

## The Changing Consequences of Attending Historically Black Colleges and Universities<sup>†</sup>

By ROLAND G. FRYER, JR. AND MICHAEL GREENSTONE\*

*Using nationally representative data files from 1970s and 1990s college attendees, we find that in the 1970s matriculation at historically black colleges and universities (HBCUs) was associated with higher wages and an increased probability of graduation, relative to attending a traditionally white institution. By the 1990s, there is a wage penalty resulting in a 20 percent decline in the relative wages of HBCU graduates between the two decades. There is modest support for the possibility that the relative decline in wages associated with HBCU matriculation is partially due to improvements in TWIs' effectiveness at educating blacks. (JEL I23, J15, J24, J31)*

Historically black colleges and universities (HBCUs) have a proud and storied role in the education and progress of blacks in the United States. For nearly a century, HBCUs were practically the only institutions of higher learning open to blacks. Today, roughly 20 percent of all college-going blacks choose to attend one of the 103 HBCUs, and these institutions are responsible for 22 percent of current bachelor's degrees granted to blacks. W. E. B. Du Bois (Wilberforce College), Ralph W. Ellison (Tuskegee University), Martin Luther King, Jr. (Morehouse College), Thurgood Marshall (Lincoln University), Ruth J. Simmons (Dillard University), and Oprah G. Winfrey (Tennessee State University) headline a long list of famous HBCU alumni. Among blacks, 40 percent of all congressmen, 12.5 percent of chief executive officers (CEOs), 50 percent of professors at non-HBCUs, 50 percent of lawyers, and 80 percent of judges are HBCU graduates.<sup>1</sup>

HBCUs' successes are, in no small part, due to their substantial financial support from federal, state, and, to a lesser degree, local governments. Between 1977 and

\* Fryer: Department of Economics, Harvard University, 1805 Cambridge Street, Cambridge, MA 02138 (e-mail: rfrayer@fas.harvard.edu); Greenstone: Department of Economics, Massachusetts Institute of Technology, 50 Memorial Drive, E52-359, Cambridge, MA 02142 (e-mail: mgreenst@mit.edu). We are grateful to David Card, David Cutler, Bryan Graham, Chang-Tai Hsieh, Lawrence Katz, Henry Louis Gates, Jr., Edward Glaeser, Lani Gunier, Caroline Hoxby, Glenn Loury, Enrico Moretti, Andrei Shleifer, Lawrence Summers, colleagues at the Mellon Foundation, and participants in numerous seminars. We also thank three anonymous referees for detailed feedback that improved the paper. This paper makes use of the College and Beyond (C&B) database. The C&B database is a restricted-use database. Researchers who are interested in using the database may apply to the Andrew W. Mellon Foundation for access. Sam Schulhofer-Wohl, Sheldon Bond, Jörg Spenkuch, Elizabeth Greenwood, David Toniatti, Paul Torelli, and Katherine Penner provided exceptional research assistance. All errors are our own. Correspondence can be addressed to the authors.

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<sup>1</sup> The data sources are Congressional Black Caucus (congressmen), Black Enterprise (CEOs), US Department of Education, Office of Civil Rights (professors), and Ronald G. Ehrenberg (1996) (lawyers and judges).

2001, 61 percent to 73 percent of public HBCUs' revenues came from public funds. While numbers are smaller for private HBCUs, public support still accounts for nearly one-third of total revenues. In the years 1999–2001, total annual public support of HBCUs averaged roughly \$2.65 billion (2005\$) (Stephen Provasnik, Linda L. Shafer, and Thomas D. Snyder 2004).

Despite their past successes and historical importance, HBCUs are at a crossroads today. In *US v. Fordice*, 505 US 717 (1992), the Supreme Court instructed state legislatures to find “educational justification” for the existence of HBCUs or else integrate them. Doing the latter would completely alter the mission of HBCUs. In response, some HBCUs experienced a decline in enrollment, others pursued policies to dramatically increase the fraction of non-black students, and a number of HBCUs have seen critical declines in their financial standing.<sup>2</sup>

The Supreme Court's call for an “educational justification” is surely related to the absence of convincing evidence of the consequences of attending an HBCU for blacks. HBCU proponents claim that the schools provide an idyllic learning environment that is free from the pressures of discrimination and racism. It is also argued that HBCUs help to build important social capital by engendering a strong sense of communal responsibility and civic consciousness while providing networking opportunities for high-achieving blacks (Henry N. Drewry and Humphrey Doermann 2001). If these arguments are correct, then HBCUs offer unique opportunities for educational and social development of black students, and the support for remaining segregated seems justified.

However, it is possible that HBCUs are inferior to traditionally white institutions (TWIs) in preparing blacks for post-college life. If students are taking less challenging courses from less distinguished faculty, have access to poorer resources, or are not investing in the social skills necessary to interact with diverse sets of people, then graduates will perform poorly in the labor market and have inferior non-labor market outcomes. In this scenario, the case for supporting HBCUs with public resources appears weak.

This paper empirically assesses the consequences of HBCU attendance so that future decisions by governments, students, and parents are based on evidence rather than theories and historical anecdotes. We analyze three large datasets with adequate pre- and post-college information for blacks that identify the students' choice of college and whether it is an HBCU. The datasets are: the National Longitudinal Survey of the High School Class of 1972 (NLS-72), Baccalaureate and Beyond (B&B), and the College and Beyond database (C&B). The first two datasets provide a snapshot of a nationally representative sample of HBCU students at two points in time: 1972 and 1992. The third dataset contains four specific HBCUs (Howard University, Morehouse College, Spelman College, and Xavier University), allowing

<sup>2</sup> The ruling had an adverse effect on many HBCUs. Alcorn State University experienced a 9.9 percent drop in enrollment and Mississippi Valley State University experienced a 20.1 percent drop in enrollment. Other HBCUs, especially in North Carolina, have shown substantial increases in integration. Elizabeth City State University increased from 11 percent white enrollment in 1980 to 23.7 percent in 1998, Fayetteville State increased in white enrollment from 11.9 to 22.2, NC Central increased in white enrollment from 4.1 to 13.4, and Winston Salem State University increased in white enrollment from 11.3 to 18.0. In other states, such as Florida, the ruling has been largely ignored. Enrollment at Florida A&M University remains 90 percent black.

us to take a focused look into the most elite HBCUs in 1976 and 1989. Although there are important limitations with each of these datasets, together, they provide a rich portrait of the changing labor market and non-labor market consequences of HBCU attendance. Importantly, these datasets sample college matriculates in the 1970s and 1990s, so it is possible to assess how these consequences changed during these two decades of dramatic social change.

Together the nationally representative NLS and B&B reveal an important change in the returns to HBCU attendance. In the 1970s, HBCU matriculation was associated with higher wages and an increased probability of graduation, relative to attending a TWI. By the 1990s, however, there is a substantial wage penalty. Overall, there is a 20 percent decline in the relative wages of HBCU graduates over just two decades. Interestingly, relative pre-college measures of student quality (e.g., SAT scores) improved among HBCU attendees during this period, so higher achieving students were increasingly choosing these schools while the returns gained from attending them were falling behind.

These results are robust across four separate statistical approaches to adjust for pre-college differences between HBCU and TWI attendees. We begin by using the rich set of covariates on family background and high school academic achievement (including SAT scores) to fit least squares models. We use the same pre-college covariates to implement a propensity-score matching estimator to assess the robustness of the results to functional-form assumptions about the observables. These approaches are supplemented by methods that are designed to account for selection bias due to missing outcome observations (James J. Heckman 1979), and bias that emerges when colleges admit students based, in part, on characteristics unobserved in our data that are positively correlated with future outcomes (Stacy Berg Dale and Alan B. Krueger 2002). Despite the robustness of the result across these methods, the absence of a randomized experiment, or credible quasi-experiment, means that thorny issues of selection may remain. Consequently, we urge caution in interpreting the results as causal.

The underlying source of the decline in HBCU performance is unlikely to be important for policy reasons, given the high court's stance. Nevertheless, understanding it would be of considerable interest to researchers and educational practitioners. The data fail to contradict or, in at least one specification, support the possibility that the relative decline of HBCUs is partially due to improvements in the effectiveness of educating blacks at TWIs. In contrast, the data contradict a number of intuitive explanations for the decline in outcomes among HBCU attendees, for example, educational expenditures per student increased *more* at HBCUs than at TWIs between the 1970s and 1990s.

We supplement the analysis of these nationally representative data files with an analysis of the C&B, which provides a rare opportunity to assess the most elite colleges. Here, too, there is evidence of a wage decline between the 1976 and 1989 cohorts, but it should only be considered suggestive, as these estimates are imprecise. There is stronger evidence that the later HBCU matriculates were less satisfied with their choice of college and self-reported developing fewer leadership and social skills that are valuable in post-college life, relative to TWI students. On the other hand, the later cohort was significantly more likely to be involved in political activities, and marginally more likely to give to national charities.

The paper proceeds as follows. Section I provides a brief history of HBCUs and their important role in the education of blacks in the United States. Section II reviews some theoretical explanations for why blacks might benefit (or be harmed) by attending an HBCU. Section III presents the data and summary statistics. Sections IV and V report results on the changing consequences of HBCU attendance. Section VI summarizes the differences between the results from the 1970s and 1990s, and assesses alternative explanations for these differences. Last, Section VII concludes. A Web Data Appendix describes the details of our sample construction.

## I. A Brief History of HBCUs

### A. Antebellum Period

The 1860 census counted 4.4 million black people in the United States, most of whom lived in the southern states and were held as slaves. Prior to the end of the Civil War, teaching slaves to read or write was prohibited by law (or social custom) in many areas of the south. Even so, there were three black colleges founded before the Civil War: the Institute for Colored Youth (now known as Cheney University) was founded in Pennsylvania in 1837, Lincoln College in Pennsylvania was founded in 1854, and Wilberforce College in Ohio was founded in 1856. All of these universities served secondary and post-secondary students. Formal education for most blacks would not become available until after the Civil War, when the Freedmen's Bureau, black communities and their churches, and private philanthropists organized schools for blacks (John J. Donohue III, Heckman, and Petra E. Todd 2002).

### B. Post-Civil War and the Second Morrill Land Grant

During the period immediately following the Civil War, there was a dramatic increase in the number of educational institutions geared toward blacks, funded primarily through groups like the American Missionary Association, the Freedmen's Bureaus, and southern state governments, especially during the Reconstruction period. Between 1865 and 1890, over 200 private black institutions were founded in the south. Very few of these early institutions awarded bachelor's degrees. The American Missionary Association, the Freedmen's Bureaus, and other groups that were active in the early education of freed blacks, played a large role in establishing some standard of education—most notably, literacy—that would be important when degree-granting institutions for blacks opened en masse in the 1890s.

Most public HBCUs trace their history to the second Morrill Act, passed in August 1890. Over the next decade, 16 HBCUs opened their doors. The Morrill Act allowed for the creation of a two-tier system of land-grant universities, with southern and border states creating HBCUs primarily to gain access to federal funds in order to develop white land-grant colleges. These HBCUs were largely limited to vocational training. Well-known agricultural, mechanical, and technical institutions, such as North Carolina A&T and Florida A&M, were founded during this period.

By 1895, public HBCUs had awarded 1,100 college diplomas to black students. Yet, a liberal arts education, as was offered at many public white institutions, remained

unavailable to black students. During the Jim Crow era that followed Reconstruction in the south, educational opportunities for white students expanded, and blacks were almost completely excluded from white institutions.

In the 1896 decision, *Plessy v. Ferguson*, 163 US 537 (1896), the two-tier system of higher education—based on the incentive structure in the second Morrill Act—became more firmly set. As a result, HBCUs began to become institutions that primarily trained teachers to teach in segregated public schools. The rapid expansion of black high schools in southern urban areas set in motion a supply-demand chain in which the sudden availability of teaching positions, supported by state treasuries, drew more black students into HBCUs (Julian B. Roebuck and Komanduri S. Murty 1993). There became an interdependence between the public school system and HBCUs.

### C. World War II and the Higher Education Act of 1965

HBCUs, as well as other institutions of higher learning, faced a funding crisis in the 1940s due to the budget cuts in education funding brought on by World War II (WWII). In 1944, the United Negro College Fund was established, raising \$765,000 for HBCUs in its first funding campaign (three times as much as had been raised by the individual colleges in the previous three years combined).

The landmark decision in *Brown v. Board of Education*, 349 US 294 (1955), and the legislation developed to implement it, improved the plight of many HBCUs. Title III of the Higher Education Act of 1965, which was devoted to “Strengthening Developing Institutions,” was interpreted as primarily referring to HBCUs. As a result, many HBCUs benefited greatly from the federal funds provided under Title III, funds that could be used for faculty and student exchanges, faculty improvement and visiting scholars programs, curriculum improvements, student services, and administrative improvements.

Despite the material gains to the HBCUs from the Higher Education Act, the NAACP continued a legal strategy of attacking the two-tier educational system, asking the US 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. In the 1973 case *Adams v. Richardson*, 356 F. Supp. 92 (D.D.C.), modified and aff’d, 480 F.2d 1159 (D.C. Cir. 1973), the NAACP won. States were required to develop desegregation strategies that would allow for a better racial mix of students, faculty, and staff in public colleges, and increase the access and retention of minorities at all levels of higher education. The ruling was primarily aimed at non-HBCUs, however, and the court made it clear that fulfilling the ruling’s mandate should not be accomplished at the expense of, or detriment to, traditionally black colleges.

The decision in *Adams v. Richardson* increased funding for HBCUs because it stated that states could not meet their mandates by closing HBCUs, and that they must include “yardsticks” to measure the improvement of facilities and academic programs at black colleges. The Court’s reasoning was that this was the only way possible to ensure that HBCUs would become desirable institutions for white students.

#### D. *The Unintended Consequences of US v. Fordice*

On June 26, 1992, the Supreme Court decided *US v. Fordice*, a case brought by a black litigant with the chief aim of removing structural differences between HBCUs and TWIs. The plaintiff, represented by the NAACP, was concerned about the disparity in the number and quality of academic programs, instructional staff, and physical plant facilities. The argument was that this resulted from the “historically operated racially segregated dual systems of higher education.” The court ruled that it would be wasteful to maintain the two-tier system that had been erected during an era of de jure segregation, noting that Mississippi had 8 institutions, 5 white and 3 black, and that 4 of them (2 white and 2 black) were within 25 miles of one another. The decision was a victory for civil rights lawyers, ordering Mississippi and 18 other southern states to do more to integrate its HBCUs and TWIs.

However, the ruling had an adverse effect on HBCUs because the court ordered state legislatures to find “educational justification for the continued existence” of the parallel education systems. The consequences of this ruling for the future of HBCUs is unclear at this point, but at least three outcomes seem possible: a decision that HBCUs are indispensable for the education of blacks and an increase in public funding; increased recruitment and matriculation of white students, which has the potential to undermine the unique mission and culture of these institutions; or a decision that HBCUs are no longer necessary (or as necessary), and a commensurate reduction in public financial support.

The remainder of the paper assesses, empirically, the consequences of attending HBCUs, which will help determine their “educational justification.”

## II. Conceptual Framework

There are at least three theories as to why blacks would benefit from the racial segregation of institutions of higher education. First, Beverly Daniel Tatum (1997) argues that racial grouping is a developmental process in response to racism. This argument suggests that segregation by race is a positive coping strategy that allows individuals to gather support through shared experiences and mutual understanding. Second, William J. Wilson’s (1987) pioneering study of the South Side of Chicago argues that the migration of talented blacks from black neighborhoods had adverse effects on the individuals left behind. A similar phenomenon may exist for segregation across schools—low-ability blacks may benefit from segregation through more intensive interactions with their high-ability peers. Third, segregated social connections within schools may also reduce adverse peer interactions resulting from interracial contact. Fryer (2008) shows that racial differences in the social price of academic achievement are exacerbated in environments with more interracial contact.

There are also several theories as to why racial segregation across colleges and universities may harm blacks. A well-developed literature emphasizes the importance of peer groups (James Samuel Coleman 1966), social interactions (Anne C. Case and Lawrence F. Katz 1991; David M. Cutler and Edward L. Glaeser 1997), and network externalities (George J. Borjas 1995; Edward P. Lazear 1999), especially

for youths. Many argue that these effects are important in the formation of skill and values, and the development of human and social capital. Moreover, segregation across schools may lead to the development of an “oppositional culture” and the enforcement of other negative behavioral norms (Signithia Fordham and John U. Ogbu 1986). Additionally, segregation across schools can prevent positive spillovers between racially defined peer groups (Lazear 1999).

A final disadvantage of the separation of racial groups across universities concerns the importance of interracial contact in mediating stereotypes and promoting understanding and tolerance. Interracial interaction generally leads to positive sentiment (George C. Homans 1950), and fosters the creation of “bonding” and “bridging” capital (Mark S. Granovetter 1973; Robert D. Putnam 2000).

It is impossible to identify the separate impact of each of these channels on the well-being of segregated blacks with the available datasets. Instead, this paper’s goal is to produce reliable estimates of the net impact of HBCU attendance. The resulting “reduced form” estimates will likely reflect a number of the channels specified in this section.

### III. Data Sources and Summary Statistics

We analyze three large datasets: NLS-72, B&B, and the C&B database. These datasets were chosen because they contain detailed information on pre-college academic performance, family background, college entry decisions, performance while in college, and later life outcomes.<sup>3</sup> Throughout the analysis, the rich set of pre-college and family background variables is used as conditioning variables to adjust for observable differences between HBCU and non-HBCU matriculates in equations for the other variables. This section discusses each of these sources and presents summary statistics from them.

Before proceeding to this material, Appendix Table 1 provides some summary statistics on the 89 four-year HBCUs in the United States. Forty-nine of them are private institutions. They are predominantly located in the south. Together, their undergraduate enrollment in fall 2005 was 238,911, and there were an additional 37,151 graduate students enrolled. The 14 historically black two-year colleges are not included in this table.

#### A. *The National Longitudinal Survey of the High School Class of 1972*

The NLS-72 is a nationally representative sample of 23,451 high school seniors in 1972. Participants in the sample were selected in the spring of 1972, and in a supplementary sample drawn in 1973. The data include a base year survey, and follow-up surveys in 1973, 1974, 1976, 1979, and 1986. Our analysis is focused on outcomes in the last (1986) follow-up, which provide an opportunity to observe respondents after they have

<sup>3</sup> Two other datasets collected by the National Center for Education Statistics, the National Educational Longitudinal Study 2000 (NELS) and the Beginning Postsecondary Study (BPS), are equipped to answer some of the questions posed here. Unfortunately, however, these datasets do not track individuals long enough after college completion to be useful for understanding outcomes later in life.

largely completed post-secondary schooling. Roughly 1,300 high schools are included in the sample, with an average of 18 students per school in the study. We restricted the sample to individuals who reported attending at least one four-year college.

A wide range of data is gathered on the students in the study, as described in detail at the NLS-72 Web site (<http://nces.ed.gov/surveys/nls72>). There is detailed information on each student's family environment, parents' education and occupation, socio-economic status, and the pre-college characteristics of each student (i.e., high-school grades, college admission scores, and so on). There are also detailed records from post-secondary transcripts, collected in 1984, and high school records. Important for our purposes, a six-digit identification number was assigned to educational institutions by the Federal Interagency Committee on Education (FICE) to distinguish post-secondary schools that qualified as institutions of higher learning from those that did not. These codes are crucial in defining HBCUs, and ensuring that this definition is consistent across datasets.

### *B. Baccalaureate and Beyond*

The B&B is a nationally representative sample of 11,192 degree-completers from 648 American colleges and universities in the 1992–1993 academic year. To identify a random sample of degree completers, B&B uses the National Postsecondary Student Aid Study as a base. The National Postsecondary Student Aid Study is a large nationally representative sample of colleges and universities, students, and parents.

A considerable amount of data is gathered on the students in the study, as described in detail on the B&B Web site (<http://nces.ed.gov/surveys/b&b>). It contains detailed information on pre-college characteristics of each student, information about their parents and home environment, and financial aid information. Follow-up surveys were administered in 1994, 1997, and 2003. These follow-up surveys include information on employment and entry into graduate school. We focus on the responses to the 1997 survey, which takes place after most students are in the workplace. We had planned to use the 2003 data more extensively, but we generally found it to be of poor quality on the dimensions we cared about most. For example, the original 2003 sample of black respondents attrited by 25 percent, compared to just 6 percent in the 1997 sample. And, this attrition was largely from black students in TWIs.

There is one important difference between the B&B and the other datasets we employ. The NLS and C&B begin with samples of students in the freshmen year of a four-year college. The B&B samples degree *completers*, which can introduce bias if graduation rates between HBCUs and non-HBCUs differ substantially. Whenever the results from this survey differ from those of the other datasets, we note whether it is due to this difference in sampling frames. A convenient way to handle this is to restrict the sample in our other datasets to degree completers, which we do throughout.

### *C. The College and Beyond Database*

The C&B contains student-level administrative data on 93,660 full-time students who entered (but did not necessarily graduate from) 34 colleges and universities



in the fall of 1951, 1976, and 1989. These institutional records were linked to an extensive survey conducted by The Andrew W. Mellon Foundation between 1995 and 1997, and to files provided by the College Entrance Examination Board and the Higher Education Research Institute. There are four HBCUs in the database—Xavier University, Morehouse College, Spelman College, and Howard University. These schools are commonly known to be the most elite of the HBCUs. The 1976 cohort contains data on all four colleges. The 1989 cohort only includes Morehouse College and Xavier University.<sup>4</sup> The final dataset consists of black students from 34 colleges and universities including the four elite HBCUs. The sample consists of 2,125 students in 1976 and 1,785 in 1989.

The C&B data are remarkably rich, containing information drawn from students' applications and transcripts, SAT and American College Test (ACT) scores, as well as information on family demographic and socioeconomic status. This information was attained by linking the institutional files of the 34 colleges and universities with data provided by the College Entrance Examination Board and the Higher Education Research Institute. Importantly, the C&B survey includes the responses to a questionnaire administered to all three cohorts in 1996 that provide detailed information on post-college labor market, life satisfaction, and other outcomes. The response rate to the 1996 questionnaire was approximately 80 percent. The C&B survey is described in greater detail in William G. Bowen and Derek Bok (1998).

#### D. Summary Statistics

Summary statistics for the variables in our core specification are displayed in Tables 1A and 1B for black students in the three datasets described above, according to whether or not they attend an HBCU or TWI. Students who are missing data on race, or the college they attended, are dropped from the sample.

Tables 1A and 1B consist of five sets of columns. The first column provides summary statistics for students in the NLS-72 whose first college was an HBCU versus a TWI, where "first college" is defined as the first four-year college a student attends. An individual who attends a junior college or technical school, and then attends an HBCU, is considered to have the HBCU as his first college. The second column restricts the sample to those who completed a bachelor's degree, allowing one to make direct comparisons with B&B for which descriptive statistics are displayed in column 3. Columns in Table 1B provide means of the variables for students in the C&B database for the 1976 and 1989 cohorts, respectively.<sup>5</sup>

Across all our datasets, blacks attending TWIs tend to have substantially higher academic credentials. In the NLS-72, SAT and ACT scores of blacks in TWIs are roughly one standard deviation higher. Yet, blacks attending HBCUs have slightly higher GPAs than their peers who attend TWIs (2.86 compared to 2.83), suggesting that these students attend less academically challenging high schools. Students in HBCUs are more likely to attend private high schools. Similar patterns emerge in

<sup>4</sup> All forthcoming results have been run by restricting the 1976 cohort to Morehouse College and Xavier University to ensure that any differences that emerge cannot be explained by different samples in the two cohorts.

<sup>5</sup> The C&B 1976 data used to construct the summary statistics in Table 1B contain all four HBCUs available.

TABLE 1A—SUMMARY STATISTICS OF BLACK STUDENTS DATA FILES (NLS AND B&amp;B)

Dataset Definition of HBCU	NLS (1972)		NLS (1972)		B&B (1997)	
	First college		Bachelor's degree college		Bachelor's degree college	
	HBCU	TWI	HBCU	TWI	HBCU	TWI
<i>Pre-college academic background</i>						
SAT combined	661.77 (114.84)	788.85 (172.68)	677.78 (120.23)	805.60 (198.57)	768.62 (197.61)	832.14 (183.37)
ACT composite	12.60 (4.09)	15.13 (4.80)	13.43 (4.90)	15.93 (4.84)	16.52 (4.37)	18.87 (5.39)
High school GPA	2.86 (0.58)	2.83 (0.65)	2.98 (0.55)	2.88 (0.64)		
Private high school	0.158	0.073	0.238	0.082	0.062	0.207
<i>Pre-college personal and family background</i>						
Female	0.707	0.630	0.737	0.587	0.721	0.639
Family income (1972\$):						
<\$3,000	0.198	0.233	0.187	0.116	0.256	0.236
\$3,000–\$5,999	0.215	0.183	0.221	0.159	0.174	0.133
\$6,000–\$8,999	0.325	0.261	0.376	0.339	0.185	0.146
≥\$9,000	0.262	0.323	0.215	0.386	0.385	0.485
Father's education						
< bachelor's	0.950	0.867	0.972	0.793	0.572	0.742
= bachelor's	0.033	0.080	0.026	0.140	0.247	0.141
> bachelor's	0.017	0.053	0.002	0.067	0.181	0.117
Mother's education						
< bachelor's	0.925	0.914	0.939	0.886	0.573	0.740
= bachelor's	0.038	0.052	0.045	0.067	0.192	0.134
> bachelor's	0.037	0.034	0.016	0.047	0.235	0.126
South	0.866	0.389	0.873	0.340	0.709	0.494
Rural	0.162	0.089	0.167	0.078	—	—
<i>Post-high school outcomes</i>						
Income	12.82 (35.70)	10.55 (8.59)	14.46 (45.52)	11.38 (7.70)	7.68 (3.06)	9.12 (3.88)
ln(income)	2.16 (0.61)	2.21 (0.52)	2.20 (0.62)	2.32 (0.46)	1.97 (0.37)	2.14 (0.38)
Physical science major	0.074	0.025	0.051	0.040	0.139	0.083
Biological science major	0.075	0.103	0.077	0.101	0.075	0.146
Business major	0.183	0.333	0.191	0.324	0.317	0.245
Attended graduate school	0.321	0.197	0.492	0.347	0.361	0.299
Received graduate degree	0.104	0.128	0.183	0.220	0.096	0.097
Received bachelor's degree	0.648	0.560	1.000	1.000	1.000	1.000
Treated unfairly in job because of race	0.211	0.212	0.214	0.159	—	—
Employed full time	0.823	0.946	0.762	0.937	0.914	0.954
Satisfied with life	0.735	0.815	0.660	0.924	—	—
Would choose same college again	—	—	—	—	—	—
College developed ability to get along with other races (1–5 scale)	—	—	—	—	—	—
Fraction black in zip code	—	—	—	—	—	—
Participates in political activities	—	—	—	—	—	—
Participates in religious activities	—	—	—	—	—	—
Participates in civil rights activities	—	—	—	—	—	—
Participates in social service activities	—	—	—	—	—	—
Participates in alumni activities	—	—	—	—	—	—
Participates in national charity	—	—	—	—	—	—
<i>Sample size details</i>						
Observations	260	364	164	224	172	415
Number with missing values for at least one variable	259	360	164	219	172	415
Number with missing values for wages	57	71	32	48	48	113

Notes: The entries report the means of variables listed in the row headings. For SAT combined, ACT composite, high school GPA, income, we also report the standard deviation in parentheses. The NLS and B&B income variables are hourly wages reported in 1986 and 1997, respectively. The income and ln(income) variables are reported in 1982–1984 dollars using the CPI-Urban.

TABLE 1B—SUMMARY STATISTICS OF BLACK STUDENTS DATA FILES (C&amp;B)

Dataset Definition of HBCU	C&B (1976)		C&B (1989)	
	First college		First college	
	HBCU	TWI	HBCU	TWI
<i>Pre-college academic background</i>				
SAT combined	795.50 (161.29)	973.11 (171.39)	891.58 (154.94)	1,043.18 (164.37)
ACT composite	12.64 (4.21)	21.17 (4.74)	18.73 (4.55)	22.30 (3.72)
High school GPA	3.03 (0.51)	3.40 (0.44)	3.15 (0.54)	3.42 (0.41)
Private high school	0.214	0.312	0.248	0.300
<i>Pre-college personal and family background</i>				
Female	0.566	0.602	0.390	0.615
Family income (1972\$):				
<\$3,000	0.132	0.086	0.098	0.071
\$3,000–\$5,999	0.182	0.149	0.148	0.101
\$,6000–\$8,999	0.202	0.230	0.082	0.092
>=\$9,000	0.484	0.535	0.672	0.735
Father's education				
< bachelor's	0.708	0.606	0.443	0.565
= bachelor's	0.197	0.265	0.317	0.240
> bachelor's	0.095	0.129	0.240	0.194
Mother's education				
< bachelor's	0.670	0.611	0.376	0.554
= bachelor's	0.234	0.273	0.333	0.298
> bachelor's	0.096	0.116	0.290	0.149
South	0.622	0.236	0.676	0.237
Rural	—	—	—	—
<i>Post-high school outcomes</i>				
Income	33,145 (26,288)	39,768 (32,222)	16,247 (11,460)	18,634 (17,450)
ln (income)	10.11 (0.93)	10.26 (1.01)	9.28 (1.20)	9.42 (1.17)
Physical science major	0.147	0.127	0.268	0.146
Biological science major	0.212	0.144	0.284	0.107
Business major	0.185	0.078	0.263	0.085
Attended graduate school	0.538	0.648	0.482	0.522
Received graduate degree	0.314	0.482	0.404	0.440
Received bachelor's degree	0.782	0.896	0.815	0.913
Treated unfairly in job because of race	—	—	—	—
Employed full time	0.571	0.669	0.580	0.574
Satisfied with life	0.829	0.829	0.810	0.791
Would choose same college again	0.670	0.543	0.653	0.657
College developed ability to get along with other races (1–5 scale)	3.608 (1.262)	3.561 (1.288)	3.468 (1.372)	3.947 (1.197)
Fraction black in zip code	0.597	0.565	0.532	0.345
Participates in political activities	0.302	0.290	0.389	0.241
Participates in religious activities	0.628	0.551	0.611	0.491
Participates in civil rights activities	0.517	0.513	0.600	0.523
Participates in social service activities	0.229	0.272	0.331	0.303
Participates in alumni activities	0.351	0.353	0.471	0.425
Participates in national charity	0.358	0.360	0.422	0.323
<i>Sample size details</i>				
Observations	983	1,142	623	1,162
Number with missing values for at least one variable	983	1,142	623	1,162
Number with missing values for wages	20	123	12	14

Notes: The entries report the means of variables listed in the row headings. For SAT combined, ACT composite, high school GPA, income, and "college developed ability to get along with races," we also report the standard deviation in parentheses. The C&B income variables are annual income reported in 1995 for the 1976 sample, and in 1996 for the 1989 sample. The income and ln (income) variables are reported in 1982–1984 dollars using the CPI-Urban.

the B&B, though the differences in academic credentials between HBCU and non-HBCU students are less pronounced. A portion of the difference between the NLS-72 and B&B can be explained by the different sample restrictions.

In the 1976 and 1989 cohorts of C&B, the GPAs of black students in HBCUs are 0.73 and 0.5 standard deviations lower than black students at TWIs, respectively. SAT and ACT scores of HBCU students are more than one standard deviation behind black students in non-HBCUs. In these data, students who attend HBCUs are less likely to have attended a private high school.

The “Pre-college personal and family background” variables provide measures for the home environments in which students were reared. These variables include family income (measured in 1972 dollars), parental education, and whether a student attended high school in a rural area or in the southern United States. The definition of income differs slightly between datasets. In NLS-72, students were asked, “What is the approximate income before taxes of your parents (or guardian)? Include taxable and non-taxable income from all sources.” For B&B, we used family income in 1991 for students that were dependents of their parents, and the student’s own taxed and untaxed income for those who were not dependents.<sup>6</sup> For C&B, family income is derived from the HERI student survey. The CPI-U was used to convert all income measures to 1972 dollars.

It is apparent that there are important observable differences between blacks who attend HBCUs and those who attend TWIs. The subsequent analysis uses a variety of statistical approaches to adjust for these differences.<sup>7</sup>

The third panel reports on many of the outcome variables. These include income (reported as hourly wage), choice of major, whether or not a student received their bachelor’s degree, attended graduate school, or obtained a graduate degree, and variables designed to measure college experiences, and job and life satisfaction. In the raw data, blacks who attend HBCUs tend to make less money than blacks who attend TWIs, with one exception, NLS-72, which is due to a single outlier observation.<sup>8</sup> They are also less likely to be employed full time and more likely to be dissatisfied with life. HBCU students are more likely to major in physical sciences.

In the two nationally representative samples, black students at HBCUs are more likely to receive a bachelor’s degree and attend graduate school (though they are less likely to graduate). Black students in the elite HBCUs are more likely to major in biological sciences (this is driven in large part by Xavier University, which has a storied reputation for premedical studies) and business, less likely to receive a bachelor’s degree

<sup>6</sup> For students who were their parents’ dependents in 1991, total family taxed and untaxed income was obtained, in order of priority, from the student’s financial aid application, a telephone interview with parents, a telephone interview with the student, the student’s Pell Grant file, or the student loan file. For students that were not their parents’ dependents, the information was obtained, in order of priority, from the financial aid application, the student’s phone interview, the student’s Pell Grant file, or the student loan file.

<sup>7</sup> For analysis of the attendance margin, see Ehrenberg, Donna S. Rothstein, and Robert B. Olsen (1999) or Fryer and Greenstone (2007).

<sup>8</sup> In the NLS-72, the average hourly wage is \$12.82 (\$14.46) for HBCU attendees (graduates) and \$10.55 (\$11.38) for TWI attendees (graduates). The mean of the natural logarithm of hourly wages is about 5 percent (12 percent) higher for TWI attendees (graduates). The difference in the rank of wages across HBCUs and TWIs is due to a single HBCU respondent with an average hourly wage of \$494. The influence of this observation on the Table 1A and 1B entries is also evident in the larger standard deviation of wages among HBCU attendees and graduates. See the Data Appendix for details on the sample selection rules.

or attend graduate school, and, in the 1989 cohort, less likely to report that their college experience helped develop an ability to get along with individuals of other races.

The final panel in Tables 1A and 1B provides the total number of HBCU and TWI observations in each sample. It also provides some details on the incomplete observations. As a solution to the large number of observations with at least one missing variable, we turn all of the explanatory variables into a series of indicator variables based on ranges of the values of these variables, and include separate indicators for missing responses to each variable. The bottom panel also reports on the number of observations with missing wage information. The subsequent analysis implements a standard selection-correction approach to account for these cases (Heckman 1979).

#### IV. The Consequences of Attending HBCUs in the NLS and B&B Data Files

##### A. Econometric Approach to Estimating the Consequences of Attending HBCUs

In the absence of a randomized experiment or a credible instrumental variable for HBCU attendance, we implement four statistical approaches to adjust for pre-college differences between HBCU and TWI attendees. This subsection details these strategies.

The first and simplest model we estimate is a linear specification of the form:

$$(1) \quad outcome_i = \alpha + \beta X_i^{home} + \gamma X_i^{pre-college} + \delta HBCU_i + \varepsilon_i,$$

where HBCU is a dichotomous variable that equals one if the student attends an HBCU, and zero if he does not;  $X_i^{home}$  denotes an array of variables which proxy for a student's home environment; and  $X_i^{pre-college}$  denotes pre-college characteristics of each student. In all instances, the estimation is done using weighted least squares, with weights corresponding to the sample weights provided in the data.

The home environment variables that we include are family income, mother and father's education, and whether or not a student lives in the south. Family income, measured in 1972 dollars, is divided into four categories: <\$3,000, \$3,000–\$6,000, \$6,000–\$9,000, and \$9,000+ based on a survey question described in the previous section. Parental education (mother and father, independently) is partitioned into three categorical variables: less than a bachelor's degree, a bachelor's degree, and beyond a bachelor's degree. Whether or not a student lives in the south is a dummy variable that takes on the variable of one if the answer is yes. Pre-college characteristics include SAT and ACT scores, high school GPA, and whether or not a student attended a private high school. Combined SAT scores are divided into less than 600, 600–800, and greater than 800. ACT scores are divided similarly, less than 11, 11–15, and greater than 15. High school GPA is measured on a four-point scale and is divided into less than 2.5, 2.5–3.5, and greater than 3.5. We also include an indicator for whether the respondent is female.

Equation (1) is a simple and easily interpretable way to obtain estimates of the effect of HBCU attendance on outcomes. Its shortcoming is that it relies on a linear

model to control for the covariates  $X_i^{home}$  and  $X_i^{pre-college}$ . This may be unappealing since the true functional forms are unknown. For example, the appropriate way to break the variables into categories is unknown.

As a solution, we match HBCU and TWI students with similar predicted probabilities or propensity scores ( $p$ -scores) of HBCU attendance (Paul R. Rosenbaum and Donald B. Rubin 1983).<sup>9</sup> The estimated  $p$ -scores compress the multi-dimensional vector of covariates into an index. The advantages of the propensity-score approach are two-fold. First, it is a feasible method to control for observables in a more flexible manner than is possible with linear regression. Second, it provides an opportunity to focus the comparisons of outcomes between the HBCU and TWI attendees among those with similar distributions of the observables. Finally, it is important to emphasize that, just as with linear regression, the identifying assumption is that assignment to the treatment (i.e., HBCU attendance) is associated only with *observable* pre-period variables. This is often called the ignorable treatment-assignment assumption or selection on observables.

We implement the  $p$ -score matching strategy in three steps. First, the estimated  $p$ -scores are obtained by fitting probit regressions for HBCU attendance, using  $X_i^{home}$  and  $X_i^{pre-college}$  as explanatory variables:

$$(2) \quad HBCU_i = \mu + \lambda X_i^{home} + \theta X_i^{pre-college} + \psi_i.$$

In other words, we try to replicate the average student's selection rule with the observed covariates.<sup>10</sup> We then conduct two tests to ensure that the  $p$ -scores are suitable. For both tests, we divide the sample into quintiles based on their  $p$ -scores. In the first test, we assess whether the estimated  $p$ -scores are equal across the HBCU and TWI students within quintiles. In the second test, we examine whether the means of the covariates are equal for the two sets of students within each quintile. If the null hypothesis of equality is rejected for either test, we divide the quintiles and/or estimate a richer probit model by including higher order terms and interactions.<sup>11</sup> Once the null is accepted for both tests, we proceed to the next step. The Web Appendix contains kernel density plots of the distribution of estimated propensity scores.

Second, the "treatment effect" for a given outcome is calculated by comparing the difference in the outcome of HBCU and TWI students with similar or "matched" values of the  $p$ -score. We do this in two ways. The first calculates a treatment effect for each HBCU student for which there is at least one TWI student with an estimated  $p$ -score within 0.10 of the HBCU student's  $p$ -score. In cases in which multiple students have  $p$ -scores within 0.10, we take the simple average of outcomes across all of these students. Further, this matching is done with replacement so that individual

<sup>9</sup> An alternative is to match on a single (or possibly a few) crucial covariate(s). See Joshua D. Angrist and Victor Lavy (2001) or Rubin (1977) for applications.

<sup>10</sup> See Ehrenberg and Rothstein (1994) for an examination of the determinants of attending an HBCU in the 1970s and 1980s. They find that the availability of an HBCU within a student's state is associated with higher HBCU attendance rates and lower two-year college attendance.

<sup>11</sup> See Rajeev H. Dehejia and Sadek Wahba (2002) and Rosenbaum and Rubin (1984) for more details on how to implement the propensity-score method.

TWI students can be used as controls for multiple HBCU students.<sup>12</sup> The second matching approach uses all of the TWI students to form a control for each HBCU student, but in calculating the average among them, we use a kernel-weighted average, where the weight is inversely proportional to the distance from the HBCU student's  $p$ -score. We use a Gaussian kernel with a bandwidth of 0.10.

Third, a single treatment effect is estimated by averaging the treatment effects across all HBCU students for whom there was at least one suitable match. This approach has the desirable property that it focuses the comparisons where there is overlap in the distribution of propensity scores among the HBCU and TWI students so that these students are "similar."<sup>13</sup>

We also implement two other econometric approaches to account for potential selection issues. First, we estimate probits for whether the wage variable is missing on the sample of observations with missing and nonmissing wage values. We then include the inverse Mill's ratio from these probits in equation (1) to account for the possibility that wages are not missing at random (Heckman 1979). This procedure is identified from a functional form assumption, since we are unaware of a valid exclusion restriction in this setting.

Second, the available datasets may not include measures of some attributes (e.g., strength of essay, motivation, and teacher recommendations) that persuade admissions committees to select certain applicants for admission. These attributes may also be rewarded in the labor market. Further, they may differ across HBCU and TWI students. The least-squares and propensity-score approaches, which rely on "selection on observables" assumptions, will produce biased estimates in this case.

To confront this source of misspecification, we implement a variant of the method pioneered by Dale and Krueger (2002) that matches students based on the colleges to which they were accepted. This approach can only be implemented with the NLS data file, as B&B does not contain information on the sets of colleges to which individuals are admitted. We operationalize the Dale and Krueger approach by determining the identity of the colleges that accepted each student. Among the colleges where they were accepted, we find the midpoint of the twenty-fifth–seventy-fifth percentile SAT range reported in *US News & World Report* (2006). We use current SAT scores since scores from 1972 are unavailable. For colleges that report only ACT scores, we use an equivalence scale to convert to an SAT equivalent.

For each student, we record the midpoint SAT score (as previously described) of any college to which the student was accepted. We divide the students into quartiles according to the highest of their midpoint SAT scores. We then include separate indicators for each of these groups in equation (1). This approach mitigates the impact of any confounding due to characteristics observable to admissions officers that are not measured in the dataset. Specifically, the identifying assumption is that after adjustment for the available covariates, the decision to attend an HBCU versus a non-HBCU within a quartile is "ignorable" or orthogonal to unobserved

<sup>12</sup> See Dehejia and Wahba (2002) and Heckman, Hidehiko Ichimura, and Todd (1998) on propensity-score algorithms.

<sup>13</sup> If there are heterogeneous treatment effects, this strategy produces an estimate of the average effect of the "treatment on the treated."

determinants of outcomes. See Dale and Krueger (2002) for a more detailed discussion of this approach.

Finally, we note that we considered a number of candidate instrumental variables, such as distance to a student's nearest HBCU, residence in the south, or the closing of HBCUs, but, in all cases, we were unconvinced that the exclusion restriction was valid, or the instruments were not powerful enough, for the relatively small samples in the available data files. Furthermore, with approximately 300 observations, it is challenging to construct an instrument with a powerful first stage. Consequently, thorny issues of selection may still remain.

### B. *Estimates of the Consequences of Attending HBCUs*

Table 2 presents results of the effect of attending an HBCU on the natural logarithm of wages from the four approaches in the six columns. The estimated standard errors are reported in parentheses below the point estimate for the HBCU indicator. In the NLS entries in panels A and B, the standard errors allow for clustering among observations from students that attended the same high school (except in column 5). In panel A, the treatment is matriculation at an HBCU, while in panel B, it is graduation from an HBCU. For the B&B entries in panel C, we report standard errors that allow for unspecified heteroskedasticity in the variance-covariance matrix. Underneath the standard errors, we report the  $R^2$  statistic, as well as the number of students in HBCUs and TWIs in the relevant sample. For the NLS, wages are measured in 1986, 14 years after high school graduation and roughly 10 years after obtaining a bachelor's degree. In the B&B, wages are in 1997 dollars, five years after completion of the bachelor's degree.

Column 1 reports the mean difference in labor market wages for individuals who attend HBCUs, without adjustment for any controls. In the NLS, HBCU students earn roughly 5 percent less when the treatment is the first college attended, and 11.5 percent when the treatment is receipt of a bachelor's degree. Neither of these estimates is statistically different from zero at conventional levels. The B&B estimate from the 1990s indicates that HBCU graduates earn 16.6 percent less than TWI graduates. Recall, Tables 1A and 1B demonstrated that on observable dimensions HBCU students have lesser academic credentials than their TWI counterparts (especially in the NLS), so these raw gaps are likely downwardly biased.

Column 2 reports the results from estimating equation (1). The adjustment for the academic and home environment controls changes the results in the NLS dramatically.<sup>14</sup> The wage benefit of attending an HBCU in the 1970s is 11.1 percent when HBCU status is based on the first college attended, and 6.0 percent when it is defined as receiving a bachelor's degree. The former estimate is marginally significant, while the latter has an associated  $t$ -statistic less than one.<sup>15</sup> In the B&B,

<sup>14</sup> Similar results have been found in Jill M. Constantine (1995) and Elton Mykerezzi and Bradford F. Mills (2008). Constantine (1995) uses that NLS-72. Mykerezzi and Mills (2008) use the geocoded National Longitudinal Survey of Youth 1979 data.

<sup>15</sup> Results are similar if one implements a "fraction method," using individual transcripts to calculate the fraction of a student's college experience that was spent at an HBCU. Further, the results are also similar (though a bit smaller) using 1979, rather than 1986, wages in the NLS.



TABLE 2—EFFECT OF HBCU ATTENDANCE ON WAGES IN NLS AND BB

	Linear regression without controls (1)	Linear regression with controls (2)	Propensity score kernel matching (3)	Propensity score radius matching (4)	Selection correction for missing wages (5)	Dale-Krueger with controls (6)
<i>Panel A. NLS: log (1986 hourly wage); treatment: first college was HBCU</i>						
HBCU coefficient	−0.051 (0.078)	0.111* (0.066)	0.129** (0.065)	0.134** (0.066)	0.123 (0.103)	0.225** (0.094)
R <sup>2</sup>	0.002	0.154				
Number HBCU	203	203	203	203	260	98
Number TWI	293	293	286	286	364	151
<i>Panel B. NLS: log (1986 hourly wage); treatment: bachelor's degree from HBCU</i>						
HBCU coefficient	−0.115 (0.090)	0.060 (0.083)	0.055 (0.085)	0.062 (0.073)	0.111 (0.071)	—
R <sup>2</sup>	0.011	0.150				
Number HBCU	132	132	132	132	164	—
Number TWI	176	176	155	155	224	—
<i>Panel C. B&amp;B: log (1997 hourly wage); treatment: bachelor's degree from HBCU</i>						
HBCU coefficient	−0.166*** (0.051)	−0.138*** (0.050)	−0.144*** (0.044)	−0.142*** (0.041)	−0.121*** (0.043)	—
R <sup>2</sup>	0.037	0.107				
Number HBCU	124	124	124	124	172	—
Number TWI	300	300	278	278	415	—

*Notes:* The entries in columns 1, 2, 5, and 6 are from least squares regressions. In all cases, the coefficient associated with the HBCU indicator is reported along with its standard error. The variance-covariance matrix allows for unspecified heteroskedasticity in these columns, and in the NLS samples, we allow for clustering at the high school level. These equations are weighted by the NLS and B&B sampling weights, respectively. The column 1 estimate is not adjusted for any covariates, while column 2 adds our full set of independent variables. Family income, measured in 1972 dollars, is divided into four categories: <\$3,000, \$3,000–\$6,000, \$6,000–\$9,000, and \$9,000+ based on a survey question described in the Data Appendix. Parental education (mother and father independently) is partitioned into three categorical variables: less than a bachelor's degree, a bachelor's degree, and greater than a bachelor's degree. Whether or not a student lives in the south is a dummy variable that takes on the variable of one if the answer is yes. Combined SAT scores are divided into less than 600, 600–800, and greater than 800. ACT scores are divided similarly, less than 11, between 11 and 15, and greater than 15. High school GPA is measured on a 4-point scale and is divided into less than 2.5, 2.5–3.5, and greater than 3.5. We also include an indicator for whether the respondent is female. Columns 3 and 4 report on the propensity score matching results. The former uses a Gaussian kernel with a bandwidth of 0.1, while the latter uses radius matching with a bandwidth of 0.1, and with replacement. The STATA code is available at <http://www.lrz-muenchen.de/~soebecker/pscore.html>. Standard errors for matching estimates are computed by bootstrapping, with propensity scores recomputed for each bootstrap sample. The matching estimates are unweighted. Observations are dropped if wages are missing or zero, or propensity score is not strictly between zero and one. Column 5 includes the inverse Mill's ratio that is derived from the estimation of an equation for missing wages, as well as the column 2 controls. These standard errors fail to account for heteroskedasticity or clustering. Column 6 adds indicators based on quartiles of the median SAT score, at the school with the highest SAT score, among the schools where the student was admitted. All observations with missing or zero wages are dropped. See the text for details on the propensity score routines.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

however, the wage effect for attending HBCUs is −13.8 percent, and the null of zero would be rejected with conventional criterion.<sup>16</sup>

<sup>16</sup> In the most recent wave of the B&B (B&B 2003), there is no wage gap between HBCU students and non-HBCU students. However, 53 percent of the HBCU sample does not have valid wages in the later survey (some are in the survey and unemployed while others were dropped completely). HBCU graduates have a 9.6 percent

The next two columns report on the implementation of the  $p$ -score method to test the sensitivity of these results to the linear model. Column 3 uses kernel matching, while column 4 relies on radius matching.<sup>17</sup> Standard errors for both matching estimates were bootstrapped (200 iterations), with propensity scores recomputed for each bootstrap sample. Further, the  $p$ -score matching estimates are not weighted with the sample weights. Web Appendix Figures 1 and 2 report the kernel density plots of the distribution of estimated propensity scores for the NLS and B&B, respectively.

The  $p$ -score estimates are remarkably similar to those from the linear regression in column 2. This finding is not terribly surprising because equation (1) models the covariates flexibly. Nevertheless, it is reassuring that functional-form issues do not appear important in this setting.

Column 5 presents estimates that are selection-corrected for missing wages and adjusted for the full set of covariates. It seems plausible that HBCU attendance is correlated with selective withdrawal from the labor force. This possibility is not supported by the data as this approach produces unimportant change in the estimated impact of HBCUs on wages.<sup>18</sup>

Column 6 implements the column 2 specification and adds controls for the “best” school to which the student was admitted in order to account for the richer data available to admissions committees (Dale and Krueger 2002). Specifically, we include indicators for the three highest quartiles of SAT scores of the best school to which the student was admitted, leaving the lowest quartile as the excluded group. This method is only possible in the NLS data, and, in this sample, it doubles the estimated impact of attending an HBCU to 22.5 percent. Specifically, this approach suggests that the gains from HBCU attendance may be larger than indicated by the other methods. However, the imprecision of the estimate makes definitive conclusions unwarranted.

Additionally, we conducted a number of tests for whether there was heterogeneity in the returns to attending an HBCU, which are reported in Web Appendix Table 1. We assessed whether returns differed with students’ estimated propensity score, home region (i.e., south versus north), parental education, SAT score, and gender. In general, there is no substantial evidence of heterogeneity across these subsamples of students. The lone exception is that the returns to attending an HBCU appear higher for black women than for black men in the NLS sample. It is also immediately

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higher unemployment rate, and median regression techniques provide identical results to the 1997 wave. Thus, we concentrate on the earlier 1997 wave with more complete data.

<sup>17</sup> Observations with estimated  $p$ -scores that are not strictly between zero and one are dropped. Further, when implementing the radius-matching estimators, we lose several observations due to outliers that did not have matches in the relevant range. The exact numbers are 7 observations in the NLS when the treatment is first college attended, 21 in the NLS when the treatment is degree college, and 21 observations in the B&B.

<sup>18</sup> We also assessed the impact of labor market dropouts on the estimates with a simple, reweighted linear regression, as well as a median regression. In the first approach, we estimate a weighted probit for whether the wage variable is nonmissing on all of the covariates in Table 2, where the weight is the sampling weight. We then multiplied the sampling weight by the inverse of the predicted probability in the probit to get new weights. This procedure upweights observations where the predicted probability of a missing wage is high. Linear regressions are then estimated with these new weights. This approach led to remarkably similar conclusions as the selection-correction approach. Median regressions were estimated by imputing zeros to all missing wage observations. Qualitative conclusions were the same, though the coefficients were smaller as expected.

evident that subdividing the sample is too demanding of the data because the standard errors in the subsamples are much larger.

Overall, these results suggest that attending an HBCU conferred remarkable advantages on students in the 1970s. Conventional estimates of the average return to college are 10 percent per year (Heckman, Lance J. Lochner, and Todd 2003). Attending an HBCU versus a TWI in the 1970s was roughly equivalent to one more year of schooling. In contrast, more recent HBCU attendees appear to be suffering a wage penalty. If the point estimates are taken literally, there is nearly a  $-25$  percent swing in the relative return of HBCU attendance in just two decades.

*Nonwage Outcomes.*—Thus far, we have concentrated on the effect of attending an HBCU on a single outcome, labor market wages. The value of attending HBCUs, however, likely extends well past labor market considerations. The conventional wisdom is that these institutions instill confidence in their students, a sense of responsibility, and provide environments free of racism and discrimination that allow for greater personal development. Such environments are likely to have many benefits beyond those captured in wages.

Table 3 explores the effect of attending HBCUs on a number of outcomes, including the probability of full-time employment, measures of life satisfaction, and a series of academic outcomes. These wide-ranging outcomes were chosen because of their economic and social relevance, as well as their comparability across datasets. The coefficients reported in the table are from kernel matching estimates and their associated bootstrapped standard errors. In all cases, weighted least squares confirm these results.

The most striking finding from these outcomes is that HBCU matriculation is associated with a nearly 10 percent increase in the probability of receiving a bachelor's degree in the 1970s. It is evident that part of the wage gain in the NLS is due to the increased probability of graduating from college. There is some evidence that students who attend HBCUs are modestly more likely to major in physical sciences. Interestingly, HBCU and TWI matriculates report similar degrees of life satisfaction. There are negligible effects on all other outcomes.

## V. A Brief Look at the Most Elite HBCUs

There is substantial quality variation among the set of 89, 4-year HBCUs, as well as among the TWIs. To this point, we have analyzed the NLS and B&B, which are nationally representative data files that include the full spectrum of HBCUs and TWIs from the quality continuum. In this section, we take a specifically focused look at four of the most elite HBCUs: Morehouse College, Xavier University, Spelman College, and Howard University. One limitation of this exercise is that due to the C&B's sampling approach, these four HBCUs can only be compared to the 30 selective TWIs in the sample. Importantly, the 1989 dataset does not include information on Spelman and Howard students.

One major benefit of the C&B database is the availability of detailed questions about life outcomes, beliefs, college experiences, labor market outcomes and experiences, political and civic engagement, and more. These rich questions can help to shed

light on the overall experience of students attending HBCUs and non-HBCUs. The Data Appendix describes how these variables were constructed. For both cohorts, data on the majority of outcomes were obtained in 1995, 15 years after graduation for the early cohort and 2 years after graduation for the later cohort, though some data, such as wages, in the 1989 cohort were collected in 1996. Individuals without valid wage observations are dropped from the sample.

We report results on a wide series of outcome variables. Additionally, we supplement these outcome variables with five indices to better understand the experiences of HBCU students along the following dimensions: objective academic, subjective academic, labor market, leadership and lifestyle, and social interactions. The Data Appendix describes the specific questions used to make up these indices. Each index is obtained by taking the first principal component of the set of variables described. This approach has two main advantages. First, principal component analysis reduces the dimensionality of problems by extracting the portion of a set of variables that explain the most variance within the set. Second, it ensures that all variables are measured on the same scale. The cost is that the result's meaning is not transparent and cannot be easily applied to different settings.

Web Appendix Figures 3 and 4 plot the distributions of the estimated propensity scores for HBCU matriculation for the HBCU and TWI attendees from the 1976 and 1989 C&B classes, respectively. It is apparent that there is no substantial overlap between the two distributions in either year, especially in 1989. The poor overlap of the distributions means that the selection on observables assumption is unlikely to be valid, and, for this reason, these C&B results should be interpreted cautiously.

With these differences in the distributions of propensity scores in mind, Table 4 reports the results of estimating the effect of HBCU attendance on the set of wage and nonwage outcomes from kernel matching. This approach was also used in column 3 of Table 2 and all columns of Table 3. Column 1 includes all four HBCUs in the 1976 sample. Column 2 also reports results from the 1976 sample, but only includes students who attended Morehouse College and Xavier University to facilitate comparisons with the 1989 cohort, whose results are reported in column 3.

In the 1976 cohort, there are not meaningful differences in labor market outcomes among HBCU and TWI attendees. However, graduates of the four HBCUs were 9 percent more likely to major in the biological sciences (12 percent for Morehouse College and Xavier University graduates), and 11.1 percent (23.4 percent) more likely to major in business, but 10 percent (11.6 percent) less likely to attend graduate school and, conditional on attending, 13.6 percent (14.6 percent) less likely to receive a degree. On objective academic outcomes, HBCU students are significantly negative, though their subjective view of the academic experience is quite positive. Leadership and lifestyle components of the HBCU experience are large, which is consistent with much that has been written on these institutions (Drewry and Doermann 2001). Social interactions are also statistically significant and substantively large. Students do not seem to possess a particular taste for segregation, as HBCU graduates are no more likely to live in more racially homogenous zip codes than TWI graduates. And, HBCU graduates are no more likely to be engaged in political, religious, civil rights, social service, or philanthropic activities, or give to a national charity. The clearest evidence of the importance of HBCUs is that, controlling for all other factors,

TABLE 3—EFFECTS OF HBCU ATTENDANCE ON NONWAGE OUTCOMES IN NLS AND B&amp;B

Dataset	NLS (1972)	NLS (1972)	B&B (1997)
Definition of HBCU	First college	Bachelor's degree college	Bachelor's degree college
	(1)	(2)	(3)
<i>Employment</i>			
Employed full time	-0.018 (0.021)	0.045 (0.040)	-0.023 (0.025)
<i>Life satisfaction</i>			
Satisfied with self	-0.004 (0.038)	-0.078 (0.049)	—
Treated unfairly in job because of race	-0.027 (0.046)	0.041 (0.055)	—
<i>Academic outcomes</i>			
Received bachelor's degree	0.098** (0.049)	—	—
Attended graduate school	0.033 (0.042)	0.025 (0.061)	0.087** (0.041)
Received graduate degree	0.016 (0.030)	0.063 (0.049)	0.016 (0.036)
Physical science major	0.056 (0.034)	0.035 (0.028)	0.072** (0.029)
Biological science major	-0.003 (0.047)	0.050 (0.032)	-0.036 (0.033)
Business major	0.024 (0.075)	0.026 (0.073)	-0.001 (0.038)

*Notes:* The entries report the results from propensity score matching routines. The row headings report the dependent variables. The samples and treatment are noted in the column headings. The entries report the impact of HBCU matriculation (graduation), relative to TWI matriculation (graduation). The propensity score is estimated with a probit, and all of the covariates used in Table 2 are included as explanatory variables. The matching method uses a Gaussian kernel with a bandwidth of 0.1. The standard errors (reported in parentheses) are computed by bootstrapping, with propensity scores recomputed for each bootstrap sample. The estimates are unweighted. For each outcome, all observations with data on that outcome are used. Observations are dropped if the propensity score is not strictly between zero and one. See the text and notes to Table 2 for more details.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

HBCU students are 18 percent (22 percent) more likely to report they would choose the same college again.

The 1989 cohort reports different experiences. The labor market experiences are now more negative, although they remain statistically insignificant. Students are more likely to major in physical and biological sciences and business. Students continue to benefit from leadership and lifestyle components of HBCUs, but the magnitudes of these effects are less than one-fourth of their previous levels. Many of the other positive elements turn negative in the more recent cohort. The objective and subjective academic outcomes are negative, and HBCU matriculates are 10 percent less likely to receive a bachelor's degree. The social interactions index, which was positive in the 1976 cohort, turns sharply negative in the 1989 cohort. HBCU attendance is associated with living in a zip code where the fraction of blacks is 16 percent higher. Perhaps, most telling, HBCU students are now less likely than

TABLE 4—EFFECTS OF HBCU ATTENDANCE ON LABOR MARKET AND OTHER OUTCOMES IN C&amp;B

Dataset Definition of HBCU Include Howard and Spelman?	C&B (1976) first college yes (1)	C&B (1976) first college no (2)	C&B (1989) first college no (3)
<i>Labor market outcomes</i>			
ln(annual income)	-0.074 (0.069)	-0.032 (0.145)	-0.114 (0.160)
Employed full time	0.099 (0.112)	0.513 (0.363)	-0.181 (0.202)
Subjective labor market index	0.059 (0.061)	0.104 (0.164)	0.032 (0.123)
<i>Life satisfaction</i>			
Satisfied with life	-0.009 (0.026)	-0.046 (0.044)	-0.013 (0.044)
College was first choice	-0.084** (0.034)	-0.079 (0.079)	-0.063 (0.058)
Would choose same college again	0.177*** (0.035)	0.219** (0.086)	-0.048 (0.054)
Leadership/lifestyle index	0.417*** (0.069)	0.633*** (0.157)	0.152 (0.109)
Social interactions index	0.220*** (0.071)	0.357** (0.169)	-0.177 (0.123)
College developed ability to form and retain friendships	0.423*** (0.088)	0.53*** (0.142)	0.129 (0.124)
College developed ability to have rapport w/people of different beliefs	0.254*** (0.088)	0.386* (0.205)	-0.220* (0.116)
College developed ability to get along with other races	0.034 (0.093)	0.255 (0.211)	-0.445*** (0.170)
<i>Academic outcomes</i>			
Received bachelor's degree	-0.105*** (0.025)	-0.047 (0.068)	-0.105*** (0.037)
Attended graduate school	-0.101*** (0.033)	-0.116 (0.086)	-0.019 (0.059)
Received graduate degree	-0.136*** (0.033)	-0.149* (0.082)	-0.007 (0.057)
Academic outcomes index	-0.301*** (0.066)	-0.296 (0.185)	-0.123 (0.110)
Subjective academic index	0.165** (0.072)	0.356* (0.204)	-0.201** (0.096)
Physical science major	-0.027 (0.028)	-0.107 (0.080)	0.074* (0.042)
Biological science major	0.087*** (0.026)	0.120** (0.051)	0.196*** (0.040)
Business major	0.111*** (0.021)	0.234*** (0.030)	0.214*** (0.028)
<i>Other</i>			
Fraction black in zip code	0.022 (0.025)	0.081 (0.074)	0.156*** (0.041)
<i>Participation</i>			
Political	0.007 (0.035)	-0.044 (0.082)	0.208*** (0.048)
Religious	0.031 (0.034)	0.085 (0.083)	0.054 (0.072)
Civil rights	-0.008 (0.034)	0.061 (0.082)	0.068 (0.078)
Social service	-0.034 (0.031)	-0.068 (0.080)	-0.038 (0.072)

(Continued)

TABLE 4—EFFECTS OF HBCU ATTENDANCE ON LABOR MARKET AND OTHER OUTCOMES IN C&amp;B (Continued)

Dataset Definition of HBCU Include Howard and Spelman?	C&B (1976) first college yes (1)	C&B (1976) first college no (2)	C&B (1989) first college no (3)
Alumni	-0.021 (0.034)	-0.008 (0.090)	-0.100 (0.072)
National charity	-0.035 (0.038)	-0.124 (0.092)	0.066 (0.072)
Mean observations by column	1,927	807	1,174

*Notes:* The entries report the results from propensity score matching routines. The row headings report the dependent variables. The samples and treatment are noted in the column headings. The entries report the unweighted impact of HBCU matriculation (graduation), relative to TWI matriculation (graduation). The propensity score is estimated with a probit, and all of the covariates used in Table 2 are included as explanatory variables. The matching method uses a Gaussian kernel with a bandwidth of 0.1. The standard errors (reported in parentheses) are computed by bootstrapping, with propensity scores recomputed for each bootstrap sample. For each outcome, all observations with data on that outcome are used. Indexes are first principal components of sets of variables, normalized to have mean zero and variance one. In constructing each index, we include every observation that has data on at least one variable in the set, by replacing any missing data with the mean of the corresponding variable. Observations are split roughly evenly between HBCU and TWI students. Observations are dropped if the propensity score is not strictly between zero and one. See the text and notes to Table 2 for more details.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

non-HBCU students to report they would choose the same college again, although the difference isn't statistically significant.

Interestingly, HBCU students in the later cohort are significantly more likely to be engaged in political activities and marginally more likely to give to national charities, though they are just as likely as non-HBCU students to report that their main motivation for college is to earn more money. This may partly explain the divergence in wages.<sup>19</sup>

## VI. Reconciling the Differences between the 1970s and 1990s

### A. Assessing the Difference between the 1970s and 1990s Results

Panel A of Table 5 summarizes the difference in the results between the 1970s and 1990s. It reports regression results for five of the key dependent variables examined above. The difference is that we use the stacked 1970 and 1990 datasets to estimate the following equation:

$$(3) \quad \text{outcome}_{it} = \alpha + \beta_t X_{it}^{\text{home}} + \gamma_t X_{it}^{\text{pre-college}} + \delta HBCU_{it} + \eta 1990_{it} \\ + \theta HBCU_{it} 1990_{it} + \varepsilon_{it}$$

<sup>19</sup> We are grateful to Lani Gunier for pointing out this possibility.

where the  $i$  subscript indexes an individual, and the  $t$  subscript reveals whether the observation is from a 1970s or 1990s college student. The parameter vectors  $\beta$  and  $\gamma$  have  $t$  subscripts, indicating that they are allowed to differ for 1970s and 1990s college attendees. The equation also includes separate intercepts for attending an HBCU, and whether the observation is from a 1990s college attendee. The parameter of interest is  $\theta$ , which is associated with the interaction between the HBCU indicator and the indicator for an observation from the 1990s. This parameter is a difference-in-differences (DD) estimate of HBCU attendance and is equal to the difference of the cross-sectional HBCU estimates (e.g., column 2 in Table 2).<sup>20</sup>

In column 1, the dependent variable is the natural logarithm of wages. For this regression, the nationally representative NLS and B&B data files are used. The other seven dependent variables are taken from the 1976 and 1989 C&B samples, which focused on a subset of elite HBCUs and TWIs. Howard University and Spelman College attendees are dropped from the sample, just as in column 2 of Table 4.

The results summarize the change in the relative returns to HBCU attendance over the two decades. The four “objective” outcomes (i.e., those where a higher value of the dependent variable would be considered a positive) in columns 1–4 suggest that the returns to HBCU attendance have declined. Specifically, the point estimates suggest a 20 percent decline in wages, a 13 percent decline in the fraction of students who would attend the same college again, and substantial declines in the leadership and social interactions indices. Of the three more “subjective” outcomes in columns 5–7, which measure political participation, social/civic service, and donations to national charities, only donations to national charities increase between the two C&B classes. The other two subjective outcomes increase as well, but they are measured imprecisely. The results in the final column indicate that HBCU attendees became less likely to live in integrated neighborhoods. It is noteworthy that all of these estimates are economically and statistically significant.

### *B. Robustness of the Result that HBCUs' Performance Worsened between the 1970s and 1990s*

This subsection reports on some checks that aim to explore the robustness of the basic result that the economic returns to attending an HBCU declined. Many obvious explanations fail to explain the differences. We have ensured, through the use of Federal Interagency Committee on Education codes, that the definition of HBCUs is consistent across datasets and over time. Moreover, the addition of more control variables, such as occupational choice indicators, or a richer set of academic variables, fail to explain the differences. Differential labor market dropout rates cannot explain the change.

Selection of students into (or by) colleges is a potential explanation with some intuitive appeal, but the available data fail to support it. For example, a probit regression for HBCU attendance demonstrates that, if anything, selection on observables appears to work in the opposite direction. Students with higher scores on aptitude

<sup>20</sup> The C&B results are not identical to the difference between the 1989 and 1976 results in Table 4 because that table reports on the kernel matching results, while Table 5 relies on least squares adjustment for the covariates.



TABLE 5—RELATIVE CHANGES BETWEEN THE 1970S AND 1990S

Dependent variable:	ln (wage) (NLS/BB) (1)	Choose college again (2)	Percent black in zip code (3)	Leadership index (4)	Social interactions index (5)	Political (6)	Social service (7)	Charity (8)
<i>Panel A. Sample restricted to blacks</i>								
1(HBCU) × 1(1990s)	-0.197** (0.094)	-0.133** (0.055)	0.135*** (0.041)	-0.329** (0.130)	-0.429*** (0.129)	0.090 (0.058)	0.031 (0.057)	0.153*** (0.061)
Observations	734	3,255	2,461	3,252	3,250	2,622	2,627	2,576
R <sup>2</sup>	0.17	0.04	0.16	0.07	0.03	0.04	0.02	0.03
<i>Panel B. Sample restricted to blacks and whites that attended TWIs</i>								
Dependent variable is ln (wage) from the NLS and BB								
1(Black) × 1(1990s)	0.055 (0.071)	0.043 (0.097)	0.134** (0.065)	— —	— —	— —	— —	— —
Observations	9,607	9,607	9,607	—	—	—	—	—
R <sup>2</sup>	0.11	0.13	0.11	—	—	—	—	—
Controls no interactions	Yes	No	No	—	—	—	—	—
Controls interacted with decade indicators	No	Yes	No	—	—	—	—	—
Controls interacted with race indicators	No	No	Yes	—	—	—	—	—

*Notes:* The table reports on the results from fitting equation (3) in panel A and equation (4) in panel B. In panel A, the samples are composed of stacked data from the NLS and B&B in column 1, and the 1976 and 1989 C&B in columns 2–8, and the sample is limited to blacks. The dependent variable is denoted in the first row of the panel. This panel's entries report on the parameter estimate associated with the interaction of indicators for HBCU attendance and for an observation from the 1990s cohort and its heteroskedastic standard error. In panel B, the sample is comprised of blacks and whites that graduated (column 1) from TWIs. Here, the dependent variable is always ln (hourly wage). This panel's entries report on the parameter estimate associated with the interaction of indicators for black and for an observation from the 1990s cohort and its heteroskedastic standard error. The covariates are noted in the row headings at the bottom of the panel. In both panels, the sample weights associated with the NLS and B&B are used with the normalization that the weights for each cohort sum to one. (In the C&B, all observations are weighted equally.) Thus, the two cohorts in each regression are equally weighted, but some observations are counted more heavily than others within a cohort according to the sample weights. See the text for further details.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

tests and better home environments are more likely to attend HBCUs in the 1990s, relative to the 1970s.<sup>21</sup>

Nevertheless, we further explored the role of selection on observables. Specifically, we stacked the observations with nonmissing wages from the NLS and B&B and estimated a weighted probit for whether the observation was from the NLS (i.e., the 1970s).<sup>22</sup> We then calculated the predicted probabilities that the B&B (i.e., 1990s) observations are from the NLS. These predicted probabilities are multiplied by the sampling weight, and this product is used as a weight in the fitting of the Table 2

<sup>21</sup> The results from these probits are reported in tabular form in Fryer and Greenstone (2007).

<sup>22</sup> The weights are adjusted sampling weights, where the adjustment ensures that they sum to one within the NLS and B&B observations. The covariates in the probit are the standard controls used throughout the paper (e.g., in column 2 of Table 3).

column 2 OLS specification. This weighting scheme aims to ensure that the distribution of observables is similar across the NLS and B&B.<sup>23</sup> The result of this procedure is that the estimated impact of HBCU attendance on wages in the B&B declines from -13.8 percent (standard error of 0.050) to -18.7 percent (standard error of 0.056). This approach only increases the relative worsening of HBCU attendees' labor market performance between the 1970s and 1990s.

Web Appendix 2 uses the Freshman Survey to understand whether our results are driven by who chooses to attend an HBCU in the 1970s versus the 1990s.<sup>24</sup> Using a similar framework with stacked survey responses from 1976 and 1989, we find no evidence to suggest that wage penalties from HBCU students can be attributed to lower quality students. In fact, high school GPA increased significantly from 1976 to 1989 for HBCU students relative to TWI students. HBCU students are also more likely to seek a master's degree in 1989 relative to 1976 (even after controlling for high school GPA), relative to TWI students. They are also more likely to attend college to make money or seek a graduate degree, although these results are not significant. Although we cannot rule out selection on unobservables, it seems reasonable to conclude that the results are not due to differences in observable characteristics.

Another possibility is that due to the relatively small sample sizes, the quality of the HBCUs and TWIs represented in the NLS and B&B differed. To explore this, we used *US News and World Report* (2006) to obtain the current midpoint of the twenty-fifth through seventy-fifth percentile SAT range for all the HBCUs and TWIs represented by the valid observations in the data files. This information is only available for a subset of the observations.<sup>25</sup> Nevertheless, these data indicate that the gap in average SAT scores between the HBCUs and TWIs chosen by the respondents in our analysis decreased modestly between the two decades. Among the colleges and universities in our sample, SAT scores in TWIs were 236.1 points higher than HBCUs in the 1970s and 226.2 higher in the 1990s. Thus, the available evidence suggests that the results are not due to a change in the composition of HBCUs and TWIs between the NLS and B&B.

### C. Did HBCUs Decline or Did TWIs Improve?

If the estimated decline is causal, the source of the relative decline in HBCUs' performance is unlikely to be important for public policy purposes. Nevertheless,

<sup>23</sup> This method is a variant of John DiNardo, Nicole M. Fortin, and Thomas Lemieux (1996)

<sup>24</sup> The Freshman Survey is directed by the Higher Education Research Institute (HERI) at UCLA. Surveys that have been administered to college freshmen each year since 1966 provide detailed demographic, financial, and educational data, as well as information about students' attitudes and beliefs. More information can be found in the Data Appendix and online at <http://www.gseis.ucla.edu/heri/cirpoverview.php>. The 1976 and 1989 surveys include data on students from 25 and 28 different institutions, respectively. Both list four accredited HBCUs: Howard University, Morehouse College, Spelman College, and Xavier University. The 1976 data have information for 19,403 freshmen, 2,627 of whom self-identify as black. The 1989 data detail 20,493 freshmen, 3,033 of whom self-identify as black.

<sup>25</sup> We matched 92.3 percent of the HBCUs and 84.0 percent of the TWIs represented in the NLS. For the B&B, these numbers were 88.9 percent and 82.7 percent, respectively. Unfortunately, many of the colleges represented in these data files do not report SAT information in *US News and World Report* (2006). Specifically, we obtained SAT information for 29.2 percent of the HBCU attendees and 49.0 percent of the TWI attendees in the NLS, and for 33.0 percent of HBCU attendees and 49.2 percent of TWI attendees in the B&B.

it would be of considerable interest to researchers and educational practitioners to understand whether it is due to a decline in the performance of HBCUs or an improvement in TWIs. An answer to this question could lead to the design of more effective educational programs for blacks.

One potential explanation is that HBCUs' financial position weakened between the 1970s and 1990s, leading to a decline in the quality of their educational environments. This explanation has some intuitive appeal, because HBCUs experienced enrollment declines during this period, and Caroline Hoxby (2000) suggests that the nationalization of the higher education market has hurt smaller colleges and universities. However, the data do not appear to support this explanation. Specifically, on a host of input measures including financial information, faculty compensation, research grants received, and composition of faculty with various degrees, there is little evidence that the relative quality of HBCUs has declined in a substantial way (Provasnik, Shafer, and Snyder 2004).

Expenditures per student are, perhaps, the best measure of the quality of the education these schools provide. Data on educational expenditures at HBCU and non-HBCU schools are available from the Higher Education General Information Survey from 1970 to 1984 and the Integrated Postsecondary Education Data System from 1985 to 2004 through the ICPSR Web site. In 2000 dollars, educational expenditures per student increased from \$9,423 to \$11,996 between 1974 and 1991 at HBCUs, and \$8,468 to \$10,560 at TWIs.<sup>26</sup> (The years 1974 and 1991 are chosen because they are roughly in the middle of the prime college attendance years of the students in the NLS and B&B, respectively.) Put another way, real educational expenditures per student increased by 27.3 percent at HBCUs between 1974 and 1991, compared to 24.7 percent at TWIs. It is evident that the data reject the hypothesis that the decline in returns to HBCU attendance is due to a decline in their quality as measured by expenditure. It is also notable that the level of education expenditure per student was higher at HBCUs in the 1970s and 1990s.

An alternative explanation is that TWIs became more effective at educating blacks between the 1970s and 1990s in ways that are not reflected in spending. After all, the 1970s are not far removed from the civil rights struggles of campus sit-ins, boycotts, and battles over allowing black students to enroll in many southern TWIs. Further, it has been noted that many TWIs were not hospitable places for black students in the 1970s (Lori D. Patton and Mary F. Howard-Hamilton 2005).<sup>27</sup> A related theory that is empirically indistinguishable is that society has changed such that there is a greater premium on cross-racial connections.

To explore this possibility credibly, it is essential to have a counterfactual for blacks' changing experiences at TWIs. It is possible that TWIs became more effective educational institutions for all students between the 1970s and 1990s. We use whites' experiences at TWIs as a counterfactual. Specifically, we fit the following

<sup>26</sup> Educational expenditures are the sum of expenditures made from current funds that relate to the functions of instruction, research, public service, academic support, student services, institutional support, operation, and maintenance.

<sup>27</sup> It is worth noting that Mykerezzi and Mills' (2008) estimates imply that the relative decline in HBCUs may not have begun until the early 1980s.

equation on all white and black TWI attendees (all HBCU attendees are dropped from the sample) in the NLS and B&B:

$$(4) \quad \ln(\text{wage})_{it} = \alpha + \beta_{rt} X_{it}^{\text{home}} + \gamma_{rt} X_{it}^{\text{pre-college}} + \delta \text{Black}_{it} + \eta 1990_{it} \\ + \theta \text{Black}_{it} 1990_{it} + \varepsilon_{it},$$

where (again) the  $i$  subscript indexes an individual, the  $t$  subscript reveals whether the observation is from a 1970s or 1990s college student, and  $r$  references race. The vectors  $\beta$  and  $\gamma$  have “ $rt$ ” subscripts, indicating that they may vary by race, time period, or both. The equation also includes separate intercepts for black students and whether the observation is from a 1990 college attendee. The parameter of interest is  $\theta$ , which is associated with the interaction between the black indicator and the indicator for an observation from the 1990s attendees. This parameter is a difference-in-differences estimator, and reports on whether the returns for TWI attendance increased between the 1970s and 1990s for blacks, relative to whites. We reiterate that all HBCU attendees are dropped from the estimating samples in all specifications in the estimation of (4).

Panel B of Table 5 reports on the estimation of equation (4) for only the natural logarithm of wages, since this is the variable of interest available in the nationally representative data files. The column 1 specification constrains the  $\beta$  and  $\gamma$  vectors to be constant across races and periods. The column 2 specification allows them to differ across decades, but holds them constant across whites and blacks within a decade (i.e., in the same survey). In column 3, they are allowed to vary across races but are restricted to be constant across decades.

The column 3 specification suggests that among TWI attendees, the wages of blacks increased by 13.4 percent more than wages of whites between 1970 and 1990. This estimate is statistically significant and would account for roughly two-thirds of the relative decline in the wages of black HBCU attendees in panel A. The point estimates are also positive in the other two specifications, but they are smaller and statistically indistinguishable from zero.

The difference in the results across the three specifications is due to the choices about the  $\beta$  and  $\gamma$  parameter vectors. It is important to note that  $F$ -tests lead to rejections of the hypotheses that the parameter vectors are equal across decades (column 2) and race (column 3), so the column 1 specification can be rejected for being too parsimonious. The  $R^2$  statistic is largest in the column 2 specification, but so is the standard error on the parameter of interest. We also experimented with a model that allowed the parameter vectors to vary with indicators for the interaction of decade and race, but the resulting estimates had little empirical content.<sup>28</sup>

We are unaware of principled reasons to favor either the column 2 or column 3 specifications, so we are left with two specifications that appear to have equal standing. One suggests that roughly two-thirds of the decline in the relative wages of

<sup>28</sup> This model is too demanding of the data. Recall, all of our controls are indicator variables, so issues of multicollinearity are a special concern. As a measure of this problem, the standard error on the parameter of interest ( $\theta$ ) is more than nine times larger than the error in column 1.

HBCU attendees are due to improvements in the efficacy of TWIs' education of black students. The other produces an imprecise estimate that, if taken literally, implies that this explanation has little empirical backing. The two estimates have confidence intervals that substantially overlap. The sober conclusion is that the data fail to reject the possibility that TWIs became more effective at educating blacks between the 1970s and 1990s, but they also fail to provide decisive evidence in favor of this possibility.

## VII. Conclusion

HBCUs are an integral and proud part of black history and culture. For generations, these institutions have educated blacks and produced leaders in government, business, entertainment, and academia. Yet, their reliance on public funding and the *Fordice* decision mean that it is more important than ever to understand the consequences of matriculation at HBCUs.

Existing evidence on the effects of attending HBCUs has typically concentrated on either degree attainment or future wages. In this paper, we take a more holistic approach—analyzing three large datasets with adequate pre- and post-college information, students' college choices, and myriad social and economic outcomes—to paint a rich portrait of the experiences of black students at HBCUs, relative to their counterparts who choose to attend non-HBCUs in the 1970s and 1990s. Consistent with the charge from the high court, we search for “educational justification.”

Several important results from this search have emerged. The nationally representative datasets reveal an important change in the returns to HBCU attendance. In the 1970s, HBCU matriculation was associated with higher wages and an increased probability of graduation, relative to attending a TWI. By the 1990s, however, there is a substantial wage penalty. In fact, there is a statistically significant 20 percent decline in the relative wages of HBCU graduates between the two decades. Notably, relative measures of student quality (e.g., SAT scores) improved among HBCU attendees during this period, so higher achieving students were increasingly choosing these schools at the same time that the schools appear to have fallen behind. Finally, there is also some evidence of a relative decline in the performance of elite HBCUs from the C&B dataset.

The analysis has unearthed some important clues as to why HBCUs' relative performance declined in this period. The data provide some support for the possibility that HBCUs' relative decline is partially due to improvements in TWIs' efficacy of educating blacks, but this evidence certainly is not decisive. In contrast, the data reject a number of seemingly intuitive explanations, including relative declines in the pre-college credentials of students attending HBCUs and in educational expenditures per student at HBCUs. The question of why HBCUs' performance declined merits further research, although the identification of the exact channel is unlikely to be important for policy purposes.

In summary, the evidence presented in this paper suggests that relative to TWIs, HBCUs may have provided unique educational services for blacks in the 1970s. However by the 1990s, this advantage seems to have disappeared on many dimensions and, by some measures, HBCU attendance appears to retard black progress.

## APPENDIX

TABLE A1—BASIC SUMMARY STATISTICS ON THE HBCUs

Number	College or university	Location	Undergraduate enrollment	Total enrollment	Type
1	Alabama A&M University	Normal, AL	5,047	6,182	Public
2	Alabama State University	Montgomery, AL	4,485	5,469	Public
3	Albany State University	Albany, GA	3,228	3,649	Public
4	Alcorn State University	Alcorn State, MS	2,962	3,544	Public
5	Allen University	Columbia, SC	624	624	Private
6	Arkansas Baptist College	Little Rock, AR	287	287	Private
7	Benedict College	Columbia, SC	2,552	2,552	Private
8	Bennett College	Greensboro, NC	572	572	Private
9	Bethune-Cookman College	Daytona Beach, FL	3,090	3,090	Private
10	Bluefield State College	Bluefield, WV	1,708	1,708	Public
11	Bowie State University	Bowie, MD	4,020	5,319	Public
12	Central State University	Wilberforce, OH	1,617	1,623	Public
13	Cheyney University of Pennsylvania	Cheyney, PA	1,401	1,560	Public
14	Clafin University	Orangeburg, SC	1,678	1,728	Private
15	Clark Atlanta University	Atlanta, GA	3,667	4,469	Private
16	Coppin State College	Baltimore, MD	3,451	4,306	Public
17	Delaware State University	Dover, DE	3,440	3,722	Public
18	Dillard University	New Orleans, LA	1,993	1,993	Private
19	Edward Waters College	Jacksonville, FL	839	839	Private
20	Elizabeth City State University	Elizabeth City, NC	2,604	2,664	Public
21	Fayetteville State University	Fayetteville, NC	5,029	6,072	Public
22	Fisk University	Nashville, TN	864	920	Private
23	Florida A&M University	Tallahassee, FL	10,552	12,154	Public
24	Florida Memorial University	Miami Gardens, FL	1,945	2,004	Private
25	Fort Valley State University	Fort Valley, GA	1,997	2,174	Public
26	Grambling State University	Grambling, LA	4,573	5,164	Public
27	Hampton University	Hampton, VA	5,325	6,309	Private
28	Harris-Stowe State University	St. Louis, MO	1,662	1,662	Public
29	Howard University	Washington, DC	7,164	10,930	Private
30	Huston-Tillotson College	Auston, TX	675	706	Private
31	Interdenominational Theological Center	Atlanta, GA	—	447	Private
32	Jackson State University	Jackson, MS	6,660	8,416	Public
33	Jarvis Christian College	Hawkins, TX	572	572	Private
34	Johnson C. Smith University	Charlotte, NC	1,404	1,404	Private
35	Kentucky State University	Frankfort, KY	2,228	2,386	Public
36	Knoxville College	Knoxville, TN	300	300	Private
37	Lane College	Jackson, TN	1,213	1,213	Private
38	Langston University	Langston, OK	3,001	3,151	Public
39	Lemoine-Owen College	Memphis, TN	809	809	Private
40	Lincoln University	Jefferson City, MO	2,953	3,180	Public
41	Lincoln University	Lincoln University, PA	1,714	2,278	Public
42	Livingstone College	Salisbury, NC	895	895	Private
43	Meharry Medical College	Nashville, TN	—	707	Private
44	Miles College	Fairfield, AL	1,758	1,758	Private
45	Mississippi Valley State University	Itta Bena, MS	2,748	3,165	Public
46	Morehouse College	Atlanta, GA	3,029	3,029	Private
47	Morehouse School of Medicine	Atlanta, GA	—	272	Private
48	Morgan State University	Baltimore, MD	5,747	6,438	Public
49	Morris Brown College	Atlanta, GA	66	66	Private
50	Morris College	Sunter, SC	863	863	Private
51	Norfolk State University	Norfolk, VA	5,337	6,096	Public
52	North Carolina A&T State University	Greensboro, NC	9,735	11,103	Public
53	North Carolina Central University	Durham, NC	6,353	8,219	Public
54	Oakwood College	Huntsville, AL	1,751	1,751	Private
55	Paine College	Augusta, GA	828	828	Private
56	Paul Quinn College	Dallas, TX	790	790	Private
57	Philander Smith College	Little Rock, AR	785	785	Private
58	Prairie View A&M University	Prairie View, TX	5,702	7,912	Public

(Continued)

TABLE A1—BASIC SUMMARY STATISTICS ON THE HBCUs (Continued)

Number	College or university	Location	Undergraduate enrollment	Total enrollment	Type
59	Rust College	Holly Springs, MS	970	970	Private
60	Saint Paul's College	Lawrenceville, VA	717	717	Private
61	Savannah State University	Savannah, GA	2,975	3,091	Public
62	Selma University	Selma, AL	287	287	Private
63	Shaw University	Raleigh, NC	2,565	2,762	Private
64	South Carolina State University	Orangeburg, SC	3,888	4,446	Public
65	Southern University A&M College	Baton Rouge, LA	8,969	10,364	Public
66	Southern University at New Orleans	New Orleans, LA	2,824	3,647	Public
67	Southwestern Christian College	Terrell, TX	251	251	Private
68	Spelman College	Atlanta, GA	2,318	2,318	Private
69	St. Augustine's College	Raleigh, NC	1,163	1,163	Private
70	Stillman College	Tuscaloosa, AL	804	804	Private
71	Talladega College	Talladega, AL	368	368	Private
72	Tennessee State University	Nashville, TN	7,036	8,880	Public
73	Texas College	Tyler, TX	794	807	Private
74	Texas Southern University	Houston, TX	9,760	11,903	Public
75	Tougaloo College	Tougaloo, MS	933	933	Private
76	Tuskegee University	Tuskegee, AL	2,510	2,880	Private
77	University of Arkansas at Pine Bluff	Pine Bluff, AR	3,132	3,231	Public
78	University of Maryland Eastern Shore	Princess Anne, MD	3,448	3,870	Public
79	University of the District of Columbia	Washington, DC	5,169	5,363	Public
80	University of the Virgin Islands	Charlotte Amalie, VI	2,185	2,392	Public
81	Virginia State University	Petersburg, VA	4,332	5,055	Public
82	Virginia Union University	Richmond, VA	1,344	1,700	Private
83	Virginia University of Lynchburg	Lynchburg, VA	122	178	Private
84	Voorhees College	Denmark, SC	709	709	Private
85	West Virginia State University	Institute, WV	3,455	3,491	Public
86	Wilberforce University	Wilberforce, OH	1,157	1,170	Private
87	Wiley College	Marshall, TX	827	827	Private
88	Winston-Salem State University	Winston-Salem, NC	5,264	5,566	Public
89	Xavier University	New Orleans, LA	2,343	3,091	Private

Notes: The list of schools is taken from the US Department of Education's Web site: <http://www.ed.gov/about/inits/list/whhbcu/edlite-list.html>. The location data and enrollment information (current as of Fall 2005) is from the National Center for Education Statistics's Web site: <http://nces.ed.gov>.

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