The Catholic School Advantage in a Changing Social Landscape: Consistency or Increasing Fragility?

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Abstract

For several decades, researchers have examined sector effects on student outcomes. Several argue the presence of a Catholic school advantage (CSA), an effect that shows improvement of educational outcomes upon attendance at a Catholic school. The magnitude of this effect, however, is often debated, particularly in the era of educational reform. In this study, we analyze nationally representative data to examine whether attending a Catholic school consistently promotes educational attainment. On net, we find that students who attend Catholic high schools are more likely to continue in education although this advantage is not persistent across measures of institutional selectivity.

THE CATHOLIC SCHOOL ADVANTAGE IN A CHANGING SOCIAL LANDSCAPE: CONSISTENCY OR INCREASING FRAGILITY?

The empirical examination of schooling processes and how they impact inequality has a long history, both domestically and internationally, addressing levels from pre-kindergarten through higher education (Hallinan, 2000; Shavit, Arum & Gamoran, 2007; Shavit & Blossfeld, 1992). Varying forms of schooling organizations seemingly present opportunities for changing the landscape of educating students and for parents to avail their children of an educational environment that may increase opportunities in the future. In the U.S., much of this discussion has taken place within the framework of school choice.

Indeed, school choice is one among several education reforms that policymakers hold up as a way to ameliorate the increasing inequalities of educational opportunity. In many ways, choice has become embedded in the public discourse, but the evidence underlying school choice writ large—whether talking about Catholic school, charter public school, or voucher programs—is contentious, often fraught with cantankerous debates (see Berends, 2014; Berends, Cannata, & Goldring, 2011; Berliner & Glass, 2014; Henig, 2008; Ravitch, 2013). For these reasons, seldom is there a clear public understanding of what the many forms of choice actually mean (e.g., charter schools, private schools, magnet schools, vouchers, tuition tax credits, homeschooling, etc.).

Even so, the notion that parents should have some choice in the education of their children is deeply engrained in the United States culture and modeled in myriad ways in education policy (e.g., Smith & Rowland, 2014). Recent federal efforts in the United States have helped promote choice for families, whether through No Child Left Behind's choice options for families if schools failed to make adequate progress over time, or more recently, the Obama

Administration's call to expand charter schools as part of the four billion dollar Race to the Top initiative. As choice options are expanding, public debate continues. Politicians are scrutinizing voucher programs in places like Washington, D.C. and Milwaukee, WI, while voucher programs are being widely expanded and further tested in states like New York, Indiana, and Ohio (see Clowes, 2009 for a review of the Milwaukee program and Chingos and Peterson [2015] for an analysis of voucher intervention in NYC). Simultaneously, policymakers are reexamining the role of school choice in post-desegregation school districts and its impact on academic achievement and attainment. Thus, the rigorous study of issues related to school choice is both timely and important for policymakers, practitioners, scholars, and families (Manno, 2010).

One particular arena of debate in the realm of school choice is the role and potential individual benefit of private schooling. Many scholars argue that public schools are outperformed by private schools, particularly Catholic schools (Chubb & Moe, 1990; Coleman & Hoffer, 1987; Coleman, Hoffer, & Kilgore, 1982). However, the magnitude of these effects and their implications are often the center of heated debate both in the academy and amongst private research firms (see Lee & Bryk, 1993; Jeynes, 2008). Much of this debate focuses on whether students attending Catholic schools score higher on achievement tests than students in public schools. If so, then indeed school choice programs like vouchers may be a viable pathway to decreasing inequality in educational outcomes between groups positioned as privileged and less privileged in the current context.

However, studies assessing the Catholic school advantage (CSA) historically run into a series of methodological challenges. Mainly, when comparing sector differences, there is a continuing concern about selection bias−that is, that there is something different about students who attend Catholic schools vis-à-vis public schools (e.g., social background, values and beliefs)

(Goldberger & Cain, 1982). Below we offer a recent innovation in this continuing line of research and suggest that further caution when making causal claims is warranted.

WHAT IS THE CATHOLIC SCHOOL ADVANTAGE?

Within comparative analyses of school sector effects on student outcomes, researchers often focus on the sources and the magnitude of the Catholic school advantage (CSA). The CSA refers to the higher educational outcomes of Catholic school students compared with their public school peers

Beginning in the early 1980s, scholars and policy makers pursued the question of sector effects in education. Perhaps most well known, Coleman, Hoffer, and Kilgore (1982) used the High School & Beyond data to demonstrate a persistent Catholic school advantage in high school achievement, controlling for demographic factors. They theorized Catholic schools and public schools operated from different models of education such that the parochial model resulted in higher overall outcomes. This model is often referred to as the "common school ideal" which, according to Hallinan and Kubitschek (2012, p. 1), "signifies the goal of providing equal access to learning opportunities for all students." That is, the CSA persists because Catholic schools are more successful than public schools at educating students of differing social backgrounds. The core tenets of the "common school ideal" include high educational standards and strict disciplinary and social control over students.

As the CSA was researched further, scholars came to several, more specific conclusions about the mechanisms through which the CSA operates, including: stronger ties between stakeholders invested in Catholic schools (Coleman & Hoffer, 1987), a more explicit curriculum aimed at college attendance for those who attend Catholic schools (Carbonaro & Covay, 2010; Hoffer, 2009), a skimming effect whereby parochial schools in under-served areas recruit the

strongest students to their schools (Altonji, Huang, & Taber, 2010; Epple & Romano, 1998), and an educational environment inspiring hard work and internal motivation (Jeynes, 2008) as well as a caring community (Bryk et al., 1993). Together these mechanisms provide us with much reason to suggest that Catholic schools may provide students with a beneficial educational experience when compared to their public school counterparts. Many of the studies mentioned above focus on higher *achievement* outcomes for students enrolled in Catholic schools, but we also recognize the importance of college attendance and, more generally, educational attainment and thus we shift our focus below to post-secondary outcomes.

In addition to these mechanisms through which the CSA may operate, much has changed in the United States since the initiation of school sector effects scholarship. The CSA, if it ever was persistent, may not be as stable as previously documented due to shifting demographics in the United States and the contraction of the Catholic Church. For instance, due to the contraction of the Catholic diocese, many parochial schools have closed their doors in the recent past, particularly in underserved neighborhoods in urban areas (Brinig & Garnett, 2014; McDonald & Schultz, 2011). This could have an unpredictable impact on the CSA. For instance, if the schools that are closing are schools that previously served under-privileged students and these are the students that benefit the most from parochial education (Evans & Schwab, 1995; Jeynes, 2002), then we might expect a decrease in the CSA writ large. If however, the CSA is stable across demographic categories, this contraction of parochial education may have little to no impact on the national CSA.

Charter schools add a complication to the diocese contraction described above. Over the past twenty years, charter schools have increasingly become part of the choice landscape for parents, particularly in urban centers. If charter schools and private schools pull from the same

"pool" of students and charter schools provide a cheaper and more broadly advertised alternative to traditional public education than Catholic schooling, the landscape for Catholic schools may shift dramatically as charter schools provide unprecedented competition for students (Lackman, 2013). If these students benefit most from a Catholic education, we might expect to see a sizable drop in the CSA more broadly. Thus, the contraction of the Catholic school system may also be a function of the widening school choice options for parents. The first step is assessing these impacts is to examine the CSA over time.

Additionally, the United States hosts an increasingly diverse student body under the age of eighteen. Much of this diversification is due to the growing Latino population (Kena et al., 2014), and this growth has exposed a significant need and opportunity for Catholic schools (Notre Dame Task Force, 2009; 2013). How this diversification pattern has influenced the process through which the CSA operates is also unclear. Some research reports that Latino students who attend Catholic schools are more likely to graduate from both high school and college than their public school peers (e.g., Neal, 1997). If this is the case, then we might expect to see a particular increase in the CSA given the shifting populations of parochial schools.

Regardless of these broad shifts in organization, religiosity, and demographics, as states continue to propose voucher programs that funnel public funding to private schools, the benefits of a Catholic school education remain critically important to assess in a methodologically rigorous way (Berends, 2014; Hoffer, 2009; Marks, 2009; Regnerus & Smith, 2005; Zimmer & Bettinger, 2015). Particularly important to this question is the issue of selection bias as well as precision in selecting the outcome of interest. Therefore, rooted in this historical moment and methodological precision, we ask how a Catholic high school experience impacts college

attendance, the type of post-secondary school attended, and offer a preliminary exploration of how the Catholic School Advantage has changed over time

THE CSA AND COLLEGE ATTENDANCE

Given the possible mechanisms through which a CSA might operate and the theorized reasons for a shift in the magnitude of the CSA, the question remains, how much has a Catholic school education mattered for educational outcomes in the past? To date most scholars—particularly sociologists—have focused on student outcome differences between public and Catholic schools in terms of standardized test scores. Others—including many economists—have concentrated on college attendance and attainment (see Marks, 2009). But few studies considering college attainment put these findings in historical context.

Analyzing nationally representative High School and Beyond (HSB) data from the early 1980s (the same dataset used in Coleman's [1982, 1987] work), Evans and Schwab (1995) compare college attendance rates of Catholic and public school students. To address some of the challenge associated with selection bias, they rely on instrumental variable analysis, a method that selects a proxy variable affecting the biased explanatory variable (attendance at a Catholic school) but not affecting the outcome of interest (college attendance) to model the magnitude of the sector effect. The instrument Evans and Schwab use is religious identification. Thus, identifying as a Catholic would likely affect enrollment in a Catholic high school but would not be expected to influence post-secondary enrollment. In their analysis, Evans and Schwab find that Catholic schools are consistently more effective than public schools at producing higher rates of college attendance. In their various analyses, the effect sizes of Catholic school attendance on college attendance ranges from 0.098 to 0.132. That is, students who attend a

Catholic high school are about 10 to 13% more likely to attend college than their public school peers.

Following, Nguyen, Taylor and Bradley (2006) analyze the National Education Longitudinal Survey (NELS) beginning with 8th graders in 1988 and following them up every few years in high school (1990 and 1992) and then into college and beyond (1994, 2000). Relying on propensity score analysis (a method described in detail below), they examine the effect of attending a Catholic high school on student outcomes, including enrollment in college. They find that the unadjusted college enrollment rates favored students who attended Catholic schools by 27 percentage points. In different propensity score matching models, the effect sizes for the Catholic school advantage in college enrollment were between .12 and .17. That is, once adjusted for selection bias on observable characteristics, the Catholic school advantage was reduced from a 27% advantage to a 12-17% advantage, accounting for about half of the unadjusted gap in college enrollment.

Also analyzing NELS data to assess Catholic school effects on student outcomes like college attendance, Altonji, Elder, and Taber (2005) approach the CSA question from a different angle, one that points directly at the selection bias challenge. Their paper estimates how large selection bias would have to be in order to explain away any positive or negative effects in their analysis. The essence of the approach is to assess the sensitivity of the effect size to determine if it should be attributed to selection bias. Using this approach, they too find a CSA for college enrollment; the unadjusted advantage was 28 percentage points, and the effect size (adjusted for other measures in their models) was 0.149.

Grogger and Neal (2000) examine Catholic school effects on student outcomes in NELS as well, but they examine these effects separately for different groups, such as urban minority and

urban white students. They rely on various methods of estimation to control for selection bias, including probit and instrumental variable analysis. They find a Catholic school advantage, particularly for urban minorities; the CSA on college enrollment for urban minority students ranges from 0.16 to 0.17. Together these studies suggest that attendance in a Catholic high school, independent of selection bias, promotes college enrollment significantly, at least through the 1980s and 1990s.

EXPECTATIONS FOR SECTOR EFFECTS ON COLLEGE ENROLLMENT

As mentioned above, Catholic schools are undergoing significant changes, including severe financial crisis and increasing operational expenses, particularly for schools serving economically under-privileged populations. Between 2000 and 2011, 1,755 Catholic schools either closed or consolidated, and Catholic school enrollment declined over 22% (McDonald & Schultz, 2011; see also Brinig & Garnett, 2014; Uecker, 2008).

Because of the contraction of Catholic schools in the United States and the demographic shift in enrollment, the CSA documented by researchers over 30 years ago needs to be revisited. As such, we examine several hypotheses in our analysis. First, we expect that, independent of selection characteristics, receiving a Catholic high school education will promote post-secondary attendance, but this impact will be demonstrably smaller than in previous studies. Our data are uniquely situated to allow a modern test of this effect.

Second, few studies investigate the nuances of the CSA with regard to type of institution. The "common school ideal" suggests that Catholic schools may be more adept at promoting enrollment in selective institutions of higher education. Despite a possible decrease in the overall CSA, we might expect that as Catholic schools have become more specialized (in order to recruit and retain more students and as a way to justify tuition), the CSA may be more demonstrable

when specifically identifying the targeted outcome (in this case selectivity of post-secondary institution). We tease out these nuances by testing the impact of attending a Catholic high school for attendance at particular levels of postsecondary institutions. We expect a Catholic school education to promote attendance at four-year colleges or universities but not necessarily at two-year junior colleges or technical schools. Additionally, we hypothesize that although the CSA on post-secondary attendance may have diminished over time, the benefit may still exist for attendance at elite post-secondary institutions. Therefore, we expect to find a benefit for Catholic school attendance on attending more selective 4-year post-secondary institutions.

ANALYTIC STRATEGY: PROPENSITY SCORE MATCHING

As previously discussed, selection bias is a prominent concern in school effects research. That is, students who attend a form of school other than a traditional public school may themselves be unique in some way that would account for differences in outcomes otherwise attributable to school sector. As a result, researchers need to be cognizant of this possibility and control for selection in the most rigorous way available. Of course, the most rigorous way to discern "true" sector effects would be to stage an experiment in which students across the nation were randomly assigned to public and Catholic schools. We could then observe differences in educational outcomes over time. Due to obvious ethical concerns as well as the infeasibility of such a research plan, scholars have used several statistical procedures to control for selection bias in sector effects studies. We use propensity score matching (PSM) to simulate random assignment to school sector in the following analyses, acknowledging that any statistical method, including PSM, cannot fully account for selection bias in studies utilizing observational data.

PSM allows us to match students who attend secondary schools in different sectors based on a series of background characteristics (socioeconomic, demographic, and academic). This

"match" establishes that although each student only attends school in one sector, the student enrolled in public school has a greater-than-zero likelihood of attending Catholic school that "matches" the likelihood of the student enrolled in the Catholic school. The closeness of the match is determined by the method of matching selected by the researcher.[1] Once matched, researchers can estimate the "treatment" effect on outcomes of being enrolled in the Catholic sector (Morgan, 2001). The accuracy of this estimation depends on the quality of the match as well as the assumption that all critical variables that influence selection are included in the matching algorithm (Bifulco, 2012; Hans-Vaughn & Onweugbuzie, 2006; Murnane & Willett, 2011). Some recent researchers suggest that even when the selection model is balanced and inclusive, PSM is still a flawed method that can increase imbalance and bias (see King & Nielson, 2015).

A reality of using any statistical procedure to control for selection bias is that we can only control for the observable differences between students. There may still be differences that go unmeasured that could produce any sector effect uncovered by our analyses. However, propensity score matching is a robust method to approximating random assignment in social science research and is utilized in many recent studies of sector effects (see, for example, Witte et al.'s [2014] analysis of voucher programs in Milwaukee and Schneider et al.'s [2007] piece on causal effects in observational research more generally). PSM is particularly well suited for data in which balance can be achieved without dropping a substantial proportion of cases from the treated category.

We implement the PSM algorithm using four steps, following the procedures outlined in Hans-Vaughn and Onweugbuzie (2006) and Rosenbaum (1986). First, we identify the covariates

[1] The common support assumption requires that only Catholic high school students who have propensity scores that are "matchable" in the public school sample be included in the analyses. We follow this assumption by dropping cases where the common support condition is not met, although this results in a loss of less than 3% of cases.

to predict the treatment variable, in this case, attendance at a Catholic high school. These variables, stemming from theory and previous research (see Hoffer, 2009; Marks, 2009), are listed in the first column of Table 1. Second, we show that there are indeed demographic differences in terms of who attends Catholic high schools and who attends traditional, public high schools (see first three columns in Table 1). This is purely an informative step; even if results are not significantly different, variables remain in the propensity score estimation routine (Rosenbaum, 2002). We note here that we use the covariates mentioned in step 1 to capture the o*bservable* differences between sector attendance; unobservable differences may still exist. Third, we estimate a propensity score predicting the likelihood of each student in the sample of attending a Catholic high school using the relevant variables to predicting Catholic school attendance. Simply put, this step models school sector as an outcome of the indicators that we hypothesize could impact attendance at a Catholic institution. After estimating this propensity score, we test for differences in demographics across similarly grouped propensity ranges. This test for difference establishes balance across ranges of propensity scores, that is, the two groups must look as close as possible to "identical," simulating an experimental treatment condition (see King & Nielsen [2015] for problems with PSM and balance). Once assured that our selection model is balanced, we can move on to estimating the treatment effect of attending a Catholic high school on post-secondary outcomes.[2]

Estimating the Treatment Effect

[2] We estimate here the average treatment effect on the treated, which is the average benefit for attending Catholic schools for those who actually attended Catholic schools. For explanation of the differences between the ATET (estimated here) and the average treatment effect (ATE), see Austin 2011.

Based on the propensity score produced from the steps above, we implement two different strategies to "match" students into groups with similar propensity scores.[3] The two matching methods are variants of the nearest neighbor matching routine. Nearest neighbor matches a treated case to a control case based on the "n" closest propensity scores. In other words, a student who attends a Catholic school will be matched with a student (or students) who attends public school whose likelihood of attending Catholic school is the most similar to their own. We utilize 1-to-5 matching in the below analyses to avoid loss of data from the controls, a common critique of the nearest neighbor matching algorithm employing only the single closest match.

Matching 1-to-5 potentially allows for matches that are a large "distance" apart because it indiscriminately includes the five nearest matches. To account for this possibility, we also use caliper matching which restricts the matches to fall within a particular propensity distance from the treated case (in this case .01). After matching, the treatment effect is averaged across all matches that exist within this caliper. For additional details on selecting a propensity score matching routine, see Bifulco (2012); Hans-Vaughn & Onweugbuzie (2006); Heckman, Ichimura, & Todd, (1998); and Smith & Todd (2005).

Sample Weights

The literature is unclear regarding the best method for weighting data when using propensity scores. Some research recommends that the data be weighted during the propensity score process, others recommend weighting only the treated sample post-estimation (Hans-Vaughn & Onweugbuzie, 2006), and still others highlight the inconsistencies involved when using weights in an attempt to highlight internal, rather than external, validity (Rosenbaum,

[3] We originally used multiple modeling strategies as there is little consensus in the literature about the best matching method (see Morgan 2001) and to demonstrate robustness across strategies. Results varied little and for the sake of brevity, only nearest neighbor results are presented here.

1999). Following Rosenbaum (1999) and Winship & Radbill (1994), we do not weight our data in these analyses.

DATA AND MEASUREMENT

National Study on Youth and Religion

The National Study of Youth and Religion (NSYR) is a longitudinal, nationally representative dataset initiated in the fall of 2001 (see Smith, 2005; 2009; 2011). It consists of multiple waves of telephone surveys administered to youth (ages 11-17) and their parents periodically from 2001 to 2012. These surveys consist of age-appropriate questions aiming to "examine the religious lives of American youth from adolescence into young adulthood" (Smith & Denton, 2003).

The original dataset consisted of 3,370 respondents, including an over-sample of 90 Jewish households that were not part of the representative sample. We exclude youth who are still in high school at wave 3 (169 respondents), students who were in grade seven or below at wave 1 (390 respondents), and students who did not attend a Catholic or traditional public high school as these observations are inappropriate for our modeling scheme (237 respondents). Due to these selections, sample attrition, and missing data on our series of dependent variables, the sample size for this study ranges from 1,234 to 1,776 (depending on the dependent variable in use). Prior to the estimation of the propensity score, we imputed missing values using the *mi:* procedure in Stata for all variables except the dependent variables.[4] Although missing data is not a large concern in the case of the NSYR (0 to 3% missing on most variables), we seek to maintain as much information as possible to maximize accuracy in our estimates. Similar to

[4] We use the *mi:* family of commands in Stata to estimate missing data followed by Rubin's (1987) rules to pool estimates across imputations. Although other procedures for addressing missing data concerns exist in the literature (e.g., Little & Zhang 2011), multiple imputation remains a common and an accepted form of adjustment.

other, larger-scale datasets, self-report of GPA (10.6 %), family income (6.3%), and parental education (4.7%) are missing at slightly higher rates.

Integrated Post-Secondary Education Data System

Although college attendance was part of the NSYR data collection, selection criteria and institutional characteristics were not included. To investigate sector effects on more nuanced post-secondary variables, we used the Integrated Post-Secondary Education Data Systems (IPEDS), which is a federally funded database with comprehensive data about all higher education institutions. We downloaded the IPEDS data for 2005 and 2007 (the years corresponding to when respondents in the NSYR were first entering college) and merged this institutional-level dataset with the individual level data identifying a student's first post-secondary institution in the NSYR data.

Variables Estimating the Propensity Score

Consistent with Caliendo & Kopenig (2008), we worked for a balance between parsimony and inclusiveness in estimating the propensity scores for the likelihood of students attending a Catholic high school during secondary school. As mentioned above, the variables contained in our propensity score estimation are depicted in Table 1 showing differences among public school students and Catholic school students before and after the matching estimation. Significant differences are eliminated by the matching procedure, thus establishing a balanced model for comparing students and controlling for selection bias, at least on observable characteristics. For example, by looking at the first two columns in Table 1, we can see that prior to adjustment, students attending Catholic school come from homes with much higher incomes than students who attend public schools. However, after matching, the difference is no longer statistically significant. Simplistically, although public and Catholic high school students, on average, differ

in family income (for instance), our modeling scheme will now only compare Catholic and public school students who share similar incomes when estimating the CSA.

Insert Table 1 here

Household Indicators. We included a series of household indicators to conceptualize a basic understanding of a student's living situation: parental income, parental report of debt and savings, number of siblings, household size, locale (population size of country, logged), and region (Northeast as reference category)[5].

Parent Indicators. To more finely gauge characteristics of parents that might account for selection into Catholic schooling, we added parental age at wave 1, the work status of parents in the household, marital status, and religion. We also used indicators of parents' religiosity due to parents' overwhelming influence on the decision to invest in a Catholic education. These two proxy measures for religiosity detailed parents' attendance at religious services in the last month and the importance of the religion in daily life.

Student Indicators. We also aimed for balance on student characteristics including: age at wave 1, race (Latino, Other, White)[6], gender, grade point average in high school (a proxy for

[5] As Bifulco's (2012) recent work asserts, these measures are proxies for a student's neighborhood. As a result, some self-selection bias may still persist in our data.

[6] Although this may seem like a non-traditional breakdown of racial identities, Latino students and White students are the two largest racial/ethnic groups represented in our sample of the NSYR data. Indeed, in terms of enrollment in parochial education, racial minorities, with the exception of Latino students, are far below minority enrollments in public schools. Because the Latino racial/ethnic category is both substantively important (given the high rate of Catholicism in the Latino community) and quantitatively substantial, we retained Latino as a separate racial category while collapsing all other non-White identities into an "Other" category. Ideally, we might have larger sample sizes of all minority groups enrolled in parochial education, but due to the small sample sizes reflecting national patterns, we do not have the statistical power to retain these distinctions.

prior student achievement)[7], and learning disability status. We used these latter two variables as indicators of student type. Ideally, we could measure success in school with a standardized achievement variable, however, the NYSR does not include these kinds of variables. Finally, private schools often have difficulty serving students with disabilities, whether in quickly identifying students struggling with disabilities, providing them proper services once identified (such as self-contained classrooms, team teaching arrangements, or speech and language services), or acquiring additional private funding for these services (Bello, 2007; Powell, 2004) As such, we included this indicator expecting that students with disabilities are less likely to enroll in Catholic schools.

Dependent Variables

Our six dependent variables that represent the post-secondary enrollment patterns of youth enrolled in public or Catholic high schools are dummy variables constructed from either the NSYR data (enrollment patterns) or from IPEDS (institutional characteristics). Summary statistics of these variables are displayed in Table 2 across public and Catholic high schools prior to adjusting by propensity score. Results in Table 2 demonstrate the unadjusted, significant differences across exposure to Catholic secondary school. Prior to PSM, it appears that the CSA persists in significant magnitude. For instance, the unadjusted CSA for any post-secondary enrollment is 0.27, indicating that students who attend a Catholic high school are 27% more likely to attend post-secondary school than their public school peers. It remains to be seen if these effects are robust once accounting for selection bias with observable characteristics.

[7] GPA is an imperfect assessment of prior student achievement, particularly given the variability in how schools apply grading scales. Without prior test score data or other similar measures, this measure is the best measure available to capture prior student achievement in the NSYR data. See Grove, Wasserman, & Grodner (2006) for complexities of using proxies for academic aptitude in predicting later student outcomes, and see Hiss & Franks' (2014) recent report on the usefulness of high school GPA in predicting college success.

Insert Table 2 here

Attended a Post-Secondary Institution. We constructed this variable from three variables in the NSYR dataset. First, we determined if the respondent had earned a degree from a post-secondary institution since graduating from high school. If they had, they were immediately designated as "having attended" a post-secondary institution. Respondents were then asked if they were currently in school and the level of their current school. Any respondent who answered "Yes" to current enrollment and "Junior College or Vocational Program" or "4 Year College or University" was included in the affirmative category for post-secondary enrollment.

Attended a Junior College or Associate's Program. Respondents who were enrolled in post-secondary education at wave 3 of the NSYR and specified that they were enrolled in a Junior College or Vocational Education Program were coded as affirmative in this category as were respondents who indicated that they had already earned an Associate's degree.

Attended a Four-Year College or University. If respondents indicated on wave 3 of the NSYR that they were currently enrolled in a four-year college or university or that they had already earned a bachelor's degree, they were coded affirmative in this variable. If respondents were not enrolled in schooling, were enrolled in any other type of schooling, and had not earned a bachelor's degree, the observation was coded as negative for attendance at a four-year college or university.

Affiliation of Post-Secondary Institution. Using the IPEDS institutional affiliation variables, we created three dichotomous variables representing institutional affiliation, including public institution, private, religious institution, and private, Catholic institution.

Open Admissions Policy. When a respondent on the NSYR indicated that he or she enrolled in a post-secondary institution, the interviewer also recorded the name of the institution.[8] We used these institutional identifiers to match the post-secondary institutions with the IPEDS data. IPEDS records many institutional characteristics about post-secondary schools. If institutions indicated that they have an open admissions policy when admitting new students, we used this as a low estimate of selectivity.

Selectivity Criteria. We constructed two additional measures for selectivity using the admissions criteria included in the IPEDS. Institutions indicated whether they use each of eight different criteria in making admissions decisions. We constructed a scale indicating the number of criteria used by a school ($\alpha = 0.851$) as well as a dichotomous cut-off point of over four criteria used in admissions decisions based on the variable's distribution. If an institution required the admission criterion, we counted it in the scale. If it was recommended, neither required nor recommended, or not applicable to the institution's policies, we coded that criterion as not present in the scale. The criteria include secondary school GPA, secondary school rank, secondary school record, completion of a college preparatory program, recommendations, formal demonstration of competencies, admission test scores, and TOEFL (Test of English as a Foreign Language) for non-native students.

Entrance Exam Average Scores. We also constructed a measure of selectivity using the average test scores for the mathematics and English portions of the test most commonly submitted to the institution. We counted a school as selective if the 75th percentile of scores from the school's admitted students is above the 75th percentile of SAT scores nationally in 2005. We followed a similar procedure for ACT scores in order to gather the most complete information possible (College Board, 2011). If an institution is selective on either the SAT or ACT

[8] These data are not available in the public release of the NSYR.

component in mathematics, we coded it as a selective math institution. We then followed the same procedure for English standardized test scores.

RESULTS

Below we present our results in three steps. First, we detail the selection model involved in estimating the propensity score. Then, we discuss whether attendance at a Catholic high school impacts post-secondary enrollment and dimensions of tertiary education beyond attendance. Finally, we discuss the existence of a CSA across time.

Estimating the Propensity Score

All significant differences prior to balancing are no longer statistically significant after estimating the propensity score models (see Columns 4 and 5 of Table 1). In other words, the sample of students who attended a Catholic high school and the sample of students who attended public high school are now matched to share a range of "propensities" to attend Catholic school such that we can compare their post-secondary school outcomes to estimate the Catholic School Advantage.

Does the CSA Persist for Post-Secondary Educational Outcomes?

Attending College. The next step in our analyses assesses if the CSA persists after adjusting for selection bias on observable characteristics. The second column of Table 3 presents results for attendance at any post-secondary institution using nearest neighbor and caliper matching methods. When using caliper matching, we indeed find that the CSA persists, particularly for attendance at any post-secondary institution. The effect size is estimated at .097. In other words, attending a Catholic high school appears to increase the propensity to attend any post-secondary institution by about 10%. However, the effect fails to reach conventional

requirements for statistical significance ($p < .05$) in the 1-to-5 nearest neighbor matching algorithm.

CSA on Level of Tertiary Institution. Perhaps we are being too general in our selection of post-secondary outcomes. If the curricular focus of Catholic schools is on attendance at 4-year institutions or at more selective institutions, we need to refine our measure of post-secondary outcomes beyond the traditional "did the respondent go to college" requirement.

If parochial education encourages a "college prep" mindset, students who have attended Catholic schools may be more likely to attend a four-year institution than a junior college. Thus, the effect size discussed above may be artificially deflated by including attendance at junior colleges and other two-year institutions. Table 3, columns 3 and 4, however, suggest that this is not the case. Although we find little suggestion of any CSA on attendance at a two-year institution, the effect size for attendance at a four-year college or university is similar to the overall effect size for any post-secondary institution. Here, Catholic high schools appear to increase attendance at a 4-year college or university by about 10 percentage points.

Insert Table 3 Here

CSA on Type of Institution. Our remaining hypotheses explore the possibility that parochial schools have shifted focus to equip their students to attend particular types of post-secondary institutions, mainly religious institutions and/or more selective institutions. However, the remaining results from Table 3 suggest that, by and large, attendance at a Catholic high school has few effects on the type of post-secondary institution attended. We find small and insignificant effects for our two measures of religious institutions and for attendance at a public

institution. Additionally, we find small and insignificant effect sizes for attendance at institutions that require four or more selectivity measures. Our results suggest that students who attend a Catholic high school may be more likely to attend institutions with higher average standardized test scores but none of these effects reach conventional levels of significance. Interestingly, the results do imply a Catholic high school education decreases the propensity to attend an open admissions institution by approximately 11%.

Stability of the CSA Over Time

Our results thus far suggest some agreement with the persistence of the CSA over time for post-secondary outcomes. But how do our results compare to previous studies? Table 4 helps us uncover the answer to this question by presenting results from five previous studies that document the size of the CSA for various datasets and subsamples. In the first column of Table 4, we list the researchers and year of their published study discussed earlier. In the 2nd and 3rd columns, we note the years of analyses and the data set examined. The unadjusted size of the CSA is listed in column 4, and the low and high-end adjusted estimates from the analyses are listed in columns 5 and 6, respectively. In the last two columns, we show the methodologies used for estimation and provide information about the sample. We must note here that an extensively longitudinal dataset with multiple cohorts that extends over forty years would be the most advantageous method of answering this question of persistence. Due to the lack of such a dataset, we offer these results as the start of a conversation, not the conclusion.

First, the unadjusted size of the gap (i.e., before adjusting for selection bias) is actually slightly larger using the NSYR data than the vast majority of the estimates in the other datasets (i.e., High School and Beyond [HSB] in the early 1980s and the National Education Longitudinal Survey of the last 1980s and early 1990s [NELS]). If the positive impact of Catholic schooling

is consistent over time, we might expect that the adjusted CSA estimates would also be slightly larger in magnitude than other studies.

As we see in Table 4, our results suggest otherwise. The NSYR estimated effect size is substantially smaller in magnitude than estimates in previous data sets. Our effect sizes are approximately 0.10, similar to the lowest of estimates in other studies. When compared to the high-end estimates of the CSA, our estimate is 18-36% smaller.[9] These results seem to suggest that the CSA in post-secondary attendance may be diminishing in size across time, even while the unadjusted gap, due to demographics differences, may be increasing.

Insert Table 4 here

DISCUSSION

This study aimed to assess the impact of a Catholic secondary education on post-secondary outcomes beyond simply post-secondary attendance. We find that, indeed, students who attend a Catholic high school are more likely to continue their education, all other factors being equal. However, although this effect is statistically significant, it does not persist across most of the more refined measures of post-secondary attendance. Our results also suggest that the CSA is decreasing in magnitude over time. Compared with results from previous studies, many of which use data that are 20 years old or older, we find a high-end 18-36% decrease in the effect size over time. Although empirically examining the reasons for this shrinking effect are beyond the scope of this paper, we suspect that the shifting demographic patterns of the United States as well as the political restructuring of the Catholic Church have both contributed to this result. As

[9] Even when relaxing the requirements for matching restrictions, these results remain relatively stable.

additional nationally representative data become available, we will be able to further examine the consistency of the CSA and factors related to changes over time.

It is also critical to look not only at *if* a Catholic school education promotes enrollment in post-secondary institutions but also at *what type* of institutions students who attend Catholic schools select. Our results suggest that in most cases, students from Catholic high schools are not enrolling in more selective institutions than their peers who attended public schools.

The Complexity of the Catholic School Advantage

These results address an important question for policy-makers and education practitioners alike. The current political environment is trending toward a parental choice model in which parents can opt to send their children to private or non-traditional public schools, under the assertion that school choice provides educational opportunities for promoting academic achievement and educational attainment (Chubb & Moe, 1990; Walberg & Blast, 2003). However, there are few recent studies that explore if Catholic institutions in particular still have a positive impact on the students' educational outcomes over time, particularly with regard to post-secondary enrollment patterns (cf., Jeynes 2008). Although there is not an abundance of available data to look into these questions, the additional waves of NSYR data offer researchers a unique opportunity to investigate some of these questions further with a longitudinal, nationally representative dataset.

In terms of academic achievement, the research to date suggests that there is variability in the effects of Catholic schools by level (e.g., high school vs. elementary). For example, when considering effects on mathematics achievement, there is some evidence that the CSA for student achievement has been consistently positive in nationally representative cohorts of high school students from the early 1980s. For example, in his review of the average achievement

differences among high school seniors, Hoffer (2009: p. 432) finds a persistent and significantly positive CSA on across datasets (ELS, NELS, HSB) and time. Controlling for important measures in nationally representative data from the 1980s, Coleman & Hoffer (1987) found that between grades 10 and 12, students in Catholic schools outperformed public school students by about one grade level equivalent in both mathematics and reading. With more sophisticated multivariate models in more recent nationally representative data (2002-2004), Carbonaro & Covay (2010) found that the CSA for mathematics persists.

At the elementary school level, Catholic school effects seem less robust. For instance, analyzing the Early Childhood Longitudinal Study (ECLS-K), Carbonaro (2006) found that kindergarten students in public and Catholic schools experienced similar achievement gains in mathematics and general knowledge, net of other characteristics. Analyzing the ECLS-K data and the gains of students between 3rd and 5th grades, Reardon, Cheadle, & Robinson (2009) found that public school students outperformed their Catholic school peers in math but experience similar gains in reading (see also Elder & Jepsen, 2014; Hallinan & Kubitschek, 2012).

Further research comparing Catholic schools at the pre-k through 8th grade levels would help shed light on the sector differences, with an emphasis on mechanisms and policy implications. Further examination of the organizational and instructional conditions may explain sector differences at earlier grade levels and the variability between as well as within sector (Berends, 2014; Bryk, Lee & Holland, 1993; Berends, Springer, & Walberg, 2008). For example, at the high school level, a consistent finding in explaining the CSA has been the academic focus and more rigorous course taking patterns of Catholic school students. Yet, at the elementary grade levels, these organizational and instructional conditions have not been fully

analyzed. In addition, there are several other factors—such as communities of learning and trust—that prior research and theory have pointed to but so far not fully examined as important for explaining sector differences. (Bryk & Driscoll, 1988; Bryk & Schneider, 2002), social capital (Berends & Zottola, 2009; Hoffer, 2009), peer effects (Marks, 2002), or market vis-à-vis institutional hypotheses (Berends, 2015; Berends, Goldring, Stein, & Cravens, 2010).

To extend the findings here, opportunities for further research at the high school and transition to college stages are possible with analyses of the nationally representative data from High School and Beyond (1980s), National Education Longitudinal Survey (1988 and follow ups), the Educational Longitudinal Study (2002 and follow ups) and High School Longitudinal Study of 2009. Although there are challenges of comparable measures in these databases (see Berends, Lucas, Sullivan, & Briggs, 2005; Berends & Peñaloza, 2010), opportunities to estimate similar model specifications across these different cohorts have not been fully explored in the context of sector effects. Such cross-time comparisons of sector differences and the processes that may explain them would further clarify the consistency of the CSA over time.

It is also important here to caution researchers about the limitations of causal analyses using observational data. Propensity score matching, while an accepted method for approximating experimental methods with observational data, has several limitations. Mainly, propensity score matching is only as strong as the observed variables that predict the treatment condition (commonly termed the ignorability assumption). That is, we can only be certain that our sample is matched on the variables used in Step 1 outlined above; we cannot assume that these students are matched on any other unused covariates. Although we assert that our model is robust and includes the most likely predictors of Catholic school attendance, it is not possible to absolutely assure ignorability. Thus, causal claims resulting from PSM should be interpreted

with caution. Additionally, PSM can eliminate particular cases when suitable matches are not found. Although this is rarely the case with our data, this can decrease the external validity of the study (Graham & Kurlaender, 2011) and, in some cases, increase bias (King & Nielsen, 2015). These limitations demonstrate that PSM should be used thoughtfully and carefully to improve analysis of causal questions with observational data.

Despite these limitations, our results demonstrate that the historical CSA may be especially vulnerable to the changing social landscape. Because our research focuses on establishing the size and significance of a CSA, future research should explore the relationship between these socio-political shifts and the effect's fragility. Such macro shifts are likely to change the way we view school sector estimates and their contribution to students' educational opportunities (Morgan, 2001). Our results also extend research that has remained largely unexplored since the findings of Coleman and others in the early 1980s and 1990s regarding the specificity of the CSA in post-secondary attendance. Because our sample is somewhat limited in power due to a relatively small percentage of the population, datasets with the same depth of information but a more extensive sample can further hone these results.

These future analyses will help place the current condition of sector effects within a historical perspective. With attention to macro- and micro-level forces that influence how the organization and schooling processes operate over time, important new findings will emerge to further illuminate the educational opportunities of students who attend different types of schools.

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