can also contribute to negative effects on student retention and graduation rates and mitigate some of the positive effects of HBCUs.

Fourth, HBCUs may affect outcomes due to practices on campus that have been found to benefit students. Researchers argue that by incorporating traditional interventions for learning, culturally relevant pedagogy (Gallien Jr, 2004; Watkins, 2005), and more supportive learning environments (Fleming, 1985; Fries-Britt and Turner, 2002; Smith, 2018b), HBCUs may contribute uniquely to student achievement. Additional research findings suggest that Black students attending HBCUs perform at least as well academically as their PWI peers (Baker et al., 2021; Flowers III et al., 2015; Bohr et al., 1994; Wenglinsky, 1996; Kim and Conrad, 2006; Kim, 2002). Some researchers indicate that HBCUs even produce higher levels of academic achievement among Black students relative to their peer institutions (Cokley, 2000; Flowers, 2002).

Other practices at HBCUs that may positively affect outcomes include an emphasis on racial, intellectual, and leadership identity. Some studies have found greater academic (intellectual) confidence among samples of Black HBCU students compared to students at PWIs (e.g., Cokley, 2002). The presence of Black role models, such as peers, university presidents and other leaders, instructors (Rucker and Gendrin, 2003; Jett, 2013; Lusher et al., 2018), and external role models (Palmer and Gasman, 2008; Thompson, 2008), such as black guest speakers, can help to shield students against negative stereotypes (Fries-Britt and Turner, 2002; Perna et al., 2009) and support students' racial identity development (Van Camp et al., 2009). HBCUs also help to develop Black students' self-identity through leadership formation. Outcalt and Skewes-Cox (2002) found that Black HBCU students were more likely to be "satisfied" or "very satisfied" with leadership opportunities on campus when compared to Black students attending a PWI. In addition, Black HBCU

---

[7]For example, Xavier University of Louisiana and Howard University have acceptance rates of 95 percent and 35 percent, respectively.

[8]https://uncf.org/wp-content/uploads/2022-UNCF-HBCU-Resource-Guide-FINAL.pdf

[9]Jones (2016); https://www.bet.com/article/3d5ktm/black-colleges-endowment-gap. Last accessed 4/4/2023.

leaders usually explicitly share a commitment to nurturing Black students as leaders of the next generation (Jean-Marie, 2008; Ricard and Brown, 2008). These ideas are part of several broader literatures outside of economics but focused on HBCUs about concepts like belongingness, peers, mentors, and pride (e.g., Hiatt et al., 2019; Mwangi, 2016; Goings, 2016; Johnson, 2019), which have been shown to impact both academic success and academic course of studies (i.e., college major). Within economics, there is a small and related literature about identity formation, confidence, and self-esteem among HBCU enrollees, as discussed in Price and Viceisza (2023). These literatures motivate our examination of academic success and choice of college major within our analyses.

3   Data

We use one of the largest and richest student-level datasets in the U.S., following students from high school, through college, and tracking economic, financial, and geographic outcomes at age 30. The base data consist of the millions of Black students who took the SAT between 2004 and 2010 across the U.S. These SAT data are then linked to National Student Clearinghouse (NSC) and TransUnion credit bureau data.

3.1   SAT Data

Pre-college educational information comes from administrative SAT data. The SAT is one of two college entrance exams considered in admissions and program placement by thousands of colleges across the U.S. Approximately 1.5 million students per cohort take the exam. The SAT is scored between 400 and 1600 - 200 to 800 for each of the math and verbal sections. The individual-level SAT data includes students who took the SAT in the high school graduating cohorts of 2004 to 2010.[10]

Upon registering for the SAT, students complete a questionnaire that denotes sex, race/ethnicity, and parental income and education. Race/ethnicity are mutually exclusive categories and we primarily make use of students who identify as Black. The data also includes which high school they attend, their home zip code, and SAT scores on all attempts.[11]

One critical piece of data from the SAT are score sends. SAT score sends are official reports of students' SAT scores that are sent to college campuses, primarily for the purpose of admission. These have been shown to be good proxies for college applications (Pallais, 2015; Smith, 2018a) but more accurately reflect a student's interest in a college and the potential for an application. Students receive up to four free score sends at the time of registration for the SAT and soon after the exam is taken, before a score is known, each additional score send costs between $10 and $15, depending on the year.

We also use Advanced Placement (AP) exam taking. AP is a program that offers high school course content in over 30 different subjects and the corresponding AP exam can earn students college credit. We simply count the number of AP exams taken.

---

[10]We also use nationally representative data to assess the representativeness of the College Board data. The National Center for Education Statistics' Educational Longitudinal Study is a leading candidate from a similar cohort.

[11]We focus on the SAT "superscore" – the SAT score that colleges often use in admission – that is the sum of the highest math and verbal section, regardless of whether they are on the same attempt.

3.2 National Student Clearinghouse

NSC data are a near census of college enrollment spells in the U.S. It includes enrollment dates for each student in each college for approximately 98 percent of all enrollees in the U.S.[12] We focus on the first college enrolled, but can observe whether the students transfer.

NSC data also include if and when a student graduates, from which college, the degree earned, and college major (if they graduate).[13] The matching process with the College Board data happens approximately six years after high school completion, so information on student enrollment and completion after six years is generally unknown, but for the cohort of 2004, which we observe for eight years.

3.3 TransUnion Credit Bureau

Financial outcome data come from TransUnion, one of three main credit bureaus that collects and generates financial metrics for most people in the U.S. We merge a single cross-section of these data as of November 2017 to our SAT and NSC data, giving us a single snapshot in time of students' financial well-being.

The credit bureau includes many variables on borrowing, debt, and repayment. These variables culminate in a credit score. At a more granular level, we will consider debt variables directly related to college enrollment, such as outstanding student loans, delinquent payments, and default. But we also consider other forms of debt, such as credit card balance and other loans, and any delinquency or default on those debts. Similarly, we observe whether someone has a mortgage (a proxy for home ownership), its balance, and delinquency or default.

We also know students' state of residence in 2017, allowing us to observe geographic mobility. We will also consider the characteristics of the zip code in which students live in 2017, including crime rates, median earnings, and economic mobility, all of which are publicly available and demonstrate how HBCUs may impact the neighborhoods in which people live at age 30.

Finally, the credit bureau estimates household income. They use a wide range of financial characteristics to estimate a consumer's joint gross adjusted income (line 37 of the 1040 federal tax form), which includes investment income, alimony, business income, IRA distributions, pensions and annuities, real estate income, unemployment compensation, and Social Security benefits. Relative to other studies that typically rely on earnings from a state's unemployment insurance, our income measure covers earnings for almost everyone and all types of income, not just earnings reported by employers to the state. Unlike the other measures at age 30, household income is estimated by TransUnion. Previous work assesses its validity at an aggregate level and finds that it is highly correlated with other measures of earnings at the college-level, but larger in magnitude, reflecting the more expansive definition of income Smith et al. (2020).

3.4 Analytic Dataset

Our analytic dataset links these three primary data sources and focuses on the almost 1.2 million self-identified Black SAT takers. The first column of Table 1 shows the summary statistics for these students.

---

[12]The biggest deficiency is for-profit colleges, despite including some of the largest ones.

[13]We only make use of the first major listed in the data but only 6 percent of graduates have more than one major.

To complete the dataset, we link the colleges that receive students' SAT score sends and the college to which students enroll to the Integrated Postsecondary Education Data System (IPEDS). IPEDS contains information about colleges, including whether the college is an HBCU, the average SAT of enrollees,[14] the state in which the college is located, whether the college is public or private, tuitions, etc. By doing so, we characterize the application portfolio variables (controls) and enrollment variables (outcomes). Out-of-state colleges are colleges in states that differ from that of the students' high school state.

We summarize student characteristics in Table 1. Column 1 shows the characteristics of all Black students who took the SAT between 2004 and 2010. Column 2 shows characteristics for students who did not apply to an HBCU. The third column, representing our primary analytic sample, shows the summary statistics for the students who sent their SAT score to at least one HBCU. We see that 435,607 students applied to at least one HBCU, representing 37.5 percent of all Black SAT-takers. Columns 4 and 5 shows the characteristics of students who didn't enroll and those who enrolled in an HBCU.

The summary characteristics of all colleges and HBCUs separately, which we merge onto the student data, are in Appendix Table 1. Of particular note is that four-year HBCUs have lower average SAT scores and graduation rates than other four-year colleges, but they also have roughly 20 percent less spending per student.

Appendix Table 2 shows how the characteristics of Black students in our SAT-taking sample compare to the broader population of Black students.[15] The SAT-taking population's parents have slightly less income and education than the broader population. However, they are quite a bit more likely to enroll in and complete college.

4 Descriptive Analyses

4.1 HBCU Applications

We begin by exploring which students apply to HBCUs. Specifically, we estimate the relationship between students' demographic and academic characteristics and HBCU application with the following generic equation:

$$ApplyHBCU_{it} = \delta_0 + \delta_1 * X_{it} + T + HS + \upsilon_{it} \tag{1}$$

X_{it} includes sex and parental income and education and also SAT scores and AP exam taking. T and HS represent cohort and high school fixed effects.

We consider two forms of the outcome $ApplyHBCU$. First, we use a binary variable equal to one if the student applied to at least one HBCU - the extensive margin. Second, we use the number of HBCU score sends, which represents the intensive margin. Results are in Table 2.

Column 1 of Table 2 shows that females are 7.8 percentage points more likely to send an SAT score to at least one HBCU than males. There is no strong relationship between parental education and HBCU interest, but students whose parents have incomes greater than $100k are 6 percentage points less likely to

---

[14]We take the average of the 25th and 75th percentiles of math and verbal SAT scores among enrollees at each college.

[15]We compare our data to Black students in the Educational Longitudinal Study (ELS). ELS is a nationally representative survey from the National Center for Education Statistics that follows the high school graduating cohort of 2004, which is the beginning of our sample.

send a score to an HBCU than the students whose parents earn less than $50k (the omitted category). These relationships do not change after adding in academic characteristics in column 2.

Column 2 also shows that students who take the SAT multiple times are more likely to send a score to an HBCU. And students in the middle of the SAT distribution among Black students are the most likely to send scores to an HBCU, while those with the highest SAT scores (above 1200) are by far the least likely to send an SAT score.

Columns 3 and 4 are analogous to columns 1 and 2 but examine the intensive margin on the number of score sends to HBCUs. Qualitatively similar results appear. Only looking at the set of students who sent at least one score send to an HBCU (column 5) yields roughly similar estimates other than the highest income students who send more score sends than the lowest income students.

More details on the application patterns of students interested in HBCUs are available in Edwards et al. (2023). How the application patterns relate to the counterfactual and, ultimately, the impacts of enrolling in an HBCU, are discussed later.

4.2   HBCU Enrollment

In addition to who applies to HBCUs, we also consider who enrolls. We conduct a similar analysis as above but consider a new outcome - HBCU enrollment. Columns 6, 7 and 8 of Table 2 show the results.

Column 6 shows that females are not only more likely to apply to HBCUs, but also more likely to enroll (2 percentage points). Additionally, the students whose parents have the highest income are the most likely to enroll, which deviates from score sending behavior. This is confirmed in columns 6 and 7 that add in more controls and looks at those who consider HBCUs, respectively.

Lastly, students with SAT scores in the 3rd quartile are most likely to enroll in an HBCU, followed by the second quartile. Students with SAT scores above 1200 are the least likely to do so.

In sum, HBCU applicants are more likely to be women and more likely to come from the middle (second and third quartile) of the SAT score distribution. There is no strong relationship between parental education and HBCU application and enrollment behavior. Students whose parents have incomes greater than $100k are less likely to send a score to an HBCU than the students whose parents earn less than $50k (the omitted category), but students in this higher income category who consider HBCUs are more likely to enroll.

5   Empirical Method

We follow the methods pioneered by Dale and Krueger (2002), who use a selection on observable approach on the returns to college selectivity, but account for unobservable variables related to college choice that often lead to selection bias by accounting for the college application portfolio.[16] We find students who apply to the exact same or very similar sets of colleges, including the exact same set of HBCUs. This allows us to compare students with similar interests in HBCUs, an aspect often unobserved, where some choose to enroll in an HBCU while others enroll elsewhere.

More specifically, we use the subset of Black SAT takers who apply to at least one HBCU to estimate the following equation:

---

[16]The method was recently improved upon and validated in Mountjoy and Hickman (2021), which is the paper we most closely follow.

$$y_{ict} = \beta_0 + \beta_1 * HBCU_{ct} + \beta_2 * X_{it} + AppPort + T + \epsilon_{it} \tag{2}$$

In this equation, y_{ict} is one of many individual-specific outcomes for person i who attends college c and graduates high school in year t. Outcomes range from college completion to credit score. The primary treatment, $HBCU$, is whether the student begins their postsecondary education at one of the over 100 HBCUs in the country. As such, we consider the impact of initially enrolling at an HBCU, not ever attended. X is a vector of characteristics, including sex, math and verbal SAT score, parental income and education, and even a complete set of high school fixed effects. Students' SAT scores and high school attended are strong predictors of college enrollment and often the college to which students attend. T is a set of high school cohort fixed effects and ϵ_{it} is an idiosyncratic error term.

Most important and unique to the equation, relative to the literature, is $AppPort$ - controls for college applications. After controlling for the basic demographics and academic ability, the application portfolio controls allow us to compare two students who consider attending a similar (or same) set of colleges but one chooses to attend an HBCU and the other does not. We provide more details on these key application portfolio control variables below.

5.1 Implementing Application Portfolio Controls

We implement the application portfolio controls with two issues in mind. First, we only have access to proxies for college applications, whereas Dale and Krueger (2002) also have access to acceptance/rejection decisions. In earlier work, Smith (2013) uses nationally representative data from the National Center for Education Statistics and shows that whether you control for the application portfolio or the portfolio of acceptances and rejections, the same results are produced, conditional on student characteristics.[17] This is likely due to the fact that students who choose the same application portfolio generally have similar probabilities of acceptance at the constituent colleges, at least conditional on student academic and non-academic characteristics.

Despite the reassuring result above, we enhance our portfolio controls by interacting them with students' SAT scores. The SAT is a primary determinant of college admission and by interacting the set of colleges with SAT scores, we are comparing two students within the same range of SAT score who apply to the same set of colleges.[18] If SAT was the sole determinant of admission, then we would have identical controls to Dale and Krueger (2002). Since SAT is not the sole determinant, we approach Dale and Krueger (2002), likely with a high degree of similarity. In practice, our robustness tests indicate that interacting portfolios with SATs yields nearly identical results to excluding the interactions.

Second, our data give us the opportunity to control for a set of unique portfolio fixed effects or the self-revelation model, both of which are interacted with SAT scores. But there is a tradeoff between the two estimation strategies. The fixed effect approach requires that at least two students have the same exact portfolio (and SAT scores). There are tens of thousands of such students. The self-revelation model only

---

[17]Smith (2013) tests this using the "self-revelation" model from Dale and Krueger (2002), which does not require a portfolio fixed effect, but only some statistics on the characteristics of the colleges in the portfolio.

[18]Using exact SAT scores interacted with portfolio statistics drastically reduces the identifying variation, hence, the range of SAT scores. Our primary method relies on the variation in the smoothness of SAT scores. However, since our results are not sensitive to interacting with SAT scores at all, the exact variation in SAT scores is not critical to our conclusions.

requires some statistics on the portfolio (interacted with SAT scores), so each of the hundreds of thousands of students can be used in the analysis.

In practice, we use the self-revelation model so as not to exclude most of our sample. But we show in robustness checks that our results are quantitatively similar if we use the portfolio fixed effects approach with fewer observations.

5.2   Identification Concerns and Tests

Our main regression compares students who initially enroll in HBCUs to those who do not, but are similar on academic and demographic characteristics, along with college application portfolios. Ideally, the regression mimics an experiment whereby students are randomly assigned to either attend an HBCU or not attend an HBCU (but free to choose among other college options or no college at all). This type of random assignment would allow for a comparison of outcomes, such as college completion, student loans, and income, with a causal interpretation, between those who attended an HBCU and those who did not. However, students in our sample were not randomly assigned and could choose whether to attend an HBCU or not.

Our rich set of controls is intended to account for differences among students that determine whether they are likely to attend an HBCU. Although we outline numerous steps to seek to isolate the impact of HBCU attendance, some unobserved factors may also explain why a student attends an HBCU, such as the student's family legacy, the unique historical mission of HBCUs, and a desire to be in community with a larger share of Black peers during the college experience. The observed factors for which we do account include common features correlated with college choice, such as academics and parental income and education. After including these controls, the identifying assumption is that the decision to enroll in an HBCU is uncorrelated with the outcomes.

The primary threat to our identification strategy is whether there remains omitted variable bias, even after controlling for the application portfolio. That is, are there unobserved differences between students who choose HBCUs and non-HBCUS after accounting for academic and demographic characteristics and the same application portfolio? And if so, which direction is the bias?

Some potential unobserved variables include things like legacy status or wealth, which may be correlated with HBCU enrollment and outcomes like income or student loans. For example, HBCUs tend to offer weaker financial packages than public colleges, so wealthy students, beyond parental income, may be more likely to enroll in an HBCU and have higher incomes (i.e., positive bias). Controlling for the application portfolio likely mitigates these concerns, but it is unclear whether these unobservables are fully accounted for.

This threat is addressed both theoretically and empirically by Mountjoy and Hickman (2021) who find evidence in support of the identification strategy in Texas. They estimate something analogous to an experimental covariate balance test. Specifically, they regress pre-college student characteristics on the treatment, conditional on portfolio fixed effects.[19] In our context, this means estimating the following regression:

$$X_{it} = \alpha_0 + \alpha_1 * HBCU_{ct} + AppPort + T + \omega_{it} \tag{3}$$

The outcome X_{it} is a covariate or an aggregated measure of covariates. As in Mountjoy and Hickman

---

[19]See Figure 2 of their paper for their main result of this test.

(2021), we use a univariate measure of pre-college characteristics - the predicted value of an outcome (e.g., BA completion or estimated household income). We test whether this prediction statistically differs by HBCU enrollment, controlling for the college application portfolio. This is a somewhat weak test because finding balance on covariates does not necessarily imply there is also balance on unobservables. Similarly, an imbalance on covariates does not necessarily imply there is an imbalance on unobservables. But balance on observables and unobservables would be more akin to a randomized control trial, where only the former is testable.

In Appendix Table 3, we show that two of our main outcomes, BA completion and estimated household income do show some imbalance between HBCU enrollees and non-HBCU enrollees. Importantly, we control for those measures of imbalance. As such, the lingering concern is whether there is imbalance in unobservables after controlling for those additional observables (i.e., omitted variable bias). Later, and following Oster (2019), we formally test the amount of selection on unobservables that has to exist, relative to the selection on observables, to invalidate our main estimates. Our main results show a significantly larger magnitude than these imbalance measures. Additionally, Oster's δ measure is quite large (exceeds 6), providing extra assurance that any potential bias from unobservables is likely minimal and does not change our qualitative findings.

6 HBCU Impacts

6.1 College Enrollment

Table 3 displays the estimates from equation 2 of β_1, the coefficient on $HBCU$. All outcomes in this table are about the initial college to which students enroll for the over 430 thousand students who sent their score to at least one HBCU. Collectively, they tell us what type of colleges students who enroll in an HBCU are choosing and, perhaps more importantly, forgoing.

Students who initially enroll in an HBCU are 16.5 percentage points more likely to enroll in any college than those who do not. This implies that a meaningful number of students who consider HBCUs do not enroll in any college, at least not soon after high school or a college that reports to NSC. As such, a portion of the counterfactual to enrolling in an HBCU is not enrolling anywhere. This will have clear consequences on degree attainment and student loan outcomes since a portion of the control group cannot earn a degree and does not accumulate student debt.

The next two columns show that starting at an HBCU increases the probability of enrolling in a four-year college by 47.7 percentage points and decreases the probability of enrolling in a two-year college by 31.2 percentage points. The first statistic is largely because most HBCUs are four-year colleges. However, the combination of the two statistics tells us that many students who enroll in an HBCU would have enrolled in a two-year college.

Columns 4 and 5 say that enrolling in an HBCU slightly increases the rate of enrolling in a public college (0.5 percentage points) and modestly decreases the rate of enrolling in a for-profit college (-2.2 percentage points).

Columns 6 through 8 show that students who enroll in HBCUs are enrolling in somewhat more selective colleges, as measured by graduation rates, average SAT of enrollees, and admit rates. Though, these estimates are modest and are underestimates because these measures are unavailable for students who attend some non-selective colleges or no college.

Lastly, columns 9 and 10 show that students enrolling in HBCUs attend colleges that are more expensive than those who do not enroll in HBCUs. Again, this may be an understatement since it excludes students who did not enroll anywhere.

6.2   College Completion

In Table 4, we show the impacts of initially enrolling in an HBCU on college degree completion. There is a 12 percentage point increase in the probability of earning a degree, which is approximately a 30 percent increase relative to the mean.

The next two columns show that the overall increase in degree attainment is entirely driven by BA degree completion. In fact, there is a 3 percentage point reduction in the probability of earning an AA degree and a 14.6 percentage point (40 percent) increase in the probability of earning a BA degree.

Combined, Table 4 shows that HBCUs are a path that leads to an increase in BA completion. The decrease in AA completion is primarily because, as we saw in Table 3, attending an HBCU drastically decreases the chances of enrolling in a two-year college. At the same time, completion rates at two-year colleges are relatively low, so increased access to four-year institutions increases bachelor's degree attainment. We note that the completion results (and results to follow) are robust to variations on the college application portfolios (e.g., self-revelation model versus portfolio fixed effects model). These robustness tests are available in Appendix Table 4. We also estimate Oster's δ to be 6.09 using the BA completion outcome. This indicates that the amount of selection on unobservables must be at least six times that of the selection on observables to match the estimated effects of enrolling in an HBCU. These large delta estimates make it unlikely that selection on the remaining unobservables is driving the results.

To put these estimates in context, the impact of enrolling in an HBCU on the probability of earning a BA is similar to the "penalty" of starting at a two-year college and roughly equivalent to the impact of enrolling in a college with an average SAT that is 300 points higher than the alternative. On the two-year/four-year side, numerous studies find that BA aspiring students who start at a two-year college are substantially less likely to earn a BA than their similar peers who begin at a four-year college (Rouse, 1995; Long and Kurlaender, 2009; Smith and Stange, 2016). The magnitude of the "penalty" vary by study and context but are never small and can be as high as 30 p.p. Smith and Stange (2016). In Appendix Table 5, using our analytic sample of Black SAT takers, we estimate a 21.2 p.p. gap. On the college selectivity side, Smith (2013) finds that initially enrolling in a college where the average SAT of the college is 100 points higher than the alternative results in a 5 p.p. increase in the probability of earning a BA. Appendix Table 5 estimate a 3.6 p.p. increase in the probability of earning a BA by enrolling in a college with an average SAT that is 100 points higher, again, using our analytic sample.

6.3   Student Loans

Table 5 shows the impacts of enrolling in an HBCU on student loans around age 30. We find that enrolling in an HBCU increases the probability of taking any student loans by 10 percentage points. This is caused by a 9.4 percentage point increase in the probability of having government student loans and a 3.7 percentage point increase in the probability of having a private student loan. Column 4 shows that students enrolling in HBCUs have almost $12 thousand more in student loans around age 30 than those who do not begin at an HBCU. This is mostly driven by government loans, but not entirely.

14

There are several contextual factors important in this relationship. First, HBCUs are slightly more expensive for enrollees than the counterfactual (see Table 3). Second, students attending HBCUs are more likely to earn degrees, which implies a longer enrollment period and more tuition payments. Third, HBCUs have the potential to change Black students' employment opportunities, graduate school enrollment, and ability to repay loans in meaningful ways.

6.4 Post-College Outcomes Around Age 30

Table 6 shows the impact of enrolling in an HBCU on a variety of post-college outcomes. First, estimated household income increases by 5 percent.[20] As discussed, this is measured around age 30, where many students, especially those who enroll in four-year colleges and graduate, have very little labor market experience. Those same individuals are likely to see sharp increases in their earnings over the next few years relative to those who have been in the labor market longer (i.e., non-HBCU enrollees and college non-completers).

To put these estimates in context, Appendix Table 5 reveals that the 5 percent household income premium from enrolling in an HBCU is similar to the impact of enrolling in a college with an average SAT that is 400 SAT points higher than the alternative (and similar to that of the "two-year penalty").

Next, there is not a substantial change in the probability of the students' credit scores being above 600 or 700. This is in spite of HBCU enrollees having a higher likelihood of earning a college degree and higher incomes.

Column 4 shows that there is a 0.5 percentage point decrease in the probability of having a mortgage, which is a 7.5 percent decrease relative to the mean. Column 5 shows there is no statistical impact on overdue credit card debt. Column 6 shows a 0.4 percentage point decrease in the probability of declaring bankruptcy, which is approximately a 25 percent decline in this very undesirable outcome.

Lastly, column 7 shows that students who enroll in HBCUs are 3.2 percentage points less likely to live in the same state around age 30 as they went to high school. This result is not surprising given that HBCUs are located in only 19 states, so students from other states who wish to attend an HBCU must go out of state. While this suggests an increase in mobility among HBCU students, it also has implications on state and local tax revenues for both the sending and receiving states.

6.5 Zip Code Outcomes

Table 7 shows the impact of initially enrolling in an HBCU on attributes of the zip code students live around age 30. The zip code is observed in TransUnion data and we merge in attributes of the zip code from the American Community Survey, national crimes statistics, and Opportunity Insights.

The first columns show that students who enroll in an HBCU live in zip codes that have almost a 5 percent higher fraction of Black people relative to the population than those who do not enroll in an HBCU. The percentage of the college educated population also rises, but not my much, especially compared to the impact on students earning a college degree. Columns 3-6 show that economic measures of the zip code (household income, labor force participation rate, unemployment rate, upward economic mobility) are not impacted by HBCU enrollment. Column 7 shows there is a slight increase in the crime rate of the zip code among HBCU enrollees. Overall, the demographic and economic makeup of the zip code around age 30 is not meaningfully different for HBCU enrollees and non-enrollees.

---

[20]Appendix Table 4 shows the robustness of our results to variations on our controls for college application portfolios. We also estimate Oster's δ to be 8.96 using estimated household income.

7   Mechanisms

In this section, we look at several mechanisms behind our main estimates. First, we start with whether our estimates of the effects of HBCU enrollment remain after controlling for other college characteristics - testing whether there is something special about HBCUs over and above common college characteristics associated with positive impacts. Next, we look at the role of the counterfactual enrollment options - something our data are uniquely suited to address. Lastly, we examine whether HBCUs are changing the distribution of college majors, which are also known to relate to longer-term outcomes.

7.1   HBCUs, Net of College Characteristics

We explore which HBCU characteristics are driving the set of results and what remains unexplained. Table 8 shows the results of a modified regression that adds in several college characteristics. This empirical framework assesses whether there is an impact of enrolling in an HBCU over and above some key college characteristics that comprise an HBCU. But is it fair to wonder what is an HBCU without its key characteristics? As such, the coefficient on HBCU, net of college characteristics, merely suggest that there might be something about HBCUs distinct from the typically researched characteristics.

Table 8 shows that, net of college characteristics, enrolling in an HBCU leads to a 7.4 percentage point increase in the probability of earning a degree relative to not enrolling in an HBCU. The coefficient was 11.9 percentage points without controlling for college characteristics. There are similarly sized decreases in the magnitude of coefficients for BA degree and estimated household income.

Despite the decrease in the magnitude of the coefficients, there are still positive effects from enrolling in an HBCU, net of college characteristics. This implies that it is not simply that HBCUs are more likely to be four-year colleges or more selective than the counterfactual, but rather, there is some other (unobserved) reason HBCUs impact those outcomes. Some of these unobservables may be HBCU specific (e.g., belongingness or pride among Black students), but we cannot rule out other unobservables that are not HBCU-specific (e.g., quality of facilities or instructors). The literature outside of economics suggests that the former plays some role.

7.2   Counterfactual Enrollment

All of our estimates on the impact of enrolling in an HBCU are relative to the counterfactual enrollment. In this subsection, we consider whether the impacts vary by students' counterfactuals, as measured by their application portfolios. Table 9 shows the estimates on our main outcomes after splitting the sample in a variety of ways that highlight the role of the counterfactual enrollment.

Panel A are students whose application portfolio were below the median portfolio selectivity, as measured by the average SAT scores of the colleges in the portfolio. Panel B are students with application portfolios above the median portfolio selectivity. Our primary results are driven by those students in Panel A with the less selective counterfactual. For example, the coefficients on the probability of earning a BA and estimated household income are nearly double for those with less selective counterfactuals (Panel A) than those with more selective counterfactuals (Panel B). These students with less selective counterfactuals are not only considering less selective four-year colleges, but they are also likely to be on the margins of four-year enrollment, perhaps considering two-year college or no college. This is reinforced in two more ways in the panels that follow.

Panels C, D, and E split the sample into students who apply to one, at least two, and at least four four-year colleges. Once again, those who applied to only one four-year college (Panel C) have estimates on BA and estimated household income that are twice as large as those who applied to at least four four-year colleges (Panel E). Those in Panel E are very likely to enroll in a four-year college, even if it is not an HBCU.

Lastly, Panel F, G, and H split the sample into students' predicted probability of enrolling in a four-year college.[21] Individuals with a lower likelihood of enrolling in a four-year college (Panel F) have an estimate impact on BA completion that is over three times greater than those with a probability exceeding 90 percent chance of enrolling in a four-year college (Panel G). Moreover, those highly likely to enroll in a four-year college show no measurable increase in estimated household earnings by choosing an HBCU over another four-year college in comparison to the counterfactual.

Table 9 shows a consistent story that students who are on the margins of four-year college have the most positive impacts from enrolling in an HBCU in part because HBCUs are much more likely to be four-year colleges and be relatively more selective than the counterfactual. However, most of the time, the HBCU chosen and the counterfactual enrollment move hand-in-hand. That is, students considering selective HBCUs also consider selective counterfactuals and vice versa. This makes it difficult to separate the role of the HBCU versus the role of the counterfactual in our treatment effects.

Fortunately, our rich data include students who enroll in similar HBCUs but have different counterfactuals, as measured by their application portfolio. Appendix Table 6 shows that the results of Table 9 hold (i.e., larger impacts for those with less selective counterfactuals), even after controlling for whether the college enrolled in is a two-year or four-year and the average SAT of the college enrollees. As in Table 9 where we control for the same college characteristics, we see muted effects of enrolling in an HBCU, but the same patterns emerge across subsamples of student counterfactuals. This reinforces the result that the counterfactual accounts for part of the treatment effect.

7.3   College Major

Table 10 shows whether initially enrolling in an HBCU impacts students' completed major. Major data are only available for the 2005 to 2010 cohorts (missing 2004) and for those who graduate. As such, we assign no major to non-enrollees and non-completers. We also append to the majors the median earnings for the major (not the observed income from the student).[22,23]

The first column (and top panel) shows that students initially enrolling in an HBCU complete a major with a 25th percentile of earnings roughly 5.9 percent more than students who do not enroll in an HBCU. The 50th and 75th percentile correspond to 9.3 and 12.3 percent increase, respectively. These results show that a large portion of the earnings increase we previously showed are because students enrolling in HBCUs are completing degrees that are associated with higher wages than those who do not enroll in an HBCU.

---

[21]The prediction is based on all student attributes, including demographics, academics, and application portfolio, prior to enrolling in college.

[22]These data come from the Census Burueau's Post-Secondary Employment Outcomes (PSEO) data. The 25th, 50th, and 75th percentile earnings are 5 years after college graduation for cohorts graduating (college) in 2010-2012. It only includes a subset of postsecondary institutions. Details available here: https://lehd.ces.census.gov/data/pseo_experimental.html.

[23]We assign non-enrollees and non-graduates who do not have a major $28,396.61 and $30,741.18, respectively. These values correspond to the average earnings in the 2017 American Community Survey among respondents aged 25-32.

But these estimates combine the fact that enrolling in an HBCU increases degree completion and enrolling in an HBCU may change the distribution of intended majors.

The bottom panel of Table 10 shows the same results but only among degree completers. The estimates are modest in magnitude but do suggest a slight change in the type of majors students consider by virtue of enrolling in an HBCU.

Lastly, we explore specific majors. The last column of Table 10 shows that initially enrolling in an HBCU increases the probability of earning a STEM degree by 3 percentage points. This is relative to a base rate of 2.8 percent, which implies a more than doubling of the probability of earning a STEM degree.

Figure 1 shows the impact of enrolling in an HBCU for each college major's 2-digit CIP code, so long as the major had at least 50 students. Most of the majors are positive in magnitude and statistically different than zero, which implies that enrolling in an HBCU increases majors of most types. However, we do see a reduction in the probability of majoring in liberal arts, area/ethnic/cultural/gender studies, personal and culinary services, and interdisciplinary studies. These are relatively low earning majors.

The reduction in the probability of earning a degree in a low earning major, coupled with increased degree completion more generally, suggests that there is also a shift in the types of major, not just the probability of completing a major when enrolling in an HBCU. Figure 2 re-runs the impacts of enrolling in an HBCU on major for the sample of degree completers and finds additional evidence consistent with the shifting of major choice. That is, there are more higher earning majors and fewer lower earning majors than in the absence of enrolling in an HBCU and completing.

8 Heterogeneous and Distributional Effects

8.1 Heterogeneous Effects by Student Characteristics

Table 11 shows the impacts of enrolling in an HBCU by student characteristics. Several results, or lack thereof, stand out.

First, there are no big differences between our estimates for men and women. Women and men who enroll in HBCUs see similar positive impacts on degree, estimated household income, and other post-college outcomes compared to those who do not enroll in an HBCU. This is despite the fact that over 60 percent of the HBCU enrollees in our sample are female.

Second, for students with parental income below \$75,000, HBCU enrollment leads to a 15.5 percentage point increase in BA attainment and 5.8 percent higher income. For students with parental income above \$75,000, HBCU enrollment leads to a 12.8 percentage point increase in BA attainment and 3 percent higher income. This adds to the evidence that while HBCUs improve outcomes for more well-off students, they lead to even better outcomes for socioeconomically disadvantaged youths. However, student loans are also higher among lower parental income HBCU enrollees partially due to the higher likelihood of enrolling in and completing a degree program coupled with lower ability of families to pay for costs out-of-pocket.

Third, we consider differences in outcomes for HBCU versus non-HBCU enrollment by SAT score. For students with SAT scores below the median (about 870 in the sample), HBCU enrollment leads to a 21 percentage point increase in BA attainment and an 8 percent higher income. For students with SAT scores above the median, HBCU enrollment leads to an 8 percentage point increase in BA attainment and a 2 percent higher income. Thus, while HBCUs improve outcomes for higher scoring students, they also do so for lower scoring students, perhaps to a slightly greater extent. Consistent with earlier results, HBCUs

are an important source of access and attainment of four-year degrees for lower scoring students who are more likely to be a margin in the decision between no college, two-year college or four-year college. HBCU enrollees with SAT scores below the median are more likely than their non-HBCU counterparts to have a credit score above 600, have $15,380 more in student loans and 0.4 percentage points less likely to have a mortgage.

This last finding also shows that our results are not likely to be driven by issues related to a lack of admission data. Students below the median SAT score are much more likely to apply to less selective, and often open access, colleges. These colleges have very high admit rates and so admission decisions become less relevant (or less valuable as a control).

8.2 Impact by HBCU Characteristics

In this subsection, we acknowledge and analyze different types of HBCUs. To do so, we change the binary treatment variable (Enrolled in HBCU) into pairs of treatment variables. Specifically, we consider whether there are differential effects for public and private HBCUs, two-year and four-year HBCUs, and selective and less selective HBCUs. Results are shown in Table 12.

The top panel of results shows that the impact estimates are relatively similar for public and private HBCUs, relative to not enrolling in an HBCU. The lone exception is the nearly twice as large loan balance as a consequence of enrolling in a private HBCU versus public HBCU, compared to not enrolling in an HBCU.

The second panel of Table 12 shows that four-year HBCUs lead to almost double the amount of degrees as two-year HBCUs, primarily due to high BA completion rates. But enrolling in a two-year HBCU still corresponds to a 6.7 percentage point increase in the probability of earning any degree over not enrolling in an HBCU. Additionally, the previously reported increase in estimated household income largely comes from four-year HBCUs.

The last panel shows that selectivity of the HBCU is not a driving force behind the previous results. In fact, less selective HBCUs, with average SAT scores below 1000, lead to substantial increases in degree attainment and estimated household income. These less selective, broad-access institutions are also ones with lower graduation rates, fewer financial resources, and serve students with fewer financial and educational advantages and preparedness.

Building on this last panel, Appendix Table 7 shows the results by HBCU selectivity but for different samples of student SAT scores. This helps decouple the fact that higher SAT scoring students tend to enroll in more selective colleges and HBCUs.[24] The results show that the positive impacts of HBCU enrollment is mostly for students with SAT scores below the median, regardless of the selectivity of the HBCU to which they enroll.

Putting these and earlier results together suggests that lower SAT scoring students are the main beneficiaries of enrolling in an HBCU and that's partially because of the counterfactual enrollment and less so because of the selectivity of the college to which they enroll.

8.3 Distribution of HBCU Effects

We briefly explore the distribution of effects by looking at the effect of initially enrolling in each HBCU relative to not enrolling in an HBCU. To do so, we replace the single HBCU variable with almost 100 college-

---

[24]Appendix Figure 1 shows there is a substantial common support of high and low SAT scoring students at more and less selective HBCUs.

specific fixed effects while not changing the remainder of the regression. This exercise shows us whether a few HBCUs are driving the results and also allows us to examine what drives any heterogeneous effects.

Figure 3 shows the coefficient estimates for each HBCU and the 95 percent confidence intervals. The top panel considers the outcome BA completion whereby the main effect in Table 4 was 14.6 percentage points. First, the figure shows that the vast majority of HBCUs increase the probability of a student earning a BA relative to not enrolling in an HBCU. This is not too surprising since Table 3 shows that the counterfactual enrollment of many students are two-year colleges and no college - both of which rarely result in a BA.

Second, there are some HBCUs that have very large impacts on earning a BA, upwards of 50 percentage points. Third, there are some HBCUs that lower the likelihood of earning a BA compared to not enrolling in an HBCU. Many of these are among the two-year HBCUs.

The lower panel of Figure 3 shows the analogous results but the outcome is the estimated household income. We see a very similar pattern to the BA completion panel. That is, the vast majority of HBCUs lead to a positive income gain relative to not enrolling in an HBCU.

8.3.1   Explaining the Distribution of Treatment Effects

Figure 4 shows a few correlates with the HBCU-specific fixed effects.[25] We find that measures of college selectivity are not necessarily the same as the measures of college value-added. This is a similar conclusion to Mountjoy and Hickman (2021) but in a very different context. More specifically, the college characteristics in Figure 4 - average SAT of enrollees, graduation rate, and admission rate - are common measures of college selectivity. But in both the top and bottom panels, which correspond to the fixed effects estimated from the outcomes BA completion and estimated household income, respectively, only graduation rate is positively correlated with the HBCU fixed effects.

Although we see that most HBCUs in Figure 3 have the same sign on two of our primary outcomes, the range of magnitudes is wide. But the estimates do not separate whether the distribution of effects are driven by different students enrolling in different colleges (i.e., sorting) or similar students facing differential effects at different colleges. As we previously discussed, Appendix Table 7 suggests that a portion of this wide distribution is likely driven by differences in student characteristics who have differential benefits from HBCU enrollment, more so than differences in HBCU selectivity and treatment effects. We reinforce this result with analyses that follow Solon et al. (2015) and Beuermann et al. (2023).

Specifically, we explore whether our distributional effects change after weighting our regressions that produced Figure 3 by student SAT score. Following the details of Beuermann et al. (2023), we run three weighted regressions for each of the main outcomes where the weights are a distance from the 25th, 50th, and 75th percentile of the SAT distribution.[26]

We then compare the weighted estimates to our unweighted estimates. If student sorting plays no role and each HBCU has different treatment effects, we would expect the weighted and unweighted estimates to be the same. Conversely, if student sorting plays a big role, we would expect the weighted and unweighted estimates to diverge.

Appendix Table 8 shows the rejection rates of paired t-tests between the weighted and unweighted

---

[25]We regress the set of HBCU fixed effects with other standardized college attributes, reporting both the coefficient and 95 percent confidence intervals. Each coefficient is from a separate bivariate regression.

[26]More formally, define pct_i is the percentile of student i in the distribution of SAT scores. We weight each observation by $(1 + \frac{(X - pct_i)^2}{100})^{-1}$ where X is the percentile under consideration (25th, 50th, or 75th). This puts relatively more weight on students with SAT scores close to the Xth percentile.

estimates for each of the HBCU fixed effects, across our main outcomes. For example, 43 percent of the paired coefficients are statistically different from one another when the outcome is BA Degree and the weighted regression is weighted by the 25th percentiles. Across most of the outcomes, the 25th and 75th percentiles have high rejection rates on the t-tests. Additionally, Appendix Figures 2 and 3 show the relationship between the weighted and unweighted regressions for BA degree and estimated household income. Although they are great predictors of one another on average, many of the weighted estimates are well off the regression line.

Overall, this exercise suggests that students characteristics, including SAT score, are driving some of the heterogeneous and distributional effects. As seen in Table 11, students with lower SAT scores, who tend to (but not always) sort into less selective colleges and HBCUs, see the largest impacts from enrolling in an HBCU. And the way these students sort into colleges contributes to the wide distribution of effects across each HBCU.

9   Conclusion

In this study, we demonstrate which students consider HBCUs and the longer-term consequences of initially enrolling in an HBCU. First, we document that no college or two-year college enrollment are common counterfactuals to HBCU enrollment, suggesting that HBCUs provide access to four-year colleges for many qualified students who would have chosen alternative pathways after high school. Second and related, we find that HBCU enrollees are more likely to earn a bachelor's degree, making HBCUs a viable pathway for Black students to earn a four-year degree in the U.S. We also find higher estimated household income for HBCU enrollees and a reduction in the probability of ever declaring bankruptcy. On the negative side, we find larger student loan balances at age 30 and a slightly lower probability of owning a mortgage. Some of these results are driven by an increase in the probability of majoring in a high-earning field and because of characteristics of colleges that cannot easily be attributed to non-HBCU colleges.

Our investigation into heterogeneous effects and mechanisms unearths arguably one of most important results - less-selective, broad-access HBCUs fare better than more-selective HBCUs in improving students' outcomes. We find evidence that this effect is due to HBCU enrollment leading to better outcomes than counterfactual alternatives for lower-scoring students, regardless of institutional selectivity, and lower-scoring students tend to be concentrated at less-selective institutions. This finding is aligned precisely with the mission statement of HBCUs, which seeks to broaden access and improve the educational and economic conditions of Black Americans.

This research has several important implications. First and foremost, our findings can be used by students (or parents or high school counselors), particularly Black students, when considering which college to attend. Not only have we provided valuable information on typical outcomes like degree completion and earnings, but we also extend to a much more extensive set of outcomes that provide a more comprehensive picture of the impacts of enrolling in an HBCU.

Second, this research should be of interest to education policymakers and funders. We show that many comparable Black students who forgo HBCUs do so for no college, two-year colleges, or even for-profit colleges, which suggests that access to HBCUs may be key to giving these students more equitable access to the higher education system. Based on our findings, more access to HBCUs for these particular students would increase the fraction of Black students who earn four-year degrees and increase the number of Black STEM graduates in the American economy. Because HBCUs have a large concentration of Black students,

and they produce relatively positive outcomes for Black students, *ceteris paribus*, these institutions appear to offer a potential path to reducing racial gaps in education, economic, and financial outcomes.

Our results should be examined with the knowledge that many HBCUs are under-resourced relative to their peer four-year institutions with which they compete for students. This context makes some of the positive findings especially noteworthy and helps to explain the sizeable student loans associated with attending an HBCU. Funding policies that force already-disadvantaged groups to accrue higher out-of-pocket costs and a greater reliance on student loans likely limit the potential positive effects that HBCUs generate for Black individuals and the American economy.

These historic institutions have played an important role in giving Black students access to higher education when other institutions were unavailable due to segregation. HBCUs have faced many challenges over the last century, such as inadequate funding, state and court legislators requiring justification of their existence, and questions about their quality. This research demonstrates that the historically outsized role played by HBCUs in granting access to Black students and supplying talented Black graduates to the American economy still holds for 21st century graduates.

References

J. G. Altonji, P. Arcidiacono, and A. Maurel. The Analysis of Field Choice in College and Graduate School: Determinants and Wage effects. In *Handbook of the Economics of Education*, volume 5, pages 305–396. Elsevier, 2016.

A. T. Arroyo and M. Gasman. An HBCU-based educational approach for Black college student success: Toward a framework with implications for all institutions. *American Journal of Education*, 121(1):57–85, 2014.

R. Arum and J. Roksa. Limited Learning on College Campuses. *Society*, 48:203–207, 2011.

D. J. Baker, A. T. Arroyo, J. M. Braxton, M. Gasman, and C. H. Francis. Expanding the student persistence puzzle to minority serving institutions: The residential historically black college and university context. *Journal of College Student Retention: Research, Theory & Practice*, 22(4):676–698, 2021.

D. W. Beuermann, C. K. Jackson, L. Navarro-Sola, and F. Pardo. What is a good school, and can parents tell? evidence on the multidimensionality of school output. *The Review of Economic Studies*, 90(1): 65–101, 2023.

L. Bohr et al. Do black students learn more at historically black or predominantly white colleges?. 1994.

M. C. Brown and J. E. Davis. The historically black college as social contract, social capital, and social equalizer. *Peabody journal of Education*, 76(1):31–49, 2001.

D. Card. The causal effect of education on earnings. *Handbook of labor economics*, 3:1801–1863, 1999.

S. E. Carrell, R. L. Fullerton, and J. E. West. Does your cohort matter? measuring peer effects in college achievement. *Journal of Labor Economics*, 27(3):439–464, 2009.

S. E. Carrell, M. Hoekstra, and J. E. West. The impact of college diversity on behavior toward minorities. *American Economic Journal: Economic Policy*, 11(4):159–82, 2019.

J. H. Choi, A. McCargo, M. Neal, L. Goodman, and C. Young. Explaining the black-white homeownership gap. *Washington, DC: Urban Institute. Retrieved March*, 25:2021, 2019.

K. Cokley. An investigation of academic self-concept and its relationship to academic achievement in african american college students. *Journal of Black psychology*, 26(2):148–164, 2000.

K. Cokley. The impact of college racial composition on african american students' academic self-concept: A replication and extension. *Journal of Negro Education*, pages 288–296, 2002.

J. M. Constantine. The effect of attending historically black colleges and universities on future wages of black students. *ILR Review*, 48(3):531–546, 1995.

S. B. Dale and A. B. Krueger. 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, 2002.

M. Daly, B. Hobijn, J. H. Pedtke, et al. Disappointing facts about the black-white wage gap. *FRBSF Economic Letter*, 26:1–5, 2017.

A. Edwards, J. Ortagus, J. Smith, and A. Smythe. Applicants to historically black colleges and universities. *American Economic Association Papers and Porceedings*, 2023.

R. G. Ehrenberg and D. S. Rothstein. Do historically black institutions of higher education confer unique advantages on black students: An initial analysis, 1993.

J. U. Elu, J. Ireland, D. Jeffries, I. Johnson, E. Jones, D. Long, G. N. Price, O. Sam, T. Simons, F. Slaughter, et al. The earnings and income mobility consequences of attending a historically black college/university: Matching estimates from 2015 us department of education college scorecard data. *The Review of Black political economy*, 46(3):171–192, 2019.

J. Fleming. *Blacks in College. A Comparative Study of Students' Success in Black and in White Institutions.* ERIC, 1985.

L. A. Flowers. The impact of college racial composition on african american students' academic and social gains: Additional evidence. *Journal of College student development*, 2002.

A. M. Flowers III, J. A. Scott, J. R. Riley, and R. T. Palmer. Beyond the call of duty: Building on othermothering for improving outcomes at historically black colleges and universities. *Journal of African American Males in Education (JAAME)*, 6(1):59–73, 2015.

R. Franke and L. DeAngelo. Degree attainment for black students at historically black colleges and universities and predominantly white institutions: A propensity score matching approach. *AERA Online Paper Repository*, 2018.

S. Fries-Britt and B. Turner. Uneven stories: Successful black collegians at a black and a white campus. *The Review of Higher Education*, 25(3):315–330, 2002.

R. G. Fryer Jr and M. Greenstone. The changing consequences of attending historically black colleges and universities. *American economic journal: Applied economics*, 2(1):116–48, 2010.

L. B. Gallien Jr. Instructing and mentoring the african american college student: Strategies for success in higher education. *Diverse Issues in Higher Education*, 21(10):33, 2004.

R. B. Goings. Investigating the experiences of two high-achieving black male hbcu graduates: An exploratory study. *Negro Educational Review*, 67(1-4):54–75, 2016.

J. Goodman, M. Hurwitz, and J. Smith. Access to 4-year public colleges and degree completion. *Journal of Labor Economics*, 35(3):829–867, 2017.

E. K. Gordon, Z. B. Hawley, R. C. Kobler, and J. C. Rork. The paradox of hbcu graduation rates. *Research in Higher Education*, 62:332–358, 2021.

M. A. Hiatt, A. Mc Letchie, A. B. Bagasra, D. L. Laufersweiler-Dwyer, and M. Mackinem. Perceptions of diversity, inclusion, and belongingness at an hbcu: Implications and applications for faculty. In *Diversity, equity, and inclusivity in contemporary higher education*, pages 175–193. IGI Global, 2019.

N. W. Hillman. Borrowing and repaying federal student loans. *Journal of Student Financial Aid*, 45(3), 2015.

G. Jean-Marie. Social justice, visionary, and career project: The discourses of black women leaders at black colleges. *Historically Black colleges and universities: Triumphs, troubles, and taboos*, pages 53–74, 2008.

C. C. Jett. Hbcus propel african american male mathematics majors. *Journal of African American Studies*, 17:189–205, 2013.

J. M. Johnson. Pride or prejudice? motivations for choosing black colleges. *Journal of Student Affairs Research and Practice*, 56(4):409–422, 2019.

M. Johnson, J. Bruch, B. Gill, et al. Changes in financial aid and student enrollment at historically black colleges and universities after the tightening of plus credit standards. *Regional Educational Laboratory Mid-Atlantic*, pages 1–16, 2015.

T. Jones. A historical mission in the accountability era: A public hbcu and state performance funding. *Educational Policy*, 30(7):999–1041, 2016.

M. M. Kim. Historically black vs. white institutions: Academic development among black students. *The Review of Higher Education*, 25(4):385–407, 2002.

M. M. Kim and C. F. Conrad. The impact of historically black colleges and universities on the academic success of african-american students. *Research in Higher Education*, 47:399–427, 2006.

B. T. Long and M. Kurlaender. Do community colleges provide a viable pathway to a baccalaureate degree? *Educational Evaluation and Policy Analysis*, 31(1):30–53, 2009.

M. F. Lovenheim and J. Smith. Returns to different postsecondary investments: Institution type, academic programs, and credentials. Technical report, National Bureau of Economic Research, 2022.

L. Lusher, D. Campbell, and S. Carrell. Tas like me: Racial interactions between graduate teaching assistants and undergraduates. *Journal of Public Economics*, 159:203–224, 2018.

V. Michelman, J. Price, and S. D. Zimmerman. Old boys' clubs and upward mobility among the educational elite. *The Quarterly Journal of Economics*, 137(2):845–909, 2022.

J. A. Moore. Are state-supported historically black colleges and universities justifiable after fordice-a higher education dilemma. *Fla. St. UL Rev.*, 27:547, 1999.

J. Mountjoy and B. R. Hickman. The returns to college (s): Relative value-added and match effects in higher education. Technical report, National Bureau of Economic Research, 2021.

C. A. G. Mwangi. Exploring sense of belonging among black international students at an hbcu. *Journal of International Students*, 6(4):1015–1037, 2016.

A. H. Nichols and D. Evans-Bell. A look at black student success: Identifying top-and bottom-performing institutions. 2017.

E. Oster. Unobservable selection and coefficient stability: Theory and evidence. *Journal of Business & Economic Statistics*, 37(2):187–204, 2019.

C. L. Outcalt and T. E. Skewes-Cox. Involvement, interaction, and satisfaction: The human environment at hbcus. *The Review of Higher Education*, 25(3):331–347, 2002.

A. Pallais. Small differences that matter: Mistakes in applying to college. *Journal of Labor Economics*, 33 (2):493–520, 2015.

R. Palmer and M. Gasman. " it takes a village to raise a child": The role of social capital in promoting academic success for african american men at a black college. *Journal of college student development*, 49 (1):52–70, 2008.

L. Perna, V. Lundy-Wagner, N. D. Drezner, M. Gasman, S. Yoon, E. Bose, and S. Gary. The contribution of hbcus to the preparation of african american women for stem careers: A case study. *Research in Higher Education*, 50:1–23, 2009.

G. Price and A. Viceisza. What can historically black colleges and universities teach about improving higher education outcomes for black students? Working Paper 31131, National Bureau of Economic Research, April 2023. URL http://www.nber.org/papers/w31131.

G. N. Price, W. Spriggs, and O. H. Swinton. The relative returns to graduating from a historically black college/university: Propensity score matching estimates from the national survey of black americans. *The Review of Black Political Economy*, 38(2):103–130, 2011.

R. B. Ricard and M. C. Brown. *Ebony towers in higher education: The evolution, mission, and presidency of historically Black colleges and universities.* Stylus Publishing, LLC., 2008.

D. A. Richards and J. T. Awokoya. Understanding hbcu retention and completion. *Frederick D. Patterson Research Institute, UNCF*, 2012.

B. B. Robinson and A. R. Albert. Hbcu's institutional advantage. *Understanding minority-serving institutions*, page 183, 2008.

C. E. Rouse. Democratization or diversion? the effect of community colleges on educational attainment. *Journal of Business & Economic Statistics*, 13(2):217–224, 1995.

Y. Rubinstein and Y. Weiss. Post schooling wage growth: Investment, search and learning. *Handbook of the Economics of Education*, 1:1–67, 2006.

M. L. Rucker and D. M. Gendrin. The impact of ethnic identification on student learning in the hbcu classroom. *Journal of Instructional Psychology*, 30(3), 2003.

B. Sacerdote. Peer effects with random assignment: Results for dartmouth roommates. *The Quarterly journal of economics*, 116(2):681–704, 2001.

J. Smith. Ova and out: Using twins to estimate the educational returns to attending a selective college. *Economics of Education Review*, 36:166–180, 2013.

J. Smith. The effect of college applications on enrollment. *The BE Journal of Economic Analysis & Policy*, 14(1):151–188, 2014.

J. Smith. The sequential college application process. *Education Finance and Policy*, 13(4):545–575, 2018a.

J. Smith and K. Stange. A new measure of college quality to study the effects of college sector and peers on degree attainment. *Education Finance and Policy*, 11(4):369–403, 2016.

J. Smith, J. Goodman, and M. Hurwitz. The economic impact of access to public four-year colleges. Technical report, National Bureau of Economic Research, 2020.

T. C. Smith. Black student involvement: Student government associations and developmental outcomes at historically black colleges and universities. *Journal of Student Affairs*, 27:43, 2018b.

G. Solon, S. J. Haider, and J. M. Wooldridge. What are we weighting for? *Journal of Human resources*, 50 (2):301–316, 2015.

P. E. Sum, S. A. Light, and R. F. King. Race, reform, and desegregation in mississippi higher education: Historically black institutions after united states v. fordice. *Law & Social Inquiry*, 29(2):403–435, 2004.

P. F. Thompson. On firm foundations: African american black college graduates and their doctoral student development in the ivy league. *Historically Black colleges and universities: Triumphs, troubles, and taboos*, pages 27–39, 2008.

V. Tinto. *Completing college: Rethinking institutional action*. University of Chicago Press, 2012.

D. Van Camp, J. Barden, L. R. Sloan, and R. P. Clarke. Choosing an hbcu: An opportunity to pursue racial self-development. *Journal of Negro Education*, 78(4):457–468, 2009.

A. F. Watkins. Cultivating the education of african american college students: A learning styles approach. *Instructing and mentoring the African American college student: Strategies for success in higher education*, pages 122–127, 2005.

H. H. Wenglinsky. The educational justification of historically black colleges and universities: A policy response to the us supreme court. *Educational Evaluation and Policy Analysis*, 18(1):91–103, 1996.

R. Winkle-Wagner, J. M. Forbes, S. Rogers, and T. B. Reavis. A culture of success: Black alumnae discussions of the assets-based approach at spelman college. *The Journal of Higher Education*, 91(5):653–673, 2020.

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

Figure 1: Impacts of Enrolling in an HBCU on College Major
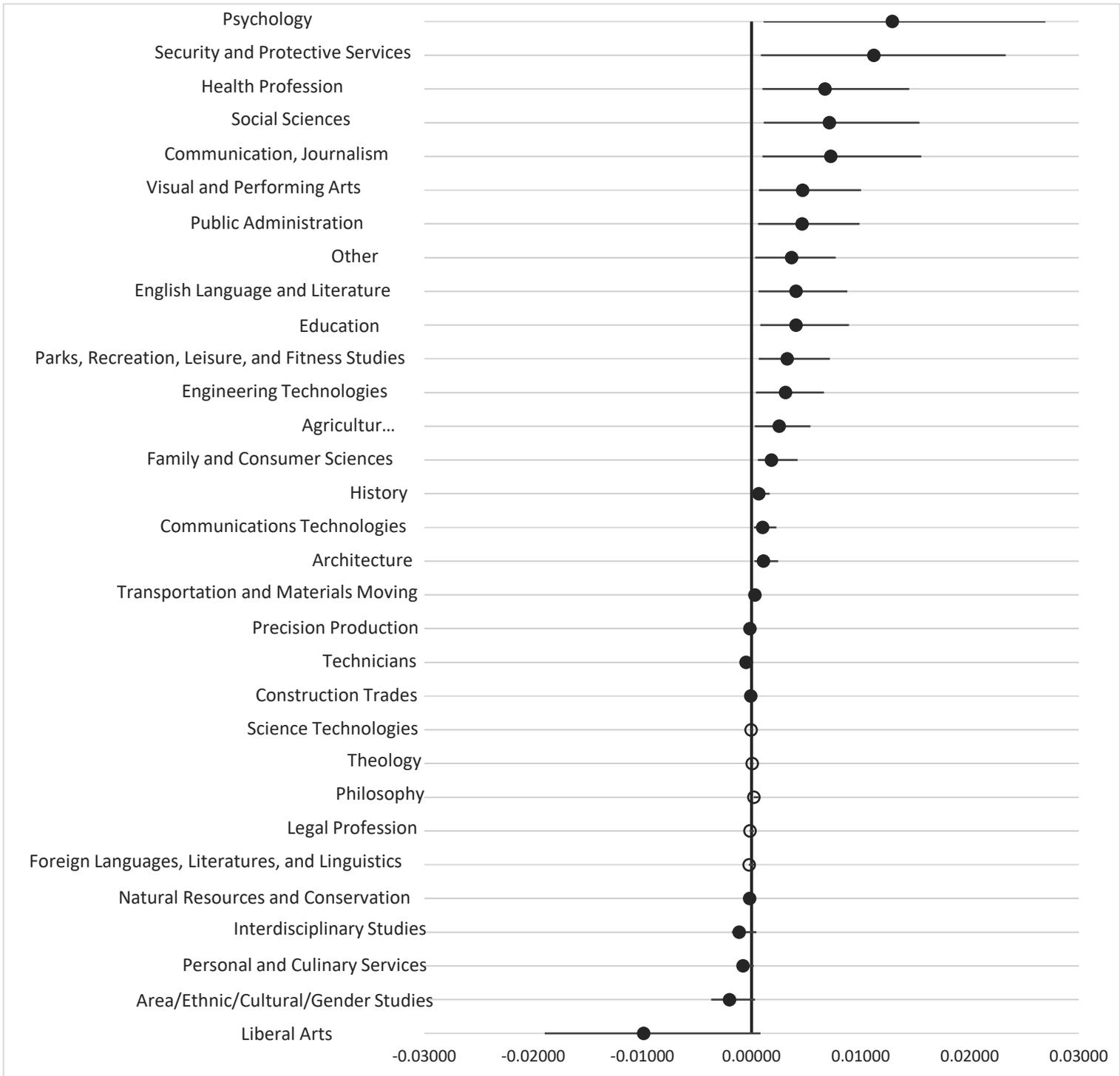
Notes: Each circle is the coefficient estimate on the impact of enrolling in an HBCU by each college major. Each college major is categorized by 2-digit CIP code, as defined by the U.S. Department of Education, and has at least 50 students. The regressions include controls for sex, parental income and education, SAT, SAT attempts, AP exams taken, cohort and high school fixed effects, and controls for score sending portfolio interacted with SAT scores. Solid circles are statistically significant estimates at least at the 5% significance level, though most estimates are at the 1% significance level.

Figure 2: Impacts of Enrolling in an HBCU on College Major, College Completers
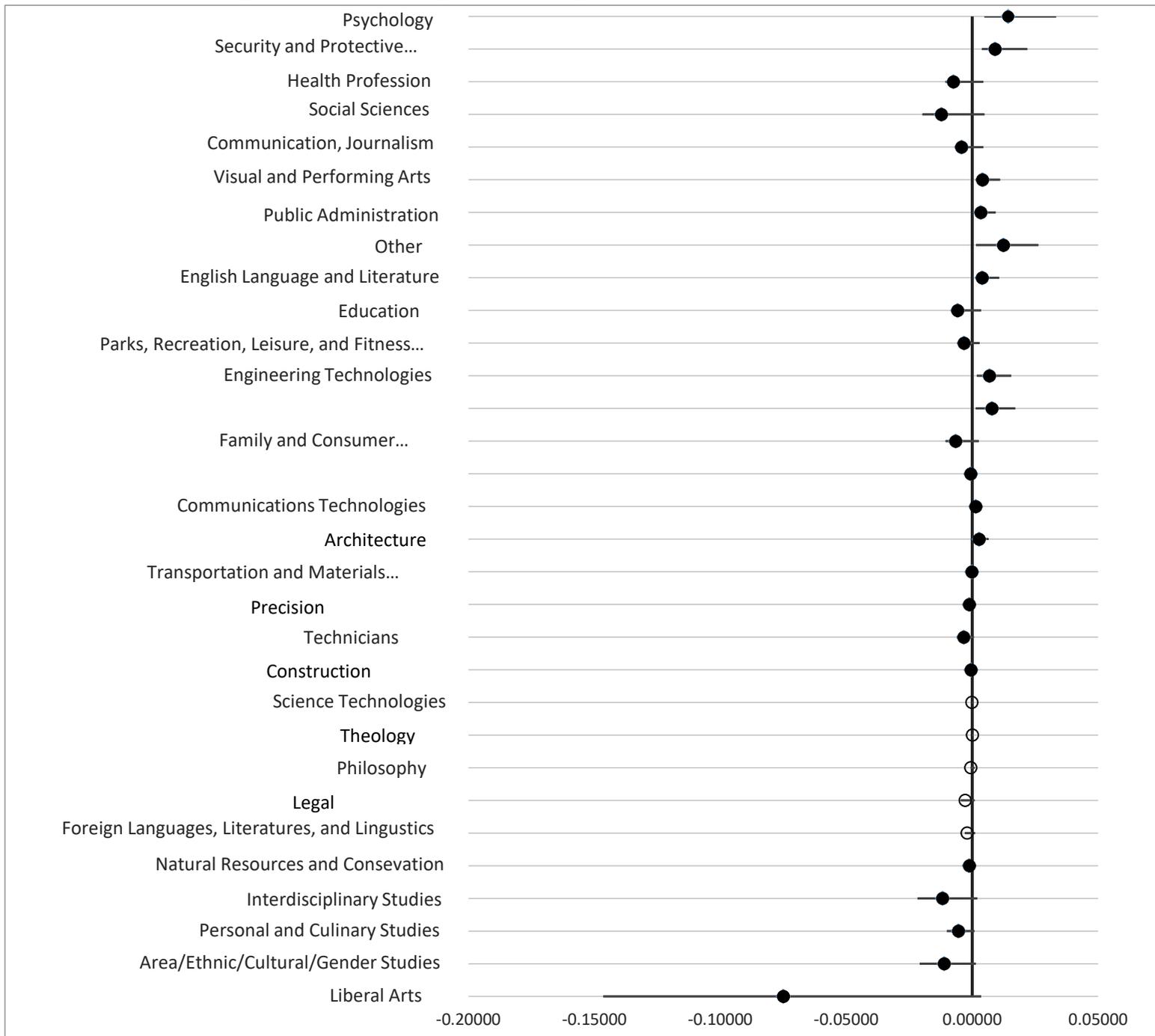
Notes: Each circle is the coefficient estimate on the impact of enrolling in an HBCU by each college major, only among the subsample of college completers. Each college major is categorized by 2-digit CIP code, as defined by the U.S. Department of Education, and has at least 50 students. The regressions include controls for sex, parental income and education, SAT, SAT attempts, AP exams taken, cohort and high school fixed effects, and controls for score sending portfolio interacted with SAT scores. Solid circles are statistically significant estimates at least at the 5% significance level, though most estimates are at the 1% significance level.

Figure 3: Distribution of HBCU Impacts, Relative to Not Initially Enrolling in an HBCU
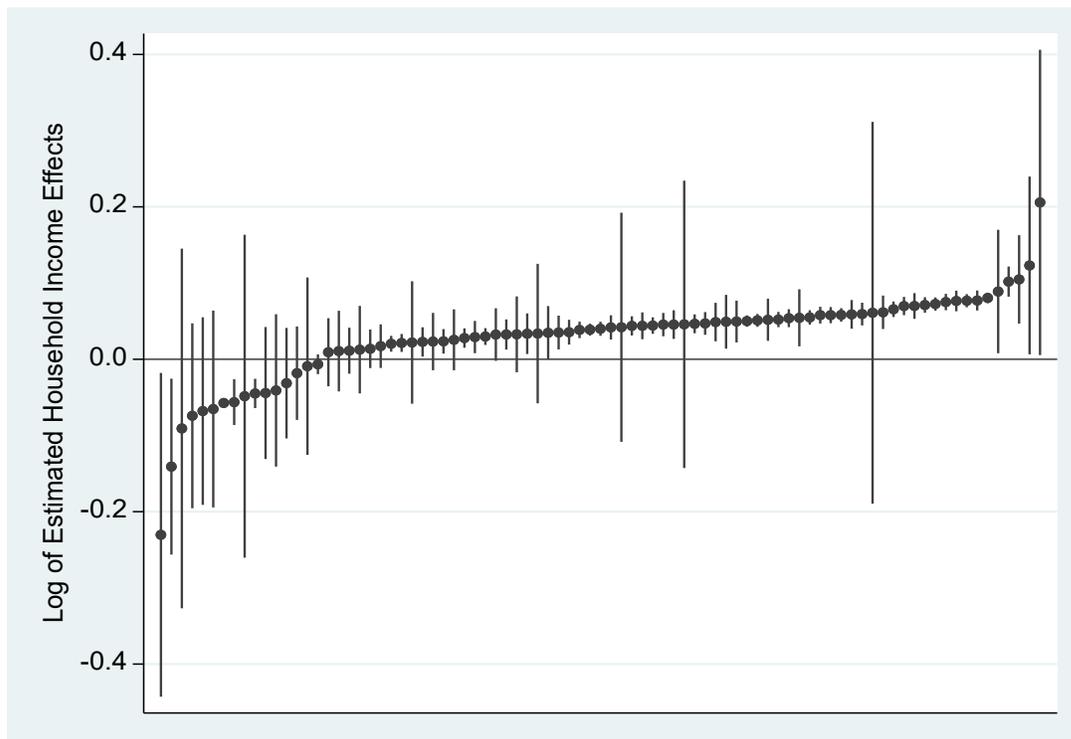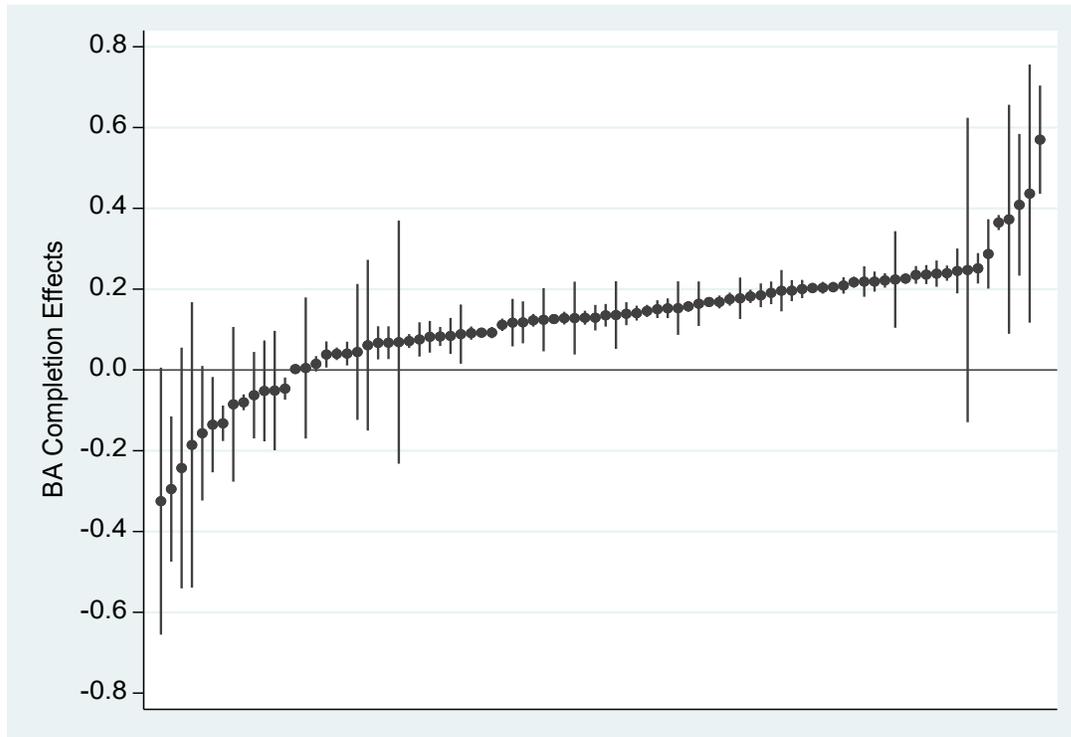
Notes: Each dot is the coefficient estimate on a college-specific fixed effect. The fixed effects coefficients are from a regression of the outcome (listed on the y-axes) on each HBCU fixed effect relative to not enrolling in any HBCU, controlling for demographics, academics, and college application portfolios. The vertical lines are the 95% confidence intervals on each coefficient.

Figure 4: College Selectivity Correlates with HBCU Fixed Effects
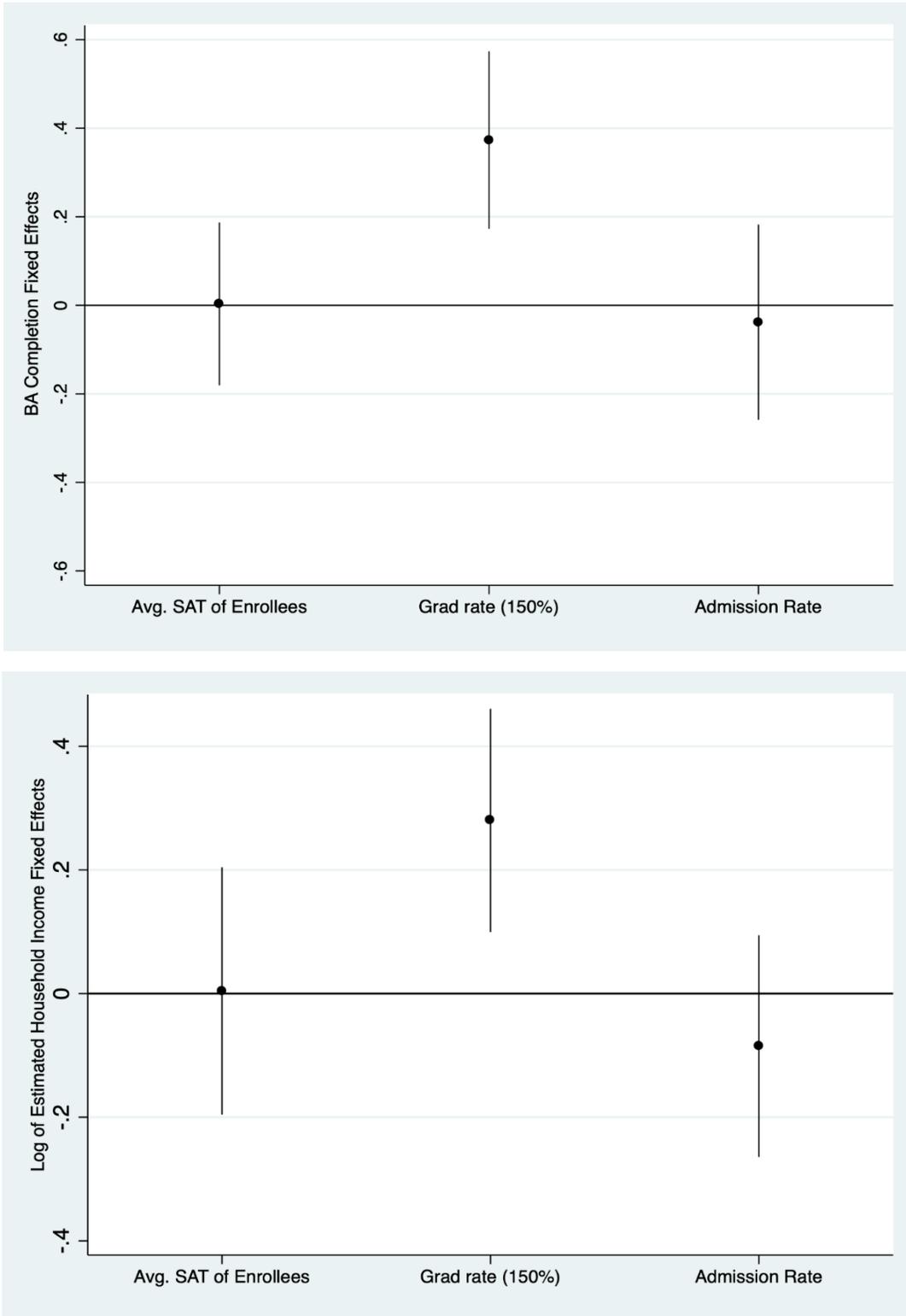
Notes: HBCU fixed effects are estimated from a regression of an outcome on a set of indicators for each HBCU, relative to not enrolling in any HBCU, controlling for demographics, academics, and college application portfolios. Each circle is the coefficient from a bivariate regression of the HBCU fixed effects on the x-axis variable. The lines are the 95% confidence intervals.

Table 1: Student Summary Statistics

	All SAT Takers (N = 1,161,534)	Did Not Apply to HBCU (N = 725,927)	Applied to HBCU (N = 435,607)	Did Not Enroll in HBCU (N = 977,126)	Enrolled in HBCU (N = 184,408)
Female	0.572	0.541	0.624	0.567	0.601
Parental Highest Education					
AA	0.330	0.322	0.344	0.328	0.338
BA or More	0.335	0.336	0.333	0.329	0.368
Missing	0.118	0.131	0.097	0.123	0.091
Parental Income					
Income $50K - $100K	0.185	0.184	0.187	0.182	0.202
Income Greater than $100K	0.067	0.071	0.062	0.067	0.070
Income Missing	0.330	0.352	0.293	0.336	0.297
Exams					
Number of AP Exams	0.617	0.652	0.558	0.634	0.526
SAT Attempts	1.624	1.554	1.740	1.597	1.769
SAT Score	871.8	876.1	864.7	872.9	866.4
Initial College Characteristics					
HBCU	0.159	0.047	0.346	0.000	1.000
Any College	0.893	0.880	0.914	0.873	1.000
Four-Year	0.601	0.555	0.678	0.528	0.988
Two-Year	0.291	0.324	0.236	0.344	0.012
Public	0.685	0.674	0.703	0.683	0.694
For-Profit	0.020	0.021	0.016	0.023	0.000
In-State Tuition and Fees	8494	9024	7645	8688	7633
Out-of-State Tuition and Fees	13901	14231	13371	13990	13505
Graduation Rate	39.598	40.272	38.518	39.706	39.119
Average SAT of Enrollees	5.454	5.214	5.853	5.052	7.582
Admit Rate	61.201	61.122	61.311	61.945	58.920
College Completion					
Any Degree	0.393	0.386	0.403	0.377	0.474
AA	0.056	0.062	0.047	0.062	0.024
BA	0.339	0.328	0.358	0.318	0.451
College Major's 50th percentile in Earnings	31050	30729	31606	30528	33868
Earned STEM Degree	0.028	0.027	0.03	0.024	0.048
Student Loans					
Took Any Loans	0.647	0.618	0.694	0.627	0.750
Took Government Loans	0.625	0.596	0.670	0.605	0.721
Took Private Loans	0.135	0.127	0.147	0.128	0.167
Loan Balance	30881	28041	35432	28627	42225
Government Student Loan Balance	27644	25005	31874	25641	37724
Private Student Loan Balance	3237	3036	3559	2986	4501
Post-College Outcomes					
Estimated Household Income	54941	54901	55006	54677	56268
Credit Score > 600	0.472	0.496	0.433	0.481	0.425
Credit Score > 700	0.182	0.203	0.148	0.191	0.134
Any Mortgage	0.067	0.064	0.071	0.066	0.068
Past Due Credit Card Debt	7.603	7.376	7.972	7.505	8.107
Ever Bankrupt	0.014	0.012	0.018	0.014	0.013
Lives in Home State	0.808	0.811	0.804	0.813	0.782

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who self-identify as Black. Degree received based on 2005-2010 cohorts. College outcomes measured six years after high school graduation through National Student Clearinghouse. Student loans and post-college outcomes as of November 2017 from TransUnion Credit Bureau.

Table 2: HBCU Score Sends and Enrollment

	Score Send to at Least 1 HBCU		Number of HBCU Score Sends			Enrolled in HBCU		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	0.078**	0.074**	0.211**	0.199**	0.122**	0.020**	0.017**	-0.018**
	(0.001)	(0.001)	(0.003)	(0.002)	(0.004)	(0.001)	(0.001)	(0.001)
Parental Education - AA	0.006**	0.003*	0.030**	0.027**	0.049**	0.015**	0.013**	0.021**
	(0.001)	(0.001)	(0.003)	(0.003)	(0.006)	(0.001)	(0.001)	(0.002)
Parental Education - BA or More	0.004**	0.002	0.040**	0.037**	0.084**	0.029**	0.031**	0.061**
	(0.001)	(0.001)	(0.004)	(0.004)	(0.006)	(0.001)	(0.001)	(0.002)
Parental Education - Missing	-0.036**	-0.039**	-0.084**	-0.097**	-0.058**	-0.014**	-0.014**	-0.016**
	(0.002)	(0.002)	(0.005)	(0.005)	(0.009)	(0.001)	(0.001)	(0.003)
Parental Income - $50k-$100k	-0.028**	-0.033**	-0.040**	-0.052**	0.038**	0.003**	0.002	0.018**
	(0.001)	(0.001)	(0.004)	(0.004)	(0.006)	(0.001)	(0.001)	(0.002)
Parental Income - $100k or More	-0.059**	-0.058**	-0.097**	-0.094**	0.078**	-0.008**	-0.004**	0.029**
	(0.002)	(0.002)	(0.005)	(0.005)	(0.009)	(0.001)	(0.001)	(0.003)
Parental Income - Missing	-0.064**	-0.062**	-0.141**	-0.136**	-0.010	-0.014**	-0.013**	0.006**
	(0.001)	(0.001)	(0.003)	(0.003)	(0.006)	(0.001)	(0.001)	(0.002)
Number of AP Exams		-0.007**		-0.028**	-0.045**		-0.004**	-0.002**
		(0.000)		(0.001)	(0.002)		(0.000)	(0.001)
SAT Attempts		0.085**		0.307**	0.294**		0.041**	0.034**
		(0.001)		(0.002)	(0.003)		(0.000)	(0.001)
SAT 750-850 (3rd Quartile)		0.035**		0.079**	0.008		0.063**	0.116**
		(0.001)		(0.004)	(0.006)		(0.001)	(0.002)
SAT 860-970 (2nd Quartile)		0.026**		0.019**	-0.089**		0.039**	0.088**
		(0.001)		(0.004)	(0.006)		(0.001)	(0.002)
SAT 980-1190		-0.031**		-0.169**	-0.257**		-0.017**	0.035**
		(0.001)		(0.004)	(0.007)		(0.001)	(0.002)
SAT >= 1200 (95th Percentile)		-0.155**		-0.487**	-0.550**		-0.075**	0.020**
		(0.003)		(0.007)	(0.014)		(0.002)	(0.005)
Only HBCU Score Senders					X			X
Observations	1,161,534	1,161,534	1,161,534	1,161,534	435,607	1,161,534	1,161,534	435,607
R-squared	0.012	0.036	0.010	0.046	0.037	0.003	0.020	0.019

Notes: Data include all self-identified Black SAT takers in the 2004-2010 high school graduating cohorts. Only HBCU Score Senders send at least one SAT score to an HBCU. SAT ranges are SAT superscores (sum of the highest verbal and math subscores, regardless of SAT attempts). Regressions include cohort and high school fixed effects. No college degree, parental income less than $50k, and SAT below 750 are the omitted categories. Standard errors in parentheses. ** $p<0.01$, * $p<0.05$

Table 3: Impact of Enrolling in HBCU on Initial College Characteristics

	Any College	Four-Year College	Two-Year College	Public College	For-Profit College	Graduation Rate	Average SAT of Enrollees	Admit Rate	In-State Tuition and Fees	Out-of-State Tuition and Fees
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Enrolled in HBCU	0.165**	0.477**	-0.312**	0.005**	-0.022**	1.946**	2.647**	-6.299**	421.115**	401.606**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)	(0.061)	(0.014)	(0.068)	(22.788)	(18.946)
Observations	432,888	432,888	432,888	432,888	432,888	381,400	432,888	267,553	381,663	381,663
R-squared	0.176	0.417	0.290	0.098	0.043	0.398	0.369	0.239	0.287	0.381

Notes: Data include all self-identified Black SAT takers in the 2004-2010 high school graduating cohorts who send at least one SAT score to an HBCU. Regressions include controls for sex, parental income and education, SAT, SAT attempts, AP exams taken, cohort and high school fixed effects, and controls for score sending portfolio interacted with SAT scores.   College charcateristics (outcomes) from IPEDS. Standard errors in parentheses. ** $p<0.01$, * $p<0.05$

Table 4: Impact of Enrolling in HBCU on College Completion

	Any Degree	AA Degree	BA Degree
Enrolled in HBCU	0.119**	-0.029**	0.146**
	(0.002)	(0.001)	(0.002)
Observations	432,888	432,888	432,888
R-squared	0.195	0.048	0.220

Notes: Data include all self-identified Black SAT takers in the 2004-2010 high school graduating cohorts who send at least one SAT score to an HBCU. Regressions include controls for sex, parental income and education, SAT, SAT attempts, AP exams taken, cohort and high school fixed effects, and controls for score sending portfolio interacted with SAT scores. Outcomes from National Student Clearinghouse. Standard errors in parentheses. ** $p<0.01$, * $p<0.05$

Table 5: Impact of Enrolling in HBCU on Student Loans

	Positive Loan Balance	Positive Government Loan Balance	Positive Private Loan Balance	Loan Balance	Government Student Loan Balance	Private Student Loan Balance
	(1)	(2)	(3)	(4)	(5)	(6)
Enrolled in HBCU	0.101**	0.094**	0.037**	11,900**	10,356**	1,544**
	(0.002)	(0.002)	(0.001)	(173)	(159)	(61)
Observations	412,519	412,519	412,519	412,519	412,519	412,519
R-squared	0.101	0.097	0.060	0.128	0.117	0.054

Notes: Data include all self-identified Black SAT takers in the 2004-2010 high school graduating cohorts who send at least one SAT score to an HBCU. Regressions include controls for sex, parental income and education, SAT, SAT attempts, AP exams taken, cohort and high school fixed effects, and controls for score sending portfolio interacted with SAT scores. Outcomes from TransUnion credit bureau, measured in 2017. Standard errors in parentheses. ** $p<0.01$, * $p<0.05$

Table 6: Impact of Enrolling in HBCU on Post-College Outcomes

	Log(Estimated Household Income)	Credit Score > 600	Credit Score > 700	Has a Mortgage	Past Due Credit Card Debt	Ever Bankrupt	Lives in Home State
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Enrolled in HBCU	0.050**	-0.003	-0.016**	-0.005**	0.040	-0.004**	-0.032**
	(0.001)	(0.002)	(0.001)	(0.001)	(0.227)	(0.000)	(0.001)
Observations	411,584	418,317	418,317	422,754	421,529	422,761	420,505
R-squared	0.198	0.115	0.100	0.059	0.022	0.042	0.092

Notes: Data include all self-identified Black SAT takers in the 2004-2010 high school graduating cohorts who send at least one SAT score to an HBCU. Regressions include controls for sex, parental income and education, SAT, SAT attempts, AP exams taken, cohort and high school fixed effects, and controls for score sending portfolio interacted with SAT scores. Outcomes from TransUnion credit bureau, measured in 2017. Standard errors in parentheses.
**p<0.01, * p<0.05

Table 7: Impact of Enrolling in HBCU on Zip Code Around Age 30 Outcomes

	Log(% Zip Who Are Black)	Log(% Zip With College Degree)	Log(Median Household Income)	Log(Labor Force Participation Rate)	Log(Unemployment Rate)	Log(Zip's Upward Income Mobility Index)	Log(Total Crime Rate)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Enrolled in HBCU	0.049**	0.011**	0.000	0.001*	0.001	-0.001**	0.017**
	(0.003)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Observations	417,938	418,050	417,659	418,121	417,567	414715	408,893
R-squared	0.282	0.248	0.312	0.255	0.233	0.314	0.385

Notes: Data include all self-identified Black SAT takers in the 2004-2010 high school graduating cohorts who send at least one SAT score to an HBCU. Regressions include controls for sex, parental income and education, SAT, SAT attempts, AP exams taken, cohort and high school fixed effects, and controls for score sending portfolio interacted with SAT scores. Outcomes come from the American Community Survey (2017), national crime statistics, and Opportunity Insights and are merged onto the zip code of residence as of November 2017. Standard errors in parentheses. ** p<0.01, * p<0.05

Table 8: Impact of Enrolling in HBCU on College Outcomes, Net of College Characteristics

	Any Degree	BA Degree	Estimated Household Income	Credit Score > 600	Student Loan Balance	Has a Mortgage
Enrolled in HBCU	0.074**	0.078**	0.021**	0.005	8,562**	-0.004**
	(0.002)	(0.002)	(0.002)	(0.003)	(247)	(0.001)
Two-Year College	0.189**	0.073**	0.003	0.043**	4,240**	0.007**
	(0.003)	(0.003)	(0.002)	(0.003)	(315)	(0.002)
Four-Year College	0.260**	0.252**	0.078**	0.039**	12,914**	0.010**
	(0.003)	(0.003)	(0.002)	(0.004)	(381)	(0.002)
Avg. SAT of Enrolled College	0.052**	0.056**	0.017**	0.027**	2,972**	0.004**
	(0.001)	(0.001)	(0.001)	(0.001)	(106)	(0.001)
Observations	432,888	432,888	411,584	418,317	412,519	422,754
R-squared	0.239	0.280	0.216	0.120	0.144	0.060

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. Each regression has fixed effects for the Score Send portfolio interacted with SAT superscore, high school fixed effects, and cohort fixed effects, There are also controls for gender and parental income and education. No college is omitted and there is a dummy variable if average SAT of enrolled college is missing. Robust standard errors in parentheses. ** p<0.01, * p<0.05

Table 9: Heterogeneous Effects, by Counterfactual Enrollment

	Any Degree	BA Degree	Estimated Household Income	Credit Score > 600	Student Loan Balance	Has a Mortgage
			A. College Application Portfolio Below Median Portfolio Selectivity			
Enrolled in HBCU	0.161**	0.191**	0.070**	0.011**	13,868.845**	-0.004**
	(0.002)	(0.002)	(0.001)	(0.002)	(203.675)	(0.001)
			B. College Application Portfolio Above Median Portfolio Selectivity			
Enrolled in HBCU	0.077**	0.102**	0.031**	-0.016**	10,179.380**	-0.006**
	(0.002)	(0.002)	(0.002)	(0.003)	(283.227)	(0.001)
			C. Applied to One 4-Year College			
Enrolled in HBCU	0.200**	0.225**	0.075**	0.026**	16,686.600**	0.008**
	(0.006)	(0.006)	(0.005)	(0.007)	(720.422)	(0.004)
			D. Applied to at Least Two 4-Year Colleges			
Enrolled in HBCU	0.110**	0.137**	0.046**	-0.006**	11,447.877**	-0.006**
	(0.002)	(0.002)	(0.001)	(0.002)	(179.823)	(0.001)
			E. Applied to at Least Four 4-Year Colleges			
Enrolled in HBCU	0.089**	0.114**	0.034**	-0.013**	10,218.479**	-0.008**
	(0.002)	(0.002)	(0.001)	(0.002)	(237.720)	(0.001)
			F. Predicted Probability of Enrolling in 4-Year College Less Than 50%			
Enrolled in HBCU	0.165**	0.198**	0.097**	0.013**	16,677.819**	-0.005**
	(0.004)	(0.003)	(0.003)	(0.005)	(319.429)	(0.002)
			G. Predicted Probability of Enrolling in 4-Year College More Than 50%			
Enrolled in HBCU	0.112**	0.139**	0.042**	-0.004**	11,189.194**	-0.004**
	(0.002)	(0.002)	(0.001)	(0.002)	(197.710)	(0.001)
			H. Predicted Probability of Enrolling in 4-Year College More Than 90%			
Enrolled in HBCU	0.049**	0.060**	-0.000	-0.021**	6,804.789**	-0.001
	(0.004)	(0.004)	(0.003)	(0.004)	(611.266)	(0.003)

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. Each regression has fixed effects for the Score Send portfolio interacted with SAT superscore, high school fixed effects, and cohort fixed effects. There are also controls for gender and parental income and education. College application portfolio selectivity is the average selectivity across all colleges in the portfolio and selectivity is the average SAT of first-time enrollees as reported in IPEDS. Predicted probability of enrolling in a 4-year college is from a regression of enrolling in any 4-year college on all pre-college academic, demographic, and application portfolio measures. Robust standard errors in parentheses. ** $p<0.01$, * $p<0.05$

Table 10: Impact of Enrolling in HBCU on College Major

	Log (Major's 25th %-tile Earnings)	Log (Major's 50th %-tile Earnings)	Log (Major's 75th %-tile Earnings)	STEM Major
	All Students			
Enrolled in HBCU	0.059**	0.093**	0.123**	0.030**
	(0.001)	(0.001)	(0.002)	(0.001)
Observations	370,520	370,520	370,520	370,520
R-squared	0.121	0.136	0.140	0.076
	Degree Completers			
Enrolled in HBCU	0.015**	0.012**	0.006**	0.086**
	(0.002)	(0.001)	(0.002)	(0.003)
Observations	82,345	82,345	82,345	82,345
R-squared	0.104	0.100	0.096	0.138

Notes: Data include all self-identified Black SAT takers in the 2005-2010 high school graduating cohorts who send at least one SAT score to an HBCU. Regressions include controls for sex, parental income and education, SAT, SAT attempts, AP exams taken, cohort and high school fixed effects, and controls for score sending portfolio interacted with SAT scores. College majors only reported for degree completers. CIP code 25th. 50th, and 75th percentile earnings come from Post-Secondary Employment Outcomes data from Census Bureau. Non-enrollees and non-completers assigned no degree and the lowest CIP code median earnings.   Standard errors in parentheses. ** $p<0.01$, * $p<0.05$

Table 11: Heterogeneous Effects, by Student Demographics and SAT Score

|	Any Degree	BA Degree	Estimated Household Income	Credit Score > 600	Student Loan Balance	Has a Mortgage
			Women			
Enrolled in HBCU	0.128**	0.158**	0.053**	0.007**	13,198**	-0.003**
	(0.002)	(0.002)	(0.001)	(0.002)	(231)	(0.001)
			Men			
Enrolled in HBCU	0.108**	0.131**	0.046**	-0.015**	10,132**	-0.007**
	(0.003)	(0.002)	(0.002)	(0.003)	(257)	(0.002)
			Parental Income < $75,000			
Enrolled in HBCU	0.124**	0.155**	0.058**	-0.000	12,873**	-0.005**
	(0.002)	(0.002)	(0.002)	(0.003)	(240)	(0.001)
			Parental Income > $75,000			
Enrolled in HBCU	0.105**	0.128**	0.030**	-0.008*	9,672**	-0.006**
	(0.003)	(0.003)	(0.002)	(0.004)	(394)	(0.002)
			Students with SAT Below Median			
Enrolled in HBCU	0.171**	0.209**	0.079**	0.016**	15,381**	-0.004**
	(0.002)	(0.002)	(0.001)	(0.002)	(191)	(0.001)
			Students with SAT Above Median			
Enrolled in HBCU	0.065**	0.084**	0.020**	-0.019**	8,356**	-0.003*
	(0.002)	(0.002)	(0.002)	(0.003)	(297)	(0.002)

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. Each regression has fixed effects for the Score Send portfolio interacted with SAT superscore, high school fixed effects, and cohort fixed effects, There are also controls for gender and parental income and education. Robust standard errors in parentheses. ** p<0.01, * p<0.05

Table 12: Impact of Enrolling in HBCU, by College Attributes

	Any Degree	BA Degree	Estimated Household Income	Credit Score > 600	Student Loan Balance	Has a Mortgage
Enrolled in Public HBCU	0.117**	0.147**	0.047**	0.003	9,615**	-0.002*
	(0.002)	(0.002)	(0.001)	(0.002)	(192)	(0.001)
Enrolled in Private HBCU	0.123**	0.144**	0.056**	-0.015**	17,117**	-0.010**
	(0.002)	(0.002)	(0.002)	(0.003)	(259)	(0.001)
Enrolled in Two-Year HBCU	0.067**	-0.175**	0.013	-0.014	6,405**	0.004
	(0.012)	(0.011)	(0.008)	(0.013)	(1,263)	(0.007)
Enrolled in Four-Year HBCU	0.120**	0.150**	0.050**	-0.002	11,960**	-0.005**
	(0.002)	(0.002)	(0.001)	(0.002)	(173)	(0.001)
Enrolled in HBCU w/ Avg SAT < 1000	0.122**	0.149**	0.050**	-0.002	11,479**	-0.004**
	(0.002)	(0.002)	(0.001)	(0.002)	(177)	(0.001)
Enrolled in HBCU w/ Avg SAT > 1000	0.090**	0.111**	0.044**	-0.011*	16,401**	-0.013**
	(0.004)	(0.004)	(0.003)	(0.005)	(460)	(0.002)

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. For each outcome (columns), each panel is a single regression. Each regression has fixed effects for the Score Send portfolio interacted with SAT superscore, high school fixed effects, and cohort fixed effects, There are also controls for gender and parental income and education. Robust standard errors in parentheses. ** p<0.01, * p<0.05

Appendix Figure 1 - Distribution of Student SAT Score, by Selectivity of College Enrolled
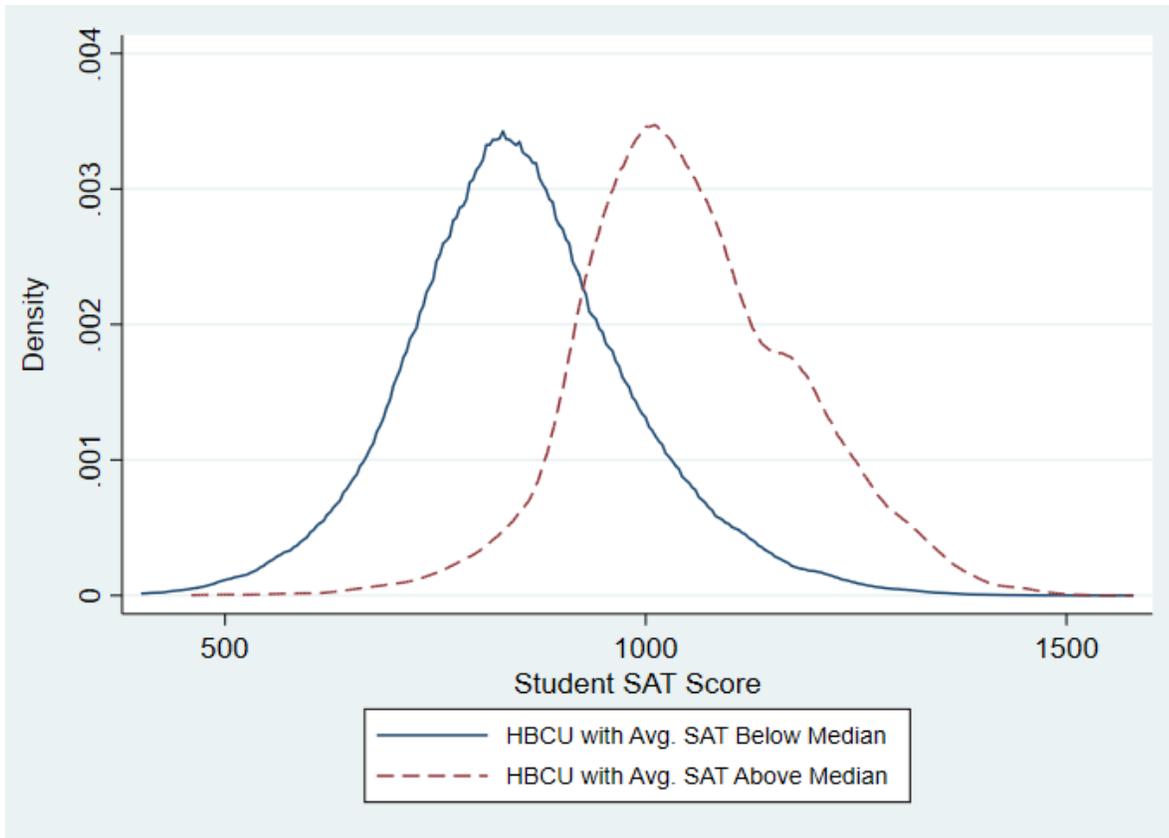
Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. Kernel density plots are student SAT super scores. HBCUs are split by the average SAT of enrollees, as reported by IPEDS in 2010.

Appendix Figure 2 - Unweighted Vs. Weighted Individual Coefficient Estimates - Outcome = BA
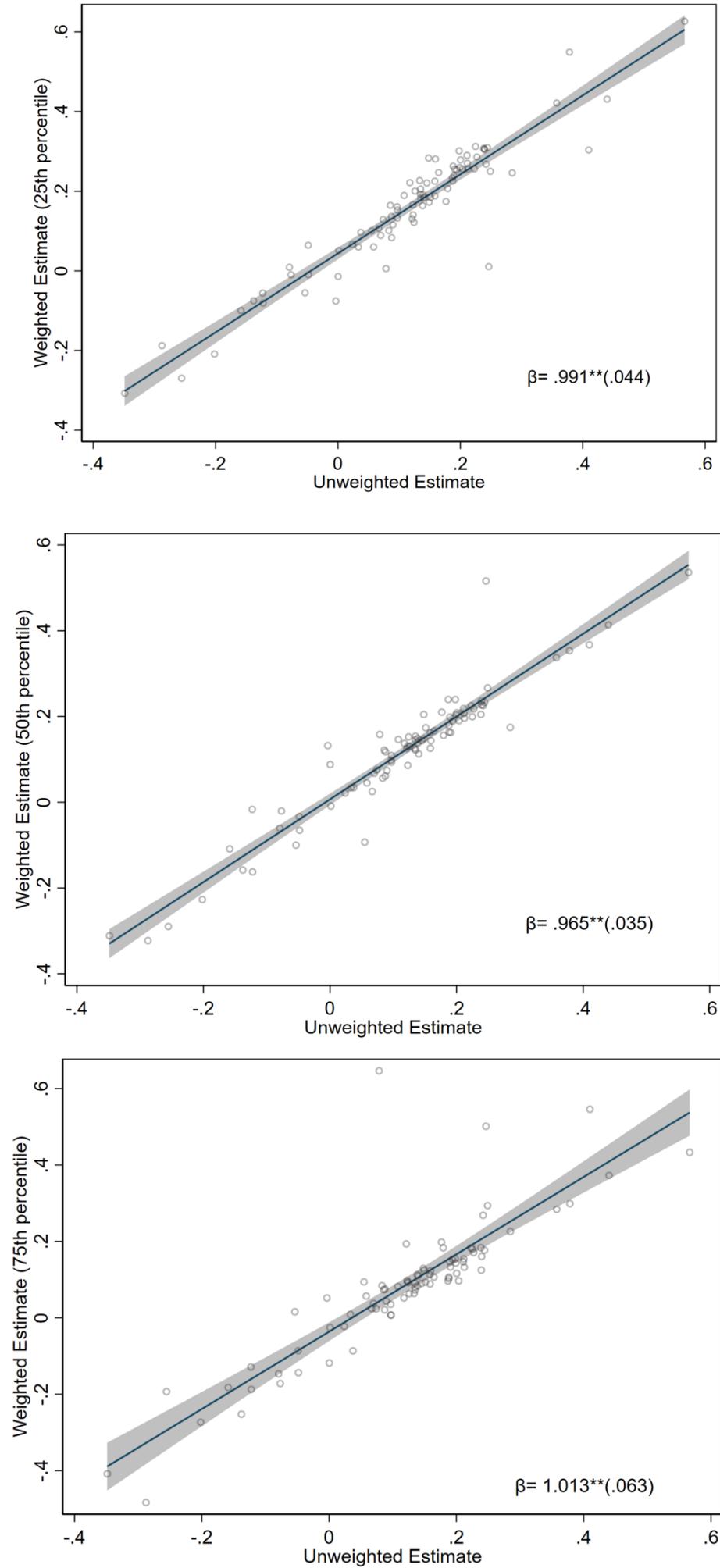

β= .991**(.044)

β= .965**(.035)

β= 1.013**(.063)

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. Each dot is the coefficient estimate for an individual HBCU from two separate regressions, weighted and unweighted. We regress BA completion on HBCU fixed effects while controlling for Score Send portfolios interacted with SAT superscore, high school fixed effects, and cohort fixed effects, gender and parental income and education. Weighted regressions are weighted by distance from students' SAT superscore distance from the 25th, 50th, or 75th percentile of the distribution. The solid is the linear prediction and the shaded line is the 95% confidence interval.

Appendix Figure 3 - Unweighted Vs. Weighted Individual Coefficient Estimates - Outcome = Log of Estimated Household Income
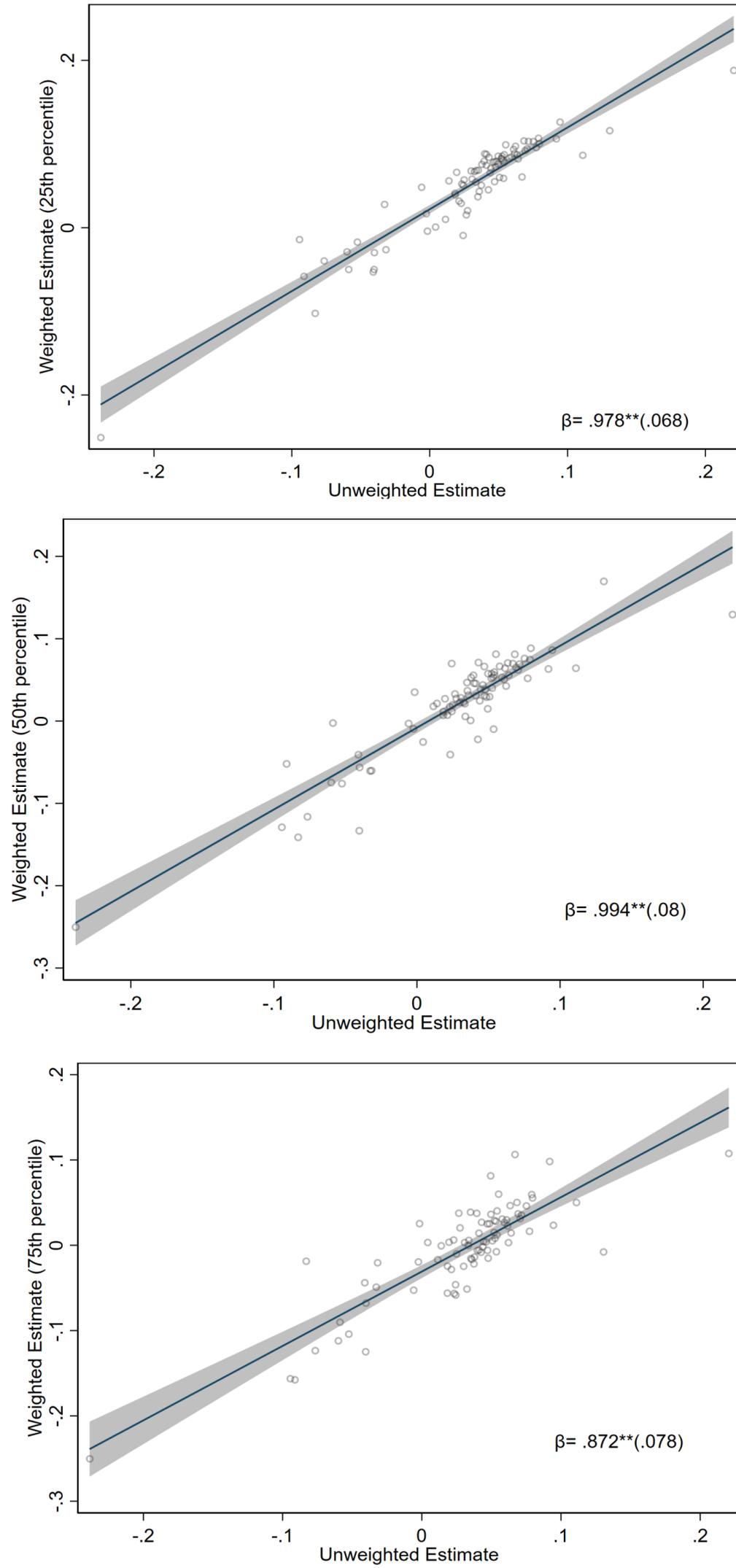

β= .978**(.068)

β= .994**(.08)

β= .872**(.078)

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. Each dot is the coefficient estimate for an individual HBCU from two separate regressions, weighted and unweighted. We regress logarithm of estimated household income on HBCU fixed effects while controlling for Score Send portfolios interacted with SAT superscore, high school fixed effects, and cohort fixed effects, gender and parental income and education. Weighted regressions are weighted by distance from students' SAT superscore distance from the 25th, 50th, or 75th percentile of the distribution. The solid is the linear prediction and the shaded line is the 95% confidence interval.

Appendix Table 1: College-Level Summary Statistics

	HBCUs (N = 96)	Non-HBCUs (N = 3,650)
All Colleges		
Public	0.52	0.55
Four-Year College	0.89	0.53
First-time, full-time undergrad enrollment	601.94	690.34
Total full-time undergrad enrollment	2452.43	2815.77
Open Access	0.33	0.36
Graduation Rate w/i 150% Time	0.31	0.47
Instructional expenditures per FTE student	7063.99	9097.15
Student services expenditures per FTE student	2381.58	2434.72
Academic and institutional support expenses per FTE student	9568.07	8432.21
Total instructional, student service, and support expenses per FTE stuc	18733.21	19650.87
Percent Black	0.85	0.11
Percent URM	0.87	0.25
Four-Year Colleges	(N = 85)	(N = 1,943)
Avg. SAT of Enrollees	863.63	1072.22
Number of Applications	4578.39	4909.94
Acceptance Rate	0.51	0.66
Yield Rate	0.35	0.42
Six-Year Graduation Rate	0.32	0.52
Instructional expenditures per FTE student	7290.18	10658.58
Student services expenditures per FTE student	2473.99	3124.32
Academic and institutional support expenses per FTE student	10072.95	10791.36
Total instructional, student service, and support expenses per FTE stuc	19498.44	24071.87

Notes: Data from 2010 IPEDS. Excludes for-profit colleges.

Appendix Table 2: Comparing College Board to Nationally Representative Data, 2004 Cohorts

	CB SAT Takers	Educational Longitudinal Study	
		SAT Takers	All
Female	0.572	0.524	0.488
Parental Education			
Parent No College	0.217	0.196	0.274
College No BA	0.330	0.407	0.414
College BA Plus	0.335	0.397	0.311
College Missing	0.118	0.000	0.000
Parental Income			
Income Less Than $50K	0.407	0.631	0.737
Income $50K - $100K	0.186	0.294	0.213
Income Greater than $100K	0.071	0.074	0.051
Income Missing	0.336	0.000	0.000
Number of SAT Score Sends/Ap	4.304	2.736	1.755
Enrolled in College	0.893	0.797	0.650
Enrolled in Four-Year College	0.601	0.556	0.298
AA Degree	0.056	0.096	0.076
BA Degree	0.339	0.375	0.203
N	1,020,687	958	2,020

Notes: Uses College Board SAT-takers in the 2004 high school graduating cohorts who identify as Black. College outcomes for CB data measured six years after high school graduation through National Student Clearinghouse. Educational Longitudinal Study is a nationally representative sample from the U.S. Department of Education's National Center for Education Statistics. We only use students who graduated high school on time in 2004.

Appendix Table 3: Covariate Balance Test

	Outcome = Predicted BA Degree	Outcome = Predicted Log Estimated Household Income
Enrolled in HBCU	0.020**	0.0072**
	(0.001)	(0.0003)
Observations	308027	294433
R-squared	0.502	0.668

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. Outcome is from an initial prediction of BA degree (and log estimated household income). Initial prediction regresses BA Degree (or log estimated household income) on all covariates (sex, parental income and education, initial SAT scores, cohort and high school fixed effects). The above coefficients are from regressions of the predicted outcome on HBCU enrollment and the students' application portfolio variables. Robust standard errors in parentheses. ** p<0.01, * p<0.05

Appendix Table 4 - Robustness Tests

Portfolio Controls:	(1) # of HBCU, # of Non-HBCU, Fraction HBCUs	(2) Non-linear # of HBCU, Non-linear # of Non-HBCU, Fraction HBCUs	(3) Col 2 + Mean, Min, and Max Avg SAT of Colleges	(4) Col 3 + Student SAT Interactions (Main Specification)	(5) Col 4, Only Obs with Exact Portfolio Match	(6) Portfolio Fixed Effects - Only Obs with Exact Portfolio Match	(7) Col 4, Only Obs with Exact Portfolio Interacted with Student SAT Match	(8) Portfolio Fixed Effects - Only Obs with Exact Portfolio Interacted with Student SAT Match
				Outcome = BA Degree				
Enrolled in HBCU	0.163**	0.163**	0.149**	0.146**	0.174**	0.141**	0.185**	0.166**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.007)	(0.011)
Observations	432,888	432,888	432,888	432,888	81,811	81,185	22,453	21,173
R-squared	0.200	0.201	0.208	0.220	0.240	0.435	0.277	0.606
				Outcome = Log Estimated Household Income				
Enrolled in HBCU	0.057**	0.057**	0.051**	0.050**	0.065**	0.047**	0.061**	0.038**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.005)	(0.007)
Observations	411,584	411,584	411,584	411,584	77,459	75,889	21,238	19,494
R-squared	0.187	0.187	0.190	0.198	0.221	0.419	0.291	0.632

Notes: Data include all self-identified Black SAT takers in the 2004-2010 high school graduating cohorts who send at least one SAT score to an HBCU. Regressions include controls for sex, parental income and education, SAT, SAT attempts, AP exams taken, cohort and high school fixed effects, and controls for score sending portfolio interacted with SAT scores. Estimated household income measured in 2017. Standard errors in parentheses. ** p<0.01, * p<0.05

Appendix Table 5: Impact of College Level and Selectivity

	Any Degree	BA Degree	Estimated Household Income	Credit Score > 600	Student Loan Balance	Has a Mortgage
Two-Year College	0.195**	0.080**	0.005**	0.043**	4,968.710**	0.007**
	(0.003)	(0.003)	(0.002)	(0.003)	(314.439)	(0.002)
Four-Year College	0.298**	0.292**	0.088**	0.041**	17,308.420**	0.008**
	(0.003)	(0.003)	(0.002)	(0.004)	(360.204)	(0.002)
Avg. SAT of Enrolled College	0.032**	0.036**	0.012**	0.026**	719.285**	0.005**
	(0.001)	(0.001)	(0.001)	(0.001)	(83.720)	(0.000)
Observations	432,888	432,888	411,584	418,317	412,519	422,754
R-squared	0.237	0.278	0.215	0.120	0.141	0.060

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. Each regression has fixed effects for the Score Send portfolio interacted with SAT superscore, high school fixed effects, and cohort fixed effects, There are also controls for gender and parental income and education. No college is omitted and there is a dummy variable if average SAT of enrolled college is missing. Robust standard errors in parentheses. ** p<0.01, * p<0.05

Appendix Table 6: Heterogeneous Effects, by Counterfactual Enrollment, Net of College Characteristics

	Any Degree	BA Degree	Estimated Household Income	Credit Score > 600	Student Loan Balance	Has a Mortgage
			A. College Application Portfolio Below Median Portfolio Selectivity			
Enrolled in HBCU	0.045**	0.043**	0.011**	-0.017**	5,457.879**	-0.008**
	(0.003)	(0.003)	(0.002)	(0.003)	(246.398)	(0.001)
			B. College Application Portfolio Above Median Portfolio Selectivity			
Enrolled in HBCU	0.001	-0.001	-0.003*	-0.028**	5,551.401**	-0.009**
	(0.003)	(0.002)	(0.002)	(0.003)	(313.099)	(0.002)
			C. Applied to One 4-Year College			
Enrolled in HBCU	0.010	-0.001	-0.000	-0.023**	6,196.273**	0.001
	(0.008)	(0.007)	(0.006)	(0.009)	(918.924)	(0.005)
			D. Applied to at Least Two 4-Year Colleges			
Enrolled in HBCU	0.017**	0.014**	0.002*	-0.026**	5,214.011**	-0.010**
	(0.002)	(0.002)	(0.001)	(0.002)	(203.746)	(0.001)
			E. Applied to at Least Four 4-Year Colleges			
Enrolled in HBCU	0.016**	0.015**	0.000	-0.028**	5,324.946**	-0.011**
	(0.003)	(0.002)	(0.002)	(0.003)	(262.604)	(0.001)
			F. Predicted Probability of Enrolling in 4-Year College Less Than 50%			
Enrolled in HBCU	0.037**	0.033**	0.020**	-0.011*	5,139.791**	-0.010**
	(0.005)	(0.004)	(0.004)	(0.006)	(400.337)	(0.003)
			G. Predicted Probability of Enrolling in 4-Year College More Than 50%			
Enrolled in HBCU	0.014**	0.011**	0.001	-0.026**	5,402.892**	-0.008**
	(0.002)	(0.002)	(0.001)	(0.002)	(223.804)	(0.001)
			H. Predicted Probability of Enrolling in 4-Year College More Than 90%			
Enrolled in HBCU	0.004	-0.003	-0.002	-0.023**	6,095.941**	-0.001
	(0.004)	(0.004)	(0.003)	(0.005)	(662.147)	(0.003)

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. Each regression has fixed effects for the Score Send portfolio interacted with SAT superscore, high school fixed effects, and cohort fixed effects, There are also controls for gender and parental income and education. College characteristics are indicators for 2-year and 4-year college and the average SAT of college enrollees. College application portfolio selectivity is the average selectivity across all colleges in the portfolio and selectivity is the average SAT of first-time enrollees as reported in IPEDS. Predicted probability of enrolling in a 4-year college is from a regression of enrolling in any 4-year college on all pre-college academic, demographic, and application portfolio measures. Robust standard errors in parentheses. ** p<0.01, * p<0.05

Appendix Table 7: Impact of Enrolling in HBCU, by College Selecitivty and Student SAT Score

	Any Degree	BA Degree	Estimated Household Income	Credit Score > 600	Student Loan Balance	Has a Mortgage
			All Students			
Enrolled in HBCU w/ Avg SAT < 1000	0.122**	0.149**	0.050**	-0.002	11,479**	-0.004**
	(0.002)	(0.002)	(0.001)	(0.002)	(177)	(0.001)
Enrolled in HBCU w/ Avg SAT > 1000	0.090**	0.111**	0.044**	-0.011*	16,401**	-0.013**
	(0.004)	(0.004)	(0.003)	(0.005)	(460)	(0.002)
			Students with SAT Scores Below Median			
Enrolled in HBCU w/ Avg SAT < 1000	0.174**	0.212**	0.080**	0.017**	15,619.723**	-0.004**
	(0.002)	(0.002)	(0.001)	(0.003)	(194.645)	(0.001)
Enrolled in HBCU w/ Avg SAT > 1000	0.199**	0.249**	0.113**	0.065**	24,064.406**	-0.006
	(0.020)	(0.018)	(0.013)	(0.022)	(1,694.317)	(0.010)
			Students with SAT Scores Above Median			
Enrolled in HBCU w/ Avg SAT < 1000	0.068**	0.089**	0.019**	-0.020**	7,390.429**	-0.002
	(0.003)	(0.003)	(0.002)	(0.003)	(302.316)	(0.002)
Enrolled in HBCU w/ Avg SAT > 1000	0.066**	0.081**	0.032**	-0.019**	14,077.615**	-0.013**
	(0.005)	(0.005)	(0.003)	(0.005)	(573.338)	(0.003)

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. For each outcome (columns), each panel is a single regression. Each regression has fixed effects for the Score Send portfolio interacted with SAT superscore, high school fixed effects, and cohort fixed effects, There are also controls for gender and parental income and education. Robust standard errors in parentheses. ** p<0.01, * p<0.05

Appendix Table 8: Share of Rejected t-tests on Individual HBCU Fixed Effects - Unweighthed Vs. Weighted Regressions

	Any Degree	BA Degree	Estimated Household Income	Credit Score > 600	Student Loan Balance	Has a Mortgage
Avg - 25th	0.372	0.430	0.447	0.176	0.400	0.024
Avg - 50th	0.058	0.070	0.059	0.024	0.024	0.000
Avg - 75th	0.395	0.454	0.471	0.106	0.341	0.012

Notes: Uses College Board test-takers in the 2004-2010 high school graduating cohorts who identify as Black. Each share compares the 86 individual HBCU fixed effects in a weighted versus unweighted regression. The columns show each outcome and controls include Score Send portfolios interacted with SAT superscore, high school fixed effects, and cohort fixed effects, gender and parental income and education.   Weighted regressions are weighted by distance from are students' SAT superscore distance from the 25th, 50th, or 75th percentile of the distribution. T-tests are calculated at the 5% level.