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ARTICLE

What Effect Does Being a Historically Black College/University Have on Endowments?

Some Counterfactuals and Decompositions

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Abstract

This article estimates several causal counterfactual parameters of the effect of being an Historically Black College/University (HBCU) on college/university endowment, and on the probability of a college/university failing as a function of its financial health, which is proportional to endowment. Our various counterfactual causal parameter decomposition estimates suggest that the racial distinctiveness of HBCUs causes, and can account for cumulative HBCU/non-HBCU endowment disparities between $11.5 billion and $58.9 billion for the HBCUs in our estimating sample. This is consistent with, at least in part, racial discrimination against HBCUs in philanthropic endowment contributions/gifts. With respect to failure, as HBCU status contributes to higher failure probabilities that are a function of college/university financial health, reducing the HBCU/non-HBCU endowment disparity would also enhance the ability of HBCUs to continuously exist. We suggest two public policy interventions to close the endowment disparity. First, increase the tax subsidy for contributions/gifts to HBCUs relative to non-HBCUs, as a way to incentivize more gifts to HBCUs from wealthy foundations and individuals. Secondly, to the extent that the wealth of HBCU alumni—who give back to their alma mater at higher rates than their non-HBCU peers—has been constrained due to the legacy of Slavery and discrimination, a distribution of reparations to the descendants of Black American Slaves would close Black-White wealth disparities that could translate into larger endowment contributions/gifts from HBCU alumni.

Keywords: Historically Black Colleges/Universities; HBCU; Endowments; Discrimination; Racial Inequality; Reparations; Philanthropy

Introduction

At least since James Tobin (1974) posed the question "What is permanent endowment income?", the endowment of a college/university has been understood to be the instrument of financial input that will indefinitely sustain the institution's rate of consumption needed to support its output. This is particularly important given the endogeneity and volatility of the other revenues (e.g., student tuition, grants) that can finance consumption and production. While Henry Hansmann (1990) points out the limitations of Tobin's intergenerational equity motivation for the existence of endowments, Caroline M. Hoxby (2012, 2014) provides a compelling venture capital framework in which college/university endowments are necessary if they are to finance welfare-enhancing intellectual capital—human capital

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and research—to society. In particular, similar to venture capital projects, investments in human capital and research—or intellectual capital—has properties that cannot rely on conventional financing, and endowments emerge as an optimal financing mechanism.[1] Viewing colleges/universities as intellectual capital venture projects that contribute to society's welfare, the number of such projects with benefits that exceed their costs can have a proportional relationship to social welfare. It is in this context that endowment inequality among colleges/universities can be harmful for social welfare. Venture capital firms are heterogeneous with respect to what they identify as worthwhile investment projects, and can reduce the informational asymmetries associated with particular investments, given they can attract financing (Amit et al., 1998; Gompers and Lerner, 2001). Thus, relative to colleges/universities with higher endowments, those with lower endowments can be constrained in scaling up intellectual capital investments with potential net benefits to society that colleges/universities with higher endowments do not identify and/or choose not to make.

The success that Historically Black Colleges/Universities (HBCUs) achieve relative to non-HBCUs in educational and intellectual outcomes (Koch and Swinton, 2023; Price and Viceisza, 2023) for its students suggests that relative to non-HBCUs, they are better able to identify and invest in welfare-enhancing human capital investments among their traditional constituency—Black Americans—which has been historically excluded from non-HBCUs.[2] Frankki Bevins and colleagues (2021) report on several dimensions in which HBCUs seem to be able to to achieve this. Roland G. Fryer and Michael Greenstone (2010) estimated that with respect to Black Americans, HBCUs have graduated 40% of all congressmen, 12.5% of chief executive officers (CEOs), 50% of professors at non-HBCUs, 50% of lawyers, and 80% of judges.[3] Perhaps even more impressive, the mean economic mobility rate—the probability that a college graduate reaches the top fifth of the income distribution given his/her household is in the bottom fifth (Chetty et al., 2015)—of HBCU graduates is more than twice that of non-HBCUs (Hammond et al., 2021).

HBCUs appear to have an advantage relative to non-HBCUs in educational and economic/social mobility outcomes for its graduates (Elu et al., 2019; Hammond et al., 2021; Hardy et al., 2019, Koch and Swinton, 2023). However, this advantage is not complemented by a favorable endowment disparity, as on average—even though there is evidence HBCUs are not less capable stewards of endowment resources relative to non-HBCUs (Drezner and Gupta, 2012), and use their endowment more efficiently relative to non-HBCUs (Coupet and Barnum, 2010)—HBCU endowments are dramatically lower than those of non-HBCUs. William Darity Jr. (2019) reveals the starkness of the endowment disparity between HBCUs and non-HBCUs. In 2018, the ten HBCUs with the largest endowments had a total that approached $2 billion. The largest was held by Howard University at about $689 million, followed by Spelman College at $387 million. The sum total of the top ten HBCU endowments was less than that of state-supported non-HBCUs such as University of Michigan ($12 billion), University of Virginia ($8.6 billion), Ohio State University ($5.2 billion), University of North Carolina at Chapel Hill ($5 billion), and private non-HBCUs such as Harvard ($38 billion), Stanford ($27 billion), Yale ($29.4 billion), Princeton ($26 billion) and Smith ($2 billion). Such a misalignment between HBCU relative success in producing intellectual capital and their relatively smaller endowments suggests that society would be better off if the endowment disparities between HBCUs and non-HBCUs were closed. A recent analysis by the Association of Black Foundation Executives (2023) suggests that philanthropic foundations contribute to the endowment disparities, as between 2015– 2019 Ivy League colleges/universities received $5.5 billion relative to $303 million for HBCUs. Marybeth Gasman and colleagues (2022) report a downward trend in foundation giving to HBCUs over the past twenty years. This of course raises the question as to why there are endowment disparities between HBCUs and non-HBCUs.

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This article considers both the consequences and causes of the endowment disparity between HBCUs and non-HBCUs. As a historical institutional racial identity distinguishes the difference between HBCUs and non-HBCUs, the endowment disparity between them constitutes a component of racial inequality in the United States, and is a likely driver of other race-based inequalities and inequality in general (Cheslock and Shamekhi, 2020; Christensen and Rankin, 2011; Eaton et al., 2016; Meyer and Zhou, 2017), as college/university endowments fund welfare enhancing intellectual capital that improve the economic well-being of college graduates. With recent cross section data on college/university financial health and endowments, we estimate the parameters of a failure model specification, a treatment effect specification, and an endowment distribution decomposition specification. The central aim is to determine if the endowment disparities between HBCUs and non-HBCUs has consequences for the viability of HBCUs to continuously exist, and if institutional racial identity is a causal driver of endowment disparities between HBCUs and non-HBCUs. If institutional racial identity does matter, this would be consistent with racial discrimination in the market for philanthropic contributions/gifts, providing at least a partial explanation for the endowment disparities between HBCUs and non-HBCUs.

While the endowment disparity between HBCUs and non-HBCUs can be explained by a variety of historical factors (Harris 2021; Smith 2021), our inquiry focuses exclusively on the role of the racial distinctiveness of HBCUs as a driver of endowment disparities.[4] The historical persistence of racial inequality (Collins and Wannamaker, 2022; Darity and Mullen, 2022; Jung 2023; Margo 2016; Williams et al., 2021), particularly as it relates to educational financing (Loubert 2004) and HBCUs (Sharpe 2004), permits one to treat the racial distinctiveness of HBCUs as an analog of a sufficient statistic for at least two reasons. First, the persistence of racial inequality in the United States suggests that observable and identifiable racial characteristics convey more information about the parameters of interest —the effects of race on college/university endowments—relative to any other parameters based on non-racial phenomena. Second, the findings of Denise Smith (2021)—that relative to a random sample of colleges/universities, the variablility in educational outcomes of students at HBCUs is different—suggest that HBCUs are racially distinct institutions.

The remainder of the article is organized as follows. The second section provides an overview of relevant extant literature. The third section describes the data and methodology. Our empirical methodology considers estimating the parameters of two outcomes within a treatment effect framework—the probability of a college/university failing as function of its financial health which is conditioned on its endowment, and its endowment level—across two specifications. We appeal to a potential outcomes causal framework to determine if being an HBCU has a causal effect on endowment, and an endowment decomposition framework to determine if the the endowment distribution of HBCUs, differs from that of non-HBCUs as a result of HBCUs being racially distinct. Parameter estimates are reported in section four. The last section concludes.

Overview of Relevant Extant Literature

There is, as far as we can determine, an extant but limited literature on the causes and consequences of HBCU endowment disparities relative to non-HBCUs related to our inquiry. In his book, *The History of Higher Education*, James D. Anderson (1997) provides several insights that offer a historical context for our inquiry. Anderson's analysis implicates the racial distinctiveness of HBCUs as a factor in their relative disadvantage is attracting philanthropic gifts along two dimensions. First, from the genesis of their founding after the Civil War, wealthy philanthropists were biased toward HBCUs that offered industrial

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training deemed appropriate and suitable for the formerly enslaved by many industrialists. As these were a subset of all HBCUs, and non-industrial training was not considered taboo for non-Blacks, the bias for Black industrial training in college was a plausible driver of disparities in endowments between HBCUs and non-HBCUs. Lastly, by 1900 the missionary societies that perhaps disproportionately funded HBCUs not specialized in industrial education, were largely diminished in their capacity to raise funds. Thus, it is plausible that private HBCUs offering non-industrial education lost a reliable source of endowment funds, contributing to endowment disparities between them and their non-HBCU peers.

In more recent times, Sara Straubel (2024) finds evidence that grantmaking professionals at private foundations are prone to implicit racial bias in their grantmaking. This can reduce the likelihood of non-White individuals and institutions receiving grants and endowment gifts and engender racial disparities in philanthropic grants and endowment gifts. Marybeth Gasman and Noah D. Drezner (2008) report evidence for the post-1960 period suggesting HBCUs experience discrimination with respect to donations from White Churches, as HBCUs received some sixty percent less relative to non-HBCUs. Gasman and Drezner (2008) also summarize the findings of Trent (1971) and Votaw and Sethi (1970), who found racial disparities in corporate philanthropic gifts to colleges/universities, suggestive of racial bias in corporate giving to both private and public HBCUs.

The limited extant literature on HBCU endowment disparities does not explicitly test for racial bias in philanthropy that support endowments. As such, our inquiry aims to consider if the endowment disparities between HBCU and non-HBCUs are driven by the racial distinctiveness of HBCUs—or discrimination. In this context, our contribution is in the spirit of Christina M. Fong and Erzo FP Luttmer (2011) who find experimental evidence of racial bias in perceptions of gift worthiness. In particular, they found that for donors, knowing the recipient was Black lowered perceived recipient worthiness significantly more among non-Black respondents than among Black respondents.

Data and Methodology

Our data were obtained from six sources: (1) Forbes 2021 Financial Health Data for private colleges/universities, (2) National Association of College and University Business Officers (NABCU) fiscal year 2021 endowment data, (3) TP-insights-The Plug, (4) National Science Foundation (NSF) Higher Education Research and Development Expenditures for 2021, (5) Wikipedia, and (6) U.S. Department of Education College Scorecard. Our initial source for the colleges/universities in our endowment sample was the NSF data, as it included a key an indicator of the type of intellectual capital produced by colleges/universities—research and development expenditures.[5]

As not all colleges/universities participate in the NABCU analysis of endowments, supplementing it with additional sources such as TP-insights-The Plug was a practical necessity. The supplemental endowment data enabled enhancing our sample by matching with institutional research and development expenditures reported by the NSF—as these expenditures are important for the venture-like outcomes enabled by endowments. Supplementing the NABCU endowment data with that provided by TP-insights also enabled more observations on HBCUs, which likely enhances the statistical power of inferences on the HBCU effect in our parameter estimates (Norton and Strube, 2001).

The Forbes Financial Data are utilized to enable an inquiry into a particular possible consequence of endowment disparities between HBCUs and non-HBCUs—the likelihood of failing. Of the nine components that determine the financial health of college/university, the majority of the weights are on components that are a function of the endowment.[6]As such, a consideration of the probability of a private college/university failing as a result of its measured financial health can inform the extent to which

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endowment disparities between HBCUs and non-HBCUs have consequences for relative survival likelihoods. Two of the components in the Financial GPA also capture the extent to which graduates/alumni of an institution provide donations that could be allocated to the endowment—the Core Operating Margin, and Tuition as a percentage of Core Revenues —with a total weight of twenty-five percent. As such, matching HBCUs and non-HBCUs on the Financial GPA allows for some control on the wealth/income of an institution, graduate/alumni, and their effects on endowment gifts by graduates/alumni to a given institution.

Following the lead of others, (Elu et al., 2019; Price and Robinson, 2023; Price and Surprenant, 2022), we first parameterize and estimate the treatment effect of being an HBCU within a Rubin potential outcomes causal framework (Rubin 2005). Suppose a sample is characterized by (Y_i, X_i, T_i), where the Y_i are continuous or discrete scalar outcomes for the treated and untreated states of Y(1) and Y(0) respectively, the X_i are covariates measuring pre-treatment characteristics of observational units, and the T_i are treatment indicators for whether an observational unit is an HBCU. For M potential matches on treated observations, the imputed potential outcomes are $\widehat{Y}_i(0) = Y_i$ if $T_i = 0$, $\widehat{Y}_i(0) = \frac{1}{M}\sum_{j \in l_{m(i)}} Y_j$ if $T_i = 1$, $\widehat{Y}_i(1) = \frac{1}{M}\sum_{j \in l_{m(i)}} Y_j$ if $T_i = 0$, and $\widehat{Y}_i(1) = Y_i$ if $T_i = 1$, where $l_m i$ is an index l for $T_l \neq T_i$ that satisfies $\sum_{j|T_j \neq T_i} 1\left[\left\|X_j - X_i\right\| \leq \left\|X_l - X_i\right\|\right] = \mathrm{m} \in \mathrm{M}$. The indicator function $l(\cdot)$ selects and matches observational units in the control group—with index j—that are the m^{th} closest with respect to the distance norm $\| \cdot \|$.

For a sample of N observational units with N_1 treated and N_0 controls, we consider three treatment effect parameters (Abadie et al., 2004):

$$\tau^p = \frac{1}{N}\sum_{i=1}^{N}\left[\widehat{Y}_i(1) - \widehat{Y}_i(0)\right]$$

$$\tau_T^P = \frac{1}{N_1}\sum_{i:T_i=1}^{N}\left[\widehat{Y}_i(1) - \widehat{Y}_i(0)\right]$$

$$\tau_C^P = \frac{1}{N_0}\sum_{i:T_i=1}^{N}\left[\widehat{Y}_i(1) - \widehat{Y}_i(0)\right]$$

where τ^P is the treatment effect for a randomly assigned observational unit of the population, τ_T^P is the treatment effect for observation units that actually received the treatment, and τ_C^P is the treatment effect for observation units in the control group, if they were exposed to the treatment.

For a given observational unit exposed to treatment, the treatment effect parameters enable causal inference with the use of so-called *counterfactuals*—the alternative state outcomes in which an observational unit is not actually exposed to the treatment (Shadish 2010). With matching, an estimate is made of outcomes had the observational unit not experienced exposure to the treatment under consideration. Thus, the causal effect of the treatment is conceptualized as a comparison of an observational unit in two possible states of the world; one in which there is exposure to treatment, and one in which there is no exposure to treatment—the counterfactual state. When estimating the treatment effects, we use two approaches. The generation of the counterfactual to estimate the treatment effect is enabled by a matching distance function which compares treated units with untreated units on the basis of: (1) a propensity score and (2) covariates.[7]

The alternative state outcome is an empirical operationalization of David Hume's (2000) counterfactual notion of causality (Lewis 1973, 2000).[8] In our empirical and

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econometric framework, we view the HBCU treatment as making a difference from what would have happened without it. Our estimate of the treatment effect of being an HBCU constitutes an exercise in viewing causality in a Humean sense whereby counterfactual dependence between certain types of outcomes and their absence establishes a causal relationship (Harbecke 2021).

The three treatment parameters capture three different counterfactuals that can be estimated to determine the causal effects of a particular treatment. From a counterfactual causal perspective, τ^P is the average counterfactual treatment effect for a random draw from the entire population of observational units, τ_T^P is the average counterfactual treatment effect for a random draw from the subpopulation of observational units assigned to the treatment, and τ_C^P is the average counterfactual treatment effect for a random draw from the subpopulation of observational units not assigned to treatment. For each counterfactual causal parameter, a Rubin Causal matching estimator imputes the missing potential outcomes—the treated and untreated state—by using average outcomes for observational units with similar values for the matching covariates in the relevant population and subpopulation.

Our second parameterization of the treatment effect of being an HBCU deploys the counterfactual distribution decomposition framework of Victor Chernozhukov and colleagues (2013). For the entire distribution of potential outcomes Y^*_j and vector of characteristics X_j, let 0 be the population of non-HBCUs and 1 the population of HBCUs. For $j = 0$ and $j = 1$, and where the potential outcomes are realized ($Y^*_j = Y_j, \ \forall \ j$), the conditional distribution functions that characterize the stochastic assignment of outcomes $y \in Y$ to non-HBCUs and HBCUs with characteristics $x \in X$ is $F_{Y_0|X_0}(y \mid x)$ and $F_{Y_1|X_1}(y \mid x)$ respectively. The counterfactual distribution of outcomes that would have prevailed for HBCUs if they faced the non-HBCU distribution is:

$$F_{Y(0|1)}(y) = \int_{x_1} F_{Y_0|X_0}(y|x) dF_{X_1}(x)$$

The difference in the observed outcome distribution between non-HBCUs and HBCUs, can be decomposed similar to the approaches of Ronald Oaxaca (1973) and Alan S. Blinder (1973) as:

$$F_{Y(1|1)} - F_{Y(0|0)} = \left[F_{Y(1|1)} - F_{Y(0|1)}\right] + \left[F_{Y(0|1)} - F_{Y(0|0)}\right]$$

where the first expression on the right is the difference in the outcome distribution due to differences in outcome structure and the second expression is due to differences in characteristics. The first expression is a measure of discrimination against HBCUs, as it captures any differences in outcomes, when HBCUs face the same outcome distribution as non-HBCUs.

Following Chernozhukov and colleagues (2013), for a link function Λ, and location function for the conditional mean $P(x)'\beta(y)$ we estimate the relevant parameters of the differences in the observed outcome distribution with a distribution regression specified as $F_{Y|X}(y|x) = \Lambda\left[P(x)'\beta(y)\right]$. The choice of a distribution regression specification is pragmatic, as relative to alternative specifications (e.g. quantile) does not require smoothness of the conditional density functions.

Similar to the counterfactual Humean causal interpretations of the treatment parameters estimated in the Rubin Causal framework, the counterfactual decomposition parameters also permit a causal interpretation. The value-added of a counterfactual distribution decomposition framework is that when the potential outcomes equal the actual outcomes

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in the distribution, one can determine explicitly how much, if any, of the differences in the distribution of outcomes between HBCUs and non-HBCUs is due to differential treatment—perhaps as a result of discrimination.

Results

Table 1 reports a statistical summary, description, and source notes for all regressors and regressands utilized. All estimated Rubin Causal treatment parameter estimates use four matches with replacement, as there is evidence that four matches produces the lowest mean-squared error of treatment parameters (Abadie and Imbens, 2002).[9] As matching parameter estimates can be biased if the matching is not exact, our matching parameter estimates use bias adjustment on the matching covariates (Abadie et al., 2004). For the failure probabilities, we match on two covariates derived from the data on private colleges/universities to enable the counterfactuals of the treated and untreated observations: (1) The standardized value of the financial GPA and (2) The encoded numeric value of the financial letter grade. We use six matching covariates derived from the data to enable the counterfactual endowment outcomes of the treated and untreated observations: (1) The quartile for the year a college/year was established to account for the possibility the endowment can accrue over time; (2) The quartile of total student enrollment; (3) The quartile for total research and development expenditures; (4) A binary variable for an college/university being private; (5) A binary variable indicating whether an institution is a professional school (e.g. medical school), research institute, or administrative unit for a system of state colleges/universities; and (6) A binary variable indicating whether the college/university is located in one of the former States of the U.S. Confederacy. To allow for the possibility that the conditional variance of the treatment effect to varies with the matching covariates and treatment, the parameter estimates are estimated with heteroskedasticity robust standard errors—also with four matches. In general, the matching covariates are derived from the data, and are motivated to enable a comparison of similar counterfactual treated and untreated observations, particularly within the context of financial and endowment stratification among colleges/universities (Lee 2008).

Tables 2 and 3 report Rubin Causal propensity score and covariate matching parameter estimates for the treatment effect of being an HBCU on the college/university endowment.[10] For both matching approaches, the parameter estimates are similar in sign, magnitude, and statistical significance, suggesting precision in our estimates of the treatment effects, and affording interpretation with the covariate matching parameter estimates, which are more robust to model specification (Imai et al., 2009; Imai et al., 2008). The average treatment effect (τ^P) is statistically significant, suggesting that for a randomly selected private college/university, being an HBCU decreases the endowment by approximately \$1.2 billion. The statistically significant estimated average treatment effect on the treated (τ_T^P) suggests that actually being an HBCU, relative and counterfactually to being a non-HBCU, has the effect of decreasing the endowment by approximately \$340 million. If non-HBCUs were HBCUs, the statistically significant estimated average treatment effect on the controls (τ_C^P) suggests that there endowment would be lowered by approximately \$1.3 billion. In tandem, the two estimated counterfactuals of not being an HBCU provided by τ_T^P and τ_C^P suggest that being an HBCU causes the endowment to be lower.

Parameter estimates for the counterfactual decomposition of the endowment distribution are reported in Table 4. All three of the estimated distributional decompositions parameters are positive and statistically significant. The magnitude of the effects of being a non-HBCU on endowment ($F_{Y(1|1)} - F_{Y(0|1)}$) suggests that counterfactually, being a non-HBCU relative to being an HBCU, causes the endowment to increase by approximately \$255 million. The estimated coefficient implies that if HBCUs were non-HBCUs, there

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Table 1. Description and Statistical Summary of Regressands and Regressors

Regressor/ Regressand	Definition	Mean	Standard Deviation	Number of Observations
Regressands:				
Failure[a]	Binary variable equal to one if the college/ university closed between 2022–2024	.040	.1964	921
Failure Probability[b]	Estimated probability of closing	.0282	.0448	921
Endowment[c]	Year 2021 institutional endowment (millions of dollars)	1480	4660	561
Regressors:				
Financial GPA[d]	Forbes 2021 financial grade point average of college/university	2.23	.9275	921
Financial Letter Grade[e]	Forbes 2021 financial letter letter grade of college/university	6.94	2.55	921
Year Established[f]	Year in which institution was established	1897.03	52.90	643
Number of[f] Students	Total number of enrolled	14895.24	19950.34	623
Private	Binary variable equal to one if college/ university is private students	.3704	.4833	648
Regressands:				
Confederacy	Binary variable equal to one if college/ university is located in a state that was a member of the confederacy during the US civil war	.2623	.4402	648
Other Institution[g]	Binary variable equal to one if institution is a professional school (e.g. medical school), research institute, or administrative unit	.2623	.4402	648
HBCU	Binary variable equal to one if institution is a historically black college/university	.0741	.2621	648
Non-HBCU	Binary variable equal to one if institution is not a historically black college/ university	.9259	.2621	648
Research and Development[g]	Year 2021 research and development expenditures (millions of dollars)	138462.1	307445	648

Sources/Notes:

a The failure rate is based upon the private colleges/universities in the *Forbes Magazine* 2021 College Financial Health Grades, that closed—ceased operations—in years 2022–2024. The 2021 Forbes data reports for each college/university both a letter grade, and an overall financial grade point average. Closed colleges/universities were identified in the publicly available U.S. Department of Education *College Scorecard* data. See: https://www.forbes.com/sites/schifrin/2021/02/22/college-financial-grades-2021-will-your-alma-mater-survive-covid/?sh=f8199149163f; https://collegescorecard.ed.gov/

b Estimated from a logit specification where the binary dependent regressand is Failure, and the regressor is the college/ university 2021 Forbes Financial Grade Point Average.

c Endowment as reported by the National Association of College and University Business Officers (NACUBO) for fiscal year 2021. For HBCUs that did not have reported values in the NACUBO data, publicly endowment data from *TPinsights-The Plug* for fiscal year 2021 are utilized. See: https://www.nacubo.org/Research/2022/Historic-Endowment-Study-Data; https://tpinsights.com/data-sets/hbcu-endowments/

d https://www.forbes.com/sites/schifrin/2021/02/22/college-financial-grades-2021-will-your-alma-mater-survive-covid/?sh=f8199149163f

e The letter value of the ten distinct financial health letter grades were numerically encoded into ten distinct number values.

f For each college/university, the data reported in *Wikipedia* as of June 1, 2022.

g Research and Development expenditures by college/university in 2021 as reported by the National Science Foundation based on on the National Center for Science and Engineering Statistics, Higher Education Research and Development Survey, Table 21: Higher education R&D expenditures, ranked by FY 2021 R&D expenditures: FYs 2010–21. See: https://ncses.nsf.gov/pubs/nsf23304

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Table 2. Rubin Causal Treatment Propensity Score Matching Parameter Estimates: The Effect of Being an HBCU on Endowment

	Coefficient	Robust Standard Error
Outcome: Endowment (2021 Dollars)		
Treatment: Historically Black College/University		
τ^P:	–1,260,000,000	194,000,000*
τ^P_T:	–353,000,000	152,000,000**
τ^P_C:	–1,340,000,000	208,000,000*
Number of Observations	557	
Number of Matches	4	

*p < .01, **p < .05

Table 3. Rubin Causal Treatment Covariate Matching Parameter Estimates: The Effect of Being an HBCU on Endowment

	Coefficient	Robust Standard Error
Outcome: Endowment (2021 Dollars)		
Treatment: Historically Black College/University		
τ^P:	–1,240,000,000	175,000,000*
τ^P_T:	–347,000,000	162,000,000**
τ^P_C:	–1,310,000,000	189,000,000*
Number of Observations	557	
Number of Matches	4	

*p < .01, **p < .05

Table 4. Endowment Distribution Decomposition Parameter Estimates: The Effect of Being a Non-HBCU on Endowment

	Coefficient	Bootstrapped Standard Error[a]
Outcome: Endowment (2021 Dollars)		
Treatment: Historically Black College/University		
$F_{Y(1\|1)}$ - $F_{Y(0\|0)}$:	1,690,000,000	229,000,000*
(Observed Difference in Endowment Distribution)		
$F_{Y(1\|1)}$ - $F_{Y(0\|1)}$:	255,000,000	64,300,000*
(Differences in Endowment Structure Distribution)		
$F_{Y(0\|1)}$ - $F_{Y(0\|0)}$:	1,440,000,000	235,000,000*
(Differences in Characteristics Distribution)		
Number of Observations	557	

* p < .01

[a] Bootstrapped error based on fifty replications.

endowment would been higher by $255 million, on average. Given the observed total distributional endowment differences ($F_{Y(1|1)}$ - $F_{Y(0|0)}$) between HBCUs and non-HBCUs of approximately $1.7 billion, this suggests that approximately 15% of the endowment disparity ($255 million) between HBCUs and non-HBCUs is explained by

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discrimination—in the market for philanthropic endowment contributions/gifts—against HBCUs.

Overall, the parameter estimates reported in Tables 2–4 suggest that the racial distinctiveness of HBCUs is a cause of the endowment disparities between HBCUs and non-HBCUs. Our variety of estimated counterfactuals reveal that being an HBCU relative to being a non-HBCU has an adverse effect on surviving as an ongoing institution—which is a function of endowment—and on the amount of the endowment. Given the range of endowment losses caused by being an HBCU implied by the various counterfactual causal estimates in Tables 2–4, the statistically significant estimate of $F_{Y(1|1)} - F_{Y(0|1)}$ can inform a lower bound conservative estimate. As there are forty-five HBCUs in the endowment sample, the estimate of $F_{Y(1|1)} - F_{Y(0|1)}$ in Table 4 suggests that cumulatively, racial discrimination in philanthropic endowment contribution/gifts lowered the value of endowments for all HBCUs by approximately $11.5 billion. A less conservative, and perhaps upper bound estimate can be informed by the causal counterfactual parameter estimate of τ_C^P—the endowment effects of non-HBCUs becoming counterfactually HBCUs in Table 4. In this instance racial discrimination in philanthropic endowment contribution/gifts has the effect of cumulatively reducing HBCU endowments by approximately $58.9 billion.

In Table 5, we report the Logit parameter estimates for the failure probability of the private colleges/universities—which is reported on as a regressand in Table 1.[11] We specify the failure probability as a function of the 2021 Forbes financial GPA, and the quartile in which the GPA falls—to capture possible unobserved distributional effects. As the failure is rare in a particular year for colleges/universities (Eide 2018), and the adverse effects of a college/university's balance sheet can plausibly take time, we measure failure for the private colleges/universities in our sample for the three year period of 2022–2024.[12] For the Logit parameter estimates in Table 5, while the probability of failure is decreasing with respect to increases in financial health, not all of the regressors are statistically significant. However, as the aim is to predict private college/university failure as a function of financial health—which is a function of endowment, this is satisfactory. Adeline Lo and colleagues (2015) find that the presence or absence of statistical significance for a predictor regressor is not necessarily an optimal criterion for good or bad prediction—and they provide evidence of instances where statistically insignificant predictors generate accurate predictions. In general, classical hypothesis tests can lack sufficient power for detecting the predictive power for sets and subsets—which can include a number of unknown interactions—of

Table 5. Logit Parameter Estimates of Private College/University Failure as a Function of Financial Grade Point Average

	Coefficient	Robust Standard Error
Regressand: Binary variable for college/university closed in 2022–2024		
Financial Grade Point Average	–2.18	.838*
Financial Grade Point Average Quantile	.338	.700
Constant	.197	.726
Number of Observations	921	
H_o: $\beta_k = 0 \ \forall \ k$ (χ_k^2)	18.99*	
Pseudo-R^2	.142	

* $p < .01$

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regressors. Sara Shugars and Nicholas Beauchamp (2019) find that this is particularly true for out-of-sample predictive accuracy. As such, we retain the statistically insignificant regressors for predicting the probability that a private/college university will fail—which we use as a regressand in our treatment and distribution decomposition specifications to determine how HBCU status affects the probability of failure for a private college/university.[13]

Tables 6 and 7 report Rubin Causal propensity score and covariate matching parameter estimates for the treatment effect of being an HBCU on probability of a private college/university failing.[14] For both matching approaches, the parameter estimates are similar in sign, magnitude, and statistical significance, suggesting precision in our estimates of the treatment effects, and affording interpretation with the covariate matching parameter estimates in Table 7, which are more robust to model specification (Imai et al., 2009; Imai et al., 2008). The average treatment effect (τ^P) is negative and statistically significant, suggesting that for a randomly selected private college/university, being an HBCU decreases the probability of failure. However as selection into the HBCU treatment is not random across the entire population of colleges/universities, the average treatment effect on the treated (τ_T^P) is perhaps more informative and relevant, and it is statistically insignificant. This suggests that actually being an HBCU, relative and counterfactually to being a non-HBCU, does not increase the likelihood of failure. In the sample, the financial GPAs of HBCUs relative to non-HBCUs is lower.[15] The negative sign and statistical significance of the average treatment effect on the controls (τ_C^P) informs the third causal counterfactual. If non-HBCUs were HBCUs, their failure probabilities would be lower,

Table 6. Rubin Causal Treatment Propensity Score Matching Parameter Estimates: The Effect of Being an HBCU on the Probability of Private College/University Failing

	Coefficient	Robust Standard Error
Outcome: Predicted Failure Probability		
Treatment: Historically Black College/University		
τ^P:	-.0052	.0016***
τ_T^P:	-.0009	.0019
τ_C^P:	-.0053	.0016***
Number of Observations	921	
Number of Matches	4	

*** p < .10

Table 7. Rubin Causal Treatment Covariate Matching Parameter Estimates: The Effect of Being an HBCU on the Probability of Private College/University Failing

	Coefficient	Robust Standard Error
Outcome: Predicted Failure Probability		
Treatment: Historically Black College/University		
τ^P:	-.0056	.0016*
τ_T^P:	.0002	.0019
τ_C^P:	-.0058	.0016*
Number of Observations	921	
Number of Matches	4	

* p < .01

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Table 8. Failure Distribution Decomposition Parameter Estimates: The Effect of Being a Non-HBCU on the Probability of Private College/University Closing/Failing

	Coefficient	Bootstrapped Standard Error[a]
Outcome: Predicted Failure Probability		
Treatment: Historically Black College/University		
$F_{Y(1\|1)} - F_{Y(0\|0)}$:	-.0095	.0091
(Observed Difference in Failure Distribution)		
$F_{Y(1\|1)} - F_{Y(0\|1)}$:	.0012	.0008*
(Differences in Failure Structure Distribution)		
$F_{Y(0\|1)} - F_{Y(0\|0)}$:	-.0107	.0094
(Differences in Characteristics Distribution)		
Number of Observations	921	

* $p < .01$
[a] Bootstrapped error based on fifty replications.

suggestive again, of HBCU endowments being more productive relative to non-HBCUs. Based upon covariate matching results in Table 7, this implies that relative to their mean sample failure rate, the counterfactual reduction in non-HBCU failure probability would be approximately twenty-one percent.[16] As this counterfactual is based on private colleges/universities with similar financial GPAs, an implication is that if non-HBCUs had HBCU status, they would have lower failure probabilities.

As college/university financial health is proportional to its endowment (Bare 2024), the treatment effect parameter estimates in Tables 6 and 7 suggest that the lower relative endowments of HBCUs does not translate into financial insolvency that leads to failure. This also suggests that endowments at HBCUs are more productive relative to non-HBCUs, as per dollar of endowment, HBCU failure probabilities are lower.

As the estimates in Tables 6 and 7 do not explicitly account for the possibility that HBCUs are treated differently relative to non-HBCUs, parameter estimates for the counterfactual decomposition of the failure probability distribution are reported in Table 8.[17] The overall observed distribution in failure probabilities ($F_{Y(1|1)} - F_{Y(0|0)}$) and the component explained by different characteristics ($F_{Y(0|1)} - F_{Y(0|0)}$) is statistically insignificant. However, the distributional component explained by the racial distinctiveness of HBCUs ($F_{Y(1|1)} - F_{Y(0|1)}$) is positive and statistically significant. This suggests that while for the overall distribution of failure probabilities, there are no differences between HBCUs and non-HBCUs, the racial distinctiveness of HBCUs appears to matter. The positive sign and statistical significance of ($F_{Y(1|1)} - F_{Y(0|1)}$) suggests that, all things being equal, if non-HBCUs were counterfactually HBCUs in the sense of facing the HBCU failure distribution, the non-HBCU failure probability would be higher. The failure probability of a college/university reflects, at least in part, an inability to service existing and/or long-term operating expenses. As such, the positive sign and statistical significance of ($F_{Y(1|1)} - F_{Y(0|1)}$) suggests that HBCUs, with their higher failure probabilities relative to non-HBCUs, face discrimination from philanthropic donors who could provide endowment gifts to shore up balance sheets, and/or from lenders in financial markets who could refinance/restructure debt.[18]

Conclusion

This article considered both the consequences and causes of the endowment disparity between HBCUs and non-HBCUs. Historic and persistent inequality in the endowments

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between HBCUs and non-HBCUs is one component of racial inequality in the United States. This disparity in endowments is a likely consequential driver of racial inequality in general, that if closed, could enable some convergence, if not elimination of, racial disparities in income and wealth. With recent cross-section data, we estimate several causal counterfactual parameters, that estimate the impact of being an HBCU has on failure probability of a college/university failing, and on the endowment levels. The posited counterfactuals permit alternative states of the world in which HBCUs are non-HBCUs and vice versa, as a way to identify the causal effects of being a racially distinct HBCU.

We first estimated the parameters of HBCU treatment effect endowment specifications to identify the effects of HBCU status on a college/univerity endowments likelihood of failure as a function of its endowment-dependent financial health, and the extent to which it is explained by the racial distinctivness of HBCUs. Lastly, we estimated the parameters of an HBCU treatment effect and endowment distribution decomposition to determine if HBCU status mattered for a college/university endowment. Similar to the estimates of Thomas Sav (2000), and historical findings and conclusions of Adam Harris (2021), Gasman and Drezner (2008), Laura T. Hamilton and colleagues (2024), Samuel M. Nabrit (1971), Charles V. Willie (1990), and Melissa E. Wooten (2015), our treatment effect parameter estimates suggest that the endowment disparities between HBCUs and non-HBCUs is caused, at least in part, by racial discrimination in philanthropic endowment contributions/gifts. With respect to a college/university failing as a function of its financial health—which is proportional to endowment—our failure decomposition parameter estimates suggest that the racial distinctiveness of HBCUs, all things being equal, has the effect of increasing their probability of failure relative to non-HBCUs.

Closing the endowment HBCU/non-HBCU disparity would be beneficial, as the endowments of colleges/universities finance human and intellectual capital that improve well-being—and HBCUs appear to have a comparative advantage in this regard. As HBCU status contributes to higher failure probabilities that are a function of college/university financial health, reducing the HBCU/non-HBCU endowment disparity would also enhance the ability of HBCUs to continuously exist. We find that if non-HBCUs were HBCUs, their failure probabilities would be higher. With respect to the endowment disparities, our various counterfactual causal parameter estimates suggest that the racial distinctiveness of HBCUs causes, and can account for, cumulative endowment disparities between HBCUs and non-HBCUs between $11.5 billion and $58.9 billion for the HBCUs in our estimating sample.

The top end of our estimated HBCU/non-HBCU cumulative endowment disparity of $58.9 billion provides a stark insight of the overall endowment inequality that exists, and would possibly persist between these two types of institutions. The nine generously endowed non-HBCUs considered in this article's introduction have a cumulative endowment of approximately $153 billion. Our top end estimate of $58.9 billion in HBCU/non-HBCU endowment disparities constitues approximately 38% of the cumulative endowment of just nine generously endowed non-HBCUs. In this context, remedying the endowment shortfalls of HBCUs due to their differential treatment philanthropic would still result in a status quo of stark endowment inequality between HBCUs and non-HBCUs.

As our results implicate racial discrimination in philanthropic endowment contributions/gifts as a source of the endowment disparities between HBCUs and non-HBCUs, policy interventions that can induce philanthropic institutions move away from their existing racially inegalitarian practices (Beer et al., 2021; Cunningham et al., 2014), could increase HBCU endowments relative to non-HBCUs. One such policy intervention could be to increase the tax subsidy for contributions to HBCUs relative to non-HBCUs, as a way to incentivize more gifts to HBCUs from wealthy foundations. Of course, private

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philanthropic foundations are not the only source of endowment gifts to colleges/universities—alumni are also. In this case, a modest public policy intervention would be to also tax-subsidize individual gifts to HBCUs relative to non-HBCUs. However given long-standing persistent Black-White wealth disparities (Derenoncourt et al., 2022) HBCU alumni have less wealth to provision gifts to their HBCU alma mater, and there is evidence that HBCU alumni give back to their alma mater at a higher rate relative to relative to their non-HBCU peers (Stokes 2023). As such, two policy interventions warrant consideration. First, a public policy that distributes reparations to the descendants of Black American Slaves (Brooks 2004; Darity and Mullen, 2022) that closes Black-White wealth disparities could translate into larger endowment contributions/gifts from HBCU alumni. Second, to the extent that chattel slavery constrained the wealth accumulation trajectory of Black Americans (Craemer et al., 2020), which constrained their ability to make gifts to HBCUs, private corporations who benefitted from chattel slavery could directly provide reparations to HBCUs in the form of endowment gifts (Marks 2023).

While our findings implicate differential treatment of HBCUs relative to non-HBCUs in philanthropic donations, it provides no explicit insights into how the relative financial disadvantages of state-supported HBCUs are driven by historic and ongoing state-level underfunding (Ortega and Swinton, 2018; Rose 2022; U.S. Department of Education 2023). Extending our analysis to consider this is perhaps a worthwhile research effort, as this may be an important determinant of how endowments in publicly funded colleges/universities evolve over time. Our estimates do however control for whether an institution is private or public, which may capture, however imprecise, the role of state-level appropriations of state-supported colleges/universities. However, to the extent that relative to public non-HBCUs, public HBCUs are subject to discriminatory treatment in state appropriations, and our matching methodology captures this imprecisely, the estimates provided here on the effects of being an HBCU on failure probabilities and endowment levels could be downwardly biased.

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Notes

[1] In Hoxby's framework, college/university endowments emerge as way in which the institutions elicit and incentivize alumni financial gifts as a means to finance the intellectual capital projects it undertakes. This voluntary giving and unconventional financing emerges as a result of not being able to write and enforce explicit contracts to capture a part of the private and social returns individuals realize as a result of attending/graduating from the institution.

[2] For a history of HBCUs, see: Bond (1960), Allen and Jewell (2002), Allen et al., (2007), Drewry and Doermann (2012), and Smith and Jackson (2019).

[3] The Fryer and Greenstone estimates are based upon data from the Congressional Black Caucus (congressmen) Black Enterprise Magazine (CEOs), U.S. Department of Education, Office of Civil Rights (professors), and Ehrenberg (1996) (lawyers and judges).

[4] Public state-supported HBCUs are subject to annual state appropriations, which our analysis does not consider. However there is evidence of disparities in state appropriations between Public HBCUs and non-HBCUs. A recent analysis by the Hunt Institute (2022) finds, for example, that Tennessee State University, a Public Land Grant institution have been underfunded between 1956–2006 by an amount upwards to $544 million. Overall, the U.S. Department of Education (2023) concluded that sixteen of the country's nineteen historically Black land-grant universities have been underfunded by their states by approximately $12 billion, based on an analysis of per-student state spending data from 1987 to 2020.

[5] The data are available upon request from the author.

[6] The nine components that determine financial health, with weights in parentheses are: (1) Endowment Assets Per FTE (15%). The ratio of endowment assets at year end to per full-time equivalent student; (2) Primary Reserve Ratio (15%): The ratio of expendable assets to total annual expenses, where expendable assets are

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defined as total unrestricted net assets, plus temporarily restricted net assets, plus debt related to property, plant and equipment, minus property, plant and equipment net of accumulated depreciation, divided by total annual expenses; (3) Viability Ratio (10%): The ratio of expendable assets to debt load; (4) Core Operating Margin (10%). The ratio of net revenue to core revenue—where core revenue is tuition, donations and investment revenue; (5) Tuition as a Percentage of Core Revenues (15%). The ratio of tuition to core revenue; (6) Return on Assets (10%). Annual Change in net assets; (7) Admissions Yield (10%). The percentage of accepted students who choose to attend; (8) Percent of Freshmen Getting Grant Aid (7.5%). Percent of admitted students receiving scholarships and/or grants; and (9) Instruction Expenses Per FTE (7.5%). Ratio of instructional expenses to full time enrollment.

[7] The propensity score is a scalar measuring the probability of an observational unit receiving treatment. Using an estimated propensity score identifies treatment effects by mimicking randomization in the probability of assignment between treated and untreated status. In contrast, and relative to matching on the propensity score, matching on covariates provides two major advantages. First, it can provide a better approximation to a fully blocked randomized experimental design (King and Nielsen, 2019). Lastly, matching on covariates produce treatment effect parameter estimates that have less bias and dependence on the model specification (Imai et al., 2009; Imai et al., 2008). We report treatment parameter estimates using both approaches so as to discern the precision of estimated treatment effects, as there is evidence the precision of parameter estimates could vary across the two approaches (Elze et al., 2017).

[8] In particular, Hume conjectures that "….an object followed by another, and where all the objects, similar to the first, are followed by objects similar to the second. Or, in other words, where, if the first object had not been, the second never had existed" (Harbecke 2021, p. 1648). The Rubin causal framework operationalizes "in other words" by constructing an alternative state for observational units—matched on similar covariates—in which they are not treated.

[9] Matching on the propensity score or covariates exploits the full sample by finding, for each treated observation, nearest neighbor matches from the full sample. The resulting treatment effect averages the difference in the outcome of interest between each treated and nearest neighbor untreated observation. In our estimating samples, there are forty-eight HBCUs, each of which are matched with a nearest neighbor from a sample of 509 HBCUs in the case of the endowment outcome specifications, and 873 non-HBCUs in the failure outcome specifications.

[10] The propensity score was estimated via Logit, and specified the probability of being an HBCU as a function of the covariates in the covariate matching specification. The reported p-values for the statistical significance of the parameters are asymptotic.

[11] All parameters were estimated with *Stata* 15.0.

[12] The failure rate is based upon: the private colleges/universities in the *Forbes Magazine* 2021 College Financial Health Grades, that closed/ceased operations in 2022–2024, as reported by the U.S. Department of Education *College Scorecard* data. To enhance the reliability of the 2024 closures, the data were triangulated with additional Web-based data sources: (1) Inside Higher Education, (2) College and Career Network, and HIGHER ED DIVE. The websites, last accessed on August 3, 2024 are respectively: https://www.insidehighered.com/news/business/financial-health/2023/12/21/look-back-college-closures-and-mergers-2023; https://www.scoir.com/blog/college-name-changes; https://www.highereddive.com/news/how-many-colleges-and-universities-have-closed-since-2016/539379/.

[13] We follow this approach for all our parameter estimates that deploy predictors and propensity scores and retain insignificant regressors.

[14] The propensity score was estimated via Logit, and specified the probability of being an HBCU as a function of the covariates in the covariate matching specification. The Rubin Causal matching parameter estimates were enabled with the *nnmatch* command in *Stata* 15.0 (Abadie et al., 2004).

[15] In the sample, the average financial GPA for HBCUs and non-HBCUs is approximately 2.06 and 2.34 respectively.

[16] For the non-HBCUs, the mean predicted failure rate is .039 approximately.

[17] All parameter estimates for the counterfactual distribution decompositions were enabled with the *cdist* command in *Stata* 15.0.

[18] In the case of borrowing in financial markets, Dougal and colleagues (2019) find evidence suggestive of discrimination against HBCUs, in that relative to non-HBCUs with similar credit ratings, the underwriting fees for issuing Bonds are higher for HBCUs.

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