

What's in a (school) name? Racial discrimination in higher education bond markets*

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ABSTRACT

Historically Black Colleges and Universities (HBCUs) pay higher underwriting fees to issue tax-exempt bonds, compared to similar non-HBCUs. This appears to reflect higher costs of finding willing buyers: the effect is three times larger in the far Deep South, where racial animus remains the most severe. Credit quality plays little role. For example, identical differences are observed between HBCU and non-HBCUs: 1) with AAA ratings, and/or 2) insured by the same company, even before the 2008 Financial Crisis. HBCU-issued bonds are also more expensive to trade in secondary markets, and when they do, sit in dealer inventory longer.

JEL classification: H75, I24, J15

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1 Introduction

Over 50 years ago, Milton Friedman argued in *Capitalism and Freedom* that economic development deters the expression of discrimination, racial or otherwise. The crux of his argument is that free markets “separate efficiency from irrelevant characteristics,” the benefits of which he credits the ability of Jews to survive the Middle Ages, despite intense persecution. To further illustrate the intuition, he writes:

“The purchaser of bread does not know whether it was made from wheat grown by a white man or a Negro, by a Christian or a Jew. In consequence, the producer of wheat is in a position to use resources as effectively as he can, regardless of what attitudes of the community may be toward the color, the religion, or the other characteristics of the people he hires (p. 109).”

One reason this example resonates is because bread consumers and wheat growers don’t directly interact. Moreover, because bread is a commodity – contrast this with watching a baseball game or listening to recorded music – the product itself reflects virtually nothing about the producer itself. Together, these factors anonymize buyers and sellers, and consequently, limit the extent to which prices can reflect consumers’ preferences over personal attributes.

This paper explores a setting that, if Friedman’s argument is correct, would seem equally unlikely to exhibit racial discrimination: the municipal bond market. As in the wheat example above, the transaction between the “consumer” (a bond investor) and “producer” (a municipality) is intermediated and impersonal, and the product (an interest payment) is, if it arrives, indistinguishable between payers. These factors, coupled with competition, should force prices to reflect fundamentals, and little else.¹

We collect a 23-year (1988-2010) sample of 4,145 tax-exempt municipal bond issues by 965 four-year college and universities, totaling approximately \$150 billion. Of these, 102 were

¹Becker (1957) theorized that competition should reduce the expression of racial discrimination. Ashenfelter and Hannan (1986) find that competition in the banking sector decreases gender discrimination, and Heywood and Peoples (1994) and Peoples and Talley (2001) find that the deregulation of the trucking industry increased the relative wage rates of Black workers. See also Black and Strahan (2001) and Levine, Levkov, and Rubinstein, (2014).

issued by Historically Black Colleges and Universities (HBCUs), many of which originated in ex-slave states during the Reconstruction Era (1880s), with the mission of educating newly emancipated Blacks. We explore whether HBCUs pay more to access capital markets than otherwise similar peers, and if so, why. As with most discrimination studies, the key empirical challenge is attributing any differences to taste-based versus statistical discrimination (Phelps (1972), Arrow (1973)) which, in our context, would involve investors finding HBCU-bonds less attractive for reasons other than their explicit affiliation with racial minorities.

Our analysis begins when bonds are issued. Like most initial public stock offerings for corporations, financial intermediaries play a prominent role in the issuance of municipal bonds. Typically, an underwriter first purchases bonds from a university, and then resells them to public investors over the next few days. This price difference, known as the *gross spread* or *underwriter spread*, compensates underwriters for the cost of placing the issue with investors.

On average, HBCUs pay higher underwriting spreads than non-HBCUs. For the typical non-HBCU, 81 cents out of every \$100 raised flows to underwriters. The average for HBCUs is 11 basis points higher, at 92 cents per \$100 dollars raised. We propose a race-based search cost explanation: investors face tax incentives to own local bonds, and because HBCUs are located in states with high levels of anti-Black racial animus, underwriters face steep frictions when trying to find willing buyers.

There are, of course, other potential reasons why HBCU bonds might be harder to sell. Fortunately, as researchers, we observe nearly all, and likely more of, the variables that would be available to underwriters and investors. Our estimations control for: 1) bond features such as the amount raised, maturity, and call provisions, 2) measures of underwriter quality and experience, 3) school metrics like student size, alumni giving rates, and ranking and 4) potentially dynamic regional characteristics through *state* \times *year* fixed effects. Despite the combination of these controls explaining about two-thirds of the total variation in underwriter spreads, the estimated premium paid by HBCUs is similar, if not

slightly larger (16 basis points) than the unconditional difference.

We pay special attention to the possibility that HBCUs may have, or are perceived to have, higher credit risk.² Our first test limits the sample to deals with AAA credit ratings. Given that timely payment for municipal bonds with this credit class is virtually assured, focusing on this subset should remove nearly all heterogeneity in default risk. Yet, even among this 40% of the data, the HBCU effect remains virtually unchanged (16 basis points). Second, we consider only insured deals, and compare HBCU and non-HBCU bonds insured by the same entity. Among this sample, HBCUs pay a premium of 18 basis points; excluding the Financial Crisis of 2008 and afterward gives a nearly identical estimate (17 basis points).

Perhaps the strongest evidence for taste-based discrimination involves a comparison *within* the set of HBCUs. If racial animus is the primary reason why HBCU-issued bonds are harder to place, then these frictions should be magnified in states where anti-Black racial resentment is most severe. We measure racial animus using survey responses (e.g., to questions about affirmative action), racially charged Google searches (Stephens-Davidowitz (2014)), White vote share for Barack Obama in the 2008 election, and geocoded racist tweets following the re-election of Barack Obama in 2012 (Zook (2012)). Alabama, Mississippi, and Louisiana earned the dubious distinction as having the highest levels of anti-Black racial animus in the U.S., with a sharp break between these and the fourth (Georgia).³

When we reestimate our fully specified models and compare the underwriter spreads for HBCUs located in Alabama, Mississippi, and Louisiana to those in other states, the results are remarkable. Outside these three states, HBCUs pay 11 basis points more in gross spreads compared to non-HBCUs. However, within Alabama, Mississippi, and Louisiana – representing 26% of HBCU issuances – the premium triples (30 basis points). Importantly, this difference is limited to HBCUs: among non-HBCUs, the same cross-state comparison

²Empirical evidence regarding the importance of default risk for municipal market spreads is mixed. Bergstresser and Cohen (2011) and Ang, Bhansali, and Xing (2014) argue that credit risk plays a minor role, whereas recent work by Schwert (2017) concludes the opposite.

³When ranked on these measures of racial animus, from 1st (most animus) to 51st (least), Louisiana's sum of the ranks is 11, with Mississippi at 15, and Alabama at 17.5. The next state is Georgia (38), followed by Arkansas (44), and Tennessee (46.5).

shows virtually no difference (2 basis points).

A second test is motivated by recent work by Babina, Jotikasthira, Lundblad, and Ramadorai (2017), which estimates the extent to which investors are afforded a *tax privilege* for owning municipal bonds issued within their state(s) of residence. Indeed, without such tax incentives, the market for HBCU-issued bonds would be national rather than local which, given the geographical patterns of racial animus described above, should largely immunize HBCUs from any in-state investor bias. Consistent with these authors' findings, we find that even outside the far Deep South, where the HBCU effect is markedly weaker (see above), tax privilege exacerbates the effect.⁴ Among the half of states with the highest incentives for investors to own same-state bonds, HBCUs face close to 20 basis points in additional underwriting fees; among the lower half, there is virtually no effect.

For robustness, we also ask whether HBCU-issued bonds face higher transactions costs in secondary market trading, typically occurring years after the initial issuance. This not only provides external validity using a different sample, but represents the strongest case against efficiency differences and/or exploitation by primary market underwriters driving our benchmark findings. On average, HBCU-issued bonds are about 20% more expensive to trade in secondary markets, with larger orders (\$50,000 or above) facing the steepest costs (60% premium). HBCU-issued bonds also tend to sit in dealer inventory about 25% longer – again, with larger orders taking the most time to trade – perhaps the most direct evidence of intermediaries facing elevated search costs.

The paper concludes by exploring the potential impact of higher search frictions on selling prices. As a benchmark, suppose that racial bias creates a downward sloping demand curve for HBCU-issued bonds, such that by incurring higher search costs, underwriters can obtain higher selling prices. Consider now two polar cases. At one extreme, search costs (and fees) are sufficient to completely eliminate any but-for price discrepancy between HBCUs and non-HBCUs. In this case, even if the *average* potential investor discriminates against

⁴There is virtually no variation in tax privilege in Deep South states, preventing a similar analysis among them. See section 4.4.2.

HBCUs, the *marginal* one – the eventual purchaser who determines the observed selling price – may not.⁵ At the other extreme, underwriters expend no additional selling costs for HBCU bonds, but as a result, large price discounts obtain.

Across a variety of specifications, we consistently estimate price discounts for HBCU bonds, but below conventional significance levels. The estimated yield difference is about five basis points ($t = 0.5$) for small trades, and twice that for large trades ($t = 0.9$), suggesting that small (large) HBCU-bond trades sell for average discounts in the neighborhood of 1% (3%). Combining our prior findings on higher selling costs and time in inventory, we interpret the weak/small price discounts as evidence against either polar case, with the equilibrium outcome perhaps corresponding closer to the first extreme than the second.

Our paper directly contributes to the literature on racial discrimination in financial markets. Relevant work here includes studies of racial disparities in approval rates⁶ and pricing of residential mortgages.⁷ Other financial markets with evidence of racial discrimination include the peer-to-peer lending market (Pope and Sydnor, 2011), and a small but growing literature examining discrimination in small business lending.⁸ Additionally, although their primary interest is not discrimination, Bergstresser, Cohen, and Shenai (2013) find that municipal bonds issued by regions fractionalized (i.e., heterogeneous) in terms of either race and/or religion trade at discounts, which they attribute to market inefficiencies. Our study complements these by providing evidence of discrimination in an important sector of the municipal bond market.

⁵This is analogous to Becker’s (1957) original analysis of discrimination in labor markets, with recent empirical support provided by Charles and Guryan (2008).

⁶Surveys on these topics include Yinger (1996), Ladd (1998), Lacour-Little (1999), Dymski (2006), and Ross (2006).

⁷Haughwout, Mayer, and Tracy (2009) finds limited evidence of pricing discrimination in subprime loans originated in the years leading up to the 2008 financial crisis. Using data on mortgage lending, Bayer, Ferreira and Ross (2014) find that conditional on a rich set of observables, Blacks and Hispanics are charged higher interest rates.

⁸Bates (1991) finds that relative to similar White-owned firms, Black-owned firms are less capitalized and receive smaller loan amounts, which subsequently translates into higher failure rates. Cavalluzzo and Cavalluzzo (1998) find large differentials in loan denial rates for female- and minority-owned small businesses. Blanchflower, Levine, and Zimmerman (2003) find that Black entrepreneurs are roughly twice as likely to be denied credit, and are charged higher interest rates for approved loans.

2 Historically Black Colleges and Universities

Prior to the American Civil War (1861 – 1865), higher education for Blacks in the United States was almost nonexistent. The majority of American Blacks were enslaved, and, while a few free Blacks were able to attend “White” colleges in the North, educational opportunities for Blacks in the southern slave states were extremely rare and generally illegal. To combat this inequality, a small number of institutions were organized during the Antebellum period to offer elementary- and high school-level instruction specifically to Black students. These institutions later developed into full-fledged post-secondary institutions, and are generally considered the first HBCUs.⁹

The number of HBCUs grew rapidly shortly after the end of the Civil War, often by way of northern religious missionary organizations establishing new institutions in the former slave states. While another surge in HBCU founding came following the passage of the second Morrill Act in 1890, which forced each state to either desegregate their land-grant colleges established by the first Morrill Act in 1862, or establish a separate land-grant college for students of color. Almost all southern and southern-border states opted for the latter option, which led to the creation of 16 exclusively Black land-grant institutions.

The Higher Education Act of 1965, which defined and mandated direct federal aid to HBCUs provided the formal definition of an HBCU as, “any historically Black college or university that was established prior to 1964, whose principal mission was, and is, the education of Black Americans, and that is accredited by a nationally recognized accrediting agency or association determined by the Secretary [of Education] to be a reliable authority as to the quality of training offered or is, according to such an agency or association, making reasonable progress toward accreditation.” Financial support for HBCUs under the Higher Education Act of 1965 was explicitly acknowledged as partial remedy for past discrimina-

⁹The first HBCU was organized in 1837 by a group of Philadelphia Quakers. Initially called The Institute for Colored Youth, the school has since been renamed Cheyney University and is in operation today. Roughly 20 years later, two others were formed: Lincoln University (Pennsylvania) in 1854 and Wilberforce University (Ohio) in 1856.

tory action by States and the Federal Government against HBCUs. In 1980 President Jimmy Carter signed Executive Order 12232, “to overcome the effects of discriminatory treatment and to strengthen and expand the capacity of Historically Black Colleges and Universities to provide quality education,” and subsequent administrations have also signed executive orders supporting HBCUs in various ways.

Despite governmental support of HBCUs, financial backing still remains a top concern for HBCUs in order to sustain their educational mission (Arnett (2014), Gasman (2010)). Figure 1 identifies the 88 four-year HBCUs we study during our sample period. According to the National Center for Education Statistics, in 2010, four-year HBCUs served approximately 251,000 students, 233,000 (93%) of whom were Black. This statistic displays the mission of HBCUs to educate Blacks, as non-HBCU four-year institutions served 10.751 million students, of which Blacks comprised only 1.357 million (or 12.6%). Some notable HBCU alumni include the Reverends Martin Luther King, Jr. (Morehouse College) and Jesse Jackson (North Carolina A&T), Spike Lee (Morehouse College), and Oprah Winfrey (Tennessee State University).¹⁰

3 A Simple Model of Municipal Bond Trading

To fix ideas for the empirical tests that follow, we begin with a stylized model of municipal bond trading. There are three dates, $t = 0, 1,$ and 2 . Each bond has a face value \$1, and realizes risky payoffs at $t = 2$. With risk-neutral probability q , the $t = 2$ payoff is zero. With a risk-free rate of zero, and no search costs or other frictions, the price of the bond would be $1 - q$ at all dates. Trade takes place at both $t = 0$ and $t = 1$, and is intermediated. At $t = 0$, a broker/dealer purchases a bond from the issuer, and at $t = 1$ sells it to a retail investor. The model characterizes how search frictions influence the prices at which bonds will be transacted at $t = 0$ and $t = 1$.¹¹

¹⁰See Fryer and Greenstone (2010) for a general, contemporary examination of HBCUs.

¹¹Harris and Piwowar (2006), Ang and Green (2011), and Schultz (2012) document that bond transactions costs, i.e., the price differential between the $t = 0$ and $t = 1$ price, are among the highest of all financial

We model search frictions as follows. For effort level $e > 0$ expended by a broker/dealer, it can place each bond at discount $D(e) = \frac{\gamma^2}{e}$ relative to fundamental value $1 - q$, where $\gamma \geq 0$. Higher effort levels by broker/dealers translate to higher selling prices, and vice versa.¹² The cost of supplying effort is $k + e$, reflecting both a fixed and variable cost. Moreover, the returns to effort increase with γ , intended to capture search costs related to selling a bond. For example, high values of γ might correspond to bonds issued in poor states with few potential investors; or, bonds with high default risk, or contractual features that make them unattractive to investors may increase search costs.

Consider first the effort choice by the broker/dealer underwriting the bond issue at $t = 1$. Having purchased Q units of the bond at price P_{buy} at $t = 0$, its profits are $\Pi(e) = Q[1 - q - \frac{\gamma^2}{e} - P_{buy}] - (k + eQ)$ which, when optimized with respect to e , gives equilibrium effort level $e^* = \gamma$. Bonds with a thick pool of potential investors require little discount, and thus minimal effort by broker/dealers; bonds with a thinner potential clientele require larger discounts, which broker/dealers partly mitigate through a higher effort choice. This gives a selling price at $t = 1$ of $P_{sell}^* = 1 - q - \gamma$.

Backing up to $t = 0$, and assuming perfect competition between underwriters, we can derive the maximum price a broker/dealer would be willing to pay by setting $\Pi(e^*)$ equal to zero, which gives $P_{buy}^* = 1 - q - 2\gamma - \frac{k}{Q}$ and round-trip transaction cost of

$$P_{sell}^* - P_{buy}^* = \gamma + \frac{k}{Q}. \quad (1)$$

Our central hypothesis is that because of racial animus, selling costs (γ) are higher for HBCU-issued bonds which, as Equation (1) indicates, will increase transactions costs, and ultimately, HBCUs' cost of obtaining finance. This contention is based on three observations. First, municipal bonds are typically marketed and sold to wealthy individuals (Bergstresser

assets, with round-trip trading costs on the order of 150-300 basis points.

¹²Modeling the search problem with discounts is simply a normalization. If investors derive consumption value from holding municipals (e.g., from a school's alumni), one could imagine premia relative to fundamental value, which also increase with broker/dealer's effort costs.

and Cohen (2015)), as the tax benefits are most advantageous to those in the highest brackets.¹³ Second, the tails of the wealth (Strand (2010)) and income (Altonji and Blank (1999)) distributions are heavily concentrated among White individuals, making it likely that members from this group constitute the typical investor of an HBCU-issued bond.

Finally, and perhaps most significantly, municipal bond investors disproportionately reside in the same state of the issuer. As noted by Schultz (2012), such home bias has both behavioral roots (e.g., familiarity for local issuers) and tax advantages.¹⁴ Because HBCUs are mostly located in ex-slave states, it is not simply that broker/dealers must find (mostly) White investors for their bonds, but in regions where racial animus and conflict between Blacks and Whites has historically been the highest.

The key empirical challenge, as Equation (1) highlights, is distinguishing this effect from other reasons that HBCU-issued bonds may be more difficult to sell (i.e., differences in γ for non-racial factors), trade size (Q) and underwriting efficiency (k).

4 Do HBCUs pay higher fees to issue bonds?

4.1 Data

Our sample consists of municipal bonds issued by 4-year and higher, not-for-profit, U.S. colleges and universities. To identify the potential set of such issuers, we begin with the National Center for Education Statistics' Delta Cost Project Database (DCPD). The DCPD is a longitudinal database that provides the name, location, and other schools specific data all postsecondary institutions in the U.S. spanning academic years 1988 through 2010.¹⁵ The

¹³As noted by Ang and Green (2011), individual investors comprise the largest set of municipal bond investors. See also O'Hara (2012), Table 1.7, for more discussion of municipal bond investor demographics.

¹⁴Almost all states allow interest from municipal bonds to be exempt from state tax (in addition to Federal tax), provided that the investor resides in the same state as the issuer.

¹⁵Our sample ends in 2010, as this was the most recent school data available in DCPD when we assembled our datasets. Our analysis therefore avoids the detrimental effects of the 2011 enactment of the Parental Loans to Undergraduate Students (PLUS) program, which severely impacted HBCU enrollments (Bidwell (2014), Johnson et al. (2015)).

DCPD also identifies schools considered HBCUs.

We then obtain bond issuance data via the Security Data Corporation’s (SDC) Global Public Finance Database, following Butler (2008). SDC does not explicitly identify issuances from 4-year and higher, not-for-profit, U.S. colleges and universities, but does provide basic information about the issuance including the general type of issuer, main use of proceeds, amount, term, gross spread, state of issuance, name of issuer and name of the backer of the bond.¹⁶ We therefore combine information from SDC and DCPD to identify bond issuances of interest.

Between 1988 and 2010, there were 7,249 individual bond issuances from tax exempt issuers classified as universities, for which the main use of proceeds is higher education, and gross spreads are not missing. We remove 1,196 observations corresponding to two-year and junior colleges, as indicated by either the issuer or backer name containing variants of the terms “community college,” “junior college,” and “technical college.” We eliminate these schools because they are many times very small, and in turn raise capital jointly with other educational entities in the municipality to reap economies of scale. Our analysis requires issuances backed solely by a single school, which eliminates an additional 11 issuances where the backer is denoted “various.” Applying these criteria leaves 6,042 issuances.

From this set, we then manually search the backer and/or issuer fields for the names of each HBCU identified in the DCPD. We also search the CUSIP field in SDC for CUSIPs associated with HBCUs.¹⁷ We identify 102 HBCU bond issuances, each of which is listed in Figure 1. Of the remaining 5,940 non-HBCU issuances, 4,071 are unique issuers, the rest being either non-identifiable or issued by multiple entities. After trimming an additional 28 issues due to missing values for student enrollment, our final dataset consists of 4,145 bond issuances, 4,043 (102) issuances pertaining to non-HBCUs (HBCUs), and representing

¹⁶This information is obtained from a deal’s official statement. We include an example of an official statement from our sample in appendix Figure A1. Circled in red are some highlights of the deal: the credit rating (AAA), insurer (Ambac), nominal deal amount (\$44,060,000), sample of an individual bond within a package (CUSIP 704646AA6), and underwriter spread.

¹⁷HBCU CUSIPs were identified by searching for each HBCU name on the Electronic Municipal Market Access interface (www.emma.msrb.org).

920 (45) unique institutions. In the average year, about 190 bond issuances are sold to the public, with about 5 originating from HBCUs. Table 1 tabulates the time-series patterns of issuances for HBCUs and non-HBCUs separately.

4.2 Underwriting costs

When universities issue bonds, underwriters are employed to both structure the deal and market it to investors. To do this, underwriters issue university debt in packages consisting of multiple bonds of varying amounts, maturities, and other features (Ang and Green (2011)). Thus, for our primary market analysis, we analyze underwriter pricing at the package level, with our sample consisting of the 4,145 deals summarized in Table 2.

In practice, underwriters are compensated in the form of discounts, i.e., purchasing bonds from the issuer for a price lower than it expects to sell them. As indicated in Equation (1), higher values for search costs will be reflected in a larger spread between the price at which the bond package is purchased from the issuer and sold to investors. At the time bonds are issued, the precise value of this quantity cannot be calculated, since the underwriter has not yet sold, or “re-issued” the bonds to investors. Accordingly, underwriters provide an estimated selling price for each security in a package called an *offering price*, which accounts for prevailing rates, issuer risk, the timing and amount of cash flows, call provisions, and other relevant attributes. Underwriters are compelled by the Internal Revenue Service to “make a bona-fide effort to sell a substantial fraction of the bonds at a offering price (Schultz (2012)),” although excess (insufficient) demand for a given bond issue may cause actual selling prices to deviate from offering prices.¹⁸

Accordingly, most of our analysis focuses on the difference between offering and purchases prices – known in the bond industry as the *underwriter spread* or *gross spread* – as our measure for issuance costs.¹⁹ This is our preferred measure because is it publicly disclosed

¹⁸Even if such deviations are substantial, the relevant comparison for our purposes is whether such “markups” differ, on average, between HBCUs and non-HBCUs. As we show in section 5.2, they do not.

¹⁹Gross spreads are sometimes further broken down into: 1) *takedown*, which provides compensation for

in the offering’s official statement, and is observable at the time of issue.

Gross spreads are reported in basis points, as a fraction of either the bond’s par value or proceeds. We use the latter normalization, noting that because bonds are typically priced close to par, the estimates would be similar in either case. Table 2 indicates that among university-issued bonds, the average gross spread is 81 basis points, nearly identical to O’Hara’s (2012) estimate for the universe of all municipal bonds issued during this time period.

Continuing down the table, we report summary measures for various other issuance characteristics. In the second row, we see that the average deal is \$35 million, totaling almost \$150 billion over the entire sample. Nearly all deals contain bonds with call provisions (90%), and over half (56%) of the issuances are insured, with 42% securing AAA ratings, 17% with AA ratings, and the balance of deals either rated below AA (14%) or remaining unrated. Sinking fund provisions (61%) are sometimes used to provide additional protection against default. Virtually all university-issued securities are “revenue bonds,” indicating that they are backed by a stream of cash flows originating from a specific asset.²⁰

The last few rows list summary statistics for underwriters and issuers. The average number of underwriters in the syndicate is approximately two. The total number of university-issued deals by all members of the syndicate over the past five years in our sample (e.g. for issuances in 1997, considering total issuances during 1993-1997) was 78 deals, on average. Financial advisors, which among other things, provide assistance to issuers in selecting underwriters, are employed in 42% of the deals. The typical university has about 10,000 students enrolled, with about 40% being public schools. Giving among alumni averages about \$5,000 per student.

finding buyers, 2) *management fee*, which pertains to structuring and managing the bond issue, and 3) *underwriter expenses*, usually involving compliance and other regulatory functions. In our sample, these separate components of gross spreads are seldom disclosed, although for a small number (245), we find that takedown comprises some 62% of the total. This is consistent with industry data confirming that takedown is typically the largest component of spreads (MSRB 2013).

²⁰The primary alternative is a “general obligation” bond, most often seen among municipalities with taxing authority.

Our main analysis compares gross spreads between bonds issued by HBCUs and non-HBCUs, while attempting to control for sources of heterogeneity related to school quality, issuer reputation, bond characteristics, geography, and other factors. Table 2 foreshadows our regression results, where HBCU gross spreads are higher by 11 basis points ($t = 1.87$, $p = 6.2\%$), an increase of fifteen percent relative to average gross spreads for non-HBCUs. However, examining the other variables, some of this may reflect differences in issue size (HBCU amounts are lower), student enrollment (HBCUs are smaller), giving rates (HBCU alumni give less), or the number of past deals by the underwriting syndicate (HBCU underwriters appear less experienced). HBCUs are also more likely to be public universities, which as shown by Boland and Gasman (2014), may further impair their creditworthiness via reduced access to public funds.

On the other hand, note that HBCUs are much more likely to purchase insurance – 80% versus 55% for non-HBCUs – a finding that explains, in part, their superior distribution of credit ratings. Where 54% (69%) of deals issued by HBCUs are rated AAA (AA or better), these same figures are 41% and 58% for those issued by non-HBCUs. Only 2% of rated HBCU deals have credit ratings lower than AA, compared to 14% for other issuers. HBCUs are also more likely to use financial advisors (51% versus 41%) which, given that advisors tend to improve deal terms including gross spreads (Vijayakumar and Daniels (2006)), would appear to close, rather than widen, the gap in underwriting costs. These differences are useful to keep in mind when assessing the all-in gap in funding costs HBCUs face. Although data unavailability prevents a precise measurement, the additional cost of obtaining credit insurance and/or retaining financial advisors would appear to accrue disproportionately to HBCUs, and therefore, widen the overall gap between them and comparable non-HBCUs.

4.3 Regression results

To more formally characterize the difference in gross spreads between HBCUs and other universities, we estimate the following model:

$$\begin{aligned} \text{Gross Spread} = & \alpha_0 + \alpha_1 \cdot \text{HBCU} + \beta_1 \cdot \text{Bond Characteristics} + \\ & \beta_2 \cdot \text{School Characteristics} + \beta_3 \cdot \text{State} \times \text{Year Fixed Effects} + \varepsilon \quad (2) \end{aligned}$$

The number of observations is 4,145, one for each university-backed issue in our sample. The main coefficient of interest is *HBCU*, an indicator variable for whether the issuance is from a Historically Black College or University. A hypothesis based on search costs being elevated for race-based reasons predicts a positive sign on the HBCU coefficient, α_1 , as it represents the incremental gross spread charged for HBCU-issued bond packages, after controlling for a various school, bond, underwriter, and geographic attributes we expect to be correlated with spreads charged by underwriters. As a benchmark, column 1 of Table 3 shows the results when only the *HBCU* indicator is included as a covariate, replicating the univariate comparison shown in Table 2. Progressive columns sequentially incorporate controls for potentially confounding factors. Note that while all results in Table 3 are clustered by both issuing school and day, inferences are nearly identical if we instead cluster by issuing school and week, or by issuing school and month.

Temporal and geographic effects. When interpreting the *HBCU* coefficient, one possible concern is geographic heterogeneity in costs underwriters may face when attempting to sell bonds. Because of tax motivations, there is strong incentive for municipal bond investors to reside in the same state as the issuer (Schultz (2013)). Consequently, placing bonds in larger and/or richer states may be easier for underwriters, resulting in lower gross spreads. Given HBCUs are regionally concentrated amongst some of the poorest states in the U.S., perhaps the *HBCU* indicator captures, in whole or part, cross-state heterogeneity in wealth, size, education, tax rates, political stability (Butler et al. (2009)), or other relevant features of

the potential investor base. A second possibility is that *HBCUs* tend to concentrate their bond issues in times when gross spreads are high (in aggregate).

Both possibilities are addressed by the inclusion of *state* \times *year* fixed effects, shown in column 2. As seen by the dramatic increase in R^2 from just 0.1% to 50.9%, the fit of the model improves substantially. Moreover, the magnitude on the *HBCU* coefficient nearly doubles to 21 basis points ($t = 3.21$, $p < 0.1\%$).²¹ In the presence of these dynamic geographic controls, the *HBCU* effect is estimated within the state-year unit, mitigating the impact of state-level wealth, demographics, tax rates, or other similar factors.

Bond characteristics. Column 3 adds to the regression controls for issue size and other features of the issue, including the credit rating if one exists (and an indicator for no rating otherwise), insurance, and sinking fund provisions. The extant literature documents that transaction costs in bond markets decrease in size, and increase in time to maturity, instrument complexity, and credit risk (Harris and Piwovar (2006)). We too find higher gross spreads for smaller issuances, and/or those with longer maturities, or complex valuation features such as callability and sinking fund provisions.²² Measures of credit risk (beyond credit ratings, which are already included) also are significant predictors of gross spreads. Uninsured bonds have higher gross spreads, consistent with Butler (2008), as do revenue bonds, which are backstopped by the cash flows of particular projects rather than the university as a whole. Accounting for these contractual features of the bond issue, while again improving the fit of the model ($R^2 = 61.2\%$), leaves the *HBCU* coefficient nearly unchanged at 19 basis points ($t = 3.20$, $p < 0.1\%$).

Underwriters. Recall from Table 2 that *HBCUs* tend to use underwriting syndicates

²¹The reason that the estimated coefficient increases is that *HBCU*-issued bonds are disproportionately issued from states in which gross spreads for *non-HBCUs* are lower than average. Specifically, over half (58 out of 102) of *HBCU*-issued bonds are issued in Alabama, Georgia, Mississippi, North Carolina, and Virginia, where the average gross spread for *non-HBCUs* is 71 basis points. Including *state* fixed effects rather than *state* \times *year* results in an estimated coefficient on the *HBCU* indicator of 17 basis points.

²²Other examples of complexity occasionally include issuing a floating rate bond, and coupling this with a floating-for-fixed swap contract. The vast majority of deals in our sample involve simple fixed-rate standard coupon (with no accompanying derivatives), with the percentage being essentially identical for *HBCU* (78.4%) and *non-HBCU* bonds (78.3%). Adding an indicator for fixed-rate bonds to the specification does little to the *HBCU* effect. In this case, the estimated coefficient is 14.8 basis points ($p < 0.01$).

with less experience, with the typical HBCU syndicate having participated in 58 combined deals over the most recent five years, versus 79 for non-HBCUs. To the extent that such differential experience reflects disparities in operating efficiency or rents, then it is possible that the *HBCU* effect reflects, at least in part, differences in underwriter efficiency.

In particular, larger syndicates may have better developed networks of potential investors, and in other ways, likely enjoy economies of scale. The effect of such differences on transactions costs emerge immediately from the model presented in the prior section. We have already seen how fixed cost of underwriting (k) maps directly into transactions costs, and extending this to incorporate marginal costs is trivial. Suppose, for example, that underwriter i 's effort (e) function is given by $h_i^2 e + k_i$, where the marginal cost of selling (h) differs across underwriters i . In this case, $P_{sell}^* - P_{buy}^* = h_i \gamma + \frac{k_i}{Q}$, so that transactions costs increase in both marginal (h_i) and fixed costs (k_i).²³ Another potential determinant of gross spreads that may differ across underwriters is market power, a feature we leave unmodeled, but may nevertheless differ between underwriters.²⁴

To accommodate potential differences in marginal costs (h_i), we include in column 4 the number of university deals done by all members of the syndicate (in total) over the most recent five years. Consistent with Butler (2008), we observe a strong negative relation between the number of deals and gross spreads, suggesting that syndicates with more (aggregate) experience may have a cost advantage. On the other hand, after controlling for experience, gross spreads are positively associated with the number of underwriters in a syndicate, which may reflect higher total fixed costs (k_i above). Indeed, we observe a strongly positive relation with gross spreads, consistent with this interpretation. In any case, neither control has much of an effect on the HBCU coefficient, which remains stable at 18 basis points ($t = 3.11$, $p < 0.1\%$).

²³With perfect competition, the underwriter with the lowest cost could capture the entire market at $t = 0$. A less stylized model might appeal to incomplete and/or costly information acquisition by issuers, or other frictions that allow heterogeneous suppliers to simultaneously exist in equilibrium.

²⁴Bergstresser, Cohen, and Shenai (2013) find that issuers from more ethnically and religiously fractionalized counties pay higher yields on their municipal debt. They find some evidence that this is due to less efficient monitoring of the bond underwriting process.

We have experimented with additional ways of measuring underwriter quality, the results of which are reported in Appendix Table A1. For example, in column 1, we augment our existing specification with: 1) the lead underwriter’s lagged 5-year volume of *all* municipal bonds underwritten (4,335 on average), not limited to issuers in higher education, and 2) the lead underwriter’s experience in the *same state* as the issuer (382 on average). Neither coefficient estimates are significant, and more importantly, the estimated HBCU effect is nearly identical (16 basis points, $t = 2.9$). The next column excludes from the sample the 7.5% of deals in which one of more underwriters that are affiliated with racial minorities (inferred by Google searches), under the joint hypothesis that HBCUs may be more likely to use minority-affiliated underwriters (they are; 33.3 %), and that these underwriters may be less efficient. Yet, among this subset, the coefficient is nearly identical to the previous column (16 basis points, $t = 2.8$), and to the estimates reported in Table 3. Column 3 shows the results with fixed effects for each unique underwriter in the syndicate (both lead and secondary), resulting in a point estimate of 11 basis points ($t = 2.4$), nearly identical to the univariate difference in the first row of Table 2.

School attributes and alumni wealth. Cash flow characteristics aside, suppose that a school’s reputation influences an investor’s willingness to own its bonds. Though outside most mainstream asset pricing theory, there are two reasons to admit this possibility. The first is Merton’s (1987) “investor recognition” hypothesis, which is based on the assumption that investors are unlikely to purchase securities issued by unknown firms. Applied to the municipal context, this assumption would increase underwriters’ search costs for lesser-known universities, such as the small and provincial HBCUs.

A second possibility is that investors derive utility directly from owning securities, beyond their financial returns. This assumption forms the basis for the growing class of “socially responsible” funds, which include or exclude certain securities based on a priori criteria such as avoiding defense firms, or investing in green energy companies. Hong and Kacperczyk (2009) explore this idea among equities, documenting that ‘sin stocks’ – firms involved in the

production of alcohol, tobacco, or gambling – tend to be less widely held, and consequently, experience higher returns. Among universities, the idea is even more intuitive, especially among a school’s alumni. To the extent that buying a school’s bonds confers consumption value directly, search costs may be lower for highly reputed schools with larger and richer alumni.

To address this possibility, column 5 of Table 3 shows the results when we augment our specification with various measures intended to proxy for school reputation, financial sophistication of its administrators, and alumni wealth. The school ranking variable corresponds to the Wall Street Journal/Times Higher Education College Ranking Overall Score in 2017, where higher values indicate better university reputations. Judging by the negative coefficient on school ranking (-0.28 , $p < 0.01$), more prestigious schools are associated with lower gross spreads, suggesting that underwriters perceive these as being less costly to place with investors.²⁵

Likewise, whether a university enlists the services of a financial advisor during its bond offering – perhaps an indication of the experience or financial sophistication of its administration – is negatively associated with underwriting spreads, confirming prior work by Vijayakumar and Daniels (2006). Other school-level controls include the size of the school’s student body, giving rates by alumni, and an indicator for being a public institution. Whereas all of these are significant in isolation, the WSJ/THE rankings subsume the explanatory power of each.²⁶

Despite the addition of these variables, the estimated magnitude of the *HBCU* indicator remains economically and statistically significant. With the full family of controls for time, geography, contractual features, underwriter activity, and school characteristics, HBCUs are charged 15.7 basis points ($t = 2.98$, $p < 0.1\%$) more to issue bonds.

Credit risk. The final issue we consider is that HBCU-issued bonds may have, or are

²⁵WSJ/THE reputation score are available for 75% of the schools in our sample. In cases of missing data, we set the value of these observations to the sample mean, as well as include a missing-value dummy variable (Cohen and Cohen (1985)).

²⁶We thank an anonymous referee for this suggestion.

perceived to have, elevated credit risk, either through higher default or lower recovery rates. Although columns 3 – 5 already include multiple controls for default risk (e.g., credit ratings, sinking fund provisions, school enrollment, etc.), these controls are likely imperfect. Columns 6 – 8 provide sharper tests to rule out residual concerns that HBCU-issued bonds are more likely than others to default.

Column 6 begins by considering only the subset of bond issuances that receive a credit rating of AAA (the highest possible rating) at issuance.²⁷ In a comprehensive study of municipal bond defaults from 1970-2011, Moody’s finds that in the universe of all municipal issuers having obtained a rating of AAA, there were *zero* instances of default over the ensuing five years.²⁸ Hence, focusing on this sample should significantly limit any remaining heterogeneity in the credit risk of issuers. Despite cutting the sample by more than half, the estimated coefficient on *HBCU* remains stable at about 16 basis points.²⁹ The reduction in statistical significance ($t = 1.94$, $p = 5.3\%$) is due mostly to reduced precision due to a smaller sample size ($5.3 \times \sqrt{\frac{4145}{1729}} \approx 12.7$).

Column 7 considers only insured bonds, and includes insurance company fixed effects. Accordingly, the average *HBCU* effect is identified by comparing gross spreads for HBCUs and non-HBCUs commonly insured by the same entity. This renders school-specific risk less relevant as the insurance company adds an additional layer of payment in the event of default. Here too, we observe a nearly identical magnitude as before, with gross spreads for HBCU-issued bonds being 18 basis points higher ($t = 3.28$, $p < 0.1\%$). Lest one be concerned about

²⁷The three primary credit rating agencies differ in their nomenclature, with Standard and Poor’s and Fitch using all capital letters (e.g., AAA, AA), and Moody’s using a combination of upper and lower case letters, and sometimes with numbers (e.g., Aaa, Aa1). Throughout the paper, we report ratings using the former convention, relying on the close correspondence between the Moody’s classification scheme and that of the other two.

²⁸See Exhibit 28, in US Municipal Bond Defaults and Recoveries, published by Moody’s on June 27, 2017.

²⁹Note that several of the coefficients become insignificant or even flip sign relative to previous columns. For example, neither *Revenue Bond* nor *Sinking Fund*, both measures of creditworthiness, are significant, suggesting that both are subsumed by a AAA rating. Also, the estimated coefficient on *Insured* becomes positive in this sample, indicating that among AAA-rated bonds, selling costs are lower for issuers with AAA ratings themselves, as opposed to obtaining this rating via insurance. Whether this represents differences in perceived credit risk, school quality, or other factors that influence investor willingness to pay, 100% of the HBCU-issued bonds with AAA ratings are insured, so that the coefficient on *Insured* has no impact on the HBCU coefficient.

bond insurance being less credible during and after the Financial Crisis of 2008, column 8 repeats the specification, but only for years 2007 and prior. Again, the coefficient and statistical significance remains virtually unchanged at 17 basis points ($t = 2.98$, $p < 0.1\%$).

4.3.1 Matching

As a non-parametric alternative, we utilize a nearest neighbor matching estimator for treatment effects (Abadie and Imbens (2006)). We take HBCU status as the treatment, and attempt to match each HBCU issue to a non-HBCU issue, based on statistically significant univariate differences (at the 5% level) between HBCUs and non-HBCUs in Table 2. To minimize credit risk differences, we first condition into a high credit quality subsample ($N = 2,845$) where the issuance was rated AAA or AA at issuance, and if not rated, was insured. We then match to the nearest neighbor on issue size, underwriter experience, school reputation, school enrollment, alumni giving rates, bond insurance, and the year of issue. We require exact matches on state of issue and public school status. Successful matches were obtained in 71 cases.³⁰ In the first two columns of Table 4 Panel B, we tabulate descriptive statistics for the match variables, from which trivial differences are observed. Formal covariate balance assessment, shown in columns 3 and 4, reveals standardized differences close to zero, and variation ratios close to one for the majority of covariates.

Panel A of Table 4 reveals the average treatment effects on the treated (*HBCU*), after bias adjustment for continuous covariates (Abadie and Imbens (2011)), is 17.6 basis points ($p = 0.2\%$), similar to results shown in Table 3. This result mitigates concerns about OLS not allowing for a sufficiently flexible relation between gross spreads and the relevant covariates. An additional benefit of this exercise is that it allows us to ‘name’ the HBCU matches, which are listed in Table A2 of the Appendix. Generally, non-HBCU controls are small,

³⁰Of the 102 deals involving HBCU issuers, conditioning into high credit quality results in a loss of 14 observations. The remaining $88 - 71 = 17$ unmatched HBCU observations are associated with somewhat smaller deal amounts, and lower student enrollments, compared to the successful matches. However, these differences are modest, on the order of the differences observed between the 71 matching HBCUs and 71 control non-HBCUs.

regional, and relatively obscure, e.g., Jacksonville State University (AL), Rollins College (FL), and Brenau University (GA). This helps address concerns about school attributes and/or reputation – beyond their impact on credit risk – conflating the relation between HBCU status and gross spreads.

4.3.2 Remaining unobservables

Oster (2016) builds upon Altonji, Elder and Tabler (2005) by deriving a bias-adjusted true treatment effect in the presence of unobservables (α^*) as a function of estimated treatment effects (in our case α , the HBCU coefficient) and model explanatory power (R^2) without and with controls. This calculation requires an assumption about the coefficient of proportionality in the proportional selection relationship (δ), and an assumption about the hypothetical explanatory power of a regression that includes both observables and unobservables (R_{max}).

Treatment effect estimates and model explanatory power without (with) controls are presented in Table 3 Column 1 (5). We assume equal selection ($\delta = 1$), implying unobservables are not more important than observables in explaining the treatment. Without a strong view on the theoretical maximum R^2 in our setting, we consider the following of values tending toward full explanatory power: 0.70, 0.80, 0.90 and 1.00. Using these inputs, the bias-adjusted treatment effects (α^*) are 16.2, 17.5, 19.1 and 21.1, respectively. These estimates suggest that were we able to better control for residual unobserved heterogeneity, the estimated HBCU effect would be slightly larger than those reported in Table 3, not smaller. Note also the consistency between the matching algorithm above, and the exercise here, both of which give treatment effects in the neighborhood of 18 basis points.

4.4 Cross-sectional analysis

To this point, our analysis has found that: 1) HBCU-issued bonds pay higher gross spreads compared to otherwise similar schools, and 2) various controls for creditworthiness, bond features, underwriting syndicate characteristics, geographic variation, and school/alumni

quality provide a poor account for this finding. In this section, we use geographic variation to explore two additional tests consistent with the hypothesis that investors' racial animus, at least in part, is responsible for the higher search costs faced by underwriters when attempting to sell HBCU-issued bonds. The first test (section 4.4.1) explores cross-state differences in anti-Black racial resentment, whereas the second (section 4.4.2) examines the impact of state-tax rates on the HBCU effect.

4.4.1 Racial animus

In our first test, we measure cross-state differences in racial animus against Blacks, and then, ask whether HBCU-issued bonds in the worst offending states have even higher gross spreads, compared to HBCUs in locations with less racial animus.³¹

To measure variation in racial animus across states, we derive a composite of five variables. The first two metrics, racial resentment and opposition for affirmative action, are derived from the Cooperative Congressional Election Study (CCES, Ansolabehere (2012)). The CCES is a large survey of American adults by county, and recent research links current variation in racial resentment and opposition for affirmative action to geographic variation in slavery in the year 1860 (Acharya et al (2014)). The third measure captures state level variation in racially charged Google searches, which, as shown by Stephens-Davidowitz (2014), inversely predict state-level vote shares obtained by Barack Obama in both the 2008 and 2012 elections. The fourth measure compares the state-level White vote share for Democratic presidential nominee Barack Obama in 2008 to the White vote share for the 2004 Democratic nominee John Kerry. Vote share is measured from exit polling of Edison/Mitofsky with larger decreases capturing more animus. The final metric follows Zook (2012), and captures the geographic dispersion of geocoded racist Tweets in immediate response to Barack Obama's re-election in 2012.

³¹Other recent studies also exploiting cross-state variation in racial animus to study taste based race discrimination with respect to wage differentials faced by Blacks (Charles and Guryan (2008)) and differential access to credit card financing by Black entrepreneurs (Chatterji et al. (2012)).

We rank all 50 states, in addition to the District of Columbia, on each metric from 1 (highest animus) to 51 (lowest animus). We designate states ranking in the top 10 on each of the five metrics as “high racism” states. Appendix Table A3 provides the complete ranking, from which a structural break separating Louisiana, Mississippi and Alabama from Georgia and the other states is clearly apparent.³² While these states account for only 4.7% of all university issuances, they are home to over one-fourth (26%) of issuances by HBCUs.

Figure 2 shows the basic result. In the left hand side, we plot the average gross spreads for non-HBCUs (dark gray, 81 basis points) and HBCUs (light gray, 87 basis points) for states other than Louisiana, Mississippi, and Alabama. The right hand side of the figure plots this same difference ($106 - 82 = 24$ basis points) for these three states. The first noteworthy observation is that the difference is over three times larger in states with high levels of racial animus (24 vs. 7 basis points). Second, spreads for non-HBCU schools are essentially the same in the left and right hand sides the figure (81 vs. 82 basis points), suggesting that the difference in differences is driven almost entirely by changes in HBCU gross spreads.

To more formally examine these differences, the first two columns of Table 5 show the results of re-estimating our fully specified model (column 5 of Table 3), for both high-animus and low-animus states, respectively. The first regression indicates an estimated gross spread premium for HBCUs of 29.6 basis points, with a p -value less than 1%, despite containing less than five percent of the total observations.³³ Although the effect remains economically and statistically significant in column 2, the HBCU effect among the low-animus sample is about one-third the size, at 10.5 basis points ($t = 2.5$). An F -test reveals the difference in HBCU coefficients is significant at the 7% level.

³²This break occurs primarily because the states remain “demographically unchanged” with the majority of the Whites being Southern born, compared with, say Georgia, where a much larger fraction of Whites are non-native and not culturally Southern (Tilove, 2008).

³³Note that all bonds in the high-animus sample are revenue bonds, which results in this variable dropping out of the estimation.

4.4.2 Tax privilege

Our second cross-sectional tests involves a comparison between states differing in the incentive for resident investors to own locally-issued municipal bonds. The most significant consideration, as described by Schultz (2012), is the extent to which interest payments are subject to state-level taxation. In most cases, states treat interest received by investors from issuers within same state – e.g., a North Carolina resident holding a bond issued by Duke University – as exempt from state taxes (here North Carolina). However, were this same investor to receive an interest payment from a bond issued by Emory University (located in Georgia), interest payments would be subject to state tax. Although this creates an incentive for municipal bonds to be held by local investors, the effects will (all else equal) be strongest for states with high tax rates, such as California, and weakest for those with low ones, such as Texas.

A recent paper by Babina, Jotikasthira, Lundblad, and Ramadorai (2017) combines data on state-level treatment of interest payments and tax rates to create an index of *tax privilege* for each U.S. state. As they show, a higher tax privilege creates a more localized market for a state’s municipal bond issuers, which a key ingredient of the search cost hypothesis. Indeed, when such tax incentives are minimal, the investor base will expand to include investors from other states. Thus, it is primarily among states that offer a significant tax advantage for owning same-state bonds where we would expect the HBCU effect to be strongest.

Ideally, the data would permit us to conduct a 2×2 sort on racial animus and tax privilege, the diagonal elements of which should show the greatest differences. Unfortunately, tax privilege is almost uniform across the high animus states of Alabama, Louisiana, and Mississippi. Thus, columns 3 and 4 compare high tax-privilege states to low tax tax-privilege states, except for these three.³⁴ The HBCU effect is large and significant (18.4 bps, $p < 0.01$) among states with high tax privilege, and virtually absent otherwise (4.63 bps, $p = 0.23$).

³⁴See the final column in Table A3 for a list of each state’s tax privilege measure from Babina, Jotikasthira, Lundblad, and Ramadorai (2017). We designate each state outside the Deep South as “low” tax privilege when below the median (6), and “high” otherwise.

An F -test rejects equivalence of the HBCU coefficient in high and low tax privilege states at the 8% level of significance.

5 Robustness and other considerations

The analysis thus far has focused on the interaction between HBCUs and bond underwriters. We saw that HBCUs pay more in underwriting costs – particularly in the far Deep South – little of which appears to reflect issuer or bond fundamentals. In this section, we continue to trace the flow of bonds, first from underwriters to investors trading in the secondary market (5.2), and then months or even years later, between investors (5.3). These additional tests establish robustness to our benchmark findings, provide perspective into the role played by financial intermediaries, and allow us to consider a richer set of outcome variables, such as the time required for a dealer to re-sell a bond (section 5.4). In section 5.5, we relate our findings to the literature on labor market discrimination, drawing on Becker (1957).

5.1 Trade-level data

All analysis prior to now has been conducted at the deal level.³⁵ The analysis in this section disaggregates observations into individual trades, using data extracted from the Municipal Securities Rulemaking Board (MSRB). The secondary trading sample begins January 31, 2005, and ends June 30, 2010.³⁶ We exclude dealer-to-dealer transactions in order to isolate trades involving retail customers, remove 5,705 duplicate trades, and winsorize price changes, par values, and sales yields at the 1% and 99% thresholds.

³⁵This is the natural unit of observation, as a single gross spread is reported for each deal.

³⁶Although some trading data is available beginning in 1999, traders lacked uniform access to real-time prices until MSRB Rule G-14 took effect on January 31, 2005. Bond prices provide important information for investors, which in turn facilitate trading volume and liquidity in the secondary market (Bessembinder et al. (2006)). Prior to Rule G-14, bonds that traded relatively infrequently (such as HBCUs) were more prone to delayed reporting of trade information. This delay potentially generates a differential information environment for HBCUs relative to other bonds.

We create two trade-level datasets, which are analyzed in sections 5.2 and 5.3 respectively. The first is intended to track *newly issued* bonds, i.e., those that soon after being purchased by underwriters are placed with investors. Following Schultz (2012), this sample starts 25 days prior to the official issuance date, and ends 10 days afterward. There are 11,226 unique CUSIP identifiers after imposing these criteria. The second sample contains only trades for *seasoned* bonds. For this sample construction, we follow Cestau, Green, and Schürhoff (2013) and consider all trades occurring 60 days (or more) after initial issuance, resulting in 16,096 CUSIPs. This permits comparison with their study, though alternative cutoffs (e.g., 10 days after issuance) make almost no difference to the results.

5.2 Markups on newly issued bonds

In section 4, we took gross spreads as our estimate for an underwriter’s revenues when issuing a bond. But, recalling the discussion from section 4.2, gross spreads are calculated relative to the underwriter’s estimate of the eventual selling price (the offering price), not the actual selling price. Specifically, for a given bond package, the underwriter’s profit, $P_{sell}^{package} - P_{buy}^{package}$, can be decomposed as follows:

$$P_{sell}^{package} - P_{buy}^{package} = \underbrace{\left(P_{sell}^{package} - P_{offering}^{package} \right)}_{markup} + \underbrace{\left(P_{offering}^{package} - P_{buy}^{package} \right)}_{gross\ spread}. \quad (3)$$

The second term is the gross spread. The first, known among municipal bond traders as the *markup*, measures the difference between the offering price and actual sales price.

To measure markups, we utilize the first of the two trade-level datasets described above. Panel A of Table 6 contains some summary statistics for individual trades. Note that relative to the analysis in Section 4, the number of observations is now much higher ($N = 116,905$), implying that on average, a bond package requires $\frac{116,905}{4,145} \approx 28.2$ trades to deplete underwriter inventory. The typical trade is \$343,000, and occurs 3 days after the issuance date. Note also that on average, sales occur at slight premia to both par (\$1.05 per \$100 notional value) and

offering prices ($\$101.05 - \$99.80 = \$1.25$). Across all trades, the average markups relative to offering prices is 128 basis points.

Equation 3 shows that markups and gross spreads are substitutes. Thus, if markups for HBCU bonds are systematically higher or lower than for non-HBCU bonds, differences in underwriter revenues may not be well captured by differences in gross spreads. Panel B of Table 6 tests for this explicitly. The first row considers as the dependent variable each trade's *Markup* relative to the offering price. In addition to our coefficient of interest, the *HBCU* indicator, we also include the bond and issuer controls considered in our analysis of gross spreads (Table 3). The regressions further include trade-level controls for the par value of the transaction, the time since the offer date (in days), and the change in the 20-year yield-to-maturity municipal bond index between the offer and sales date.³⁷

Our estimate of the coefficient on the HBCU indicator is 8 basis points, although with a standard error nearly one and a half times as high (12), suggesting no statistically significant difference in markups between HBCUs and non-HBCUs.³⁸ In other words, even though *Markups* are positive on average, there is virtually no evidence that they are higher (or lower) for HBCU-issued bonds, and accordingly, allows us to focus on gross spreads (Table 3) as our measure of underwriting revenues. To the extent that there are any differences in *Markups*, they are higher for HBCUs, further increasing their cost of obtaining finance.

The second and third columns disaggregate markups into its components considering, respectively, the offering price and (actual) transaction price for each trade. Conditioned on controls, the *HBCU* coefficient is far from significant, and with slightly positive point estimates for both. Thus, even though underwriting costs appear to be higher for HBCU-issued bonds, there is no evidence that transaction prices, or underwriter's expectation of them, are lower.

While these two phenomena may initially seem at odds, this is not necessarily the case.

³⁷Data for this series is available here: <https://fred.stlouisfed.org/series/WSLB20/downloaddata>.

³⁸Following Cestau, Green, and Schürhoff (2013), we have also estimated markups aggregating by CUSIP, as well as by $CUSIP \times DAY$. In these specifications as well, we find no evidence that markups are higher for HBCU-issued bonds.

Foreshadowing our discussion in section 5.5, underwriting costs more closely indicate the *average* level of discrimination (i.e., how many investors must be approached before one is willing to buy) whereas prices reflect the discrimination of the *marginal* investor (i.e., the one who says yes). As Becker (1957) emphasizes, these may differ considerably in the cross-section, resulting in differential observed outcomes for search costs and prices.

5.3 Turnover costs among seasoned bonds

This section compares the transactions costs between HBCUs and non-HBCUs trades occurring months to years after the initial issue. We conduct this analysis for two reasons. The first is for generalizability: if HBCU-issued bonds are more difficult to place initially, it stands to reason that they should be more difficult to place subsequently. The second reason is that by examining trades that are less likely to involve the original issuer or underwriter, the concern that our benchmark findings in Section 4 reflect differential financial sophistication by the university and/or predatory pricing by underwriters is allayed.

To estimate transactions costs in secondary trades, we adapt the approach developed in Cestau, Green, and Schürhoff (2013), which tests for, and finds, elevated transactions costs of Build America Bonds, relative to other tax-exempt municipal bonds. In analogous fashion, we estimate:

$$\Delta P_i = \beta_0 + \beta_1 \Delta Tradesign_i + \beta_2 \Delta Tradesign_i \times HBCU + \beta_3 HBCU + \Gamma Controls_i + \varepsilon_i. \quad (4)$$

Each observation i corresponds to a trade. The average size of secondary market trades is \$236,000 (Panel A of Table 7), slightly lower than that for newly issued bonds.

For each trade-level observation, we calculate a percent price change, ΔP_i , relative to the most recently recorded price for the same bond. Prices are reported per \$100 par value. Each trade is also associated with a *Tradesign*, which takes a value of one for a customer purchase, a negative one for a customer sale, and zero otherwise. The total percentage wise

transaction cost is thus given by $2\beta_1$.

We are mostly interested in the interaction between *HBCU* and $\Delta\text{Tradesign}$, which estimates the additional cost of turning over an HBCU-issued bond. In addition to these variables, the regressions include *state* \times *year* fixed effects, along with the same set of bond and issuance characteristics included in prior tables.

Panel B of Table 7 shows the results. Confirming prior work by Cestau, Green, and Schürhoff (2013), we estimate a coefficient on $\Delta\text{Tradesign}$ of 0.85, nearly identical to their estimate (0.88). More importantly, the *HBCU* interaction term is positive (17 basis points) and significant ($p < 0.1\%$). As we found in the primary market, HBCU bonds in secondary markets are about 20% more expensive to trade, with dealers taking $(85 + 17) * 2 = 204$ basis points on a round trip, compared to 170 basis points for non-HBCU bonds.

Columns 2 and 3 present the results when broken down trade size. For trades less than \$50,000, round-trip costs are about 204 basis points, declining to 82 for trades exceeding \$50,000.³⁹ These results are consistent with the model presented in Section 3, which appeals to underwriters (dealers in this setting) facing fixed costs. Against this backdrop, it is interesting that the HBCU interaction coefficient, β_2 , *increases* with size.⁴⁰ For small trades, HBCU-issued bonds are about 10% more expensive to trade, but for large trades, the increase is $\frac{26}{41} = 63\%$.

Recall from the simple model (Section 3) that discounts D were inversely related to underwriter effort e , and varied directly with γ^2 , a bond-specific scaling parameter intended to capture search costs. As γ increases, selling a bond for a given discount requires higher underwriter effort. However, in the benchmark case presented, this does not vary with the quantity being sold. In other words, there is no notion of ‘saturation,’ whereby search

³⁹The p -value on the interaction between *HBCU* and $\Delta\text{Tradesign}$ is 4.5% in column 2, and less than 0.1% in column 3.

⁴⁰We have also estimated models of transactions separately for high- and low-tax privilege states (outside the Deep South), analogous to the results in Table 5. As with underwriting spreads, we find that transactions costs in the secondary market are elevated for HBCU-issued bonds *only* in states with high tax privilege (positive 38 extra basis points per round-trip versus an insignificant negative 4 basis points). Moreover, the effects are roughly twice as large for trades over \$50,000 (66 basis points versus 38).

frictions become increasingly expensive as trade volume increases.

While this may be realistic if the pool of potential investors is large relative to the volume of bonds, this may not be the case for HBCU-issued bonds. Rather, after the first few bonds are sold, an already small pool of potential investors may quickly deplete, making it progressively more costly to find a willing buyer for the next. This can be accommodated by an extension to the basic model where the discount for HBCU-issued bonds is $\hat{D}(e) = \frac{\gamma^2}{e} Q^2$, such that discounts increase in trade size, Q . Transactions costs then become $\hat{P}_{sell}^* - \hat{P}_{buy}^* = \gamma Q + \frac{k}{Q}$, reflecting both the diminishing effect of fixed costs ($\frac{k}{Q}$), as well as the increasing effect of larger trade size (γQ).

5.4 Time in dealer inventory

The next three columns explore whether, when HBCU bonds trade, whether they sit in dealer inventory longer. If true, this would be the most direct evidence that financial intermediaries face higher search costs when attempting to place HBCU bonds with investors. Of the 140,825 bond purchases in our sample, we are able to precisely measure inventory time for 88,063 of them.⁴¹

As shown in Panel A, the average bond sits in dealer inventory for a little more than four days, although this is highly right-skewed, with some trades happening the same day, and others taking more than a month. Column 4 of Panel B shows the results of a regression where the dependent variable is *Days In Inventory*. After controlling for the same variables in prior columns, we estimate that HBCU-issued bonds take an additional day to sell ($p < 0.01$), an increase of 23% relative to the unconditional sample average. Columns 5 and 6 show the results for small and small trades, using the same \$50,000 cutoff. As with transactions costs, inventory times are most elevated for large (1.8 days, $p < 0.01$) versus small (0.7 days, $p = 0.07$) HBCU bond trades.

⁴¹Conducting an analogous analysis for issuances is not feasible because bonds can be pre-sold prior to the offering (the “when issued” period studied in Schultz (2012)), making the actual time in inventory difficult to measure.

A natural question is whether, in the context of our simple model (Section 3), the magnitudes in columns 4-6 are consistent with those in columns 1-3. That is, in a framework where brokers compete away all profits, is the cost of an additional day in dealer inventory sufficiently high to justify an extra 34 basis points in broker commissions? The typical HBCU trade is \$119,000, which multiplied by 0.34% gives about \$400. With the caveat that we do not observe brokers' labor, capital (though this will be somewhat offset by the bond's interest), or other costs related to turning over a bond, \$400 strikes us as being close to the value of a few hours of a trader's time. If true, then a competitive model with small rents accruing to brokers, versus one appealing to market power differences, may be sufficient.

5.5 Marginal versus average discrimination: Becker (1957)

We have thus far focused on the process linking bonds to investors. Here, we analyze the end point of this process, asking whether, conditioned on observables, investors pay lower prices (higher yields) for HBCU-issued bonds. Panel C of Table 7 presents the results of cross-sectional regressions where, rather than a buy-sell difference as in previous tables, the dependent variable (*Sales Yield*) is now a yield, expressed in basis points. Each observation corresponds to a sale from a broker/dealer to an investor.

Column 1 shows the results of univariate comparisons with no control variables. Although the estimate is positive (0.11 percentage points), it is not statistically significant. Adding controls for $state \times year$, credit ratings, school attributes, bond features, and prevailing yield on the 20-year municipal bond index explains almost 45% of the total variation in yields, but has little effect on the estimated HBCU coefficient, which remains economically small and statistically insignificant. As in Panel B, columns 3 and 4 show the results for small and large trades, respectively. In neither case do we estimate a significant effect, although the point estimate for large trades (0.11 percentage points) exceeds small trades (0.05 percentage points), perhaps suggesting a discount for large HBCU orders.

This weak result for bond yields might seem inconsistent with investors discriminating

against HBCUs. However, as Becker (1957) argues in the context of labor market discrimination, equilibrium wages for Black workers will represent the discriminatory taste of the marginal employer which, because Black workers constitute a relatively small fraction of the labor pool, may differ considerably from the taste of the average employer. A direct implication is that among a sample of employed Black workers – or in our context, successfully sold HBCU-issued bonds – market prices (wages, bond yields) may reveal little if any evidence of discrimination. Charles and Guryan (2008) test this implication of Becker, and find supporting evidence.

These results further illustrate the empirical challenges when attempting to estimate the all-in costs of discrimination. The problem here is one of selection: when a sale of an HBCU-issued bond occurs, this has already been conditioned on underwriters having found a willing buyer and accordingly, having incurred the associated search costs. Nevertheless, small or even no discounts at sale neither implies that average discrimination is zero, nor that HBCUs are immune from the costs associated with overcoming it. Indeed, similar to Black workers having to look longer and/or harder to find a job (Bertrand and Mullainathan (2004)), the additional placement costs of HBCU bonds ultimately are born by the issuer.

Of course, selection effects may operate even further upstream, in the decision to issue bonds at all. Only about half (45) of the 88 four-year HBCUs raised capital from 1988-2010, with issuers having higher enrollments (11,000 versus 8,400 students) and total tuition revenue (\$20 million versus \$40 million). These observations alone do not imply an inefficiency, since the funding needs for non-issuers may be lower. However, either because smaller and/or lower quality HBCUs may be particularly unattractive to investors, or via fixed cost arguments, anticipated discrimination could cause some schools to forego the market altogether. To the extent that this is so, the total all-in costs of discrimination will be larger still.

6 Potential remedies

The paper concludes with a discussion of ways to alleviate the additional burden HBCUs face when attempting to access capital markets. Sections 6.2 and 6.1 describe, respectively, a pair of market-based solutions, and highlights why either or their combination may be insufficient to fully eliminate the problem. Possible policy interventions are then explored in section 6.3.

6.1 Out of state investors

If the key friction is that racial animus makes HBCU bonds unattractive to local (in state) investors, a natural solution would seem to be selling HBCUs to investors in other areas. The problem is that for the typical investor, buying a nonlocal bond is associated with a tax penalty, and accordingly will demand a yield premium. Specifically, note that the required yield on HBCU bonds, r^{HBCU} , must be at least $\frac{r^*}{1-\tau^*}$, where r^* is the yield on bonds issued in the out-of-state investor's home state, and τ^* is his marginal state-tax rate.

The relevant question, from the perspective of an HBCU, is the size of τ^* , which determines the required premium to attract out of state investors. Statutory state-level tax rates range from 0% (e.g, Washington) to 13.3% (California), but because state taxes are deductible at the Federal level, marginal rates will be closer to 0-6%. Given that the typical yield on municipal bonds is about 4.2% over our sample, then if the marginal buyer faces a state tax rate in the middle of the distribution, the required yield premium is approximately $\approx 3\% \times 4.2\% \approx 13$ basis points.⁴² Interestingly, this is in the neighborhood of the yield difference reported in Panel C of Table 7, suggesting that perhaps out-of-state investors may already participate to some extent already. A lower bound for τ^* is of course zero, which would be the case if investors from zero or low tax states were sufficient to absorb most of the HBCU bond supply. Without data on the identities of investors, our ability to pinpoint whether, let alone which, non-local investors play an important role in this market is limited.

⁴²We thank Richard Roll for this observation.

6.2 Local institutions

Throughout the paper, we have in mind that the central friction – racial bias – operates at the level of the individual investor. Yet, echoing an argument often raised in behavioral finance, why don't arbitrageurs – with behavior presumably less influenced by biases – step in to eliminate, or at least mitigate, the problem? Possible candidates might include local banks, mutual funds, insurance companies, and even hedge funds.

The reason we are interested in *local* institutions per se is, following the discussion above, based on tax motivations. Institutions typically face incentives to own bonds issued within their state, although compared to individuals, the tax advantages are generally less beneficial.⁴³ Nonetheless, the question we ask in this section is whether local institutions step in to fill the demand gap presumably created by retail investors reluctant to own HBCU bonds.

To address this issue, we compare the percent of municipal bonds supplied (issued) by colleges in each state to the percent demanded (held) by its local insurers. To illustrate, suppose that across the U.S., Texas universities issue 5% of the total dollar volume of college-issued municipal bonds from 2001-2010. If Texas-domiciled insurance companies place 10% of their invested capital in Texas-based university bonds, this would suggest overweighting – *home bias* – of 2. The question we ask is whether this ratio differs between HBCUs and non-HBCUs. If the ratio for HBCUs exceeds 2 (in this example), it would suggest an institutional tilt toward HBCUs, and vice versa.

We obtain data on institutional investor holdings from insurance companies, which is provided by the National Association of Insurance Commissioners (NAIC), available for the years 2001-2010. For each year from 2001-2010, we aggregate all positions in any college-issued municipal bond from our set of 4,145 issuances. Then, using school location, we calculate the fraction of total supply originating from each state, for non-HBCUs and HBCUs separately. Table 8 lists the ten states in which at least one of its HBCUs: 1) issued a bond,

⁴³Ang, Bhansali, and Xing (2010) study this issue explicitly, use the sensitivity of bond prices to personal income tax rates to conclude that retail investors “dominate dealers and other institutions” in determining prices and trading volume.

and 2) is held in a portfolio by an insurance company within the U.S.

The table is best understood with an example. Columns 2 and 3 indicate that insurance companies, on average, own \$154.68 million in notional value of bonds issued by non-HBCU colleges in Georgia, corresponding to 3.55% of the (average) total amount of college-issued bonds held (\$4.36 billion). Likewise, column 3 indicates that Georgia-based HBCUs account for \$12.69 million, for 0.29% of this same total. Unsurprisingly, we see that the “other states” column contributes the majority of non-HBCU bond supply, but (by construction) zero percent for HBCU bonds.

Columns 4 through 6 present the data from a complimentary perspective, showing the dollar and percentage breakdowns for the insurance company portfolios domiciled in each state. Continuing with the state of Georgia, the sum of columns 4, 5, and 6 indicate that on average, Georgia-domiciled insurance companies invested, on average, \$10.13 million dollars in any of the college-issued bonds constituting our sample. Of this, \$8.26 (81.6%) was invested in college-issued bonds outside of the state of Georgia (e.g., the University of Texas, or University of Southern California), with the remaining \$1.87 million invested in Georgia-based non-HBCU schools, such as Georgia Tech University or University of Georgia. No insurance company in Georgia invested in a Georgia-based HBCU from 2001-2010.

Comparing the *percentage values* in columns 2 and 5 allow us to assess the extent to which insurance companies exhibit home bias. If positions were allocated in proportion to their total supply, we would expect for Georgia’s insurance companies to invest 3.55% of its funds in Georgia-based non-HBCUs, and 0.29% in Georgia-based HBCUs. Instead, what we observe is extreme home bias for non-HBCUs – actual holdings are over an order of magnitude larger (18.43% versus 3.55%) than proportional allocation would prescribe – and inverse home bias for HBCUs, with 0% actually invested versus a prediction of 0.29%.

The findings for Georgia generalize. Columns 7 and 8 calculate the home bias, respectively, for non-HBCUs and HBCUs, for each of the ten states listed. The average (median) home bias for non-HBCUs is 22.54 (15.23), versus 8.14 (0.46) for HBCUs. Of the ten states

with HBCU-issued bonds in the insurance holdings sample, only half are owned by *any* insurance company in the issuing state.

Put differently, among all insurers domiciled in Alabama, Arkansas, Georgia, Louisiana, and Virginia – states that collectively invested 34.5 times as much in same-state bonds relative to a proportional allocation – *not a single one invested in a HBCU originating from the same state*. Of the remaining five states that did invest in HBCUs, two (Mississippi and Tennessee) exhibit less home bias versus non-HBCUs. With the caveat that North Carolina-based HBCUs contribute 0.01% to the total dollar volume of college-issued bonds, and there appear to be almost no insurance companies domiciled in Washington D.C., only Texas shows some slight favoritism for local HBCUs.

For robustness, we have conducted a similar exercise involving only HBCUs and their matched pairs, based on the criteria and methodology described in Section 4.3.1 (Table 4). Although this limits the analysis to a very small fraction of the overall sample, a similar picture emerges. For example, among the universe of CUSIPs (unique bond identifiers) associated with any of the 71 matching HBCU issuances, in-state insurance companies are over three times as likely to take a position in one of the 71 non-HBCU matching control schools (see Appendix Table A2). Further, conditional on an in-state insurance company holding a bond from either an HBCU or non-HBCU match, the dollar amounts for the control schools are larger by a factor of eight. Whereas both differences are significant at the one-percent level, a comparable analysis involving out-of-state insurance companies yield no significant differences.

Together, we interpret the evidence in this section as suggesting that although insurance companies seem to have a strong preference for issuers in the same state, this is not true for HBCUs. The apparent lack of interest from local institutions – to the extent that this can be generalized from the portfolios of insurers – means that HBCU-issued bonds must either be sold to retail investors, which may be difficult to find in states where HBCUs are located, or to institutional clients out of state, which may find these bonds less attractive for tax

reasons.

Note also the consistency with Table 5, which found that among Alabama, Louisiana, and Mississippi – states with the highest levels of anti-Black racial animus – gross spreads for HBCUs were much higher compared to other states. In these three states (along with Georgia, with ranks fourth-highest in racial animus), HBCUs are almost entirely excluded from insurance company portfolios, perhaps helping explain why underwriters and/or dealers face particular difficulty finding willing investors for these bonds.

6.3 Legislation

A perhaps more promising alternative would involve eliminating the incentive of investors to hold bonds of local issuers. Assuming home bias is not sufficiently binding, perhaps states could allow interest from out-of-state issuers to be tax exempt; eliminating state level exemptions altogether would have the same effect. This would allow HBCUs to target investors in, say, New York or California, who could purchase HBCU bonds and not forgo the tax benefit that otherwise only accrues to purchasing home-state university bonds. With a larger pool of potential investors, gross spreads for HBCUs would, presumably, be reduced.

However promising, note that this potential solution faces a coordination problem, as described by Ang and Green (2011). The decision to honor, or not honor, state-level exemptions on municipal bonds from out-of-state issuers rests in the hands of local (state) government. And, although such a coordinated effort by multiple states would ease selling frictions for HBCUs (or other issuers facing geographically-related frictions), this is not necessarily individually rational for each state.

Federal intervention may, as a result, be a reasonable solution. The federal government has intervened in the past to support HBCUs under the Higher Education Act of 1965. To relax frictions HBCUs face in the bond market, the federal government could designate HBCU bonds as *triple tax exempt*, applying to Federal, state, and local taxes. Such a designation has precedent as a means to widen bond market participation in the US territories of Guam

and Puerto Rico, and would serve to lessen the geographic captivity HBCUs currently face.

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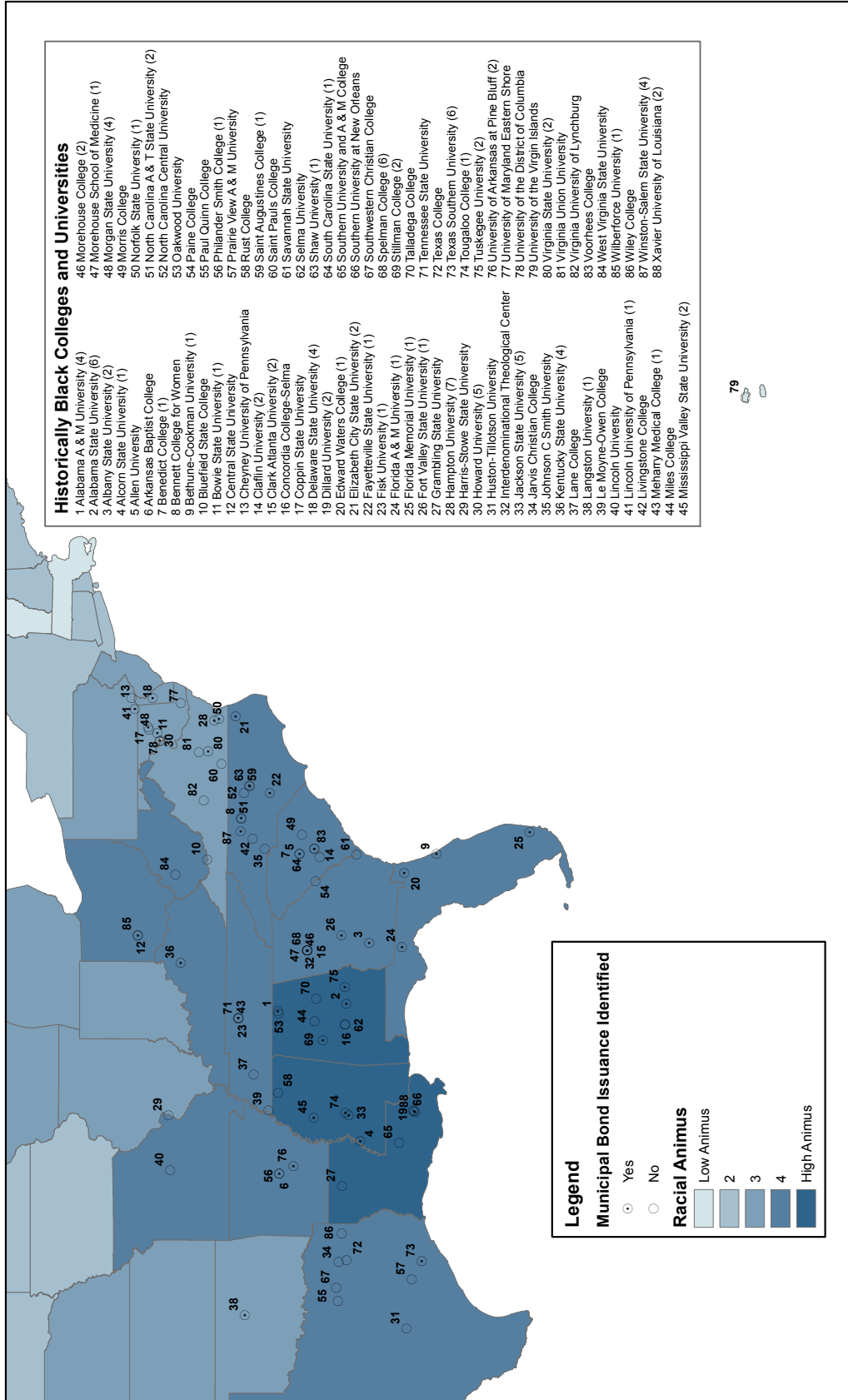


Figure 1. Four Year Historically Black Colleges and Universities 1988 – 2010 per Delta Cost Project Database. This figure plots the locations of all 4-year HBCUs in the Delta Cost Project Database over the 1988 – 2010 time period. Schools for which we can identify at least 1 municipal bond issuance in the SDC database over this same time period are marked with a circle with a dot in the middle, while those with no identifiable bond issuances are marked with a circle. School names are identified by number with the total number of issuances for each school indicated in parentheses. Levels of statewide racial animus (see Table A3) are indicated as specified in the figure’s legend.

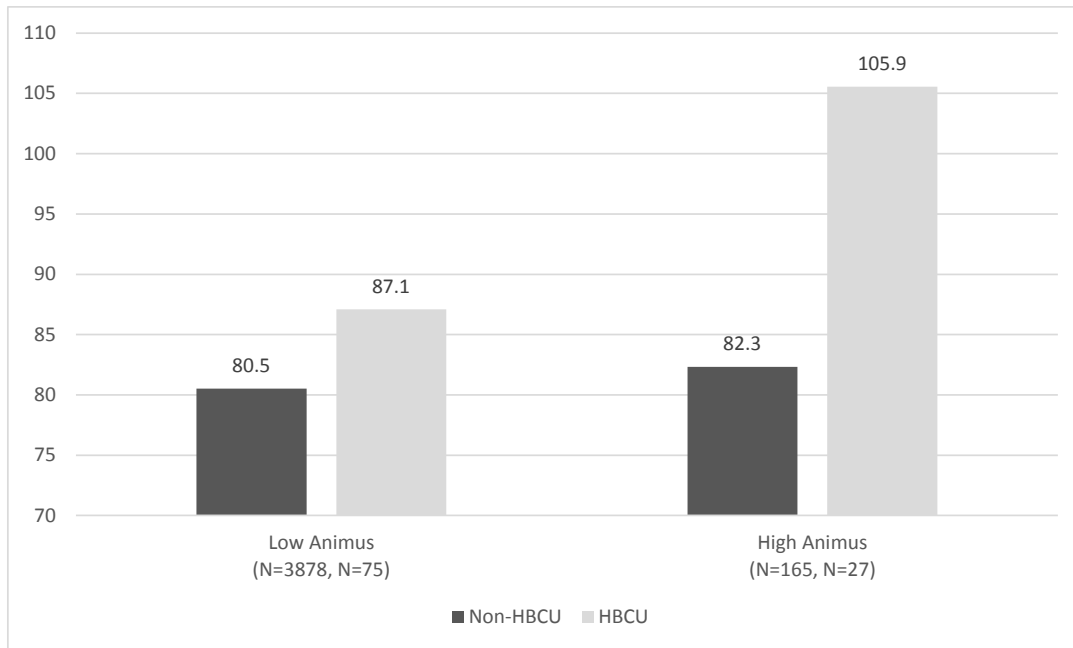


Figure 2. Average Gross Spreads. This figure plots the average gross spreads in basis points of bond issuances by HBCUs and Non-HBCUs located in states with high racial animus versus low racial animus.

Table 1. Bond Issues by Year.
 This table reports the annual number and percentage of bond issues by HBCUs and non-HBCUs.

Panel A: Bond Issues Per Year		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Year		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
HBCU		2	2	2	1	4	5	1	2	8	4	8	3
Non-HBCU		115	105	78	129	168	200	116	89	143	150	222	231
Year Total		117	107	80	130	172	205	117	91	151	154	230	234
% HBCU Obs.		1.96	1.96	1.96	0.98	3.92	4.90	0.98	1.96	7.84	3.92	7.84	2.94
% Non-HBCU Obs.		2.84	2.60	1.93	3.19	4.16	4.95	2.87	2.20	3.54	3.71	5.49	5.71
% Year Total Obs.		2.82	2.58	1.93	3.14	4.15	4.95	2.82	2.20	3.64	3.72	5.55	5.65

Panel B: Bond Issues Per Year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
HBCU		6	5	7	8	9	3	8	8	1	2	3	102
Non-HBCU		183	204	173	195	197	207	219	258	277	181	203	4,043
Year Total		189	209	180	203	206	210	227	266	278	183	206	4,145
% HBCU Obs.		5.88	4.90	6.86	7.84	8.82	2.94	7.84	7.84	0.98	1.96	2.94	100.00
% Non-HBCU Obs.		4.53	5.05	4.28	4.82	4.87	5.12	5.42	6.38	6.85	4.48	5.02	100.00
% Year Total Obs.		4.56	5.04	4.34	4.90	4.97	5.07	5.48	6.42	6.71	4.41	4.97	100.00

Table 2. Bond Issuance Summary Statistics

This table reports descriptive statistics for our sample of university municipal bond issues. Statistics are reported for all issuances, and separately for HBCU and non-HBCU issuances, and include the total number of observations (N), mean, and standard deviation. The following issue-level variables are reported: the issue gross spread (Gross Spread), the total amount of the issue (Amount), the longest maturity in the issue (Max Maturity), a dummy variable that equals 1 if the issue is callable (Callable), a dummy variable that equals 1 if the issue is insured (Insured), dummy variables signifying if the issue is rated AAA (AAA-rated), rated AA (AA-rated), rated below AA (Below AA), or unrated (Unrated), a dummy variable that equals 1 if the issue is sold to underwriters on a competitive (rather than a negotiated) basis (Competitive Bid), a dummy variable that equals 1 if the issue has an attached sinking fund (Sinking Fund), a dummy variable that equals 1 if the bonds being issued are revenue bonds (Revenue Bond), the total number of deals done within the sample by all members of the syndicate over the past five years (# of Underwriter Deals), the total number of underwriters in the syndicate (# of Underwriters), the number of full-time equivalent students in attendance at the issue's associated school (Students), a dummy variable that equals 1 if the issuing school uses a financial advisor (Advisor), a dummy variable that equals 1 if the issuing school is public (Public), annual alumni giving per student by the issuing school (Student Giving (/1000)), and the issuing school's 2017 Wall Street Journal/Times Higher Education College Ranking. Column 10 displays mean differences between HBCU and non-HBCU variables where standard errors of the difference are double clustered by school and issuance date and statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All		Non-HBCU		HBCU					
	N	Mean	SD	N	Mean	SD	N	Mean	SD	Diff
Gross Spread (bps)	4145	80.87	46.58	4043	80.59	46.59	102	92.06	45.05	11.47*
Amount (/1000000)	4145	35.13	43.15	4043	35.38	43.55	102	25.24	19.30	-10.14***
Max Maturity	4145	23.28	8.01	4043	23.26	8.05	102	24.03	6.25	0.77
Callable	4145	0.90	0.31	4043	0.90	0.31	102	0.91	0.29	0.01
Insured	4145	0.56	0.50	4043	0.55	0.50	102	0.80	0.40	0.25***
AAA-rated	4145	0.42	0.49	4043	0.41	0.49	102	0.54	0.50	0.13**
AA-rated	4145	0.17	0.38	4043	0.17	0.38	102	0.15	0.36	-0.02
Below AA	4145	0.14	0.35	4043	0.14	0.35	102	0.02	0.14	-0.12***
Unrated	4145	0.27	0.44	4043	0.27	0.44	102	0.29	0.46	0.02
Competitive Bid	4145	0.09	0.28	4043	0.09	0.28	102	0.08	0.27	-0.01
Sinking Fund	4145	0.61	0.49	4043	0.61	0.49	102	0.64	0.48	0.03
Revenue Bond	4145	0.96	0.19	4043	0.96	0.19	102	1.00	0.00	0.04***
# of Underwriter Deals	4145	78.37	85.53	4043	78.88	86.17	102	57.87	50.96	-21.01***
# of Underwriters	4145	2.14	2.12	4043	2.14	2.13	102	2.14	1.61	-0.01
Students (/1000)	4145	9.79	10.03	4043	9.94	10.11	102	3.97	2.45	-5.97***
Advisor	4145	0.42	0.49	4043	0.41	0.49	102	0.51	0.50	0.10
Public	4145	0.40	0.49	4043	0.40	0.49	102	0.57	0.50	0.17*
Student Giving (/1000)	4145	4.97	4.80	4043	5.02	4.82	102	3.11	3.02	-1.91***
School Ranking	4145	54.90	17.39	4043	55.17	17.37	102	44.47	14.62	-10.70***

Table 3. Determinants of Gross Spread.

This table reports estimates of regressions of underwriter gross spreads on issue, underwriter, and school characteristics as outlined in Table 2 and issuance rating, issuance insurer, and issuer state-year fixed effects. Each regression observation represents one municipal bond issuance. Column 6 restricts the sample to only AAA-rated issuances. Column 7 and 8 restrict the sample to only insured issuances. Regression standard errors are in parentheses, are robust to heteroscedasticity, and are double clustered by school and issuance date. Indicator variables for missing giving rates and school rankings are included in columns 5–8 (Cohen and Cohen 1985) and are not tabulated. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

Sample:	(1) All	(2) All	(3) All	(4) All	(5) All	(6) AAA Only	(7) Insured Only	(8) Insured Only
	Gross Spread	Gross Spread	Gross Spread	Gross Spread	Gross Spread	Gross Spread	Gross Spread	Gross Spread
HBCU	11.47* (6.15)	21.06*** (6.56)	18.61*** (5.82)	17.99*** (5.79)	15.72*** (5.27)	15.58* (8.02)	17.96*** (5.48)	16.98*** (5.69)
Log(Amount)			-11.79*** (0.80)	-11.28*** (0.90)	-9.14*** (0.95)	-5.28*** (1.52)	-5.88*** (1.28)	-5.58*** (1.33)
Log(Maturity)			13.66*** (1.66)	13.24*** (1.67)	12.65*** (1.67)	2.45 (3.54)	4.22 (3.24)	5.11 (3.20)
Callable			6.05** (2.42)	6.17** (2.42)	5.94** (2.46)	4.06 (3.48)	3.71 (3.16)	3.81 (3.27)
Insured			-9.23*** (2.12)	-9.38*** (2.14)	-15.34*** (2.03)	7.71 (4.70)	0.00 (0.00)	0.00 (0.00)
Competitive Bid			3.38 (3.83)	4.03 (4.10)	5.00 (3.96)	0.77 (6.00)	3.45 (5.36)	2.60 (5.11)
Sinking Fund			11.98*** (1.63)	12.18*** (1.62)	10.70*** (1.59)	3.74 (2.39)	2.28 (2.09)	1.17 (2.04)
Revenue Bond			19.10*** (5.70)	18.85*** (5.39)	21.98*** (5.33)	8.93 (13.94)	13.60 (10.49)	8.53 (9.38)
Log(# of Underwriter Deals)				-3.81*** (0.82)	-3.25*** (0.82)	-1.95* (1.05)	-1.47 (0.92)	-2.91*** (1.04)
Log(# of Underwriters)				3.31** (1.68)	3.18* (1.64)	1.18 (2.18)	-1.06 (2.11)	0.53 (2.06)
Log(Students)					0.01 (1.24)	-1.59 (1.63)	0.63 (1.51)	0.32 (1.59)
Advisor					-5.57*** (1.79)	-8.23*** (2.89)	-8.00*** (2.65)	-6.87** (2.88)
Public					2.68 (2.96)	8.04** (4.02)	5.68 (3.47)	6.46* (3.54)
Log(Student Giving Rate)					-1.59 (1.20)	0.70 (1.65)	1.44 (1.49)	1.56 (1.53)
School Ranking					-0.28*** (0.08)	-0.17 (0.11)	-0.22** (0.10)	-0.21** (0.10)
Rating FE?	No	No	Yes	Yes	Yes	No	Yes	Yes
Insurer FE?	No	No	No	No	No	No	Yes	Yes
State-YR FE?	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4145	4145	4145	4145	4145	1729	2314	2076
R^2	0.001	0.509	0.612	0.616	0.628	0.719	0.735	0.733

Table 4. Matching Estimator for HBCU Treatment Effects.

Panel A of this table reports estimates of bias-adjusted average treatment effects on the treated for a nearest neighbor matched sample of 71 HBCU (treated) and non-HBCU (untreated) bond issue gross spreads (see Abadie and Imbens (2011)). Panel B reports the covariate means, standardized differences, and variance ratios for variables corresponding to our matched sample. Matches are derived from the high credit quality subsample (rating of AAA, AA or unrated with insurance) using a nearest neighbor matching estimator (see Abadie and Imbens 2006) which matches on issue size, underwriter experience, school enrollment, alumni giving rates, school ranking, whether the bond was insured, and the year of issue. Exact matches were required on state and public school status. See Appendix Table A2 for a listing of treatment and control schools.

Panel A: Bias Adjusted Treatment
Effects on the Treated (ATET)

(1)	(2)	(3)	(4)
ATET	S.E.	<i>p</i> -value	95% Conf. Interval
17.57	5.58	0.002	[6.63,28.52]

Panel B: Covariate Balance Diagnostics

	(1) HBCU Mean	(2) Non-HBCU Mean	(3) Standardized Difference	(4) Variance Ratio
Log(Amount)	3.04	3.21	-0.16	1.15
Log(# of Underwriter Deals)	3.57	4.02	-0.15	0.95
Insured	0.92	0.77	0.00	1.00
Log(Students)	8.24	9.19	-0.36	0.44
Year	2000.80	2000.49	-0.19	1.61
Log(Student Giving Rate)	7.31	7.63	-0.05	1.59
School Ranking	42.93	53.38	-0.18	1.20

Table 5. Racial Animus, Tax Privilege and the HBCU Effect.

Column 1 and 2 report the same model as in Table 3, Column 5 restricting the sample in column 1 to issuances originating in high racial animus states, and in column 2 to issuances originating in low racial animus states. Columns 3 and 4 restrict the sample to only low racial animus states and further condition the sample into high tax privilege states (column 3) and low tax privilege states (column 4). States with tax privilege less than the median value of 6 per Appendix Table A3 are considered low tax privilege and remaining states are considered high tax privilege. Indicator variables for missing giving rates and school rankings are included (Cohen and Cohen 1985) and are not tabulated. Standard errors are in parentheses, are robust to heteroscedasticity, and are double clustered by school and issuance date. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

	(1)	(2)	(3)	(4)
	High Animus	Low Animus	High Tax Privilege	Low Tax Privilege
	Gross Spread	Gross Spread	Low Animus Gross Spread	Low Animus Gross Spread
HBCU	29.63*** (10.94)	10.52** (4.20)	18.35*** (7.00)	4.63 (3.83)
Log(Amount)	-11.81** (5.25)	-8.92*** (0.99)	-10.57*** (1.34)	-6.95*** (1.37)
Log(Maturity)	13.50 (13.47)	12.47*** (1.69)	14.78*** (2.65)	10.20*** (2.17)
Callable	-12.57 (11.83)	6.53*** (2.53)	8.47** (3.83)	3.06 (3.30)
Insured	-17.79 (16.27)	-15.06*** (2.04)	-14.93*** (2.97)	-15.52*** (2.63)
Competitive Bid	15.14 (10.55)	4.60 (4.17)	-0.69 (5.04)	12.92* (6.94)
Sinking Fund	10.84** (4.98)	10.72*** (1.64)	10.74*** (2.49)	10.55*** (2.05)
Revenue Bond	- (-)	21.75*** (5.28)	20.80*** (6.16)	20.37** (8.45)
Log(# of Underwriter Deals)	0.84 (2.84)	-3.55*** (0.84)	-2.63** (1.25)	-4.92*** (1.10)
Log(# of Underwriters)	-4.27 (5.33)	3.59** (1.69)	0.77 (2.29)	8.28*** (2.34)
Log(Students)	10.13 (7.71)	-0.11 (1.25)	3.13 (1.90)	-3.92** (1.59)
Advisor	-25.10*** (8.40)	-5.03*** (1.82)	-5.26* (3.00)	-4.55** (2.30)
Public	-21.02 (17.15)	2.70 (3.00)	1.14 (4.28)	4.03 (3.93)
Log(Student Giving Rate)	5.38 (5.94)	-1.79 (1.20)	-0.91 (1.80)	-2.62* (1.56)
School Ranking	-1.85*** (0.52)	-0.24*** (0.08)	-0.29*** (0.11)	-0.18* (0.10)
Rating FE?	Yes	Yes	Yes	Yes
State-YR FE?	Yes	Yes	Yes	Yes
Observations	192	3953	1996	1957
R^2	0.689	0.630	0.626	0.640
p -value of HBCU coefficient difference:				
Column 1 vs 2		0.07		
Column 3 vs 4				0.08

Table 6. Analysis of Newly Issued Bonds.

Panel A of this table reports descriptive statistics for the trade-level variables used to estimate the regressions reported in Panel B. Statistics for the bond-level and issue-level variables also used in these regressions are reported in Appendix Table A4. Issue-level controls are identical to the control variables reported in Table 3, while bond-level controls include days since offering, bond maturity, and bond amount, which are calculated at the bond level, not package level. Panel B reports trade-level regression estimates of bond markups, reoffering prices, and sale prices on an HBCU dummy variable and other trade price determinants. All regression samples are restricted to a time period from 25 days prior to the offering date (the when issued period) to 10 days following the offering date, following Schultz (2012). Heteroscedasticity robust standard errors are double clustered on school and month of trade and are reported in parentheses. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

Panel A: Summary Statistics						
	(1)	(2)	(3)	(4)	(5)	(6)
	N	Mean	SD	Median	Min	Max
<u>Trade-level</u>						
Markup (bps)	116905	127.65	146.81	108.78	-1034.66	1652.12
Offering Price	116905	99.80	3.58	98.91	15.25	119.35
Sale Price	116905	101.05	3.07	100.00	16.12	119.10
Days Since Offering	116905	3.06	3.11	2	-25	10
Trade Size (/1000)	116905	343.72	1247.19	30.00	5.00	10850.00

Panel B: Determinants Of Markup, Offering Price, and Sale Price			
	(1)	(2)	(3)
	Markup	Offering Price	Sale Price
HBCU	7.84 (11.91)	0.07 (0.31)	0.09 (0.28)
Rating FE?	Yes	Yes	Yes
State-YR FE?	Yes	Yes	Yes
Trade-level Controls?	Yes	Yes	Yes
Bond-level Controls?	Yes	Yes	Yes
Issuance-level Controls?	Yes	Yes	Yes
Macro Controls?	Yes	Yes	Yes
Observations	116905	116905	116905
R^2	0.544	0.386	0.247

Table 7. Analysis Of Seasoned Trades.

Panel A of this table reports summary statistics for the trade-level variables used to estimate secondary market trading costs in Panel B. Summary statistics for additional bond- and issue-level variables also used in these regressions are reported in Appendix Table A5. Issue-level controls are identical to the control variables reported in Table 3, while bond-level controls include bond maturity and bond amount, which are calculated at the bond level, not package level. Columns 1 – 3 of Panel B reports regression estimates for the following equation:

$$\Delta Price = \beta_0 + \beta_1 \Delta Tradesign + \beta_2 \Delta Tradesign \times HBCU + \beta_3 HBCU + \Gamma Controls + \varepsilon$$

where $\Delta Price$ is the percentage change in a bond’s trade price, $\Delta Tradesign$ is the change in $Tradesign$ which is an indicator variable that equals one for dealer sells and negative one for dealer purchases, and $HBCU$ and $Controls$ are as defined in Appendix Table A6. Columns 4 – 6 report regressions of the number of days for a bond to completely leave dealer inventory (Days to Sell), i.e., a trade consisting of a dealer purchase immediately followed by dealer sales that add to the same amount as the initial purchase amount, on $Controls$. Each regression observation corresponds to a bond trade. All regression samples are restricted to seasoned bond trades, i.e., only trades occurring at least 60 days after a bond’s offering date. Columns 2, 3, 5, and 6 are further restricted by trade size. Columns 2 and 4 limit the sample to trades less than \$50,000, and columns 3 and 6 to trades greater than \$50,000. Panel C reports regressions of bond sale yields on HBCU and controls for the full sample and by trade size. Heteroscedasticity robust standard errors are double clustered on school and month of trade and are reported in parentheses. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

Panel A: Summary Statistics

	(1)	(2)	(3)	(4)	(5)	(6)
	N	Mean	SD	Median	Min	Max
<u>Trade-level</u>						
Trade Size (/1000)	378079	236.43	1083.36	25	5	10850
Sale Yield (in %)	237254	4.21	1.04	4.27	0	6.46
Days to Sell	88063	4.24	7.97	1	0	48

Panel B: Transaction Costs and Time in Dealer Inventory

	(1)	(2)	(3)	(4)	(5)	(6)
	Transaction Costs			Time in Dealer Inventory		
Sample:	All	\$5K – \$50K	≥ \$50K	All	\$5K – \$50K	≥ \$50K
	ΔPrice	ΔPrice	ΔPrice	Days to Sell	Days to Sell	Days to Sell
Δ Tradesign	0.85*** (0.03)	1.02*** (0.02)	0.41*** (0.03)			
HBCU	0.00 (0.02)	-0.01 (0.02)	0.06 (0.04)	0.95** (0.40)	0.68* (0.36)	1.83** (0.71)
Δ Tradesign × HBCU	0.17*** (0.06)	0.10* (0.05)	0.26*** (0.06)			
Rating FE?	Yes	Yes	Yes	Yes	Yes	Yes
State-YR FE?	Yes	Yes	Yes	Yes	Yes	Yes
Trade-level Controls?	Yes	Yes	Yes	Yes	Yes	Yes
Bond-level Controls?	Yes	Yes	Yes	Yes	Yes	Yes
Issuance-level Controls?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	378079	283238	94841	88063	62524	25539
R ²	0.400	0.500	0.165	0.052	0.045	0.085

Panel C: Sale Yields

Sample:	(1)	(2)	(3)	(4)
	All Sale Yield	All Sale Yield	\$5K – \$50K Sale Yield	≥ \$50K Sale Yield
HBCU	0.11 (0.09)	0.07 (0.10)	0.05 (0.10)	0.11 (0.13)
Rating FE?	No	Yes	Yes	Yes
State-YR FE?	No	Yes	Yes	Yes
School Controls?	No	Yes	Yes	Yes
Bond/Issuance Controls?	No	Yes	Yes	Yes
Macro Controls?	No	Yes	Yes	Yes
Underwriter Controls?	No	Yes	Yes	Yes
Observations	237254	237254	189151	48103
R ²	0.000	0.446	0.462	0.393

Table 8. Insurance Company Holdings.

For this table our sample is limited to only university bonds held by firms in the National Association of Insurance Commissioners (NAIC) database for the years 2001 – 2010. For each state, we calculate the annual dollar amount held of bonds issued by HBCUs and non-HBCUs located within that state. Columns 2 and 3 then report the time-series average of these holdings for non-HBCUs (Column 2) and HBCUs (Column 3). For both of these columns, the percent of average holdings per state relative to average holdings across all states is reported in parentheses. We interpret these percentages as the portfolio weights by issuer state for a randomly selected portfolio of university bonds. For example, the holdings of a randomly selected university bond portfolio should consist of approximately 3.16% of Alabama, non-HBCU bonds, and 0.45% of Alabama, HBCU bonds. Next, for each state, we calculate the annual dollar amount held by NAIC firms domiciled within that state for bonds issued by a different state than the NAIC firm’s state (Column 4), for bonds issued by a non-HBCU located within the same state as the NAIC firm (Column 5), and for bonds issued by an HBCU located within the same state as the NAIC firm (Column 6). In each of these columns, the relative percentage held of these three different categories is reported in parentheses. For example, the university bond holdings for NAIC firms headquartered in Alabama consists of 90.24% bonds issued by schools located outside of Alabama, 9.76% bonds issued by non-HBCUs located in Alabama, and 0% bonds issued by HBCUs located in Alabama. Column 7 (8) reports the average home bias for Non-HBCU (HBCU) bonds calculated as the relative % of bonds held in column 5 (6) divided by the relative percentage of bonds supplied in column 2 (3). N/A indicates “Not Applicable”.

(1) State	(2) Bond Supply by State		(3) Bond Demand (Holding) by State for HBCU States		(4) Bond Demand (Holding) by State for HBCU States		(5) In-State HBCU		(6) In-State Non-HBCU		(7) Non-HBCU		(8) HBCU	
	Non-HBCU	HBCU	Out-of-State All	In-State Non-HBCU	In-State HBCU	Out-of-State All	In-State Non-HBCU	In-State HBCU	Non-HBCU	HBCU	Non-HBCU	HBCU	Non-HBCU	HBCU
AL	137.64 (3.16%)	19.77 (0.45%)	14.37 (90.24%)	1.55 (9.76%)	0 (0.00%)	14.37 (90.24%)	1.55 (9.76%)	0 (0.00%)	3.09	0	3.09	0	3.09	0
AR	52.19 (1.20%)	0.47 (0.01%)	1.19 (69.75%)	0.52 (30.25%)	0 (0.00%)	1.19 (69.75%)	0.52 (30.25%)	0 (0.00%)	25.26	0	25.26	0	25.26	0
DC	33.54 (0.77%)	61.2 (1.40%)	1.33 (98.59%)	0 (0.11%)	0.02 (1.30%)	1.33 (98.59%)	0 (0.11%)	0.02 (1.30%)	0.14	0.92	0.14	0.92	0.14	0.92
GA	154.68 (3.55%)	12.69 (0.29%)	8.26 (81.57%)	1.87 (18.43%)	0 (0.00%)	8.26 (81.57%)	1.87 (18.43%)	0 (0.00%)	5.19	0	5.19	0	5.19	0
LA	66.7 (1.53%)	8.25 (0.19%)	3.24 (15.71%)	17.4 (84.29%)	0 (0.00%)	3.24 (15.71%)	17.4 (84.29%)	0 (0.00%)	55.08	0	55.08	0	55.08	0
MS	26.46 (0.61%)	6.81 (0.16%)	18.68 (73.50%)	6.18 (24.33%)	0.55 (2.16%)	18.68 (73.50%)	6.18 (24.33%)	0.55 (2.16%)	40.09	13.83	40.09	13.83	40.09	13.83
NC	278.22 (6.38%)	0.25 (0.01%)	74.85 (88.90%)	9.15 (10.87%)	0.2 (0.23%)	74.85 (88.90%)	9.15 (10.87%)	0.2 (0.23%)	1.7	41.2	1.7	41.2	1.7	41.2
TN	23.45 (0.54%)	5.34 (0.12%)	33.52 (84.13%)	5.47 (13.74%)	0.85 (2.13%)	33.52 (84.13%)	5.47 (13.74%)	0.85 (2.13%)	25.54	17.38	25.54	17.38	25.54	17.38
TX	223.38 (5.13%)	7.53 (0.17%)	43.76 (76.07%)	12.96 (22.53%)	0.8 (1.39%)	43.76 (76.07%)	12.96 (22.53%)	0.8 (1.39%)	4.4	8.06	4.4	8.06	4.4	8.06
VA	37.85 (0.87%)	1.44 (0.03%)	1.87 (43.68%)	2.41 (56.32%)	0 (0.00%)	1.87 (43.68%)	2.41 (56.32%)	0 (0.00%)	64.87	0	64.87	0	64.87	0
OTHER	3200.82 (73.44%)	0 (0.00%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	4234.91 (97.16%)	123.75 (2.84%)												
									Average		22.54	8.14	22.54	8.14
									Median		15.23	0.46	15.23	0.46
									% Zero		0	0.5	0	0.5

Appendix – For Online Publication

Figure A1. Official Statement Excerpts – Fort Valley State University, June 2006. This figure shows excerpts from Fort Valley State University’s 2006 Municipal Bond Issuance Official Statement. Notable portions from the excerpts are outlined in red.

Official Statement Page 1:


NEW ISSUE –BOOK ENTRY ONLY

RATINGS:
 Moody's: "Aaa"
 S&P: "AAA"
 (Ambac Insured)
 (See "MISCELLANEOUS – Ratings" herein)

In the opinion of Bond Counsel, under existing law, (i) interest on the hereinafter defined Series 2006 Bonds (including any original issue discount properly allocable to an owner thereof) will be excludable from gross income of the holders thereof for purposes of federal income taxation, (ii) interest on the Series 2006 Bonds will not be a specific item of tax preference for purposes of the federal alternative minimum tax imposed on individuals and corporations, and (iii) interest on the Series 2006 Bonds will be exempt from present income taxes under the laws of the State of Georgia, all subject to the qualifications described herein under the heading "TAX EXEMPTION."

\$44,060,000

**DEVELOPMENT AUTHORITY OF PEACH COUNTY
 STUDENT HOUSING FACILITIES REVENUE BONDS
 (FORT VALLEY STATE UNIVERSITY FOUNDATION PROPERTY, LLC PROJECT)
 SERIES 2006**



Payment of the principal of and interest on the Series 2006 Bonds when due will be insured by a financial guaranty insurance policy (the "Policy") to be issued by Ambac Assurance Corporation ("Ambac Assurance" or the "Bond Insurer") simultaneously with the delivery of the Series 2006 Bonds. For a description of the Policy and Ambac Assurance, see "BOND INSURANCE" herein. For a form of the Policy, see Appendix H.

Ambac

THE SERIES 2006 BONDS DO NOT CONSTITUTE AN INDEBTEDNESS OR OBLIGATION OF THE BOARD OF REGENTS, THE UNIVERSITY, THE FOUNDATION, THE STATE OF GEORGIA (THE "STATE") OR ANY MUNICIPALITY OR POLITICAL SUBDIVISION THEREOF, INCLUDING PEACH COUNTY (THE "COUNTY"). THE SERIES 2006 BONDS ARE PAYABLE BY THE AUTHORITY SOLELY FROM THE TRUST ESTATE PLEDGED TO THE PAYMENT THEREOF UNDER THE INDENTURE. NO OWNER OF THE SERIES 2006 BONDS SHALL EVER HAVE THE RIGHT TO COMPEL THE EXERCISE OF THE TAXING POWER OF THE STATE OR ANY MUNICIPALITY OR POLITICAL SUBDIVISION THEREOF, INCLUDING THE COUNTY, TO PAY THE SERIES 2006 BONDS OR THE INTEREST OR PREMIUM THEREON OR ANY OTHER COST RELATING THERETO OR TO ENFORCE PAYMENT THEREOF AGAINST ANY PROPERTY OF THE STATE OR ANY MUNICIPALITY OR POLITICAL SUBDIVISION THEREOF, INCLUDING THE COUNTY. THE AUTHORITY HAS NO TAXING POWER.

The Series 2006 Bonds are offered when, as, and if issued by the Authority and accepted by the Underwriters, subject to prior sale and to withdrawal or modification of the offer without notice and the approval of legality by Peck, Shaffer & Williams LLP, Atlanta, Georgia, Bond Counsel. Certain legal matters will be passed on for the Authority by its counsel, Culpepper & Lüpfer, Fort Valley, Georgia, for the Company by its counsel Peck Shaffer & Williams LLP, Atlanta, Georgia, for the Company by its special counsel, Strickland Brockington Lewis LLP, Atlanta, Georgia, and for the Underwriters by their counsel, Golden & Associates, P.C., Atlanta, Georgia. Delivery of the Series 2006 Bonds to DTC is expected on or about June 29, 2006.

Siebert Brandford Shank & Co., LLC **A.G. Edwards**

Dated: June 9, 2006

Figure A1. Official Statement Excerpts – Fort Valley State University, June 2006 (Continued).

Official Statement Page 2:

MATURITIES, PRINCIPAL AMOUNTS, INTEREST RATES AND PRICES OR YIELDS				
SERIES 2006 BONDS				
\$11,880,000 Serial Bonds				
June 1 of the Year	Principal Amount	Interest Rate	Yield	CUSIP
2009	\$ 70,000	4.000%	3.700%	704646AA6
2010	130,000	4.000%	3.720%	704646AB4
2011	195,000	4.000%	3.760%	704646AC2
2012	260,000	4.000%	3.840%	704646AD0
2013	280,000	4.000%	3.920%	704646AE8
2014	305,000	4.000%	4.000%	704646AF5
2015	380,000	4.000%	4.070%	704646AG3
2016	460,000	4.000%	4.140%	704646AH1
2017	540,000	4.000%	4.200%	704646AJ7
2018	630,000	4.000%	4.260%	704646AK4
2019	725,000	4.125%	4.310%	704646AL2
2020	830,000	4.250%	4.360%	704646AM0
2021	935,000	4.250%	4.410%	704646AN8
2022	1,055,000	4.250%	4.460%	704646AP3
2023*	1,115,000	5.000%	4.330%	704646AQ1
2024	1,190,000	4.375%	4.540%	704646AR9
2025	1,320,000	4.375%	4.560%	704646AS7
2026	1,460,000	4.375%	4.580%	704646AT5
<p>\$ 6,020,000* 5.000% Term Bonds, Due June 1, 2034, Priced to Yield 4.550% CUSIP 704646AU2</p> <p>\$26,160,000 4.500% Term Bonds, Due June 1, 2037, Priced to Yield 4.720% CUSIP 704646AV0</p>				
<p>* Priced to June 1, 2016 optional redemption date.</p>				

Official Statement Page 62:

Underwriting

Under a Bond Purchase Agreement among Siebert Brandford Shank & Co., LLC, on behalf of itself and A.G. Edwards & Sons, Inc. (together, the "Underwriters"), the Authority and the Company (the "Bond Purchase Agreement"), the Series 2006 Bonds will be purchased by the Underwriters. The Bond Purchase Agreement provides that the Underwriters will purchase all of the Series 2006 Bonds, if any are purchased. The obligation of the Underwriters to accept delivery of the Series 2006 Bonds is subject to various conditions contained in the Bond Purchase Agreement. The Underwriters have agreed to purchase the Series 2006 Bonds at an aggregate purchase price of \$42,933,342 (representing the par amount of the Series 2006 Bonds, less original issue discount of \$840,263 less an Underwriters' discount of \$286,395), subject to certain terms and conditions set forth in the Bond Purchase Agreement.

Table A1. Underwriter Experience.

Column 1 of this table reports estimates of the same regression specification reported in Table 3, Column 5 with the following additional regressors added to control for underwriter experience: Log(# of All Underwriter Deals), the total number of municipal bond issuances made by all banks in the issuance's underwriting syndicate over the past five years, and Log(# of All In-State Underwriter Deals), the total number of municipal bond issuances in the same state as the current issuance made by all banks in the issuance's underwriting syndicate over the past five years. Column 2 reports the same specification as Column 1, but restricts the sample to exclude all issuances with one or more black-minority banks in the underwriting syndicate. Column 3 reports estimates of the same specification used in Table 3, Column 5 with the addition of underwriter fixed effects. Regression standard errors are in parentheses, are robust to heteroscedasticity, and are double clustered by school and issuance date. Statistical significance is indicated as follows: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

	(1)	(2)	(3)
	Gross Spread	Gross Spread	Gross Spread
HBCU	15.47*** (5.32)	15.86*** (5.75)	10.78** (4.54)
Log(Amount)	-9.24*** (0.94)	-9.41*** (0.99)	-8.76*** (0.99)
Log(Maturity)	12.26*** (1.66)	11.28*** (1.67)	11.54*** (1.79)
Callable	5.92** (2.45)	6.90*** (2.59)	3.16 (2.56)
Insured	-15.53*** (2.01)	-17.12*** (2.05)	-13.16*** (2.00)
Competitive Bid	4.10 (3.97)	5.53 (4.13)	6.87 (4.67)
Sinking Fund	11.00*** (1.57)	11.42*** (1.62)	10.58*** (1.64)
Revenue Bond	22.68*** (5.35)	29.51*** (5.13)	24.25*** (5.90)
Log(# Underwriter Deals)	-5.69*** (1.38)	-5.67*** (1.42)	-4.65*** (1.27)
Log(# of Underwriters)	3.61* (1.85)	2.39 (1.96)	7.88** (3.66)
Log(# All Underwriter Deals)	3.42** (1.37)	3.67*** (1.42)	
Log(# All In-State Underwriter Deals)	-1.53* (0.79)	-1.64** (0.81)	
Log(Students)	0.04 (1.24)	-0.11 (1.31)	-0.58 (1.32)
Advisor	-5.78*** (1.79)	-5.40*** (1.88)	-4.31** (1.94)
Public	2.66 (2.96)	1.91 (3.18)	0.48 (2.99)
Log(Student Giving Rate)	-1.73 (1.20)	-1.68 (1.26)	-2.17** (1.09)
School Ranking	-0.28*** (0.08)	-0.31*** (0.08)	-0.26*** (0.08)
Missing Student Giving Rate	4.52** (2.20)	4.20* (2.27)	4.93** (2.14)
Missing School Ranking	6.26*** (2.32)	6.93*** (2.40)	4.22* (2.43)
Rating FE?	Yes	Yes	
State-YR FE?	Yes	Yes	
Underwriter FE?	No	Yes	
Observations	4145	3831	4145
R^2	0.630	0.635	0.713

Table A2. Schools Comprising the Treatment Effects Matching Estimator Sample.

This table reports the individual schools represented in the treatment (HBCU) and control (non-HBCU) groups analyzed in Table 4. If multiple schools are used as controls, we display the first school here. Schools are listed by state, and in ascending order based on the number of unique HBCUs represented in each state.

State	Treatment Schools (HBCUs)	Control Schools (non-HBCUs)
DC	Howard University	American University, Georgetown University
TX	Texas Southern University	Angelo State University, Texas Tech
MD	Morgan State University	St. Mary's College of Maryland
KY	Kentucky State University	Murray State University
LA	Dillard University, Xavier University of Louisiana	Loyola University New Orleans, Louisiana College
AL	Alabama State University, Alabama A&M University	Jacksonville State University, University of North Alabama
MS	Jackson State University, Mississippi Valley State University, Alcorn State	University of Southern Mississippi, University of Mississippi, University of Mississippi Medical Center, Mississippi State University
VA	Hampton University, Norfolk State University, Virginia State University	James Madison University, Shenandoah University, Old Dominion University
FL	Bethune Cookman College, Edward Waters College, Florida Memorial University	Florida Institute of Technology, Rollins College, Carlos Albizu University - Miami
NC	Winston-Salem State University, North Carolina A&T State University, Fayetteville State University, Elizabeth City State University	University of North Carolina at Asheville, University of North Carolina at Greensboro, University of North Carolina at Wilmington
GA	Morehouse College, Morehouse School of Medicine, Spelman College, Fort Valley State University, Albany State University, Clark Atlanta University	Brenau University, Berry College, Emory University, Georgia Southern University, Medical College of Georgia, Mercer University, Oglethorpe University, Savannah College of Art and Design, Wesleyan College

Table A3. Ranking of Racial Animus by State.

This table reports rankings (1 to 51 with ties receiving their average rank) by different measures of racial animus across states (including Washington D.C.). In all instances a higher ranking (lower number) indicates greater racial animus. Columns 2 and 3 derive their rankings from the Cooperative Congressional Election Study (CCES, Ansolabehere (2012)). The CCES is a 50,000+ person national stratified sample survey administered by YouGov/Polimetrix. Column 2 ranks states by their level of racial resentment while column 3 ranks states by their opposition to affirmative action. Column 4 ranks states by racially charged Google searches following Stephens-Davidowitz (2014), column 5 ranks states by the decrease in the percentage of white vote share for black democratic presidential nominee Barack Obama relative to the white nominee John Kerry in the previous 2004 election. Vote share is compiled by Edison/Mitofsky exit polls (Tilove 2008). Column 6 ranks states by their level of racist Tweets following Barack Obama’s re-election in 2012 (Zook 2012). Column 7 reports the sum across all ranks for each state. States ranking in the top 10 on all of the five racial animus metrics are designated as “high racial animus” states and their corresponding rows are highlighted in gray. Columns 8 and 9 report the number of bonds per state issued by all schools and all HBCUs residing in that state. Column 10 reports state tax privilege (Babina et al. 2017).

(1) State	(2) Opposition to Affir- mative Action (CCES)	(3) Racial Re- sentment (CCES)	(4) Racially Charged Google Searches (Stephens- Davidowitz 2014)	(5) Change in White Vote Share (Tilove 2008)	(6) Racially Charged Geocoded Tweets (Zook 2012)	(7) Sum of 5 Ranks	(8) # of Bond Issues in Total	(9) # of Bond Issues by HBCUs	(10) Tax Privi- lege
LA	1	1	2	6	1	11	57	4	6
MS	2	3	4	2	4	15	46	9	5
AL	4	2	8.5	1	2	17.5	89	14	5
GA	3	4	16.5	3	11.5	38	99	14	6
AR	6	7	14.5	13.5	3	44	107	3	7
TN	11	6	11	7	11.5	46.5	59	2	6
WV	33	10	1	9	7	60	17	0	6.5
SC	7	5	8.5	23.5	29.5	73.5	52	4	7
FL	10	14	12.5	26	11.5	74	125	4	1.19
MO	18	25	18.5	8	11.5	81	165	0	6
KY	27	20	5	13.5	16	81.5	83	4	6
TX	5	8	27.5	26	16	82.5	121	6	0
OH	20	16	6.5	23.5	19	85	204	1	6.72
OK	9	15	22	36.5	11.5	94	60	1	0
NV	12	12	20	36.5	19	99.5	2	0	0
PA	19	23	3	32	23.5	100.5	334	1	2.97
NC	17	13	16.5	20	45	111.5	136	11	7.83
AZ	13	17	38	43	7	118	79	0	4.82
MD	30	28	24	16.5	23.5	122	40	5	5.28
NJ	24	30	10	36.5	23.5	124	136	0	8.16
MI	14	26	6.5	33	47.5	127	127	0	4.21
IL	28	34	22	20	23.5	127.5	151	0	0
ND	32	18	34.5	4.5	41.5	130.5	27	0	6.24
AK	15	22	40	47.5	7	131.5	0	0	0

KS	31	29	27.5	11	37.5	136	76	0	6.26
VA	21	24	29.5	20	41.5	136	79	10	5.75
ID	8	9	48	47.5	29.5	142	28	0	7.82
NE	26	19	33	28	37.5	143.5	64	0	6.78
CT	42	39	18.5	36.5	11.5	147.5	81	0	5.39
UT	22	33	51	4.5	41.5	152	40	0	4.12
NM	43	40	48	16.5	5	152.5	20	0	6.44
SD	25	11	40	47.5	29.5	153	6	0	
WI	37	37	25.5	13.5	41.5	154.5	34	0	0
DE	38	27	22	26	45	158	9	4	6.34
NY	41	41	12.5	41.5	23.5	159.5	283	0	7.72
IA	34	31	36	40	19	160	111	0	0
IN	23	21	25.5	41.5	50	161	157	0	0.6
RI	40	44	14.5	47.5	16	162	57	0	9.06
MN	45	43	45	10	23.5	166.5	64	0	7.99
WY	16	32	42.5	47.5	29.5	167.5	8	0	
NH	35	38	34.5	31	29.5	168	32	0	5
CO	29	35	48	13.5	45	170.5	58	0	4.7
CA	39	42	31	36.5	34	182.5	204	0	10.21
ME	46	46	32	30	34	188	9	0	8.24
WA	44	45	40	29	34	192	72	0	0
MT	36	36	42.5	47.5	37.5	199.5	15	0	8.83
MA	48	49	37	36.5	29.5	200	223	0	5.47
DC	51	51	46	20	37.5	205.5	31	5	0
OR	47	47	44	20	47.5	205.5	33	0	9.51
VT	50	50	29.5	47.5	49	226	32	0	9.33
HI	49	48	50	47.5	51	245.5	3	0	9.35

Table A4. Analysis of Newly Issued Bonds (Unreported Results).

Panel A of this table reports summary statistics for bond-level and issue-level control variables used to estimate secondary market trading costs in Panel B of Table 6, but which were unreported in the main table. Similarly, Panel B reports the coefficient estimates for these control variables corresponding to the regressions in Panel B of Table 6. Heteroscedasticity robust standard errors are double clustered on school and day of trade and are reported in parentheses.

Panel A: Summary Statistics						
	(1)	(2)	(3)	(4)	(5)	(6)
	N	Mean	SD	Median	Min	Max
<u>Bond-level</u>						
Bond Amount (/1000000)	116905	9.29	12.56	3.59	0.05	45.00
Bond Maturity	116905	17.02	8.75	17.00	0.50	30.50
<u>Issue-level</u>						
Callable	116905	0.98	0.14	1	0	1
Insured	116905	0.46	0.50	0	0	1
AAA-rated	116905	0.38	0.49	0	0	1
AA-rated	116905	0.27	0.44	0	0	1
Below AA	116905	0.18	0.38	0	0	1
Unrated	116905	0.17	0.38	0	0	1
Competitive Bid	116905	0.08	0.27	0	0	1
Sinking Fund	116905	0.80	0.40	1	0	1
Revenue Bond	116905	0.97	0.16	1	0	1
# of Underwriter Deals	116905	141.90	130.36	107.00	0.00	699.00
# of Underwriters	116905	2.46	2.16	2.00	1.00	14.00
Students (/1000)	116905	11.60	10.21	8.44	0.45	44.20
Public	116905	0.53	0.50	1	0	1
Student Giving (/1000)	116905	5.04	5.95	4.23	0.11	30.46
School Ranking	116905	53.32	17.49	54.80	23.50	92.10
Advisor	116905	0.54	0.50	1	0	1
HBCU	116905	0.02	0.12	0	0	1
<u>Macro-level</u>						
Municipal Index % Offer	116905	4.58	0.33	4.55	3.94	6.01
Municipal Index % Sales	116905	4.59	0.33	4.55	3.94	6.01
Municipal Index Delta	116905	-0.01	0.07	0.00	-0.49	0.69

Table A4. Analysis of Newly Issued Bonds (Unreported Results, Continued).

Panel B: Determinants Of Markup, Offering Price, and Sale Price			
	(1) Markup	(2) Offering Price	(3) Sale Price
Days Since Offering	9.25*** (0.93)	-0.09*** (0.02)	-0.00 (0.01)
Log(Trade Size)	-31.92*** (1.05)	0.60*** (0.04)	0.29*** (0.04)
Log(Bond Amount)	12.15*** (2.11)	-0.04 (0.07)	0.07 (0.07)
Log(Bond Maturity)	48.00*** (3.10)	-1.33*** (0.15)	-0.87*** (0.14)
Callable	43.76* (22.20)	-2.05*** (0.55)	-1.61*** (0.48)
Insured	-2.31 (8.13)	-0.53 (0.32)	-0.54* (0.32)
Competitive Bid	-43.15** (17.40)	-0.38 (0.35)	-0.89*** (0.33)
Sinking Fund	-4.88 (6.79)	-0.22 (0.21)	-0.28 (0.18)
Revenue Bond	3.49 (18.35)	-0.19 (0.40)	-0.23 (0.27)
Log(Students)	-8.61** (4.30)	0.27** (0.11)	0.20* (0.11)
Public	14.18 (11.20)	-0.17 (0.34)	-0.04 (0.32)
School Ranking	0.06 (0.32)	0.02*** (0.01)	0.02*** (0.01)
Log(# Underwriter Syndicate Deals)	1.19 (3.19)	0.09 (0.17)	0.11 (0.17)
Log(# Underwriters in Syndicate)	-13.37** (6.38)	0.26 (0.22)	0.14 (0.20)
Advisor	1.69 (5.51)	-0.07 (0.19)	-0.05 (0.18)
Log(Student Giving Rate)	-6.56** (3.09)	-0.13 (0.09)	-0.19** (0.09)
Missing Student Giving Rate	2.64 (7.52)	0.11 (0.20)	0.13 (0.18)
Missing School Ranking	-22.30** (9.24)	0.43* (0.22)	0.25 (0.21)
Municipal Index Delta	291.40*** (48.35)		
Municipal Index % of Offer		-0.98*** (0.23)	
Municipal Index % of Sale			-0.92*** (0.19)

Table A5. Analysis Of Seasoned Trades (Unreported Results).

Panel A of this table reports summary statistics for bond-level and issue-level control variables used to estimate secondary market trading costs in Panel B of Table 7, but which were unreported in the main table. Similarly, Panel B and Panel C report the coefficient estimates for these control variables corresponding to the regressions in Panel B and Panel C of Table 7. Heteroscedasticity robust standard errors are double clustered on school and day of trade and are reported in parentheses.

Panel A: Summary Statistics						
	(1)	(2)	(3)	(4)	(5)	(6)
	N	Mean	SD	Median	Min	Max
<u>Trade-level</u>						
ΔPrice (in %)	378079	-0.16	2.01	0.00	-5.76	4.50
ΔTradesign	378079	-0.17	1.48	0	-2	2
<u>Bond-level</u>						
Bond Amount (/1000000)	378079	14.74	15.64	7.60	0.05	45.00
Bond Maturity	378079	20.96	8.47	21.50	0.50	30.50
<u>Issue-level</u>						
Callable	378079	0.97	0.18	1	0	1
Insured	378079	0.64	0.48	1	0	1
AAA-rated	378079	0.61	0.49	1	0	1
AA-rated	378079	0.18	0.39	0	0	1
Below AA	378079	0.09	0.29	0	0	1
Unrated	378079	0.11	0.32	0	0	1
Competitive Bid	378079	0.07	0.26	0	0	1
Sinking Fund	378079	0.78	0.42	1	0	1
Revenue Bond	378079	0.97	0.17	1	0	1
# of Underwriter Deals	378079	127.11	106.34	97.00	0.00	699.00
# of Underwriters	378079	2.58	2.13	2	1	16
Students (/1000)	378079	11.92	9.93	9.59	0.45	44.20
Public	378079	0.44	0.50	0	0	1
Student Giving (/1000)	378079	5.72	6.38	4.96	0.11	30.46
School Ranking	378079	58.71	18.13	56.80	23.50	92.10
Advisor	378079	0.52	0.50	1	0	1
HBCU	378079	0.03	0.16	0	0	1

Table A5. Analysis Of Seasoned Trades (Unreported Results, Continued).

Sample:	Panel B: Transaction Costs					
	Transaction Costs			Time in Dealer Inventory		
	(1) All Δ Price	(2) \$5K – \$50K Δ Price	(3) \geq \$50K Δ Price	(4) All Days to Sell	(5) \$5K – \$50K Days to Sell	(6) \geq \$50K Days to Sell
Log(Trade Size)	0.02** (0.01)	0.07*** (0.01)	-0.02 (0.02)	0.35*** (0.05)	0.16*** (0.05)	0.36*** (0.08)
Log(Bond Amount)	-0.01 (0.02)	-0.02 (0.01)	0.03 (0.02)	-1.03*** (0.06)	-0.83*** (0.05)	-1.47*** (0.12)
Log(Bond Maturity)	-0.03 (0.02)	0.03 (0.02)	-0.16*** (0.03)	0.37*** (0.12)	0.14 (0.12)	0.99*** (0.19)
Callable	-0.05** (0.02)	-0.08** (0.03)	-0.02 (0.03)	0.33 (0.35)	0.23 (0.45)	0.29 (0.37)
Insured	-0.01 (0.01)	-0.01 (0.01)	0.04 (0.03)	-0.55*** (0.19)	-0.36** (0.17)	-0.64** (0.31)
Competitive Bid	-0.02* (0.01)	-0.03** (0.01)	-0.05* (0.03)	-0.53*** (0.20)	-0.50*** (0.19)	-0.36 (0.38)
Sinking Fund	-0.02** (0.01)	-0.01 (0.01)	-0.09*** (0.02)	0.08 (0.16)	-0.07 (0.13)	0.21 (0.26)
Revenue Bond	-0.01 (0.02)	0.00 (0.02)	-0.08* (0.04)	0.51** (0.22)	0.39** (0.17)	0.75 (0.59)
Log(Students)	0.00 (0.01)	0.01 (0.01)	-0.01 (0.01)	-0.15 (0.10)	-0.15 (0.09)	-0.15 (0.18)
Log(# Underwriter Syndicate Deals)	0.01 (0.01)	0.01** (0.01)	-0.04*** (0.01)	0.25*** (0.06)	0.23*** (0.06)	0.42*** (0.13)
Log(# Underwriters in Syndicate)	-0.01 (0.01)	-0.02** (0.01)	0.02 (0.02)	-0.16 (0.11)	-0.21** (0.09)	-0.34* (0.20)
Public	0.02 (0.01)	0.01 (0.02)	0.03 (0.04)	-0.15 (0.22)	-0.25 (0.19)	0.27 (0.41)
Log(Student Giving Rate)	-0.00 (0.00)	-0.00 (0.01)	-0.01 (0.01)	-0.09 (0.07)	-0.01 (0.08)	-0.30** (0.14)
Advisor	0.01 (0.01)	0.01 (0.01)	0.03 (0.02)	0.07 (0.14)	0.13 (0.13)	-0.26 (0.25)
School Ranking	0.00** (0.00)	0.00 (0.00)	0.00*** (0.00)	-0.01** (0.01)	-0.01** (0.01)	-0.01 (0.01)
Missing Student Giving Rate	-0.00 (0.01)	-0.01 (0.01)	0.00 (0.03)	0.30* (0.17)	0.06 (0.16)	0.88*** (0.31)
Missing School Ranking	-0.02 (0.01)	-0.00 (0.01)	-0.04 (0.04)	0.14 (0.19)	-0.01 (0.18)	0.53 (0.46)

Table A5. Analysis Of Seasoned Trades (Unreported Results, Continued).

Panel C: Sale Yields				
Sample:	(1)	(2)	(3)	(4)
	All	All	\$5K – \$50K	≥ \$50K
	Sale Yield	Sale Yield	Sale Yield	Sale Yield
Log(Trade Size)		-0.10*** (0.01)	-0.07*** (0.01)	-0.09*** (0.02)
Log(Bond Amount)		0.03** (0.01)	0.04*** (0.01)	0.01 (0.02)
Log(Bond Maturity)		0.75*** (0.06)	0.77*** (0.06)	0.72*** (0.06)
Callable		0.01 (0.09)	0.04 (0.10)	-0.01 (0.09)
Insured		-0.20*** (0.06)	-0.13** (0.06)	-0.41*** (0.10)
Competitive Bid		-0.08 (0.05)	-0.05 (0.05)	-0.16 (0.10)
Sinking Fund		0.11*** (0.04)	0.06* (0.03)	0.19*** (0.05)
Revenue Bond		-0.06 (0.07)	-0.06 (0.07)	-0.08 (0.09)
Log(Students)		0.03 (0.03)	0.02 (0.03)	0.05 (0.04)
Log(# Underwriter Syndicate Deals)		0.15*** (0.02)	0.13*** (0.02)	0.23*** (0.04)
Log(# Underwriters in Syndicate)		-0.19*** (0.04)	-0.20*** (0.03)	-0.23*** (0.06)
Public		-0.24*** (0.08)	-0.21*** (0.08)	-0.26** (0.12)
Log(Student Giving Rate)		-0.05** (0.03)	-0.05** (0.02)	-0.06 (0.04)
Advisor		0.01 (0.05)	0.02 (0.05)	-0.03 (0.07)
School Ranking		-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
Missing Student Giving Rate		0.12** (0.05)	0.13*** (0.05)	0.13 (0.08)
Missing School Ranking		0.14** (0.07)	0.15** (0.06)	0.18 (0.11)
Municipal Index % of Sale		0.89*** (0.03)	0.89*** (0.03)	0.90*** (0.05)
Constant	4.20*** (0.07)			

Table A6. Variable Definitions.

This table reports variable definitions. Data sources include the National Center for Education Statistics' Delta Cost Project Database (DCPD), the Security Data Corporation's Global Public Finance Database (SDC), municipal bond transaction data from the Municipal Security Rulemaking Board (MSRB), Mergent's Municipal Bond Securities Database (Mergent), and Arizona State University's Measuring University Performance Database (MUP).

Variable	Description	Source
Gross Spread (bps)	Also known as the underwriter's discount, the gross spread represents the difference between the expected offer price and the price the underwriter pays for the issue (i.e. proceeds to the school), all scaled by the price the underwriter pays for the issue. Reported in basis points (bps).	SDC
Amount (/1000000)	Dollar amount of the issue divided by one million. The log of this number is used as a control in regression analysis.	SDC
Max Maturity	Maturity of the bond with the longest maturity in the issue. Maturity is measured in years. The log of this number is used as a control in regression analysis.	SDC
Callable	Dummy variable that equals 1 if the issue is callable, and is 0 otherwise.	SDC
Insured	Dummy variable that equals 1 if the issue is insured, and is 0 otherwise.	SDC
Insurer	Issue insurer. In the event of multiple insurers, the first insurer listed is designated as the issue's insurer and the others are disregarded. This variable is used to construct insurer fixed effects.	SDC
Issue Rating	Rating of issue on day of issue. Used to construct rating fixed effects and the following dummy variables used in summary statistics tables: AAA rated, AA rated, Below AA, and Unrated.	SDC
Competitive Bid	Dummy variable that equals 1 if the if the issue is sold to underwriters on a competitive basis, and is 0 otherwise.	SDC
Sinking Fund	Dummy variable that equals 1 if the issue has an attached sinking fund, and is 0 otherwise.	SDC
Revenue Bond	Dummy variable that equals 1 if the issue is a revenue bond, and is 0 otherwise.	SDC
# of Underwriter Deals	The sum of the number of deals in the sample underwritten by each member of the underwriter syndicate over the past 5 years. The variable used in the regressions is $\text{Log}(\# \text{ of Underwriter Deals})$.	SDC
# of Underwriters	The number of underwriters in the underwriting syndicate. The log of this number is used as a control in regression analysis.	SDC
Students (/1000)	The number of full-time equivalent students attending the issue's associated school in the year before the issue, divided by one thousand. The log of this number (undivided) is used as a control in regression analysis.	DCPD
Advisor	A dummy variable that equals 1 if the issuing school uses a financial advisor, and is 0 otherwise.	SDC

Public	A dummy variable that equals 1 if the issuing school is public, and is 0 otherwise.	DCPD
Student Giving (/1000)	The average annual alumni giving per student by the issuing school divided by one thousand. The data for this variable is unbalanced across time and schools, thus we use the average over all years for each school using whatever data is available, i.e. this measure is time invariant. Giving rates use the mean value for missing data.	MUP, DCPD
Missing Student Giving Rate	Dummy variable that equals 1 if the issuing school does not have a recorded student giving rate, and is 0 otherwise.	
School Ranking	The 2017 Wall Street Journal/Times Higher Education College Overall Score to derive ranking for the issuing school. Missing data are replaced by the mean school score value.	https://www.timeshighereducation.com/rankings/united-states/2017#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats
Missing School Ranking	Dummy variable that equals 1 if the issuing school does not have a recorded school ranking, and is 0 otherwise.	
HBCU	Dummy variable that equals 1 if the bond issuer is an historically black college or university, and is 0 otherwise.	DCPD
High Racial Animus	A dummy variable that equals 1 if the issuer is located in a “high racial animus” state, i.e., if the issuer is located in Mississippi, Alabama, or Louisiana, and is 0 otherwise. High racial animus states are those which rank in the top 10 among all states in all four of the following racial animus metrics: (1) the proportion of whites in the state who express “racial resentment” or (symbolic racism) (CCES Survey, Ansolabehere 2012); (2) the proportion of whites in the state who say that they support affirmative action (CCES Survey, Ansolabehere (2012)); (3) the percent of Google search queries within the state that include racially charged language (Stephens-Davidowitz 2014); (4) The decrease in white vote share in 2008 for Barack Obama relative to John Kerry in 2004, measured using Edison/Mitofsky exit poll data collected from nytimes.com in 2008 and nbcnews.com in 2004; (5) the percent of racist Tweets within the state following Barack Obama’s re-election in 2012 (Zook 2012).	Multiple Sources As Cited in Description
<u>Bond-level</u>		
Bond Amount (/1000000)	Individual bond dollar par amount divided by one million. The log of this number (undivided) is used as a control in regression analysis.	Mergent
Bond Maturity	Individual bond maturity measured in years. The log of one plus this number is used as a control in regression analysis.	Mergent

<u>Trade-level</u>		
Markup (bps)	The bonds sale price less the bonds re-offering price (i.e. the bond's price listed in the issue's official statement) divided by the bond's re-offering price, expressed in basis points. Observations where the ratio of dealer sale price to re-offering price is less than 0.80 or greater than 1.20 are deleted, following Schultz (2012).	MRSB, Mergent
Offering Price	The bond's re-offering price (i.e., the bond's price listed in the issue's official statement).	Mergent
Sale Price	The bond's dealer sale (customer purchase) price.	MRSB
Days Since Offering	The number of day's since the bond's offering date.	MRSB
Trade Size (/1000)	Bond par value trade amount divided by one thousand and winsorized at the 1% and 99% levels. The log of this number (undivided) is used as a control in regression analysis.	MRSB
Δ Price (in %)	The percentage change in a bond's trading price relative to its previous trading price excluding interdealer trades, winsorized at the 1% and 99% levels.	MRSB
Δ Tradesign	The change in the variable Tradesign, which is an indicator variable that equals one for dealer sells (customer purchases) and negative one for dealer purchases (customer sells), following Cestau et al. (2013).	MRSB
Sale Yield (in %)	Sales yield for sales to customers, winsorized at 1% and 99% levels.	MRSB
Days to Sell	Number of days between purchase from customer until complete sale of purchased inventory to customers. Only populated for trades where the uninterrupted sequence of sales following a purchase provide an exact match between units purchased and units sold. Winsorized at 1% and 99% levels.	MRSB
<u>Macro-level</u>		
Municipal Index % Offer	The value of the Bond Buyer Go 20-Bond Municipal Bond Index on the offering date of the bond.	FRED: https://fred.stlouisfed.org/series/WSLB20
Municipal Index % Sale	The value of the Bond Buyer Go 20-Bond Municipal Bond Index on the sale date of the bond.	FRED: https://fred.stlouisfed.org/series/WSLB20
Municipal Index Delta	Municipal Index % Offer minus Municipal Index % Sale.	
