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The Effect of Enrolling in a Minority-Serving Institution for Black and Hispanic Students in Texas

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Abstract Using state administrative data for three cohorts of college enrollees from 1997 to 2008 and incorporating propensity score matching techniques, we examine the effects of attending a Minority-Serving Institution (MSI)—that is, a Historically Black College or University (HBCU) or a Hispanic-Serving Institution (HSI)—on college-completion outcomes in Texas. Descriptively, we find the gender gap among Black students to be quite stark, with more Black males than females enrolling in HBCUs, although this gap has decreased over time. The income gap is greatest among Hispanic students, with economically disadvantaged students enrolling more frequently at HSIs and those more economically advantaged enrolling in traditional institutions, or non-HSIs. To address this selection bias, we conducted a propensity score analysis in our assessment of college completion. The results indicate that, after matching similar students who attend and do not attend an MSI and conditioning on institutional capacity factors, we no longer see a difference between the bachelor's degree completion rates of Hispanic and Black students who do enroll in an MSI and those who do not for most of the cohorts examined. Where a significant negative effect on college completion does exist for Black students attending an HBCU, the rate is considerably lower in our matched sample. In sum, our results provide strong evidence that the effect of attending an MSI does not have a consistent negative or positive effect on college-graduation outcomes after matching similar students and controlling for institutional capacity, despite these schools serving a larger share of high-need and underprepared students.

The data used in this paper include administrative records from the Texas Education Agency and the Texas Higher Education Coordinating Board. The conclusions of this research do not necessarily reflect the opinions or official position of the Texas Education Agency, the Texas Higher Education Coordinating Board, or the State of Texas.

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Introduction

In 2012, one of the most frequently reported demographic statistics was that the majority of children born in the United States in 2011 were racial minorities, outnumbering the birth of White children of European ancestry for the first time in US Census history (Dougherty and Jordan 2012). This statistic has received significant attention at a time when education policy has shifted its focus from college enrollment to college completion. While scholars have documented a general increase in college enrollment over time, a good deal of research also has documented the stagnant rate of college completion over time (Bound et al. 2010; Bowen et al. 2009; Melguizo 2010; Turner 2004). The stagnant college-completion rates represent a trend among all students, yet some student populations are more likely than others not to complete college (Kurlaender and Felts 2008). This college-completion gap is particularly pronounced for certain racial and ethnic groups. The College Board (2012) reports that, in 2010, the graduation rates of first-time full-time students seeking bachelor's degrees at 4-year colleges were 68.9 % for Asian students, 62 % for White students, 50.6 % for Hispanic students, and 40.3 % for African American students.

The question has arisen as to why completion rates differ so significantly by race and ethnicity. While recent research indicates that college selectivity has a positive and significant effect on baccalaureate attainment by race and ethnicity (Melguizo 2010), we know less about the effects of the large, nonselective sector of 4-year institutions. In other words, we know less about the effects the 4-year institutions underrepresented minority students are likely to attend have on these students' college-graduation rates. There are few empirical studies that go beyond descriptive reports on how Minority-Serving Institutions (MSIs)—that is, institutions created to serve or that enroll large percentages of African American, Hispanic, Native American, and Asian/Pacific Islander students (Gasman et al. 2008)—compare to non-MSIs in terms of baccalaureate attainment rates in a college market where most institutions are primarily nonselective or moderately selective (Richards and Awokoya 2012).

Over the past 30 years, a sizeable percentage of minority college students have attended and graduated from an MSI.[1] Indeed, the number of institutions serving minority students has grown at an unprecedented rate, from 414 in the 1980s to at least 1,200 by the early twenty-first century (Li 2007). While the growing number of MSIs suggests their increasingly critical role in educating underrepresented students, funding trends have not kept pace with institutional needs, according to organizations that advocate for and monitor some MSI groups. These trends have been exacerbated by the sequester—a cluster of cuts to federal spending that took effect in March 2013 (Mathews 2013). The US Department of Education, for example, announced that competitions for some of the funding programs that focus on Hispanic-Serving Institutions (HSIs) would be delayed—or possibly not held at all—beginning in 2014. Moreover, in what some media outlets have termed "sequestering minority education," HSIs are likely to face even deeper cuts than the average college or university, due to the additional federal funding they have become accustomed

[1] HSIs and HBCUs comprised the pool of MSIs in Texas at the time of our analysis. Recent MSI designation includes institutions serving Asian Americans/Pacific Islanders, although these institutions are community colleges and thus not included in our analysis.

to competing for since 1999 (Domonell 2013). Antonio Flores, president and CEO of the Hispanic Association for Colleges and Universities (HACU), noted that, as HSIs are typically allotted 66 cents to the rest of the country's postsecondary institutions' dollar-per-student every year, the cuts will be particularly damaging to students who attend these institutions in terms of their rates of recruitment, support, and completion. Indeed, in 2010, the HACU (2012) reported that HSIs on average received $3,446 per student, compared to an average $5,242 per student at other degree-granting institutions, a disparity that may lead to lower college-retention rates (Núñez et al. 2013). If HSIs and Historically Black Colleges and Universities (HBCUs) are in fact funded at a lower rate than similar non-MSIs, is it at all unexpected that these institutions' average completion rates are below those of their institutional peers? We use a combination of a unique dataset and an advanced statistical technique, propensity score matching, to explore this question.

To understand the conditions behind the college-completion rates of underrepresented student populations (defined here as Blacks and Hispanics), we focus on Texas, a state with a considerable number of HSIs and HBCUs.[2] Building on previous descriptive work on the college completion of underrepresented students, we specifically compare the 6-year bachelor's degree attainment rates for Hispanic and Black students who enroll in 4-year MSIs to those who enroll in traditional 4-year institutions—that is, schools that do not have a historical (HBCUs) or federally designated (HSIs) process for serving underrepresented minority students. To further understand students' decisions to enroll in and complete college, we incorporate propensity score matching to deal with selection issues not previously addressed in this area of research on MSIs (Flores and Park 2013). Finally, as previous research utilizing propensity score matching has specifically examined the role of selectivity on the outcomes of high-achieving racial minorities (Melguizo 2010), we build on this work by examining in more detail the roles played by selectivity and associated measures of institutional capacity, also within the MSI sector. We ask:

1. What is the effect of enrolling in a 4-year MSI on the degree attainment of Hispanic and Black students, as compared to similar matched students who do not enroll in an MSI?
2. After matching on student covariates and conditioning on institutional capacity, what is the effect of enrolling in a 4-year MSI on the degree attainment of Hispanic and Black students, as compared to students who do not enroll in an MSI?

In examining these questions, we aim to contribute to the extensive literature on college completion by dissecting the postsecondary market in a state that has a large number of MSIs, as our findings are likely to have implications for other states with similar education landscapes and underrepresented student populations. For example, previous empirical work on MSIs often has been conducted separately by individual sector (HSI or HBCU), by single institution, or using national data, which may not account for distinct state higher education policy trends.[3] Some work has begun to examine the role played by choice of major and degree attainment in the science, technology, engineering, and math (STEM) fields at HSIs, although it provides limited information on pre-college characteristics, and then only at a single institution (Crisp

[2] We use the terms *Latino* and *Hispanic* interchangeably in this analysis. We do the same for *Black* and *African American*. We do not use the term *predominantly White institutions* (PWIs); due to the demography of Texas, many institutions in the state are not necessarily predominantly White, even if they are not officially an MSI.

[3] For an expanded review of HSI and HBCU development, including the educational and legal history of what federal programs they were developed under and were reassigned to, see Gasman et al. (2008) and Olivas (2005).

et al. 2009). More recently, national studies on STEM outcomes in college have begun to account for the presence of MSIs, even if their representation in samples is relatively low compared to non-MSIs (Hurtado et al. 2011; Malcom and Dowd 2012).

As MSIs become an increasingly salient topic in American higher education, we aim to contribute to the conversation by building on previous important work while incorporating new methods and data in this area of education research. This analysis contributes to the growing research base on MSIs by using (1) unique statewide K-20 data, thus providing a broader portrait of college completion that incorporates the high school context and curriculum information; and (2) propensity score matching, a quasi-experimental technique rarely used to date in analyses of MSIs (Fryer and Greenstone 2010).[4] We acknowledge the particular limitations of state administrative data in evaluating such factors as the role of student support services and mentoring, the impact of racial identity and campus climate, faculty–student interactions, and noncognitive measures such as self-esteem (Braxton et al. 2004; Freeman 2005; Harper and Hurtado 2007; Melguizo 2010; Nora 2003).

"A National and State Portrait of MSIs: HBCUs and HSIs in Texas" section provides a portrait of MSIs in the nation, and in Texas specifically, in terms of general postsecondary enrollment. It specifically discusses how MSI identification can be defined as a treatment status in this analysis, based on factors such as historical mission, demography and geographic location, and qualification for specific federal funding. In other words, we describe how MSI status is operationalized in this analysis. "Conceptual Framework" section describes our conceptual framework, including our theoretical motivation and additional research contributions relating to college completion. In "Research Design" section we provide a detailed description of our research design, including the quasi-experimental methods we use to assess the effect of attending an MSI. "Results" section presents our results, followed by a discussion of these results in "Discussion" section. "Conclusion" section offers our concluding thoughts and implications.

A National and State Portrait of MSIs: HBCUs and HSIs in Texas

To understand the broader higher education policy portrait of MSIs, we use the US Department of Education (2009) definition of HSIs as institutions that are accredited, grant degrees, and have a full-time-equivalent undergraduate enrollment that is at least 25 % Hispanic. HSIs as defined today have developed over the last 35 years, whereas HBCUs were established more than a century ago with the mission of serving Black students, although admission was not limited to Blacks (Gasman et al. 2008). While not every state has an MSI, they are located in the states with the largest Hispanic and Black 4-year undergraduate populations. For example, the five states with the largest number of Black 4-year undergraduates (Texas, Georgia, North Carolina, Florida, and Alabama) all have a significant number of HBCUs. Similarly, the five states with the largest number of Hispanic 4-year undergraduates (Texas, California, Florida, New York, and New Jersey) have

[4] Fryer and Greenstone (2010) use various longitudinal national datasets from the 1970s and 1990s to examine the consequences of attending an HBCU over time, finding a penalty of a 20 % decline in the relative wages of Black HBCU graduates compared to Black non-HBCU graduates between these two decades. While the authors compare the effect of attending an HBCU on Black student cohorts over time using propensity score matching and a number of other quasi-experimental techniques, they acknowledge that a small sample size, among other issues, did not remove all issues of selection in their analysis. The authors also restrict the sample to degree completers and pay particular attention to wages in the labor market after graduation, rather than to factors that lead to degree completion itself.

a significant number of HSIs. In our state of interest, Texas, data from the Integrated Postsecondary Education Data System indicate that in 2010 the state had the nation's largest Black and Hispanic 4-year undergraduate populations (authors' calculations).

In terms of student "customers," MSIs currently enroll more than 2.3 million students, or approximately 14 % of all US higher education students (Harmon 2012). HBCUs alone enroll about 16 % of Black students, while HSIs serve approximately 42 % of all Hispanic students—a percentage that is significantly higher in states with a high percentage of Hispanic students. The Texas MSI picture includes nine HBCUs with an undergraduate enrollment of 19,781 as of 2004,[5] and 64 HSIs with an undergraduate enrollment of 188,785 as of 2004 (Li 2007). Texas is second to California in the number of HSIs and Hispanic student enrollment, and it accounts for nearly 35 % of the total Hispanic enrollment in US higher education institutions.

While both HSIs and HBCUs have a significant presence in Texas higher education, they differ from each other in a few key dimensions. For example, the majority of HBCUs are 4-year institutions, whereas a significant percentage of HSIs are 2-year institutions, a pattern that also applies nationally (Li 2007). MSIs are in general more likely to have open admissions policies and serve a larger percentage of students who are Pell Grant recipients than their non-MSI peer institutions. However, not all MSIs are nonselective, in that a number of 4-year HBCUs have selective admissions standards, a factor we account for in our analyses (Richards and Awokoya 2012).

One critical question of interest is what it means for an institution to have a broad MSI identity or a separate HSI or HBCU identity, and how this identity relates to student outcomes as compared to institutions that are not MSIs. For the purposes of this analysis, we define the treatment of being an MSI as having the following attributes. First, MSIs—HSIs and HBCUs in this analysis—serve particular demographics, often defined by the racial concentration of a particular minority group through historical precedence which also was motivated by legal restrictions (HBCUs), or through a response to demographic change or geographic location (HSIs). In the case of HBCUs, their historical evolution as the only organizations to educate Black students made them "multifaceted institutions providing not only education, but also social, political, and religious leadership for the African American community" (Allen and Jewell 2002, p. 242). With the exception of a few institutions, however, the identity of the HSI largely developed from being located in an area with a large Hispanic population or by demographic change in an area that suddenly found itself serving a large Hispanic population.

The second identity characteristic tied to the concentration of a minority population is "mission to serve." In the case of HSIs, when an institution identifies itself voluntarily and applies formally to be labeled an HSI, in name it commits to serving Hispanic students. In other words, it is assumed that in adopting this identity, institutional leaders are making a commitment to serve the needs of Latino students, including to overcome the gaps in academic achievement and college success experienced by Latino students.

Earning HSI identification can be accomplished in two ways—one informal and one formal: (1) the institution reaches the demographic tipping point where Hispanics are 25 % of total enrollment (full and part time), and can gain membership into the HACU (HACU 2012);

[5] Black-Serving Institutions (BSIs) are an increasingly important area of study within MSI research. The US Department of Education defines BSIs as non-HBCUs whose undergraduate student body comprises at least 25 % Black students, while other minority groups do not comprise more than 25 % of that same population (Li 2007). We limit our analysis to HBCUs, since our analyses indicate that there are significantly more undergraduates in the Texas HBCU sector than the non-HBCU, BSI sector.

or (2) the institution applies for federal designation status, which in turn allows it to qualify for federal funding via Title V or in some cases Title III programs if the institution meets the 25 % of Hispanic *full-time* enrollment. The organizational history and purpose of HBCUs is well documented and they do not have a mutable identity, which contrasts with institutions that can become HSIs through demographic change and by voluntary selection into HSI—formal and informal—status. The HBCU role has evolved to some extent over time from the primary goals set by educated Blacks in the late nineteenth century of educating Black youth, training teachers, and continuing a missionary tradition to serving as key actors in community revitalization as well as the institutions most likely to educate some of the lowest income and underprepared students, while maintaining a focus on serving Black students (Allen and Jewell 2002; Marklein 2014; US Department of Housing and Urban Development 2014).

Finally, a third element of treatment relates to adopting or maintaining the federal definition of MSI identity as part of an application process to receive federal funding. Adopting the MSI definition is required as evidence that an institution is serving or intends to serve particular students and organizational goals through a particular programmatic strategy. One example is federal policy for designated HSIs, which ties their funding to particular programmatic goals. To receive funding, institutions have to apply for formal federal HSI status, and for one of two competitive grants. They cannot receive funding unless they received HSI designation, although they can apply for the designation and the grant program simultaneously. Originally funded under a Title III program with minimal support for student outcomes, the federal HSI program was incorporated into the Higher Education Act of 1998 under Title V and further amended to include the Developing HSIs program, which helped eligible HSIs expand their capacity to serve Hispanic and low-income students through a competitive grant program (US Department of Education 2013).[6] Today, program goals have moved toward increasing student achievement by decreasing remediation, increasing recruitment, and improving persistence in these MSIs. While goals are focused on increasing institutions' capacity to serve students, maintaining accessibility and affordability are key objectives for these institutions.

Conceptual Framework

Our conceptual framework is presented as an examination of the education pipeline from high school through college completion that includes students' demographic characteristics, their high school context and curriculum, and the quality of the postsecondary institution they attend (Adelman 2006; Bowen et al. 2009; Flores and Park 2013; Perna 2006). Using this foundation, we incorporate three bodies of literature relating to (1) the theoretical traditions used to explain college access and completion, which are grounded in human capital theory in terms of the individual decision to attend college, as well as the capacity of institutions to respond to college enrollees with the goal of graduating them; (2) empirical analyses that note the particular factors that have been shown to play an important role in the enrollment of African American and Latino students at HBCUs and HSIs, respectively; and (3) the effect of pre-college characteristics and college quality on students' odds of completing college. We supplement this literature with a review of policy

[6] While the original Title V funding supported up to 14 different types of capacity-building activities, these activities were reduced to seven allowable activities with the 2008 reauthorization of the Higher Education Opportunity Act in order to focus primarily on faculty development and student services, initiatives that were to support improvements in student success at HSIs (Villarreal and Santiago 2012).

changes in Texas higher education. While our data provide advantages not available in other datasets, they do have some limitations, which we address below. In sum, the long road from high school to college completion is influenced by a variety of factors that we attempt to capture, using available administrative data on students, their course-taking behavior, the high schools they attend, and the state's postsecondary institutions.

A Human Capital Perspective: The Individual and the Institution

For this analysis, we incorporate a model of student decision-making as it relates to college enrollment and degree completion, as well as institutional responses to students' decisions to enroll in college that are based in human capital theory (Becker 1964; Bowen et al. 2009; Mincer 1974). We also note important recent additions to the human capital perspective. For example, according to Becker (1964), a student's decision to attend college includes their assessment that investing in education carries a cost, and their expectation that the cost might increase their human capital in terms of new skills or benefits they can exchange for income in the labor market. Weighing the costs and the benefits, both monetary and nonmonetary, thus is part of a student's decision to invest in a college education. Bound et al. (2010) hypothesize that, as the returns on a college degree increase, as they have over the last 30 years, more students may be enticed to enter college, where they will compete with students who would in any case have entered college. This likely will have one of two effects. First, while the increasing returns on a college degree might be expected to lead to an increase in college completion, the preparation of students entering the US college system may be quite varied and in some cases inadequate, which likely will lower the college-completion rate. Second, from the supply-side perspective (that of the institutions), an increase in the number of students entering colleges and universities may change the level of resources these institutions can provide, especially if state budgets do not keep up with the growing demand for higher education services. In that public colleges and universities comprise the majority of higher education institutions in the US and in Texas, their capacity to respond to student demand is an essential part of the college-completion question. We therefore observe the roles of both the individual and the institution in the context of declining student resources over time, which is experienced most dramatically at public universities and colleges that are not among the top 50 such institutions in the US (Bound et al. 2010).

Enrolling in a Minority-Serving Institution

Our framework also builds on work that examines the college-choice decision as it relates to enrolling in an HBCU or HSI, although of the two, more substantial work has been done thus far on HBCUs (Kim and Conrad 2006; Núñez and Bowers 2012). Freeman (2005), for example, conducted a qualitative analysis of how African American high school students who attended an HBCU at the turn of the twenty-first century are different from similar students who have chosen HBCUs historically—a cohort from the 1970s specifically. The authors found that the characteristics of high-achieving students currently enrolling at HBCUs are not remarkably different from those of cohorts that attended these institutions the 1970s, in that they include growing up in predominantly Black neighborhoods and attending predominantly Black high schools. The most overwhelming concern emerging from recent student surveys about attending college is financial need, suggesting that HBCUs with fewer resources will find themselves in a difficult spot when trying to recruit high-achieving students who might receive more financial aid at other schools. As for influences on college choice, Freeman (1999), Freeman and Thomas (2002) found that the three strongest factors in the college

decision to attend an HBCU relate to knowing someone who attended the HBCU, seeking roots in Black culture, and a lack of cultural awareness. The type of high school attended did not play a big role, but having a family member, educator, or friend connected with an HBCU did influence students' choice of college. Others (Freeman 2005) have documented that a student's religion, the school's reputation, and a relative's influence were also factors in students' decision to attend an HBCU.

The factors influencing students' decision to attend an HSI have received less empirical attention; however, recent work that employs a national quantitative perspective incorporates some pre-college and high school characteristics that previous work on HBCUs has not fully examined. Employing the Educational Longitudinal Survey of 2002, Núñez and Bowers (2012) found that students who chose a 4-year HSI likely had the following characteristics: (1) chose a postsecondary institution that was close to home; (2) attended a high school with a high percentage of Hispanic students; and (3) attended a high school with a high percentage of minority students. Regional characteristics also were a factor, as students in the US West were more likely than students in other regions to attend an HSI. This pattern is expected, however, given the geographic concentration of HSIs in Western states that have large Hispanic populations. Interestingly, students who had a high math score on a standardized test and/or were a first-generation Hispanic were more likely to enroll in a non-HSI.

Research on what factors influence college completion has provided important insights in the education field, but the tradeoff is that only a handful of HBCUs have been included in national studies and, to our knowledge, no work to date has examined the HSI in the college-completion story using our methods. We now move to the factors shown to influence college completion in general and incorporate them in our assessment of completion within the MSI context.

Pre-college Characteristics and College Quality

At the pre-college level, high performance on math measures and taking rigorous courses have consistently predicted the likelihood of both entering college and, in particular, completing college. As for the effects of the curriculum, particularly the role of taking more advanced mathematics courses in high school, Adelman (2004) found that taking math one level beyond algebra II, such as trigonometry, doubles a student's odds of finishing a bachelor's degree. Others have found that engaging in rigorous coursework, such as Advanced Placement/International Baccalaureate (AP/IB) courses, and participating in dual college/high school enrollment programs may increase students' odds of gaining access to and, in some cases, completing college, although studies on the causal effects of taking AP/IB courses have yielded mixed results (Adelman 2004, 2006; American Institute for Research 2011; Iatarola et al. 2011; McCauley 2007; Sadler et al. 2010). Nevertheless, a school's ability to provide advanced courses is associated with the academic level of the students available to take such courses, which suggests an effect related to the composition of the high school population (Iatarola et al. 2011). In a well-publicized study of college completion nationally and in six states, Bowen et al. (2009) used administrative data to find that high school grades are a far better predictor of college-graduation rates than SAT/ACT scores, as are scores on achievement tests like AP exams. However, the authors still recommend triangulating more than one achievement assessment for a better selection process in college admissions. Finally, while these authors did not examine the impact of working while in high school, other studies have paid particular attention to working while in school as a choice that replaces schooling altogether, particularly for Hispanic students (Bachmeirer and Bean 2011; King and Bannon 2002; Kulm and Cramer 2006).

Bachmeirer and Bean (2011), for example, found that, for many youth of Mexican origin, attending school is conditional upon their participation in the labor force, an outcome not generally found among other racial and ethnic groups.

College quality is an important determinant not only of graduation outcomes but also of postgraduate opportunities, such as graduate or professional school and well-connected peer networks (Karabel 2005). Several studies have examined college choice and completion by type of institution, which in the United States often is a proxy for quality (e.g., Bowen et al. 2009; Hagy and Staniec 2002; Manski and Wise 1983; Ordovensky 1995; Perna and Titus 2004; Rouse 1995). The quality debate and associated empirical analyses have focused on the effect college selectivity has on college-completion rates (Bastedo and Jaquette 2011; Bowen et al. 2009; Dale and Krueger 2002; Long 2008; Melguizo 2008, 2010). Other institutional characteristics have been explored, such as per-student funding and the percentage of the faculty that is tenured, particularly for the 2- and 4-year college sectors. Bound et al. (2010), for example, found that the factors affecting completion rates differ by postsecondary institutional sector, in that institutional characteristics are more likely to explain declining college-completion rates over time at 4-year institutions, whereas students' level of academic preparation is more likely to explain declines in completion rates at 2-year institutions. However, Bound et al. focus on income level rather than on race and ethnicity. While they distinguish between 2- and 4-year institutions, they do not account for MSI status in this work.

The Texas Higher Education Policy Context

Texas higher education has undergone significant policy changes over the last 15 years, beginning with the introduction of a race-neutral admissions program known as the Top Ten Percent Plan (1998), an infusion of financial aid (2001), tuition deregulation (2003), the reinstatement of affirmative action in some colleges and universities (2005), and a statewide policy on dual enrollment (2006). Of particular importance is the impact the mandated alternative admissions plan has had on underrepresented minority student enrollment in the state's postsecondary institutions. While innovative in its simplicity and ease of interpretation, the plan still has not brought a sizable percentage of underrepresented minorities to selective institutions, despite an increase in the percentage of eligible underrepresented students in the top 10 % of the state's graduating classes (Long and Tienda 2008). Horn and Flores (2012) find that a majority of Black and Hispanic students eligible for the Top Ten Percent Plan instead enroll in nonselective and, to a lesser degree, moderately selective public institutions in Texas.

Given the extensive activity in state higher education policies related to race and ethnicity, economic need (financial aid), and merit (course-taking behavior) over time, we turn to a matching technique with various cohorts across this time period in an effort to remove selection bias in our examination of the effect attending an MSI has on degree attainment.

Research Design

Self-selection

Inherent in any study of college completion that compares different types of institutions is the issue of self-selection. Therefore, without using appropriate inference methods, it remains unclear whether other factors may be influencing student enrollment and degree

completion. For instance, a student who enrolls in an MSI may not be as prepared academically, may come from a weaker financial situation, and may not have the same access to other forms of cultural and financial capital as those enrolling in a traditional institution. In essence, a simple comparison between students who did and did not enroll in an MSI would overestimate the impact enrollment in an MSI has on degree attainment. It thus becomes difficult to capture the most accurate impact of MSI enrollment and college completion when self-selection has occurred. To address self-selection, we turn to a counterfactual framework and propensity score matching.

Counterfactual Framework

While random experiments have become the gold standard of education research and would alleviate the concern of self-selection, this particular setting—where students choose to enroll in various types of institutions—does not easily lend itself to experimental design, nor is it ethical to induce such experiments. Thus, in the absence of an experiment where a counterfactual group would be established by randomization, we approximate a counterfactual group based on the observable characteristics of Hispanic and Black students—that is, propensity score matching (Rubin 1974, 1976). While many approaches have been used to address self-selection, propensity score matching has gained popularity in the field of education research (e.g., Agodini and Dynarski 2004; Doyle 2009a, b) and is well-suited to our context. What follows is a discussion of this method as it relates to our question of interest: the impact attending an MSI has on bachelor's degree attainment.

Propensity Score Matching

Empirically, the difference between Hispanic and/or Black students enrolled at an MSI and those enrolled at a traditional institution is defined by $\Delta = y_1 - y_0$, where y_1 represents the outcome of a group of students who enrolled at an MSI and y_0 represents the outcome for those same students had they enrolled in a traditional institution. More specifically, the average treatment on the treated (ATT) in this instance is defined as (Smith and Todd 2001):

$$\begin{aligned} \text{ATT} &= E(\Delta|x,\, z=1) \;= E(y_1 - y_0|x,\, z=1) \\ &= E(y_1|x,\, z=1) - E(y_0|x,\, z=1). \end{aligned}$$

In this case, $z = 1$ represents the presence of the treatment (enrolling in an MSI) and x represents a vector of student characteristics. In any analysis of this nature, data typically are available for the outcomes among the treated individuals $[E(y_1|x, z = 1)]$. However, the counterfactual outcome is unknown $[E(y_0|x, z = 1)]$. In controlled randomized trials, the counterfactual is obtained through the use of randomization with respect to the observed characteristics x (Heckman 1979). In the absence of an experiment, many have turned to propensity score matching to approximate random assignment, based on the propensity to receive treatment (e.g., Agodini and Dynarski 2004; Doyle 2009a, b; Heckman et al. 1998; Rubin 1974, 1976).[7] With propensity score matching, the ATT is defined as (Smith and Todd 2001):

$$\text{ATT} = E(y_1|z=1) - E_{p|z=1}E_y(y|z=0,p).$$

[7] In developing this paper, we also experimented with different matching techniques, including one-to-many analyses, as suggested by Guo and Fraser (2010). In all cases, the results from these analyses were similar to those from our one-to-one matching technique.

In this specification, p is defined as the probability (propensity) that a student will enroll in an MSI, based on a number of individual characteristics, such that $\Pr(z = 1|x) < 1$ for all x. To compute the propensity score, we employ probit regression using our array of pre-college characteristics. We utilize a nearest neighbor, one-to-one matching technique where the treated (MSI student) is matched to a single control (traditional institution student) that has a very similar probability (within a caliper of $0.10\sigma_p$ or <.02 across the various samples) of enrolling in an MSI. Students in the control group can be matched to more than one student in the treatment group, and if a match cannot be found, the individual is discarded from the analysis (see footnote 7). To the extent that we have effectively captured the propensity to enroll in an MSI with our array of pre-college characteristics, we will be able to greatly reduce the selection bias in our comparison between the treatment and control groups using a logistic regression model on the matched students, with an indicator for treated students (Heckman et al. 1998; Smith and Todd 2001). To check the balance of the two groups—that is, the extent to which the matched samples differ only by virtue of enrolling in an MSI—we conduct t tests between the matched groups along our array of pre-college covariates. A successful match will yield no statistically significant results.

In our results section, we first provide logistic regression estimates from the full, unmatched sample with an indicator for MSI status (model 1), then we provide weighted logistic regression estimates using only the matched students (model 2). To ensure our estimates our doubly robust, we also provide a weighted logistic regression model including all of the covariates from the matching algorithm (those in Tables 3, 4) as controls (model 3). Models 2 and 3 specifically address our first research question of whether similar students who both do and do not attend MSIs experience differences in graduation rates.

To address our second research question regarding the influence of institutional capacity, we present two additional models for the matched students, incorporating post-secondary characteristics: Barron selectivity index, the faculty–student ratio, the percentage of tenured faculty members, and the overall enrollment of the institution. The first of these models contains only these controls (model 4) and the second contains these controls as well as all of the covariates from the matching algorithm (model 5). We conduct these further analyses as we acknowledge that not all MSIs (or traditional institutions) are homogeneous in the composition of factors known to influence college completion. Put differently, there may be additional postsecondary factors beyond MSI designation that influence college completion for Hispanic and Black students. Thus, to address this concern, we include these final two models with postsecondary characteristics in an attempt to control for variation within and between the MSI and traditional sectors. This process of multivariate analysis after matching is detailed by Guo and Fraser (2010) and has been used in other studies, such as Morgan (2001) to examine the impact of Catholic schools, and Smith (1997) to examine the impact of welfare programs.

Data

We employ a confidential and longitudinal state administrative dataset from the Texas Higher Education Coordinating Board and the Texas Education Agency, which we obtained through the University of Texas at Dallas Education Research Center. We also include regional controls, as well as additional publicly available data from the National Center for Education Statistics (the Common Core of Data and Integrated Postsecondary Education Data System) and the Bureau of Labor Statistics, to build our full models. To observe changes over time, we examine outcomes for three cohorts of students who graduated from high school in the spring

of 1997, 2000, and 2002, and entered college in the fall of their graduating years. All students were tracked for 6 years to determine their degree completion within 150 % of a baccalaureate degree. We include variables available in the data that have been shown to influence the odds of college completion, conditional on college enrollment, that relate to individual characteristics, high school academic preparation, high school context, working while in high school, community context, and postsecondary characteristics.

In computing the propensity score, we predict the likelihood that Hispanic and Black students will enroll in an MSI, based on individual characteristics, high school preparation, and high school and community context, including an indicator for whether the student worked during his or her senior year of high school. In terms of individual characteristics, we include race, sex, and limited English proficiency status. In terms of high school preparation, we include covariates for the successful completion of a trigonometry course and either an AP or IB course. We also include student performance on the state math exam and whether a student was dual enrolled—that is, simultaneously enrolled in high school and doing college coursework. High school context variables include the pupil-teacher ratio, school enrollment, the percentage of minority (Black and Hispanic) students in the school, per-pupil expenditures, and whether the high school is located in an urban setting, as defined by the US Department of Education. An indicator for working during high school is included as an indicator of whether a student worked during his or her spring semester in high school immediately preceding graduation. We also identify the match using indicators for community context, including the unemployment rate in the county where a student attended high school and whether a student's high school is located within 25 miles of a postsecondary institution. In our final robustness check, we add controls for such postsecondary characteristics as selectivity (as measured by the Barron selectivity index), the percentage of tenured faculty members, the faculty-student ratio, and full-time equivalent enrollment.

Notable limitations of the dataset include variables such as SAT or ACT scores, level of parental education, and generational status. Responding to these limitations, we first argue that the SAT/ACT variable is not as relevant for college enrollment in Texas as it might be in other states, due to the Top Ten Percent Plan. Second, a lack of information on parental education and generational status in state administrative data is quite common and is an unfortunate tradeoff when using these data rather than national datasets. However, the economic disadvantage variable in our data accounts for parental income as defined by federal standards for meeting free and reduced-price lunch requirements (Garcia and L'Orange 2010). The advantages of these state administrative data include the seamless connection between education sectors (from high school to college completion) and the ability to capture all students in Texas schools. That is, these data can be linked from K-12 to the state's postsecondary system without losing students, unless they moved out of the state or country. In contrast, longitudinal datasets such as the National Education Longitudinal Study, the Education Longitudinal Study of 2002, and the Beginning Postsecondary Student Longitudinal Study must track students using other methods and then hope they will agree to participate in the data collection multiple times. As a result, these longitudinal surveys suffer from significant sample attrition over time.

Results

Our results section is organized into two parts. We first present the descriptive landscape of college enrollment by student characteristics across MSIs in Texas. We then present results on completion from a descriptive perspective and from our propensity score analyses. We

remind the reader that, to our knowledge, this is the first quasi-experimental analysis of college completion that accounts for MSI status for multiple student cohorts.

Descriptive Portrait

Table 1 provides data on the number of Hispanic and Black students enrolled in Texas 4-year public postsecondary institutions, by MSI status. Across the three time periods, roughly half of Hispanic students enrolled in HSIs, while roughly one-third of Black students enrolled in HBCUs. While MSIs are clearly enrolling a sizeable portion of Hispanic and Black students in Texas, there are notable differences in completion rates. Table 2 provides completion rates over time, by race and MSI designation. On average, across time, minority students at MSIs tend to show completion rates 10 % lower than minority students enrolled at traditional institutions. This relationship, however, is not causal and merely suggests that there may be completion differentials by MSI status. Tables 3 and 4 provide descriptive statistics on the pre-college characteristics used in the propensity score analysis by year, race, and MSI designation. Overall we see that Hispanic and Black students who enroll in MSIs tend to be substantially underprepared academically for college and come from high schools with high minority enrollments that are located in urban settings. Specifically, in 2002, only 26 % of Black students enrolled in an HBCU took an AP or IB course in high school, compared to 45 % of Black students enrolled in a traditional institution. Additionally, 66 % of Black students enrolled in an HBCU came from an urban high school, compared to 57 % of Black students enrolled in a traditional institution. Hispanic students present similar gaps in enrollment in rigorous courses, such as AP/IB and trigonometry, also based on enrollment in an HSI. For example, data for this group indicate that 57 % of Hispanic students in traditional institutions or non-HSIs enrolled in AP/IB courses, compared to 54 % of Hispanic students who enrolled in an HSI. Another gap exists in the percentage of students who took trigonometry (62 % of Hispanics not enrolled at an HSI, compared to 54 % of Hispanics enrolled at an HSI). Interestingly, two major differences exist between Black and Hispanic students enrolled in all of these sectors. The gender gap for Black students is quite stark, with more Black males than females enrolling in HBCUs, although this gap has decreased over time. For Hispanic students, the income gap is arguably the starkest contrast among student enrollees, with more economically disadvantaged Hispanic students enrolling at HSIs and more well-off Hispanics enrolling in traditional institutions or non-HSIs. The higher segregation levels represented by the percentage of Black and Hispanic students in a high school are also a defining characteristic of students who enter an MSI. To contend with the selection issues presented by these data, we now turn to propensity score matching.

Propensity Score Analysis Results

After computing the propensity score for all of the students in each sample, we first construct double histograms for both the treated (students attending an MSI) and control (students attending a traditional college or university). Figure 1 presents these histograms by cohort and HBCU/HSI designation and suggests a substantial amount of common support for the HBCU analysis—that is, a substantial number of students with a similar propensity to enroll in an HBCU in both the treated and control groups—and a reasonable amount of common support for the HSI analysis. From results presented in Fig. 1, we feel confident in proceeding with the propensity matching procedure. Furthermore, to ensure balance, the "Appendix" includes descriptive tables with t statistics for all of the covariates used in the propensity score matching procedure in both the unmatched and matched samples. The results from these *t* tests suggest a reasonably well-

Table 1 Descriptive enrollment figures by year, race, and MSI designation

	1997		2000		2002	
	Enrolled	%	Enrolled	%	Enrolled	%
Hispanic						
HSI	3,618	55.23	3,752	52.90	6,415	56.14
Traditional	2,933	44.77	3,340	47.10	5,011	43.86
Black						
HBCU	1,096	32.36	1,250	33.17	2,226	36.57
Traditional	2,291	67.64	2,518	66.83	3,861	63.43

Source: Authors' calculations, Texas Higher Education Coordinating Board, and Texas Education Agency

Table 2 Completion rates by race and MSI designation

	Hispanic (HSI) (%)	Black (HBCU) (%)
1997		
Traditional	47.73	44.01
MSI	37.04	37.32
Difference	10.69	6.69
2000		
Traditional	65.20	55.56
MSI	52.00	41.60
Difference	13.20	13.96
2002		
Traditional	51.72	45.55
MSI	43.40	33.63
Difference	8.32	11.92

Source: Authors' calculations, Texas Higher Education Coordinating Board, and Texas Education Agency

balanced treatment and control groups after matching in all of our analyses. We now proceed with the results from logistic regression analyses conducted on the matched and unmatched samples.

Tables 5 and 6 provide the results from our propensity score analysis for each of the five models. For ease of interpretation, we provide both the point estimates from the logistic regression analyses as well as the difference in predicted probabilities of college completion computed from the point estimates from the logistic regression analyses, by race and MSI status. The full logistic regression models, including point estimates for all covariates, are available from the authors.

In every case, the unmatched analyses (model 1) produce statistically significant point estimates for the MSI indicators and the differences in predicted probability are simply those raw differences contained in Table 2. After matching, however, With regard to HSIs, we find that, in 1997 and 2000, the matching estimates (model 2) continue to yield statistically significant, though smaller, point estimates for the indicator for HSI. In other words, we continue to note statistically significant (though smaller) differences in completion rates for Hispanic students at HSIs compared to similar students at traditional institutions and the same is true is for the matched models containing the first set of controls (model 3). In the second set of models where include postsecondary controls for Hispanic students (models 4 and 5) we no longer see a difference in the completion rates of

Table 3 Group descriptive statistics over time, HSI comparison

	1997		2000		2002	
	HSI	Traditional	HSI	Traditional	HSI	Traditional
Male	46.77 %	43.66 %	42.51 %	41.86 %	44.16 %	43.62 %
	(.5)	(.5)	(.49)	(.49)	(.5)	(.5)
Economic disadvantage	47.98 %	28.50 %	51.76 %	31.10 %	58.52 %	36.06 %
	(.5)	(.45)	(.5)	(.46)	(.49)	(.48)
Limited English proficiency	.0376	.0133	.0235	.0059	.0111	.0048
	(.19)	(.11)	(.15)	(.08)	(.1)	(.07)
AP/IB course	25.48 %	34.87 %	58.05 %	56.61 %	54.72 %	57.08 %
	(.44)	(.48)	(.49)	(.5)	(.5)	(.5)
Trigonometry course	34.99 %	44.15 %	56.29 %	62.43 %	53.84 %	61.65 %
	(.48)	(.5)	(.5)	(.48)	(.5)	(.49)
Math exam score	46.47	49.47	50.39	52.17	51.35	52.91
	(10.15)	(8.88)	(8.31)	(6.38)	(9.01)	(7.67)
Dual enrollment	7.13 %	12.49 %	16.55 %	18.22 %	25.47 %	24.45 %
	(.26)	(.33)	(.37)	(.39)	(.44)	(.43)
HS pupil: teacher ratio	14.9971	15.1149	14.862	15.3014	14.8202	15.0742
	(2.11)	(2.64)	(2.34)	(2.75)	(2.16)	(2.54)
HS enrollment (100s)	17.5525	17.6036	16.9196	18.5926	17.2748	18.1479
	(7.71)	(9.78)	(7.05)	(9.68)	(7.47)	(9.93)
HS percent minority	83.16 %	56.61 %	84.45 %	54.60 %	84.65 %	56.75 %
	(.19)	(.29)	(.18)	(.29)	(.2)	(.28)
HS per pupil expenditures (logged)	8.1442	8.1193	8.2949	8.2873	8.3813	8.3748
	(.1)	(.14)	(.1)	(.12)	(.1)	(.11)
HS urbanicity	57.99 %	44.51 %	61.91 %	47.74 %	60.56 %	44.94 %
	(.49)	(.5)	(.49)	(.5)	(.49)	(.5)
Student worked while in HS	9.07 %	18.92 %	11.19 %	22.05 %	10.23 %	16.89 %
	(.29)	(.39)	(.32)	(.41)	(.3)	(.37)
County unemployment	10.4439	5.9757	6.109	4.5538	7.8059	6.3188
	(6.83)	(4.23)	(2.81)	(1.65)	(2.55)	(1.47)
Proximity to PSE (within 25 mile)	87.67 %	78.90 %	87.69 %	82.25 %	84.79 %	78.23 %
	(.33)	(.41)	(.33)	(.38)	(.36)	(.41)
N	3,618	2,933	3,752	3,340	6,415	5,011

Source Authors' calculations, Texas Higher Education Coordinating Board, and Texas Education Agency

Hispanic students between these two sectors. Put differently, there is no consistent negative (or positive) effect on college completion and HSI designation alone after taking into account student characteristics and institutional capacity.

With respect to Black students in HBCUs, we see the effect of enrolling at an HBCU vanish for the years 1997 and 2002 in all of the matched models (models 2–5, save for model 3 in 2002). This is particularly telling for models 2 and 3 given that even without taking into consideration institutional capacity, we see no effect (positive or negative) for attending an HBCU with the matched students. In other words, students with similar qualities before enrollment have an equal likelihood of graduating whether or not they attend an HBCU. Furthermore, the same is true in the 1997 and 2002 cohorts for models 3 and 5 when we add

Table 4 Group descriptive statistics over time, HBCU comparison

	1997		2000		2002	
	HBCU	Traditional	HBCU	Traditional	HBCU	Traditional
Male	42.70 %	33.39 %	44.16 %	36.70 %	41.19 %	36.99 %
	(.49)	(.47)	(.5)	(.48)	(.49)	(.48)
Economic disadvantage	24.45 %	24.90 %	29.52 %	27.05 %	33.48 %	30.24 %
	(.43)	(.43)	(.46)	(.44)	(.47)	(.46)
Limited English proficiency						
AP/IB course	14.60 %	26.88 %	24.96 %	44.34 %	25.71 %	45.33 %
	(.35)	(.44)	(.43)	(.5)	(.44)	(.5)
Trigonometry course	22.54 %	34.32 %	31.12 %	46.99 %	30.87 %	51.54 %
	(.42)	(.47)	(.46)	(.5)	(.46)	(.5)
Math exam score	40.62	45.30	44.37	48.51	46.98	50.55
	(11.9)	(9.84)	(10.76)	(8.5)	(10.62)	(8.44)
Dual enrollment	2.83 %	7.03 %	3.76 %	9.65 %	7.66 %	14.36 %
	(.17)	(.26)	(.19)	(.3)	(.27)	(.35)
HS pupil: teacher ratio	15.9788	15.6505	15.9334	15.3486	15.4598	15.2176
	(2.32)	(2.47)	(2.68)	(2.5)	(2.09)	(2.05)
HS enrollment (100s)	16.977	17.9074	18.2248	19.3644	18.303	19.658
	(8.08)	(9.25)	(9.34)	(10.26)	(9.12)	(9.95)
HS percent minority	70.02 %	58.09 %	71.43 %	59.24 %	72.42 %	62.97 %
	(.28)	(.28)	(.27)	(.27)	(.25)	(.26)
HS per pupil expenditures (logged)	8.0639	8.0828	8.2626	8.2661	8.3508	8.3563
	(.08)	(.1)	(.09)	(.08)	(.13)	(.09)
HS urbanicity	67.15 %	57.97 %	64.48 %	55.41 %	66.26 %	56.80 %
	(.47)	(.49)	(.48)	(.5)	(.47)	(.5)
Student worked while in HS	15.60 %	18.80 %	21.28 %	23.86 %	16.92 %	16.42 %
	(.36)	(.39)	(.41)	(.43)	(.38)	(.37)
County unemployment	5.0618	5.1083	4.2926	4.3512	6.2577	6.3689
	(1.48)	(1.86)	(.68)	(.93)	(.74)	(.95)
Proximity to PSE (within 25 mile)	92.88 %	88.70 %	90.24 %	87.21 %	85.74 %	83.58 %
	(.26)	(.32)	(.3)	(.33)	(.35)	(.37)
N	1,096	2,291	1,250	2,581	2,226	3,861

Source: Authors' calculations, Texas Higher Education Coordinating Board, and Texas Education Agency

institutional level controls. In addition, for the 2000 cohort, when we continue to find an effect after matching, this effect is smaller than in the basic, unmatched sample. Overall, Black students tend to perform as well in an HBCU as in a non-HBCU in terms of 6-year college graduation rates, after matching with our array of observable covariates.

Discussion

Using state administrative data that cover a high school to college completion pipeline, our results suggest that the effect of attending an MSI does not have a consistent negative or positive effect on college-graduation outcomes. The results are relevant for a number of

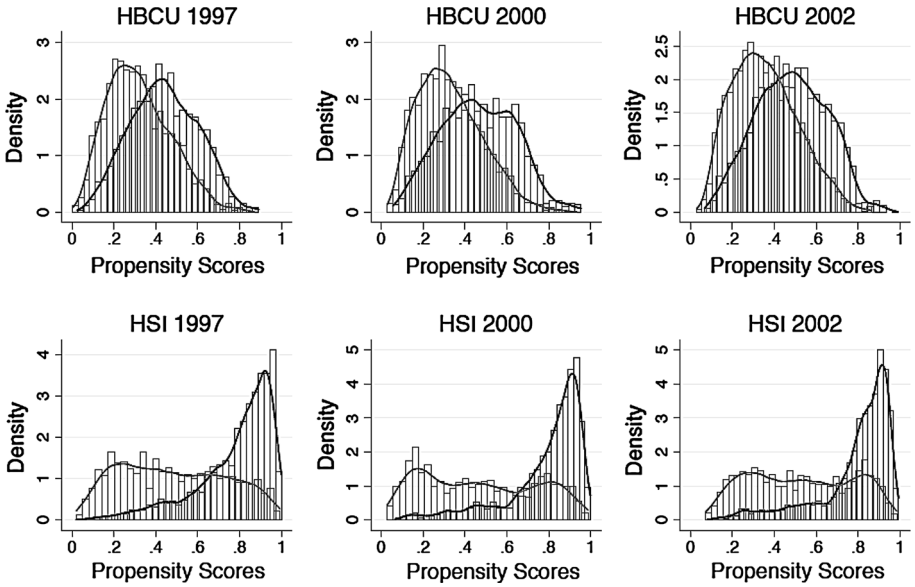

Fig. 1 Double histograms and density plots for treated/control students by year and HBCU/HSI analysis. *Source*: Authors' calculations. Texas Higher Education Coordinating Board and Texas Education Agency

reasons related to the general expectation that MSIs are more likely to underperform in terms of student outcomes than non-MSIs (Riley 2010). For example, MSIs are more likely than non-MSIs to serve students who have received Pell Grants and had less rigorous academic preparation in high school. Previous research on students' academic preparation and income level and the institution's selectivity suggests an outcome in which students who attend an MSI, if they were comprised by these institutional characteristics alone, are less likely to graduate than students who attend a non-MSI.

However, it is important to clarify the role of the MSI as much as possible in the context of a multitude of pre-college and institutional characteristics. We therefore specifically examine the role of the MSI treatment on student outcomes. One way we define the MSI identity is as having a racially concentrated student body due to historic or demographic circumstances. Other components of that identity status include a formally designated institutional status, such as an HBCU; one that refers to itself as an HSI through its association with the HACU, the largest nonprofit higher education organization dedicated to Hispanic students; or one that has formally applied to be designated an HSI through a federal process that makes it eligible for federal funding to promote student success and increase institutional capacity, broadly defined. Issues such as the selectivity of an institution and the quality of its faculty may be loosely related to its MSI status, but these are not primary identifying components of these institutions.

Assuming that an MSI is more likely to enroll low-income and underrepresented students, including MSIs with a lower admissions rate than other institutions, raises the question of whether institutional inputs, as documented by Bound et al. (2010), play a greater role in college completion than do students' inputs, such as their individual characteristics and those of the high school they attended. How might an analysis of this question look in institutions that are defined by particular mission in addition to race and ethnicity and other characteristics previously documented in the literature?

Table 5 Point estimates and predicted probabilities of college completion for Hispanic students at HSIs versus traditional institutions

	1997				
	Basic model	Matched model	Matched model with matching controls	Matched model with institutional controls	Matched model with full controls
HSI	−.440***	−.417***	−.453***	−.028	−.183
	(.06)	(.1)	(.1)	(.24)	(.26)
Difference in predicted probability	−10.69 %***	−9.99 %***	−10.81 %***	−.67 %	−4.35 %
N	6,551	1,842	1,842	1,842	1,842
	2000				
	Basic model	Matched model	Matched model with matching controls	Matched model with institutional controls	Matched model with full controls
HSI	−.548***	−.334***	−.392***	−.185	−.361
	(.06)	(.09)	(.09)	(.23)	(.25)
Difference in predicted probability	−13.2 %***	−8.16 %***	−9.53 %***	−4.55 %	−8.81 %
N	7,092	2,060	2,060	2,060	2,060
	2002				
	Basic model	Matched model	Matched model with matching controls	Matched model with institutional controls	Matched model with full controls
HSI	−.334***	−.120	−.138*	−.320*	−.316
	(.05)	(.06)	(.07)	(.14)	(.16)
Difference in predicted probability	−9.32 %***	−2.98 %	−3.4 %*	−7.2 %*	−7.02 %
N	9,837	4,228	4,228	4,228	4,228

Source: Authors' calculations, Texas Higher Education Coordinating Board, and Texas Education Agency

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 6 Point estimates and predicted probabilities of college completion for black students at HBCUs versus traditional institutions

	1997				
	Basic model	Matched model	Matched model with matching controls	Matched model with institutional controls	Matched model with full controls
HBCU	−.278***	.009	.018	−.107	−.092
	(.08)	(.13)	(.14)	(.18)	(.19)
Difference in predicted probability	−6.69 %***	.06 %	.77 %	−3.90 %	−2.10 %
N	3,387	984	984	984	984
	2000				
	Basic model	Matched model	Matched model with matching controls	Matched model with institutional controls	Matched model with full controls
HBCU	−.563***	−.312*	−.392***	−.422*	−.361
	(.07)	(.12)	(.09)	(.17)	(.25)
Difference in predicted probability	13.96 %***	−7.78 %***	−9.53 %***	−10.07 %*	−8.81 %
N	3,768	1,106	1,106	1,106	1,106
	2002				
	Basic model	Matched model	Matched Model with matching controls	Matched model with institutional controls	Matched model with full controls
HBCU	−.501***	−.120	−.138*	.171	−.316
	(.06)	(.06)	(.06)	(.14)	(.16)
Difference in predicted probability	−11.92 %***	−2.98 %	−3.4 %*	3.90 %	−7.82 %
N	6,087	1,954	1,954	1,954	1,954

Source: Authors' calculations, Texas Higher Education Coordinating Board, and Texas Education Agency

* $p < .05$; ** $p < .01$; *** $p < .001$

We find that, while the demographic characteristics relating to disadvantage remain true in the Texas context, for most of the years in our analysis it does not appear that attending an MSI hinders graduation outcomes in the Texas postsecondary market for Black students who attend an HBCU or for Hispanic students who attend an HSI, once we match students on observable characteristics and control for institutional characteristics. That is, institutional characteristics separate from the MSI identity play a role in college completion for these types of institutions as they do in the non-top 50 public institutions evaluated by Bound et al. (2010), yet there is no discernable effect directly attributable to MSI designation alone.

Our analysis is particularly relevant because it employs propensity score matching, a technique not previously utilized in this line of research on MSIs, to reduce bias in institutional comparisons previously provided in the literature. If MSIs are indeed charged with educating a population that is more likely to be underprepared and has attended segregated and lower quality schools, their ability to remain on par with traditional institutions in a majority of the years covered in our analysis is to be commended, given this gap in income and student preparation. Furthermore, our multivariate models extend this notion by accounting for differences in resources and selectivity, suggesting that MSIs are performing equally as well as traditional institution after accounting for student characteristics and institutional capacity—which is particularly telling as MSIs often receive less funding per student than non-MSIs. In summary, our research suggests that MSI status alone, beyond our measures of institutional capacity and selection does not result in reduced student success in comparison to similar institutions, in contrast to what is commonly presented in recent media accounts (Riley 2010; Vedder 2010).

Finally, this finding is also particularly important in light of recent work on the effects of attending another type of postsecondary institution that may have been once considered non-traditional—a community college, an institution that also serves a greater share of low-income and minority students. Attending a community college as a first institution in lieu of starting at a 4-year college decreases students' odds of attaining a bachelor's degree, a finding demonstrated in Texas, Florida, and nationally, using student-level data similar to those used in our analysis (Author; Calcagno and Long 2008; Doyle 2009a, b; Long and Kurlaender 2009). In fact, these findings are relatively consistent and in the range of a negative effect of 10–14 %. While no other state analysis currently exists to confirm or challenge our results, to date our findings on 4-year MSIs do not show a consistent negative effect of attending an MSI, as is seen with attending a community college. We note, however, that further research is needed to test the MSI identity within the 2-year sector, particularly the HSIs, as they are some of the fastest growing institutions in the nation.

Limitations

Some challenges to the research remain. First, our cohorts represent somewhat more advantaged students in the larger college-enrollment story, regardless of their economic background, in that they have chosen to enroll in a 4-year institution over a 2-year institution (Doyle 2009a, b; Rouse 1995). Future research might address transfer rates or the effects of attending a 2-year MSI, or the subsequent transfer patterns that may lead to graduation from a 4-year institution or bachelor's degree attainment.

Second, our data at the time did not allow for a clear examination of the role of financial aid in the overall college-completion process. It is not clear whether similarly matched students received similar financial aid packages, if such aid was received, or if institutional capacity to award aid was also a factor in this assessment. Nor is it clear if eligible students

applied for financial aid at equal rates. Linking financial aid data to college-enrollment and college-completion studies remains a difficult task, and accounting for selection issues related to students' application for aid represents another methodological task that is beyond the scope of this analysis and is not available for most research in this area, outside of randomized experiments (Goldrick-Rab et al. 2009).

In addition to these nuances, we discuss the following limitation of our study. In using propensity score matching procedures, we rely on the conditional independence assumption that we are able to effectively predict enrollment in an MSI based on observable characteristics. Two examples of such unobservable characteristics are motivation and knowledge or information about MSIs. For example, if two students with the same propensity score have different levels of motivation, the student with low motivation may attend a traditional school while the student with high motivation may choose to attend an MSI, due to the unique supports provided by these institutions. As we have not accounted for motivation in the propensity score, this characteristic may still be introducing bias in our estimates, even after matching. However, in this scenario we may expect to see positive bias in the estimate for attending an MSI. As we find either no effect for attending an MSI or a small negative effect, we argue that this scenario would not change our conclusions. Furthermore, by including academic preparation characteristics such as advanced coursework and performance on the state math examination, we argue that these factors will capture unobserved motivation to a great extent, thus minimizing remaining bias regardless of direction.

Conclusion

Our research interestingly suggests that, given the amount of responsibility and the limited resources of the MSIs examined, these institutions in Texas do not appear to be consistently underperforming with regard to preparing their students, using graduation as an outcome, as compared to similarly ranked non-MSIs, as some critics have suggested (Fryer and Greenstone 2010). Non-MSIs do have higher college-graduation rates for minority students on average, but the pool of students entering MSIs, as our research shows, are qualitatively different in terms of income and academic preparation. This study suggests that, on average, graduation rates at 4-year MSIs don not differ from similarly ranked 4-year non-MSIs, after addressing selection bias and controlling for institutional capacity, using the measurable constructs available in our data. As the data do not measure intangible benefits, such as personal development or peer and alumni networks, there may be additional benefits to attending an MSI that are not documented in even the most advanced administrative datasets. The most daunting finding concerns what institutions with fewer resources will need to do to educate highly underprepared students, and this is a task MSIs, based on selectivity issues, will be charged with most often well into the future. Moreover, there will be enormous consequences if they are not able to succeed. Therefore, we recommend that these institutions be given additional attention so their current level of success does not decline as they prepare for the increasingly important task of educating a large percentage of the nation's underrepresented and, in many cases, underprepared students.

Appendix

See Tables 7 and 8.

Table 7 Descriptive statistics and *t* tests for unmatched and matched samples, HSI

	1997						2000					
	Unmatched			Matched			Unmatched			Matched		
	HSI	Traditional	t	HSI	Traditional	t	HSI	Traditional	t	HSI	Traditional	t
Male	.47	.44	2.10	.49	.48	.41	.43	.42	.45	.40	.47	−2.54
	(.5)	(.5)		(.5)	(.5)		(.49)	(.49)		(.49)	(.5)	
Economic disadvantage	.48	.29	13.52	.45	.44	.41	.52	.31	14.47	.51	.46	1.64
	(.5)	(.45)		(.5)	(.5)		(.5)	(.46)		(.5)	(.5)	
Limited English proficiency	.04	.01	4.79	.02	.02	.14	.02	.01	4.53	.01	.01	1.40
	(.19)	(.11)		(.15)	(.15)		(.15)	(.08)		(.11)	(.08)	
AP/IB course	.25	.35	−7.04	.27	.29	−.78	.58	.57	.99	.62	.64	−.79
	(.44)	(.48)		(.44)	(.45)		(.49)	(.5)		(.49)	(.48)	
Trigonometry course	.35	.44	−6.38	.40	.42	−.79	.56	.62	−4.27	.62	.62	.04
	(.48)	(.5)		(.49)	(.49)		(.5)	(.48)		(.49)	(.49)	
Math exam score	46.47	49.47	−10.33	47.54	47.38	.28	50.39	52.17	−7.86	51.35	51.69	−.93
	(10.15)	(8.88)		(9.98)	(11.22)		(8.31)	(6.38)		(6.99)	(7.21)	
Dual enrollment	.07	.12	−6.39	.07	.10	−1.80	.17	.18	−1.52	.17	.18	−.45
	(.26)	(.33)		(.26)	(.3)		(.37)	(.39)		(.38)	(.38)	
HS pupil:teacher ratio	15.00	15.11	−1.73	15.09	15.50	−3.40	14.86	15.30	−6.07	15.02	15.22	−1.63
	(2.11)	(2.64)		(2.12)	(2.36)		(2.34)	(2.75)		(2.25)	(2.58)	
HS enrollment (100s)	17.55	17.60	−.20	17.62	18.05	−.98	16.92	18.59	−7.19	17.34	17.26	.23
	(7.71)	(9.78)		(7.66)	(8.65)		(7.05)	(9.68)		(7.16)	(7.18)	
HS percent minority	.83	.57	39.61	.81	.82	−.96	.84	.55	46.19	.83	.83	−.11
	(.19)	(.29)		(.21)	(.21)		(.18)	(.29)		(.2)	(.21)	
HS per pupil expenditures (logged)	8.14	8.12	7.19	8.15	8.14	1.03	8.29	8.29	2.51	8.29	8.29	−.74
	(.1)	(.14)		(.11)	(.12)		(.1)	(.12)		(.08)	(.09)	

Table 7 continued

	1997						2000					
	Unmatched			Matched			Unmatched			Matched		
	HSI	Traditional	t	HSI	Traditional	t	HSI	Traditional	t	HSI	Traditional	t
HS urbanicity	.58	.45	9.17	.57	.63	−2.31	.62	.48	9.90	.62	.66	−1.87
	(.49)	(.5)		(.5)	(.48)		(.49)	(.5)		(.49)	(.47)	
Student worked while in HS	.09	.19	−10.25	.09	.08	.74	.11	.22	−10.63	.12	.12	.06
	(.29)	(.39)		(.28)	(.27)		(.32)	(.41)		(.32)	(.32)	
County unemployment	10.44	5.98	24.51	9.74	8.93	2.27	6.11	4.55	21.25	5.78	5.75	.19
	(6.83)	(4.23)		(6.67)	(6.81)		(2.81)	(1.65)		(2.49)	(2.63)	
Proximity to PSE (within 2.5 mile)	.88	.79	8.31	.87	.89	−1.19	.88	.82	5.38	.87	.90	−1.65
	(.33)	(.41)		(.34)	(.32)		(.33)	(.38)		(.34)	(.31)	
N	3,618	2,933		921	503		3,572	3,340		1,030	501	

	2002					
	Unmatched			Matched		
	HSI	Traditional	t	HSI	Traditional	t
Male	.44	.44	.43	.46	.46	−.13
	(.5)	(.5)		(.5)	(.5)	
Economic disadvantage	.59	.36	18.50	.56	.54	1.06
	(.49)	(.48)		(.5)	(.5)	
Limited English proficiency	.01	.00	2.63	.01	.01	−.99
	(.1)	(.07)		(.09)	(.11)	
AP/IB course	.55	.57	−1.92	.58	.58	−.03
	(.5)	(.5)		(.49)	(.49)	

Table 7 continued

	2002					
	Unmatched			Matched		
	HSI	Traditional	t	HSI	Traditional	t
Trigonometry course	.54	.62	−6.36	.57	.58	−.70
	(.5)	(.49)		(.5)	(.49)	
Math exam score	51.35	52.91	−7.23	51.85	51.86	−.03
	(9.01)	(7.67)		(8.25)	(9.27)	
Dual enrollment	.25	.24	.94	.25	.24	.54
	(.44)	(.43)		(.43)	(.43)	
HS pupil:teacher ratio	14.82	15.07	−4.50	14.93	15.23	−3.72
	(2.16)	(2.54)		(2.13)	(2.25)	
HS enrollment (100s)	17.27	18.15	−4.27	17.46	17.83	−1.29
	(7.47)	(9.93)		(7.55)	(8.29)	
HS percent minority	.85	.57	50.21	.84	.84	−.80
	(.2)	(.28)		(.2)	(.2)	
HS per pupil expenditures (logged)	8.38	8.37	2.45	8.38	8.38	.24
	(.1)	(.11)		(.11)	(.08)	
HS urbanicity	.61	.45	12.81	.65	.69	−2.47
	(.49)	(.5)		(.48)	(.46)	
Student worked while in HS	.10	.17	−8.26	.09	.11	−1.58
	(.3)	(.37)		(.29)	(.31)	
County unemployment	7.81	6.32	26.09	7.30	7.22	1.12
	(2.55)	(1.47)		(2.04)	(2.05)	
Proximity to PSE (within 2.5 mile)	.85	.78	7.05	.87	.88	−.23
	(.36)	(.41)		(.33)	(.33)	
Total	6,415	5,011		2,114	851	

Source: Authors' calculations, Texas Higher Education Coordinating Board, and Texas Education Agency

Table 8 Descriptive statistics and *t* tests for unmatched and matched samples, HBCU

	1997						2000					
	Unmatched			Matched			Unmatched			Matched		
	HSI	Traditional	t	HSI	Traditional	t	HSI	Traditional	t	HSI	Traditional	t
Male	.43	.33	5.12	.36	.37	−.38	.44	.37	4.26	.40	.38	.53
	(.49)	(.47)		(.48)	(.48)		(.5)	(.48)		(.49)	(.49)	
Economic disadvantage	.24	.25	−.27	.21	.23	−.95	.30	.27	1.54	.29	.27	.45
	(.43)	(.43)		(.41)	(.42)		(.46)	(.44)		(.45)	(.45)	
Limited English proficiency												
AP/IB course	.15	.27	−7.85	.18	.16	.97	.25	.44	−11.39	.32	.33	−.49
	(.35)	(.44)		(.39)	(.36)		(.43)	(.5)		(.47)	(.47)	
Trigonometry course	.23	.34	−6.84	.24	.28	−1.25	.31	.47	−9.09	.39	.40	−.41
	(.42)	(.47)		(.43)	(.45)		(.46)	(.5)		(.49)	(.49)	
Math exam score	40.62	45.30	−11.62	43.32	43.94	−.94	44.37	48.51	−12.24	46.79	46.93	−.24
	(11.9)	(9.84)		(9.75)	(9.82)		(10.76)	(8.5)		(8.68)	(9.29)	
Dual enrollment	.03	.07	−4.89	.03	.03	−.18	.04	.10	−6.30	.04	.06	−1.19
	(.17)	(.26)		(.17)	(.17)		(.19)	(.3)		(.2)	(.23)	
HSpupil:teacher ratio	15.98	15.65	3.59	15.92	15.79	.82	15.93	15.35	6.34	15.57	15.79	−1.46
	(2.32)	(2.47)		(2.36)	(2.3)		(2.68)	(2.5)		(2.3)	(2.43)	
HS enrollment (100s)	16.98	17.91	−2.78	18.00	17.46	.89	18.22	19.36	−3.20	18.90	18.98	−.12
	(8.08)	(9.25)		(9.06)	(9.05)		(9.34)	(10.26)		(9.67)	(8.86)	
HS percent minority	.70	.58	11.25	.65	.66	−.17	.71	.59	12.50	.66	.67	−.32
	(.28)	(.28)		(.28)	(.27)		(.27)	(.27)		(.28)	(.26)	
HS per pupil expenditures (logged)	8.06	8.08	−5.45	8.07	8.07	−.04	8.26	8.27	−1.16	8.26	8.26	.53
	(.08)	(.1)		(.08)	(.07)		(.09)	(.08)		(.08)	(.07)	
HS urbanicity	.67	.58	5.00	.62	.64	−.50	.64	.55	5.15	.61	.63	−.89
	(.47)	(.49)		(.49)	(.48)		(.48)	(.5)		(.49)	(.48)	

Table 8 continued

	1997						2000					
	Unmatched			Matched			Unmatched			Matched		
	HSI	Traditional	t	HSI	Traditional	t	HSI	Traditional	t	HSI	Traditional	t
Student worked while in HS	.16	.19	−2.22	.15	.16	−.08	.21	.24	−1.71	.22	.23	−.28
	(.36)	(.39)		(.36)	(.36)		(.41)	(.43)		(.41)	(.42)	
County unemployment	5.06	5.11	−.71	5.14	5.12	.19	4.29	4.35	−1.95	4.32	4.22	2.24
	(1.48)	(1.86)		(1.52)	(1.71)		(.68)	(.93)		(.72)	(.82)	
Proximity to PSE (within 2.5 mile)	.93	.89	3.73	.92	.92	.11	.90	.87	2.63	.89	.90	−.28
	(.26)	(.32)		(.26)	(.27)		(.3)	(.33)		(.31)	(.31)	
N	1,096	2,291		492	401		1,250	2,518		553	454	

	2002				
	Unmatched			Matched	
	HSI	Traditional	t	HSI	Traditional	t
Male	.41	.37	2.88	.38	.36	.83
	(.49)	(.48)		(.49)	(.48)	
Economic disadvantage	.33	.30	2.33	.30	.31	−.73
	(.47)	(.46)		(.46)	(.46)	
Limited English proficiency						
AP/IB course	.26	.45	−13.81	.33	.31	.77
	(.44)	(.5)		(.47)	(.46)	
Trigonometry course	.31	.52	−14.22	.40	.39	.30
	(.46)	(.5)		(.49)	(.49)	
Math exam score	46.98	50.55	−12.87	49.64	49.75	−.28
	(10.62)	(8.44)		(7.32)	(8.69)	

Table 8 continued

	2002					
	Unmatched			Matched		
	HSI	Traditional	t	HSI	Traditional	t
Dual enrollment	.08	.14	−7.01	.10	.09	.43
	(.27)	(.35)		(.3)	(.29)	
HS pupil:teacher ratio	15.46	15.22	3.91	15.26	15.37	−1.06
	(2.09)	(2.05)		(2.)	(1.97)	
HS enrollment (100s)	18.30	19.66	−4.70	19.22	19.35	−.29
	(9.12)	(9.95)		(9.7)	(9.49)	
HS percent minority	.72	.63	12.19	.68	.67	.79
	(.25)	(.26)		(.26)	(.25)	
HS per pupil expenditures (logged)	8.35	8.36	−1.75	8.35	8.35	1.03
	(.13)	(.09)		(.07)	(.07)	
HS urbanicity	.66	.57	6.49	.61	.58	1.16
	(.47)	(.5)		(.49)	(.49)	
Student worked while in HS	.17	.16	.45	.16	.15	.64
	(.38)	(.37)		(.37)	(.36)	
County unemployment	6.26	6.37	−4.26	6.30	6.26	1.03
	(.74)	(.95)		(.8)	(.77)	
Proximity to PSE (within 2.5 mile)	.86	.84	1.99	.84	.81	1.55
	(.35)	(.37)		(.37)	(.39)	
N	2,226	3,861		977	708	

Source: Authors' calculations, Texas Higher Education Coordinating Board, and Texas Education Agency

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ERRATUM

Erratum to: The Effect of Enrolling in a Minority-Serving Institution for Black and Hispanic Students in Texas

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In the original publication of the article, some of the entries in Table 6 have not been displayed correctly. The corrected version of Table 6 is shown here.

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Table 6 Point estimates and predicted probabilities of college completion for black students at HBCUs versus traditional institutions

	1997				
	Basic model	Matched model	Matched model with matching controls	Matched model with institutional controls	Matched model with full controls
HBCU	−0.278***	0.009	0.018	−0.107	−0.092
	(.08)	(.13)	(.14)	(.18)	(.19)
Difference in predicted probability	−6.69 %***	0.06 %	0.77 %	−3.90 %	−2.10 %
N	3,387	984	984	984	984
	2000				
	Basic model	Matched model	Matched model with matching controls	Matched model with institutional controls	Matched model with full controls
HBCU	−0.563***	−0.312*	−0.292*	−.422*	0.267
	(.07)	(.12)	(.13)	(.17)	(.63)
Difference in predicted probability	−13.96 %***	−7.78 %***	−7.43 %*	−10.07 %*	6.03 %
N	3,768	1,106	1,106	1,106	1,106
	2002				
	Basic model	Matched model	Matched model with matching controls	Matched model with institutional controls	Matched model with full controls
HBCU	−0.501***	0.112	.110	0.383	0.243
	(.06)	(.10)	(.10)	(.25)	(.27)
Difference in predicted probability	−11.92 %***	2.68 %	2.54 %	8.90 %	6.44 %
N	6,087	1,954	1,954	1,954	1,954

Source: Authors' calculations, Texas Higher Education Coordinating Board, and Texas Education Agency

* $p < .05$; ** $p < .01$; *** $p < .001$