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Charter School Expansion, Catholic School Enrollment, & the Equity Implications of School Choice[*]

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Abstract

Catholic schools have seen more than a 30% decline in enrollment over the past 20 years. While some of the decline in enrollment may have been spurred by secular trends or the Church abuse scandal, the increase in schools of choice, principally public charter schools, may explain at least some of this decline. In this paper we estimate the effect of the opening of charter schools in proximity to Catholic schools across the entire U.S. We find that the opening of a nearby charter school has a negative impact on Catholic school enrollment and increases the likelihood that the school will close. We also find that charter openings induce greater racial isolation. Findings are especially pronounced in K8 schools, rather than high schools.

Keywords: Catholic School, Charter School, School Choice, Equity

JEL Code: I20, I24, I28

1. Introduction

In the 21st century support for and enactment of school choice policies has seen marked growth. This is particularly true of public charter schools of which there are now more than 7,000 serving more than 6% of the publicly educated student population (Hussar et al., 2020). In the United States, prior to the advent of public charter schools, Catholic schools enrolled the largest share of school-aged children among those not enrolled in traditional public schools (Greene & O'Keefe, 2001). Even before first charter schools, enrollment in Catholic schools had been declining, however, there has been limited study of whether and how the opening of charter schools has impacted the overall system of school choice. Several studies have looked at individual states (Michigan and Washington D.C.), and one study looked at impacts in the midwestern region, but our paper is the first to provide evidence using the entire U.S.

To better understand whether and how the growth of public charter schools has resulted in more or better school choice options overall, in this paper we estimate the causal impact of the opening of charter school in proximity to Catholic schools on student enrollment, school persistence, and the racial and ethnic composition of schools. The quasi-random timing of the opening of charter schools in proximity to existing Catholic schools allows us to compare Catholic schools that experience the opening of a proximal public charter school and those who experience such an opening later or not at all.

We contribute to several related literatures that aim to understand the relationship between school choice, student enrollment, school quality, and school closure. In particular, we speak to a subset of these literatures that also seek to understand how mechanisms of choice may or may not produce more racially and ethnically diverse schools. Our nationwide study builds directly on a

handful of state-specific studies (most notably, Chakrabarti & Roy 2016; Ferreyra & Kosenok, 2018) that studied the impact of growth in charter schools on traditional public-school enrollment, while also accounting for changes in independent school enrollment. By using national data, we provide a broader assessment of changes in the school choice landscape, accounting for other salient dimensions of choice policy, while also highlighting the compositional changes in school enrollments. Our analysis seeks to inform both charter and Catholic school policies in the future, as well as broader policy consideration of whether and how changes in the composition of school choice options may tend to reduce or induce concentrations of disadvantage or further segregate school settings.

Our paper also complements a broader literature on charter schools and school choice that seeks to understand how school openings and closures have changed the landscape of enrollment options, characteristics, and outcomes (Engberg et al., 2012; Wolf & Egalite, 2016; Harris & Martinez-Pabon, 2023). Finally, we contribute to scholarship that has demonstrated how changes in the presence of public charter schools have increased racial and ethnic isolation in both public charter schools and traditional public schools (Monarrez et al., 2022; Slungaard-Mumma, 2022).

Our analysis and hypotheses are grounded in established theories of school choice and educational inequality based on race and socioeconomic status. In free market theories of educational choice, the basic reasoning is that the opening of new schools, or low-cost availability of others, will provide options to families, and put pressure on traditional public schools that face increased pressure to meet student and family needs. In practice, evidence has been equivocal as to whether this outcome is realized. While there is some evidence that the access to charter schools has improved student test score and school completion outcomes, this has not been a universal finding, and evidence of impact on outcomes under subsidized private choice (vouchers) there is

less evidence of positive impact (Abdulkadiroglu et al., 2011; Angrist et al., 2010; Dobbie & Fryer 2008; Egalite, 2013; Howell et al., 2002; Wolf et al., 2013). Furthermore, much of the choice expansion has disproportionately occurred in communities of color and has sometimes been accompanied by the closure of local public schools, thereby undermining the persistence of an actual choice. Recent evidence has also suggested that the expansion of choice has reinforced racial and socioeconomic segregation in ways that run counter to legal mandates about racial isolation in schools and that undercut central values of the public schooling process (Monarrez et al., 2022). This work builds from this recent evidence, as well as an established literature about the long-term trends and participation in Catholic schools.

Using a generalized approach to difference-in-differences and our national dataset, we estimate the impact of the opening of a nearby charter school on previously untreated Catholic schools. We find that, regardless of the specific choice of distance used to define proximity, the opening of a charter school tends to reduce the future enrollment in the proximal Catholic school by about 3%, and increase the chance that the Catholic school will close within five years, particularly for K8 schools. We also find that the opening of charter schools tended to increase the racial isolation of Black and Hispanic students across educational settings, particularly in Catholic schools, where white enrollments dropped, and Hispanic and Latino enrollments rose. Consistent with what theory might predict, states with no caps on the number of charter schools that can open saw the steepest declines in Catholic school enrollment and higher risk of closure, while those with voucher programs that may be used to attend Catholic schools saw weaker impacts.

Our findings are robust to a range of specification checks and sample limitations, including focusing only on periods that fall beyond the expected initial negative impact of the public revelations of the clergy abuse scandal. Our findings imply at least a few important points for

educators and policy makers. First, and most generally, the opening of charter schools may not have increased choice for families over the medium-term, particularly, and somewhat paradoxically, in states that do not cap the number of allowed charter schools. While charter schools represent free alternatives, crowd out of Catholic schools may have induced a net zero increase in educational alternatives in the short- to medium-term. Second, enrollment changes in response to increased choice increase racial isolation for Black and Hispanic students in Catholic schools in ways that align with similar results found in traditional public schools and charter schools in other studies.

Our specific research questions were as follows:

1) To what extent does the opening and expansion of charter schools explain declining enrollment in Catholic schools?
2) Does the opening and expansion of public charter schools predict the closure of Catholic schools?
3) How have changes in enrollment altered the racial composition of Catholic schools, relative to nearby charter and traditional public schools?

The rest of this paper proceeds in the following manner. In the next section, we provide further context for the focus on Catholic schools, school choice, and their intersection. We present, in section three, our data and methods, followed by results in section four. We conclude in section five with robustness checks, and discussion of the results and conclusions for research and policy.

2. Background & Prior Research

2.1. Catholic School Enrollment Trends and Forces Shaping Closure

Since its peak student enrollment of over 5 million students in the 1960s and 1970s, the enrollment of students in Catholic schools has steadily declined to just under 1.7 million students in nearly 6,000 Catholic PreK-12 schools (Smith & Huber, 2022), or just under 4% of the total school-aged population (NCES).[1] The most common explanation for these long-term declines is the decrease in demand for Catholic schools based especially among white, ethnically European Catholic communities who moved into exurban and suburban areas and away from the urban centers that have seen some of the most pronounced enrollment declines (Cattaro & Cooper, 2007; Ryan, 2020). This was likely exacerbated by the public reporting on the Church's institutional corruption and sexual abuse scandals (D'Antonio et al., 2013). Studies of the consequences of these decreases in demand have suggested that it has led to increased labor and organizational costs of running tuition-based schools and school closure (Cattaro & Russo, 2015; DeFiore, 2014).

What is noticeably absent from this commonly offered explanation for the persistence of the organizational crisis in Catholic education in the U.S. is how Catholic schooling has been shaped in recent years by a dynamic and changing PreK-12 educational policy landscape in the U.S. Throughout the contemporary educational policy period, choice and competition have become

[1] There were modest enrollment increases as the result of some Catholic school regions offering in-person instruction during the 2020-2021 academic year while neighboring public districts were offering remote-only instruction in response to the COVID-related public health crisis (Porter-Magee et al., 2022), but these increases tended to be clustered in early childhood and early elementary grades, could mostly be explained by distinct regional social and political conditions, and did not serve to reverse the overall negative trend of student enrollment and school closure the Catholic sector has faced these past forty years (Cordes et al., 2023).

central to how schools and school systems have made decisions about how best to provide an equitable, high-quality education to students (Mehta, 2013; Peurach et al., 2019).

Classical market theories would suggest that increased competition among educational providers would lead to schools and systems finding ways to reinvent or improve their systems as a response to increased competition (e.g., Jabbar et al., 2020). The notion that Catholic schools already contribute to a generalizable and replicable "Catholic school advantage," despite significant empirical and conceptual questions having been raised about the existence of "Catholic school effects" on PreK-12 student learning over time (e.g., Altonji et al., 2005; Berends, 2020; Carbonaro & Covay, 2010; Freeman & Berends, 2016), has become core to the way the sector understands itself in the current policy environment (Brinig & Garnett, 2014; Schoenig & Staud, 2013). Rather than confront the possibility that increasingly competitive environments have reshaped the composition of student enrollment in urban areas in particular or generalizable ways, the "Catholic school advantage" discourse has led many within Catholic education to assume that the historical decrease in demand impacting Catholic schools described above could be easily reversed if Catholic schools were provided more favorable policy conditions like the creation of more robust private school choice policies (Garnett & McShane, 2023).

There has been little empirical research on the way competitive market forces have reshaped the demand for Catholic school within communities where Catholic schools are still present. Some Catholic school researchers have theorized that the emergence of public school choice policies creating new alternatives to district public schools would also necessarily have consequences, whether positive or negative, on the largest single sector of private schools of choice that exists in most regions (Miserandino, 2019; O'Keefe & Goldschmidt, 2014). But to this point, most of the research examining the impacts of competitive environments on Catholic schools has contained

qualitative analyses of the perspectives of the leaders and educators who work in these systems (Kotok et al., 2019; Neumerski & Cohen, 2015; Spillane et al., 2022). There has not yet been a quantitative account of how supply and demand conditions in the market for Catholic schooling have been reshaped as a result of the kinds of changing policy conditions that have happened in the contemporary environment in which Catholic schools are situated. Therefore, in this paper, we attempt to directly address that gap in the literature and to assess whether or how the presence of public school choice policy has hurt Catholic school enrollment and whether or how these analyses may confirm the assumption held by many Catholic school stakeholders that the clearest solution to the sector's organizational crisis is broader private school choice policy implementation.

2.2. Intersection of Charter School Expansion and Traditional Public Schools

Since the early 2000s, many studies have investigated the impact of charter schools on existing educational systems, particularly traditional public schools. They have not only delved into the shifts in public school enrollment but have also examined alterations in racial segregation and isolation measures at various geographic and school-levels.

Regarding enrollment dynamics, most studies have found that the expansion of charter schools significantly reduced the enrollment in traditional public schools. For instance, Slungaard-Mumma (2022) in the contexts of North Carolina and Massachusetts, Hicks & Lens (2022) in Los Angeles, and Winters (2012) in New York City have all demonstrated how the enrollment in traditional public schools declined following the introduction of charter schools. Hicks & Lens (2022) emphasize that this competition is particularly noticeable in elementary schools within approximately a 1-mile radius. Some earlier studies have also shown that charter schools can have adverse impacts on traditional public schools at the district level (Bettinger, 2005; Bifulco et al., 2009; Garcia, 2008; Reback, 2008).

As for the impact of charter school expansion on racial segregation and isolation, research findings have been mixed, with both positive and negative effects observed, and these effects vary across different geographical levels and localities (Bifulco et al., 2009; Bifulco & Ladd 2007; Ladd & Turaeva, 2020; Monarrez et al., 2022; Ritter et al., 2014; Zimmer et al., 2009; Alcaino & Jennings, 2020). Alcaino & Jennings (2020) have presented evidence indicating that the growth of charter school enrollment increases racial and socioeconomic school segregation at the county level across the United States. Monarrez et al. (2022) have suggested that charter schools marginally contribute to school segregation for Black, Hispanic, Asian, and White students. Conversely, Monarrez et al. (2022) have also shown that charters reduce segregation between districts in metropolitan areas, and Ritter et al. (2014) have indicated that most transfers improve integration levels at the schools that students leave when they switch from traditional public schools to charter schools.

2.3. Intersection of Charter and Catholic Schools

While very few studies have examined the impact of charter school expansion on private school enrollment (Murnane & Reardon, 2018), their findings have varied. Chakrabarti and Roy (2016) have presented evidence that fails to establish a causal connection between charter schools and a reduction in private school enrollment, using elementary school data from Michigan. Their research has also revealed that enrollments in Catholic and other religious schools were not affected differently compared to non-religious private schools.

In contrast, Waddington (2012), using data from ten large US cities located in the Great Lakes or Rust Belt region, has suggested that charter schools located in proximity to Catholic schools exacerbate the decline in Catholic school enrollment and school closures, with these impacts being most pronounced in elementary grades. Buddin (2012) has supported this perspective with US

nationwide data, demonstrating that charter school students, across various grade levels, were drawn from private schools. This pattern was especially pronounced in schools located in urban districts, Catholic schools, and elementary schools in large metropolitan areas. The most recent research conducted by Alcaino and Jennings (2020) aligns with this strand of thought, emphasizing that the growth in charter school enrollment exerts a negative and significant influence on private school enrollment.

It is worth noting that Ferreyra and Kosenok (2018), though not explicitly focusing on the causal relationship between charter and private schools, indicate that charters contribute to net social gains by offering additional educational options, particularly benefiting students of color, low-income students, and those in middle school. This implies that charter expansion introduces dynamic changes in both the public and private student bodies; an implication that we examine.

3. Data and Sample

The main data source in our study is the National Longitudinal School Database (NLSD), which includes school-level data for both public and private schools in the United States (REACH, 2023). The NLSD compiles Catholic school data using Private School Survey (PSS), which reports biannual enrollment head counts by grade-year-race/ethnicity, religious affiliation, geographic locations, and grade ranges. We note that PSS and NLSD have longitude and latitude for Catholic schools beginning in the 2005-2006 school year. To backfill geographic locations of them prior to 2005, we manually download their physical address for the years spanning 1997-1998 to 2003-

2004 by using National Center for Education Statistics (NCES) Elementary and Secondary Information System (ELSI) table generator and then geocode them into longitude and latitude.[2]

To capture the first public charter school opening within a defined radius of the Catholic school location, we also use the grade ranges and location data of charter schools from the NSLD. If the latitude and longitude of a school's physical location are not available in earlier years but provided in subsequent years, we use this information to fill in missing data.[3] For our main models, 9,027 K8 and 6,565 high Charter schools were included to calculate distances from Catholic to Charter schools.[4] We then merge county-level characteristics of median house income and K-12 enrollment size in 2000 from the Census Bureau's American Community Survey to account for some pretreatment differences in the locations that may be treated at different points in time.

We structure the main dataset as a Catholic school-by-year longitudinal panel spanning from 1998-99 through 2019-2020 school years. In our analysis we split our sample between K8 and high schools.[5] This choice is driven by two factors. First there is uneven availability of charter schools across school levels (Alcaino & Jennings, 2020). Second, it allows for a more precise impact analysis by capturing the first public charter school opening that share at least one

[2] Originally, there were 5,821 Catholic school cases without longitude and latitude information. Using location data from ELSI, we successfully filled in the missing coordinates for 5,590 (about 96%) of these cases.

[3] After addressing the original missing data using ELSI data (footnote 2), there were still 371 Catholic school cases from the 1998-99 and 2004-05 school years without longitude and latitude information. By employing location data from subsequent years for further backfilling, we successfully filled in 233 (about 63%) of these remaining cases.

[4] Our sequence of Charter school sample restrictions is presented in Appendix Table A10.

[5] We primarily determine the school level based on the grade offering indicators. Schools with the lowest grade of 9 or above is categorized as high schools, while those with the highest grade of 8 or below is termed K8 schools. If a school isn't classified as a high school but offers grades 9 or above, it's labeled as a combined school, falling into both K8 and high school samples. In cases where schools didn't provide their grade range, we utilized the school level indicator reported by CCD and PSS, encompassing five categories: elementary, middle, high, secondary, and combined.

overlapping grade. This is especially important in the study of Catholic schools that tend to follow a K8 or 9-12 structure. It is also important because tuition costs are substantially different in Catholic schools across these two levels.

Our final analytic sample for our main models includes unique 8,369 K8 and 1,784 high Catholic schools. This sample is a net of schools after excluding those that are not regular schools, those missing location indicators, or those that exhibit missing data in total enrollment even if they are not in a known opening or closing year. We also restrict our sample to Catholic schools that have at least two years of observations of enrollment data.[6] We present in Table 1 and Figure 1 the changes in the number of charter schools and Catholic schools over time. This highlights the source of variation from which we draw, as well as providing a sense of the scale of change over two decades.

3.1. Measures

3.1.1. Charter School Opening

Our treatment indicator of interest is the opening of the first public charter school within a defined radius of the Catholic school address. We define proximity to determine treatment in ways that are consistent with the recent literature on the impact of charter school openings (e.g. Slungaard-Mumma, 2022; Monarrez et al., 2022) and use distances of 1, 2.5, 5, 10, and 20 miles. The larger distances are more relevant when considering high schools because, on average, students travel further to attend high school (Cocoran, 2018). Our preferred models include distances of 2.5 and 5 miles. In some related literature the closer distances are relevant because

[6] Our sequence of Catholic school sample restrictions is also presented in Appendix Table A10.

charter openings are occurring in cities where smaller distances are relevant. However, because we are interested only in previously untreated settings, in most instances, 2.5 to 5 miles is a more reasonable treatment distance for these smaller urban or urban-fringe settings. Table 2 presents the average distance between a charter school and always-treated Catholic schools, omitted from our analysis, as 2.08 miles for K8 and 2.43 miles for high schools, respectively.

3.1.2. Outcome

We use several outcome measures of interest to gauge the impact of charter school opening. The primary outcome of interest is Catholic school enrollment however, we also use a binary indicator of whether a Catholic school closes as a more permanent measure of impact. The NLSD provides two school closure indicators (Carroll et al, 2023), one preferred and one alternative. As participation in PSS is not mandatory for Catholic schools, a school that stops reporting is not necessarily closed. Therefore, the NLSD manually verified their status from 2007-2008 through 2017-2018 school years. They defined schools without a verified operational status through online searches as closed in the preferred measure but as open in the alternative measure. Given that the alternative measure is available across our data range, we decide to use it.

Finally, we adopt several measures of racial composition of the student population. We focus on four racial and ethnic groups based on how they are reported in our data: white, Black, Hispanic, and Asian or other race and ethnicities. Following previous studies (Cordes & Laurito, 2023; Coughlan, 2018), we capture racial diversity using the entropy score for each school across grades.[7] Higher values of entropy score indicate more racial diversity where a value of 1 means

[7] It is computed as $E = \sum_{r=1}^{r}(p_r)\ ln\left[\frac{1}{p_r}\right]$, where p_r presents the proportion of each racial and ethnic group *r*.

that all four groups are equally represented. These latter outcomes put us in conversation with other recent papers that estimate the impact of charter schools on other public schools (Monarrez et al., 2022), and speak to whether and how Catholic schools may serve a changing student body in the wake of charter school openings.

3.1.3. Covariates

We add two county-level covariates from the American Community Survey Five-year estimates, median house income and K-12 enrollment size in 2000, to control underlying bias between never and eventually treated groups and get more accurate estimation of the average treatment effects.[8] This inclusion of covariates is particularly relevant because key stakeholders involved in the establishment of charter schools often consider factors such as parental demand, the size of the school-age population, and the economic conditions when selecting locations for establishing new charter schools. (Betts, 2009; Glomm et al., 2005; Henig & MacDonald, 2002; Singleton, 2019; Bifulco & Buerger, 2015). Data availability limits our ability to use more localized measures of covariates.

3.1.4. Heterogeneity

Not all states have similar laws that dictate the authorizing and opening of charter schools, and so we also include indicators (see Appendix Table A1 for details) of whether a state has caps on the number of charter schools that can operate or be added to capture important potential heterogeneity that is related to whether and how charter schools can be added. Implicitly, we will

[8] Our covariates used in the outcome regression specification and the propensity score (reweighting) estimation. In other words, the role of covariates in *csdid* is to improve the chances that the parallel lines assumption holds, as well as to ensure that the groups we use for the pre- and post-period are comparable (Sant'Anna & Zhao., 2020; Rios-Avila et al., 2021).

observe less variation in new charters in states that limit charter growth, however, it is not obvious ex ante, that impacts would be larger or smaller in such states. Similarly, the impact of charter openings on Catholic schools may also be mitigated by whether a state has, or did have, public vouchers that could be used to attend independent or parochial schools (also see Appendix Table A1 for details on our categorization of voucher status). All else equal, charter schools offer a freely available school of choice. However, if vouchers reduce the financial costs of choosing, or remaining in a Catholic school the presence of vouchers may mitigate the impact of the opening of a free public charter school.

3.2. Analytic Approach

Our analysis focuses on the application of quasi-experimental methods in a staggered difference-in-differences framework. Specifically, we capitalize on the opening and expansion of charter schools as a source of exogenous variation in the set of free school choice options in local areas. We fit event study models to estimate the immediate and dynamic impacts of charter school opening on enrollment in proximal Catholic schools. Our outcomes include school-level enrollment and composition measures, as well as indicators for whether Catholic schools closed. We complement our event-study specifications using a range of generalized difference-in-differences approaches that improve statistical power and attend to a host of recent updates in the application of these methodologies (see, for example, Roth, 2022). In addition to our overall impact estimates, we estimate models that allow for differences across states that do or do not have caps on the number of charter schools, or that do or do not offer vouchers that can be used to pay for independent or parochial schools. Our estimates are based on the gradual rollout or opening of public charter schools in proximity to pre-existing Catholic schools.

In Table 2, we present descriptive statistics for the Catholic K8 and high schools in our sample overall, as well as by whether they are never, eventually, or always treated. In Figure 9, we also present three panels that illustrate the change in Catholic and charter school presence in each of three major cities. In panel 1, we show changes in the schooling landscape in Cooks County Illinois which constitutes Chicago, in panel 2 we present Kings County New York which is Brooklyn, and in panel 3 we include Wayne County Michigan for Detroit. In each of these panels one can see the increase in charter options, and the closure of previously existing Catholic K8 schools, including their relative proximity. These three cities are representative of the patterns we see across hundreds of counties, and particularly in the northeast and Midwest where, historically, the greatest number of Catholic schools have existed.

Of the Catholic schools that end up being treated, the opening or treatment occurs at different times. Because treatment effects may differ by the timing of treatment, we follow the literature (Callaway & Sant'Anna, 2021) and allow for heterogenous treatment effects by period and place. We also estimate treatment effects using only never or ever-treated units, removing always treated schools from the sample. Our findings are not sensitive to restricting comparison schools only to those that will eventually be treated.

Our identification strategy compares outcomes in treated schools to non-treated schools that did not experience the opening of a nearby charter school serving the same grade levels. Based on our use of a generalized difference-in-differences approach, our identification relies on the assumption that both treated and comparison schools had parallel trends in outcomes in the pre-treatment period, and would have continued on the same parallel trajectories in the absence of the treatment. In this setting, this suggests that Catholic schools that had a charter school open nearby would have followed similar enrollment or other outcome trends in outcomes as Catholic schools that

experience a charter school opening. We cannot directly test this assumption however, we test it indirectly by 1) observing parallel trends in outcomes during the pre-treatment period, and 3) testing whether our results are sensitive to the inclusion of covariates. Identification of a causal impact also requires the absence of other simultaneous changes in the treated or comparison setting that might otherwise explain the presence or absence of effects.

One potential violation of the assumption of no other simultaneous treatments, is the fact that rapid charter school expansion occurred at a similar time as public revelations of the clergy sex-abuse scandal. Thus, changes in Catholic school enrollment are likely impacted by this scandal. However, there are several reasons that we do not expect this to bias our results. First, major revelations occurred largely in the biggest cities (e.g. Boston, NYC, Chicago, Los Angeles), where schools were always treated in our panel (i.e. no charters are opening for the first time), and so they are effectively not a source of identifying variation. Second, all Catholic schools might be thought to be subject to the additional treatment of the sex-abuse scandal, and thus, our estimates are picking up differential changes in Catholic schools that experience a proximal opening of a charter school, relative to other Catholic schools that have not yet experienced a charter opening. Finally, since the most novel and substantial revelations of the sex-abuse scandal occurred in 2002 and 2003, we also test the robustness of our findings to using a shortened panel only spanning 1998 through 2002. There is less variation in charter openings during this time period, however, our general results hold, with lessened concern about the potential for observing a possibly muddied treatment.

3.2.1. Event Study Specification

To allow for potentially dynamic impacts of treatment, we first estimate effects using an event study specification. This approach allows us to model anticipatory effects as well as variation in

the treatment effects across time without making parametric assumptions about the treatment effects. Given multiple periods and variations in treatment timing, we decide to use the Callaway & Sant'Anna estimator *csdid* with the 'not yet treated' option (Callaway & Sant'Anna, 2021). This option enables us to include both never-treated and not-yet-treated Catholic schools as our comparison group. We specify our event study model for a generic outcome *Y* as follows:

$$Y_{st} = \beta_0 + \sum_{r=-10}^{10} \beta_{\mathrm{r}} * I(t - t_s^{Treat} = r) + \lambda_t + \delta_s + X_c + \nu_{st} \quad (1)$$

We model outcomes for school *s* in year *t*. This model includes the term $I(t - t_s^{Treat} = r)$, indicating the event time r, relative to the first treated year that a school experiences the opening of a nearby charter school. λ_t controls for the cohort fixed effect and δ_s controls for the school fixed effect. X_c is a vector of county-level characteristics which include median house income and K-12 enrollment size in 2000. ν_{st} is a random error term clustered at the school level. The coefficients of interest are the β_{r}, which represent the effect of a nearby charter school serving similar grades on the outcomes of local Catholic schools, in each of the r periods after the opening of the charter school. Estimated effects are measured relative to the period.

3.2.2. Difference-in-differences

Using a parametric specification, we also model the relationship between the treatment and the outcome using a difference-in-differences design with school and year fixed effects as follows:

$$Y_{st} = \beta_0 + \beta_1 Post_t * Treat_s + \lambda_t + \delta_s + X_c + \eta_{st} \quad (2)$$

Where Y_{st} is a generic outcome (e.g. enrollment, school closure, or entropy index), β_1 is the coefficient of interest and is the interaction between the indicator for the post period and the school being treated, η_{st} is a random error term clustered at the school level, and the other terms are as in Equation (1) above.

4. Findings

Our findings suggest that the opening and expansion of public charter schools has a substantial reduction in enrollment in Catholic schools, particularly in K8 schools in more populated areas. We also find suggestive evidence of increases in the likelihood that a Catholic school closes in the years following the opening of a proximal charter school. Finally, the opening or charter schools and the subsequent changes in enrollment appears to have led to increased racial isolation for Black and Hispanic or Latino students. This latter result is driven largely by declines in white share in Catholic schools and increase in share of students identifying as Black and Hispanic or Latino, accounted for by stable enrollments of Black students and a growing number of Latino students (even as total enrollments fall). Investigation of potential sources of heterogeneity suggest that these results may be driven by states that do not cap or tightly regulate charter school growth (more charter schools create more opportunity for competition) and mitigated in states that offer school vouchers (even in the presence of charter schools, students may remain in Catholic schools if vouchers make enrollment less costly). Below, we provide more detail in the presentation of each result, as well as tests of robustness of the findings.

4.1. Impacts on Enrollment

In Figure 2 we present event-study estimates of the impact of a charter school opening within 5 miles of a Catholic school. The top panel presents estimates for K8 schools, and the bottom presents estimates in high schools. In each case, though more pronounced in K8 schools, we see evidence of a negative impact of a nearby charter opening on Catholic school enrollment, with impacts increasing in the up-to 10 years following an opening. Impacts are expressed as the change

in the number of students enrolled. Impacts should be interpreted as the one-year change in enrollment in Catholic schools and can be interpreted relative to the average enrollment in eventually treated schools (about 285) in Table 2. A decline in enrollment of 10 students, which we observe in the second year after a charter school opens, in a given year represents about a 3.5% reduction in enrollment. Estimates in Figure 2 suggest that impacts are immediate but also dynamic, increasing over time. We present in Table A2 the details on the estimates from Figure 2. We note that there is a potential for underestimation in our enrollment reduction, as our dataset excluded observations with zero enrollment following school closures.

4.2. Impacts on School Closings

In Figure 3 we present point estimates from our event study model that are analogous to our impacts on school enrollment.[9] Our estimates demonstrate that the risk of a Catholic school closing appears to be 1.6% in the first year that a charter school opens, but that it increases in the years following a charter school opening. The impacts are clearest in K8 schools. The risk of closing rises to about 1 to 3.5 percentage points in each year beyond the second year after a charter school opening. Together with the enrollment impacts, we interpret this as suggesting that across five years, a nearly 12% reduction in school enrollment is sufficient to increase the risk that a K8 Catholic school will close by more than 4 percentage points.

4.3. Impacts on Racial and Ethnic Composition

In Figure 4 we present impacts of charter openings on a measure of racial composition. Our estimates are presented in three panels, one each for white, Black, and Hispanic or Latino students,

[9] We also show closure model results with basic Two-Way-Fixed-Effects approach in Figure A1 to address negative pre-trend issues in *csdid* approach with a binary outcome (Baker et al., 2022). We observe parallel trends in the outcome during pre-treatment period.

respectively. We demonstrate that impacts of charter school openings reduce the share of white students. This means that charter openings increase the share of peers who are not white. For Black and Hispanic or Latino students, we see an increase in their relative shares. We present a second way to conceptualize the impact of charter openings on the racial composition of treated Catholic schools in Figure 5 which presents impacts on an overall measure of racial entropy, where higher values are associated with more racially diverse settings. Impact estimates suggest no net change or a slight reduction in entropy which is consistent with the increases in racial isolation we saw for Black and Hispanic students in Figure 4. We present in Table A2 the details for the estimates from Figure 4 and 5.

4.4. Heterogeneity

To test for potential heterogeneity of our impacts we split states along two dimensions that are especially relevant, and observable, insofar as they might impact Catholic schools. First, we split states by whether they ever had policies that capped or otherwise limited the growth of charter schools. Second, we split states by whether they have or had a policy that allowed for the use of vouchers to attend independent schools. Splitting the sample in this way, we find that the overall impacts of charter school openings do depend on the state policy context in which the opening has occurred. Specifically, states that do not have caps on charter expansion saw stronger and more pronounced enrollment declines and increased risk of closure relative to states with some regulation of charter expansion. Further, states that have vouchers saw more muted negative effects on Catholic schools compared to states that do not offer vouchers. Note that some states had neither vouchers nor charter caps.

Our event-study specifications presented in Figure 6 present these heterogeneity estimates. In the top panel we display estimates for school enrollment, and in the bottom panel we display

estimates for school closure. In each panel, the top-left presents estimates in states with caps on charter expansion while the top-right presents estimates in states with no caps. The bottom-left of each panel presents estimates in states with vouchers, and the bottom-right shows estimates in states with no vouchers. In states with no caps on charter schools the negative impact on both outcomes is more pronounced than in those with caps and in the years immediately following a nearby charter opening the difference in impacts across state contexts are statistically differentiable from one another. States with vouchers appear to see less negative impacts on Catholic school enrollment and closure risk, relative to states without vouchers, though the general patterns are similar across both state contexts, if noisier in voucher states. This noise is partly due to the relatively few states with vouchers. We present in Table A3 the details for the estimates from Figure 6.

4.5. Robustness checks

Net of concerns about model specification that we address by presenting multiple approaches to identifying impacts in our difference-in-differences framework, one might reasonably worry that the rise of charter schools was not the only potential impact on enrollment in Catholic schools. Specifically, the national coverage of the priest sex abuse scandal in 2002 may have also impacted the decision of families to enroll in or continue in Catholic schools. Since our identification strategy compares Catholic schools that are treated by the opening of charter with other Catholic schools that are untreated or treated later, there is no clear reason to believe that one set of Catholic schools (treated or not) would be more subject to enrollment disruptions based on the sex abuse scandal. Similarly, the US Catholic church and Catholic schools have been experiencing declines in participation for more than 40 years. Still, that decline has not be differential based on proximity to a charter school or not, and so it does not pose a threat to our identification. However, to ensure

that any potential differential impacts of the sex abuse scandal do not drive our overall estimates, we restrict our analysis window to 1998 through 2002 (before the announcement could have impacted fall school enrollments) and find similar results. We present the event-study specification of these impacts in Figure 7. Table A5 presents the analogous results. The event study for the closure outcome shows larger impacts on risk of closing among schools treated by charter openings in states that did not cap charter expansion.

We also test the sensitivity of our findings to the distance between Catholic schools and newly opened charters. In Figure 8, we present estimates across choices of distance on K8 enrollment. We complement this in the Appendix with Table A8, A9 and Figures A4.

One threat to the validity of our school closure outcomes that we cannot directly test is the possibility that diocese made strategic choices about closing schools that were correlated with, but not caused by, the conditions surrounding a charter school opening. Local Church governance structures (the diocese or archdiocese), may have made strategic, centralized decisions to close schools of enrollments were already suffering, and a new charter school was perceived as only exacerbating those trends. In fact, it is fair to say that this could be part of the mechanism that explains closure, rather than a threat to validity, per se. However, if charter schools chose where to locate because they knew there was a struggling Catholic school nearby from which they might draw enrollment, or dropping enrollments were indicative of economic conditions that might make it cheaper for a charter school to secure a facility for their new school, then the treatment of Catholic schools may not be entirely random. However, as long as the within school, cross cohort exposure to the new charter school was plausibly random, it should not undermine the validity of our inferences.

5. Discussion & Conclusion

The findings from this study suggest at least three direct implications. First, public investments in public charter schools directly and negatively impacted the enrollments and persistence of K8 Catholic schools in the same areas. Second, the impacts of charter school openings in areas that previously did not have a charter school may have had a net neutral impact on the number of choice options, though they may have reduced the private cost of attending a school of choice since charter schools are tuition free. Finally, as documented in other scholarship that estimates the impact of charter school openings, the racial isolation of Black and Hispanic/Latino students may have been exacerbated in Catholic schools as charters opened.

Our findings related to the closing of Catholic schools is consistent with but builds upon prior research that finds school closings over the last 20 years have been relatively rare and occurred most frequently among charter schools, half as common in private schools, and uncommon in traditional public schools (Harris & Martinez-Pabon, 2023). However, in this work private schools were treated as homogenous. As we document in this paper, in fact, the closure of Catholic schools occurred at a higher rate than for most private schools and even as some charter schools closed, the opening of charter schools in proximity to existing Catholic schools seemed to induce further closure by directly competing for student enrollment, and likely undercutting the financial viability of the Catholic schools. This is noteworthy insofar as it captures heterogeneity in closing risks of a low-cost form of private schooling.

Whereas for much of the last 50 years Catholic schools offered the primary source of low-cost alternatives to public schools, our research demonstrates that in many instances, particularly K8 schools, family preferences for freely available alternatives exceed their preference for

independent, religiously centered education. Such behavior is consistent with what a model of rational economic behavior would predict. All else equal, families will choose the lower cost alternative to save money, particularly given that Catholic schools had increasingly served non-Catholic student populations, thus reducing any specific faith-based explanation for enrolling. An alternative explanation for why families might change enrollment behavior would be evidence of better performance among charter schools. However, in our study, we capitalize on the first charter opening in proximity to a Catholic school, and in these cases, there would not be a verifiable data on prior performance of the new charter school (except if the new school was part of a pre-existing network of charter schools that advertised based on performance at other locations).

One piece of evidence that suggests that financial costs, rather than explicit preferences for explicit quality measures may dominate enrollment decisions comes from our heterogeneity analyses. Specifically, our estimates also suggest that in states where vouchers are available for families to attend independent schools the competitive pressures of charter openings on Catholic school enrollment are less salient. On the surface, it is unclear whether this contrasting result reflects a true preference for Catholic education, or preferences to not change schools when the financial costs of remaining are neutral or nearer to neutral (in many states that have vouchers, e.g. Indiana, the average voucher amount is comparable to the national average for annual tuition of K8 Catholic schools).

A second piece of evidence suggesting that financial costs may drive moves away from Catholic schools towards free public charter schools, is that there is little evidence to suggest that charter schools are generally outperforming their traditional public school alternatives on test score outcomes (Chen & Harris, 2023). When comparing traditional and public charter schools with similar academic outcomes, we might understand preferences for charters as evidence of choice

motivated by interest in the charters' specific learning environment, or the ability to innovate in ways that are part of their charter (Chubb & Moe, 1991). However, when understanding preference for charter schools relative to Catholic schools, the absence of standardized performance data for both school types suggests that a families' move to a public charter, when already enrolled in a Catholic school, likely reflects a desire for a lower price tag, or a non-religious learning environment. It has been more than 15 years since the last large-scale, credible estimates of the impact of Catholic schools has been published, and much of that literature focused on high school outcomes like graduation or future civic engagement (Altonji et al., 2005; Dee, 2005). Thus, there is not much of an evidence base from families might make an informed decision to prefer a Catholic K8 school based on school performance or observable quality.

To drive home this point, we present in Figure 10 descriptive data on the distribution of standardized test score performance in charter schools and traditional public schools that were proximal to treated Catholic schools. The top panel (10.1) shows the distribution of performance of TPS on math and reading by proximity to Catholic schools that were never, eventually, or always treated, and by whether they exist in urban, suburban, or rural/town settings. Panel 10.2 presents similar distributions, but cannot include a never treated status since we only include schools that are located within 5 miles of a Catholic school. A few points are worth noting. First, TPS that are close to Catholic schools that are never or eventually treated are higher performing, on average, regardless of urbanicity. Second, performance of Charter schools close to eventually treated Catholic schools tended to be lower performing, on average. Though we cannot conclude that charters nearby Catholic schools were lower performing than their proximal Catholic schools, we can say that there is not much evidence that the Charter schools were so obviously higher performing that this feature would be the reason that families might choose them over the nearby

Catholic school. At the time of opening, there would be no available signal of quality based on test score performance (unless charters were part of a national network that was touting their record of performance, but this does not describe the bulk of new openings). However, subsequent performance data does not suggest that the Charter schools opening close to Catholic schools were especially high performing.

Finally, many charter schools and charter-school networks are characterized by their high academic press and no-excuses models of operation (Angrist et al., 2010; Thernstrom & Thernstrom, 2004). These models are highly structured, emphasize college going, and tend to have stricter behavior guidelines (and contracts) than most TPS (Cheng et al., 2017), but these environments may be analogous to Catholic schools (Gottfried & Kirksey, 2018). Thus, to the extent that some families may, historically, chosen Catholic schools as preferred alternatives to TPS, charter schools in the no excuses model, may have offered families reasonable substitutes for this environment, but without the financial cost or religious aspects associated with attending a Catholic school.

The impact of charter school opening on the closing of Catholic schools create a paradox of choice among policy makers or advocates who pursue charter expansion as a means to create innovation and market pressure. If expanding public choice via charter schools ends up closing the nearby competition, a net increase in choice has not been achieved. If evidence of lower performance in Catholic schools existed, such closure might reflect a rational, market-driven outcome. However, if the financial impact of losing a modest number of students is sufficient to close a Catholic school in the near term, this might constitute a net loss to families, in particular if the charter school is revealed to be of lower quality over time. It is difficult, and possibly unwise, to do a back-of-the-envelope calculation of the conditions under which this outcome might be a

net expected loss for families. However, it is important for policy makers to consider the overall dynamics of the broader educational environment when advancing or supporting policies that are focused on increasing publicly funded school choice. The unintended consequences of policies that lead to Catholic school closure, both reduce accessible choice options in the short term, and also create a potential influx of students to publicly funded schools (charter and traditional) that may not be easily supported, particularly in cash-strapped districts. Among schools that remain open increased racial and ethnic isolation in Catholic schools and in other school settings (Monarrez et al., 2022; Slungaard-Mumma, 2022). Thus, school leaders and policy makers must be mindful of the potential implications of their choice to authorize new charter schools in areas where there is preexisting enrollment in Catholic schools, particularly at the K8 level. Future studies that can measure the flows of students between Catholic, traditional public, and charter schools may further enhance our understanding of the implications of particular choice policies on the larger school ecosystem.

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Wolf, P. J., Kisida, B., Gutmann, B., Puma, M., Eissa, N., & Rizzo, L. (2013). School Vouchers and Student Outcomes: Experimental Evidence from Washington, DC. *Journal of Policy Analysis and Management, 32*(2), 246–270. https://doi.org/10.1002/pam.21691

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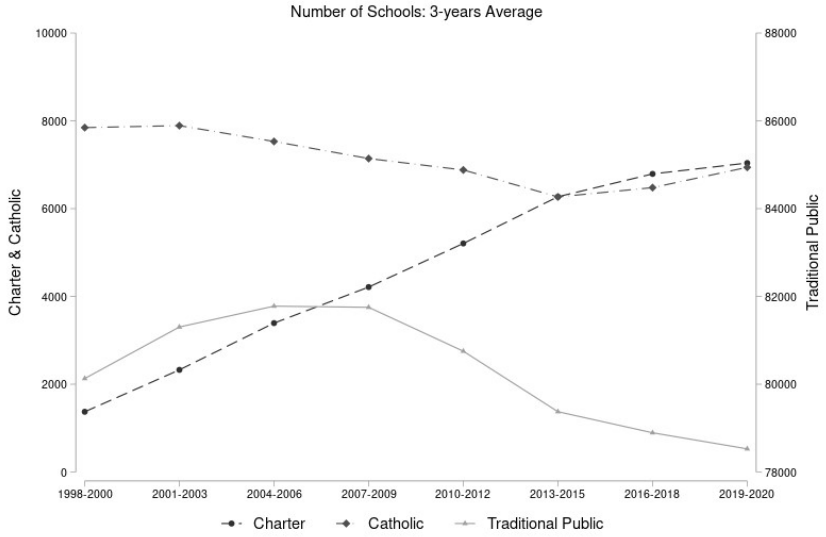
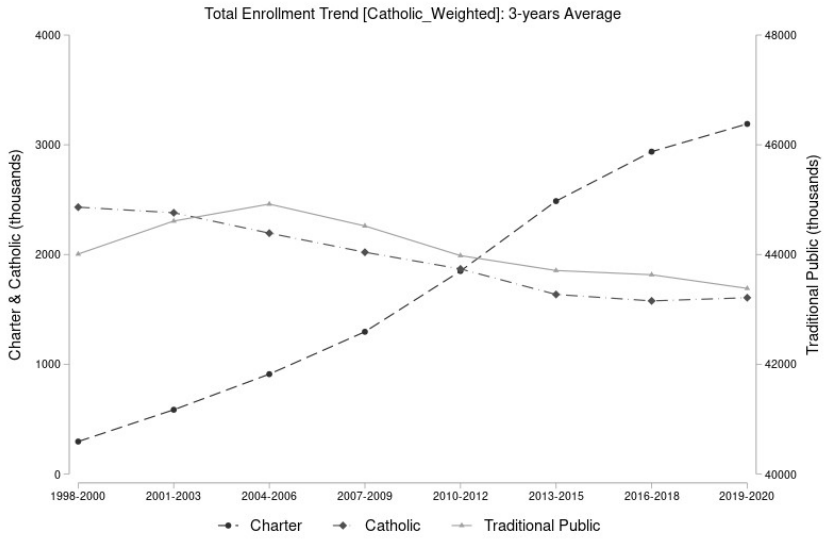
Figures & Tables

Figure 1. Charter and Catholic Schools Trend

1.1. Number of Schools (3-years Average)



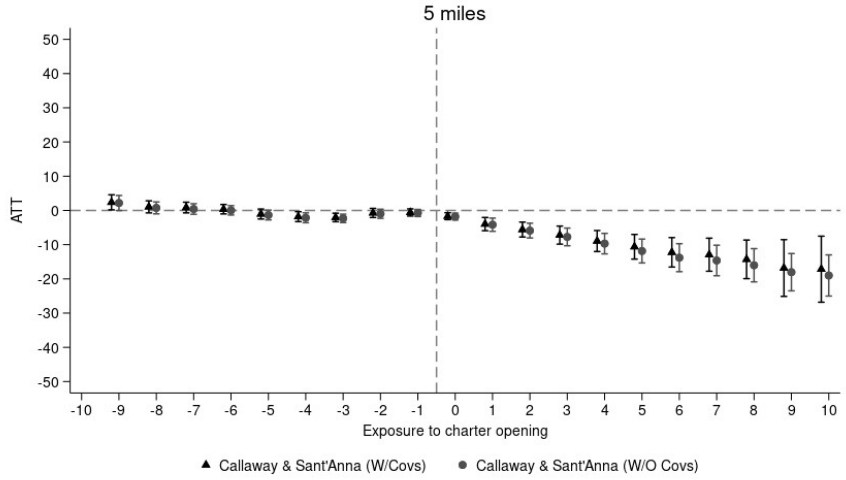
1.2. Total Enrollment (3-years Average): Weighted



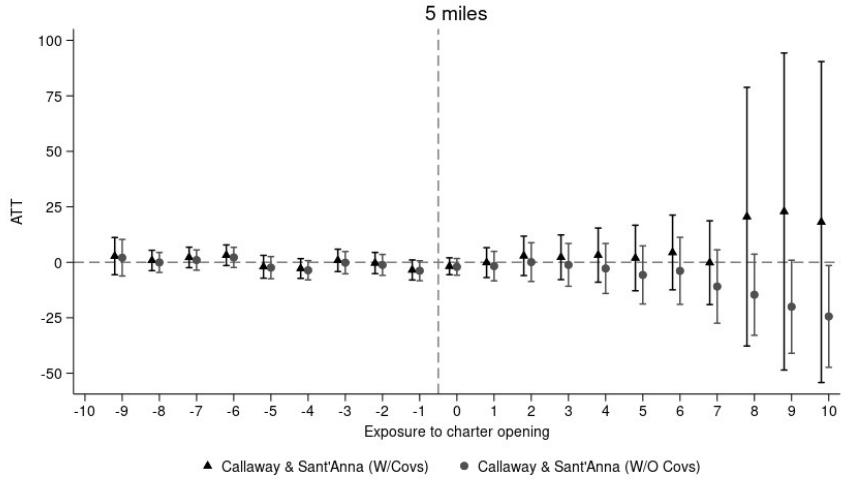
Notes: Figure 1 shows the count of schools and the weighted total enrollment spanning from the 1998-1999 to the 2020-2021 school years. We utilize three-year average estimates and employ analytic weighting for Catholic schools, as the PSS dataset does not include population data for them. The PSS provides the final analytic weight by school and year.

Figure 2. Event Study Impacts of Charter Opening on Catholic School Enrollment

2.1. K8 Schools



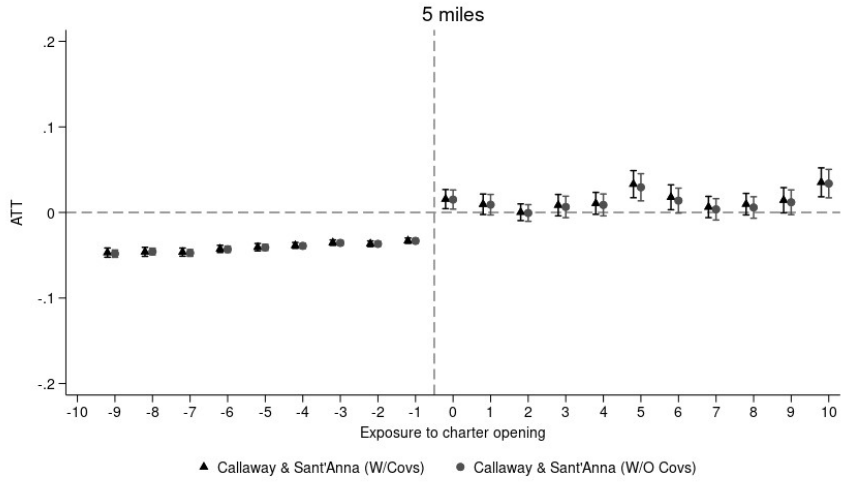
2.2. High Schools



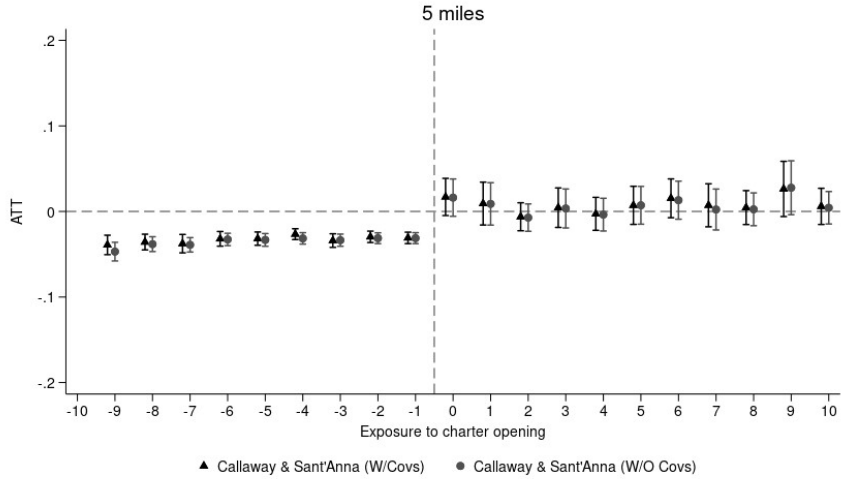
Notes: Figure 2 presents event study point estimates and confidence intervals (CIs) using *csdid* estimates. For each time point, we report two estimates, with and without county-level time-invariant covariates. Standard errors for computing CIs are clustered at school-level. We present in Table A2 the details on the estimates from Figure 2. Note that we can observe an effect on t-1 because *csdid* relies on a short-gap varying base. Unlike the universal base approach, where all differences are relative to a specific period (such as the year prior to treatment), the varying base approach uses the immediately preceding period as the base in pre-treatment periods. For example, if period -1 is pre-treatment, the base period for this would be period -2.

Figure 3. Event Study Impacts of Charter Opening on Catholic School Closure (Alternative)

3.1. K8 Schools



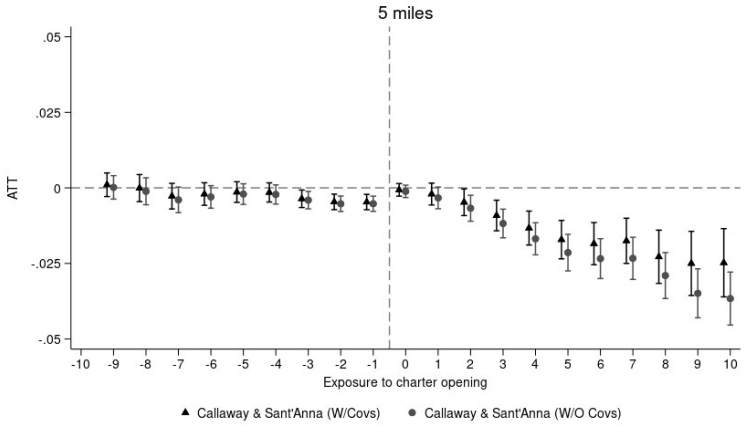
3.2. High Schools



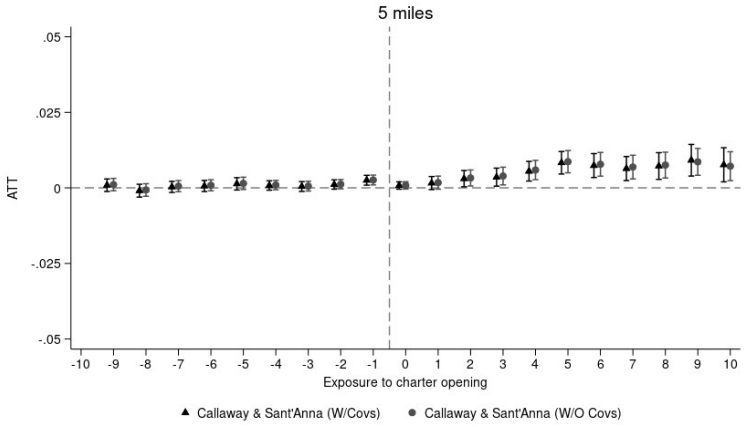
Notes: We present in Table A2 the details on the estimates from Figure 3. Table A2.1 reports the estimates with covariates and Table A2.2 reports the estimates without covariates. We also show closure model results with basic Two-Way-Fixed-Effects approach in Figure A1 to address negative pre-trend issues in *csdid* approach with a binary outcome (Baker et al., 2022). We observe parallel trends in the outcome during pre-treatment period.

Figure 4. Impact of Charter Impact on Racial Composition (K8)

4.1. White Share



4.2. Black Share



4.3. Hispanic Share

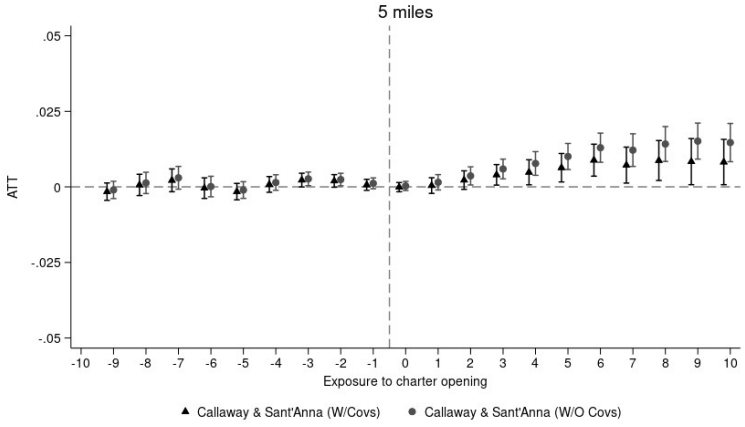
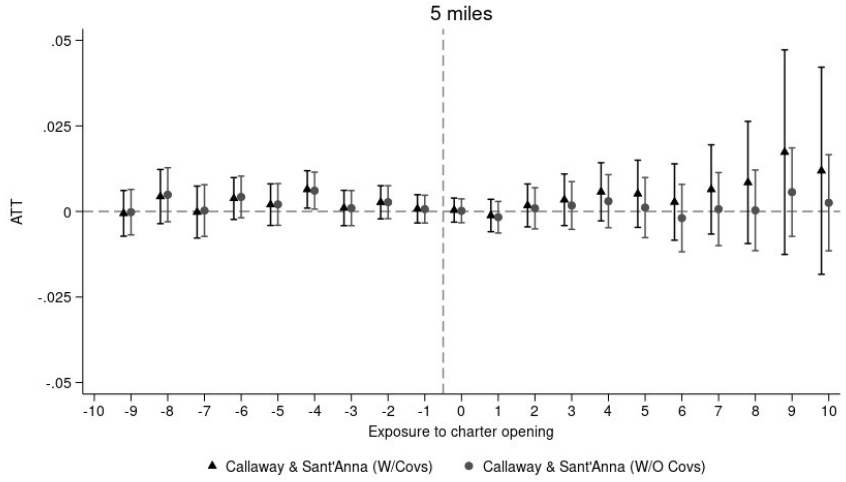


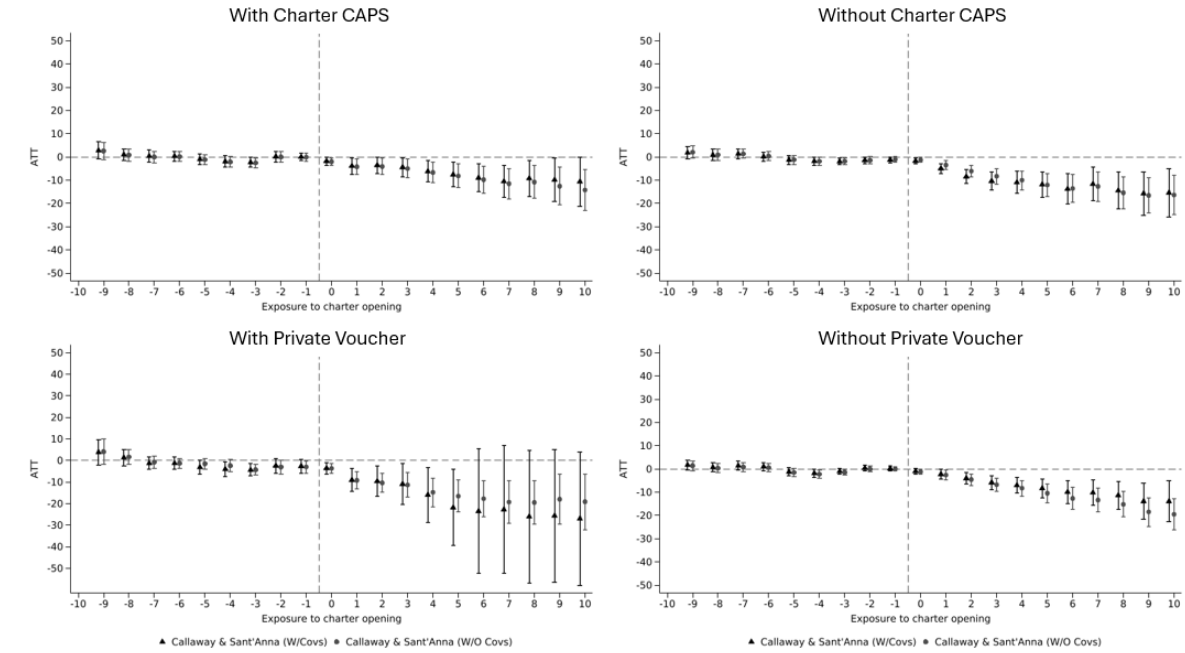
Figure 5. Impact of Charter Impact on Racial Diversity (Entropy Score, K8)



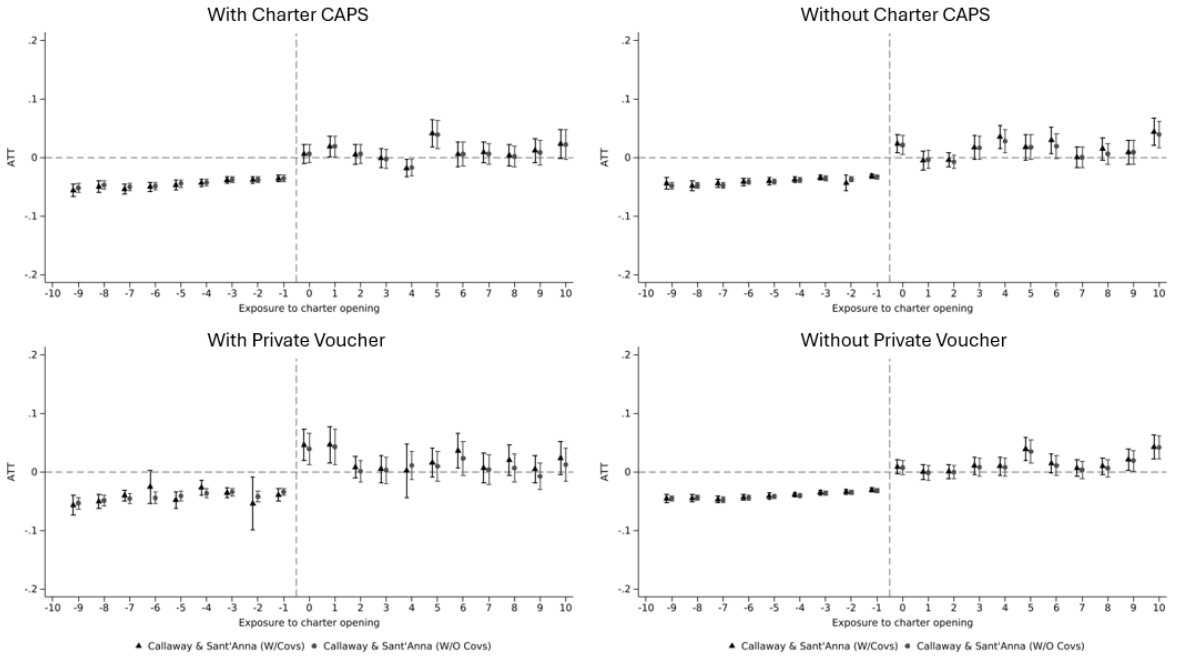
Notes: We present in Table A2 the details on the estimates from Figure 4 and 5. Table A2.1 reports the estimates with covariates and Table A2.2 reports the estimates without covariates.

Figure 6. Heterogeneity in Charter Impact on Enrollment and Closure by State Choice Policies

6.1. K8 Enrollment



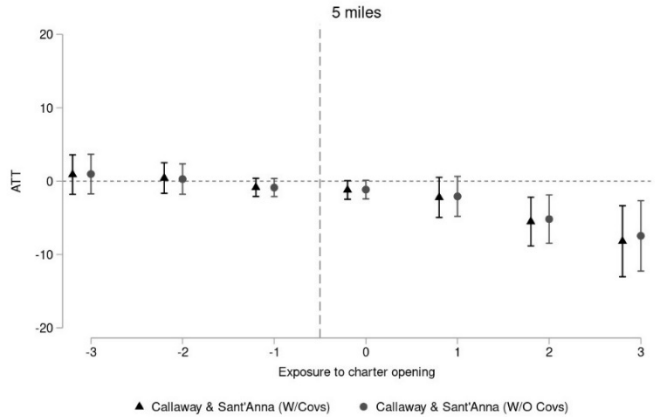
6.2. K8 School Closure



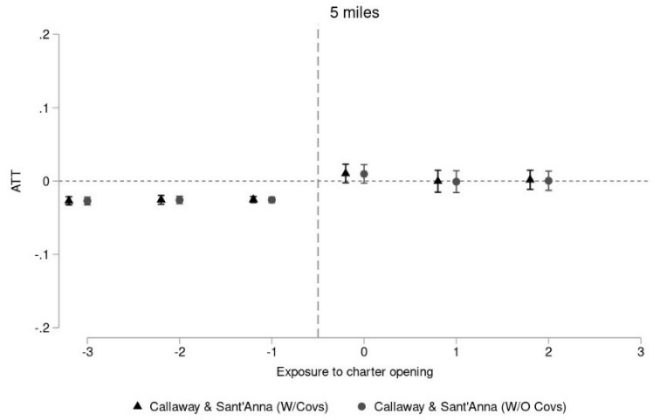
Notes: We present in Table A3 the details on the estimates from Figure 6.Table A4 and Figure A2 show the event study estimates by state choice policies for K8 racial diversity and racial composition outcomes.

Figure 7. Robustness Check (1): Event Study Impacts of Charter Opening Up to 2002

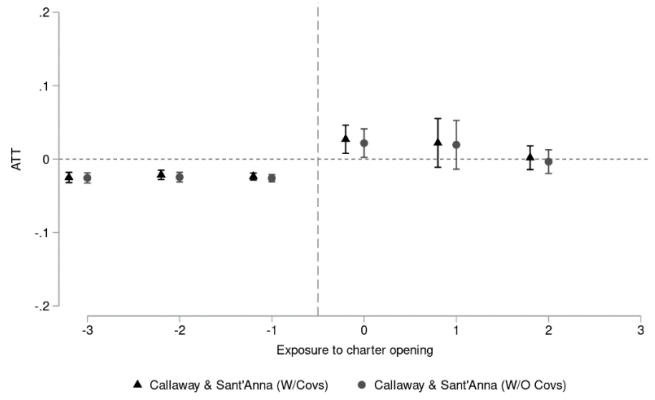
7.1. K8 Enrollment



7.2. K8 School Closure



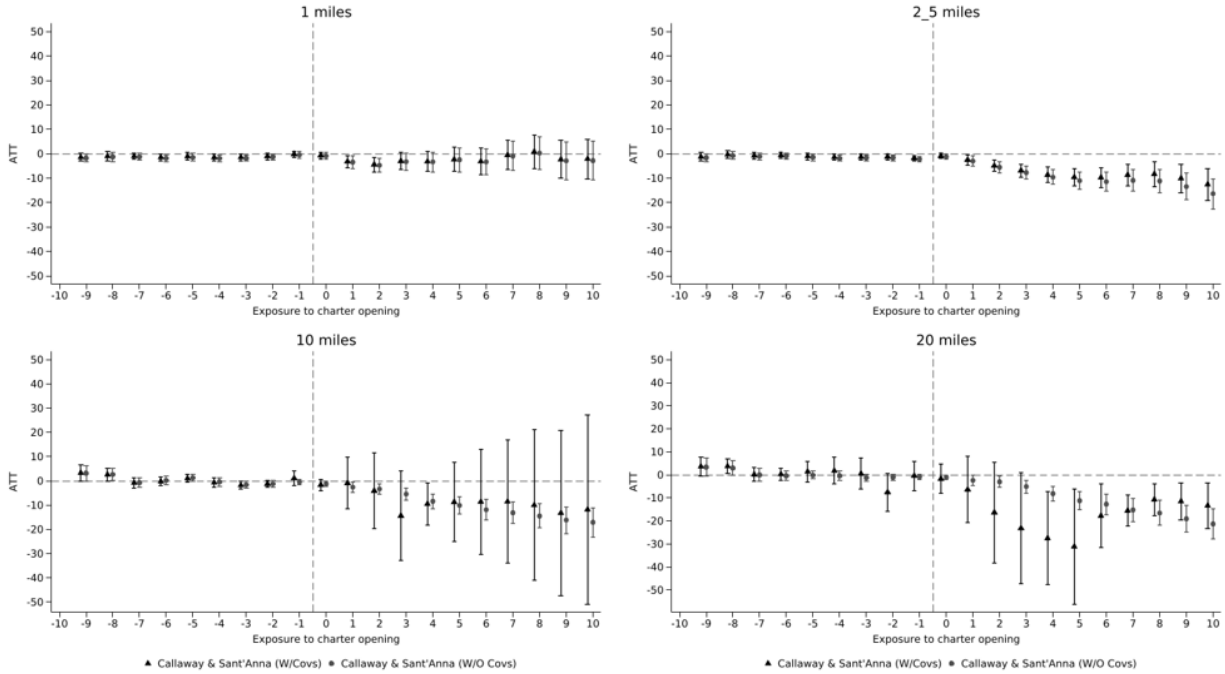
7.3. K8 School Closure (States without Charter Caps)



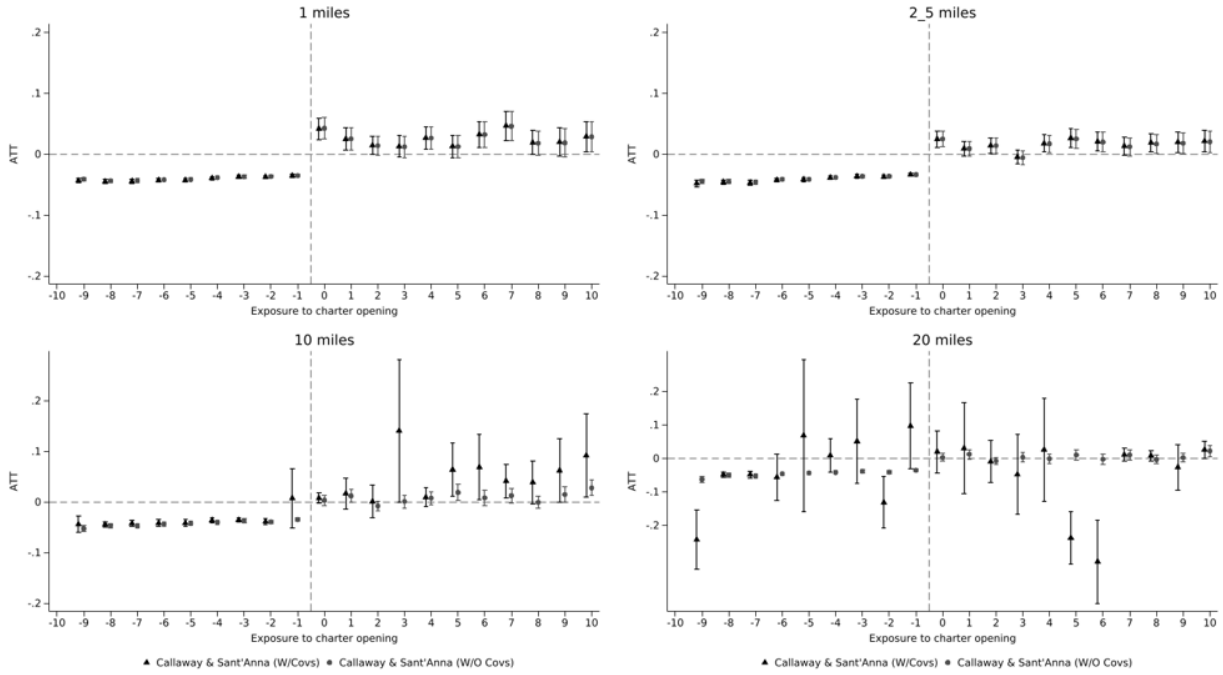
Notes: We present in Table A5 and Table A6 the details of the estimates from Figure 7. Table A7 and Figure A3 show the robustness check (1) estimates for K8 racial diversity and racial composition outcomes.

Figure 8. Robustness Check (2): Event Study Impacts of Charter Opening by Distances

8.1. K8 Enrollment



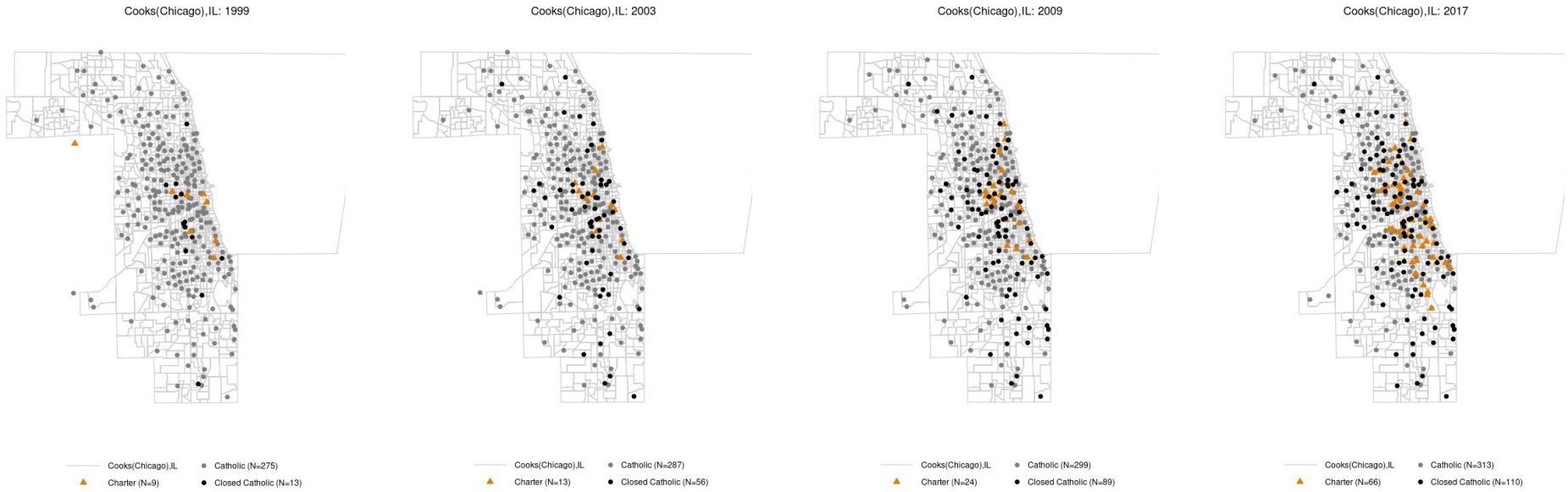
8.2. K8 School Closure



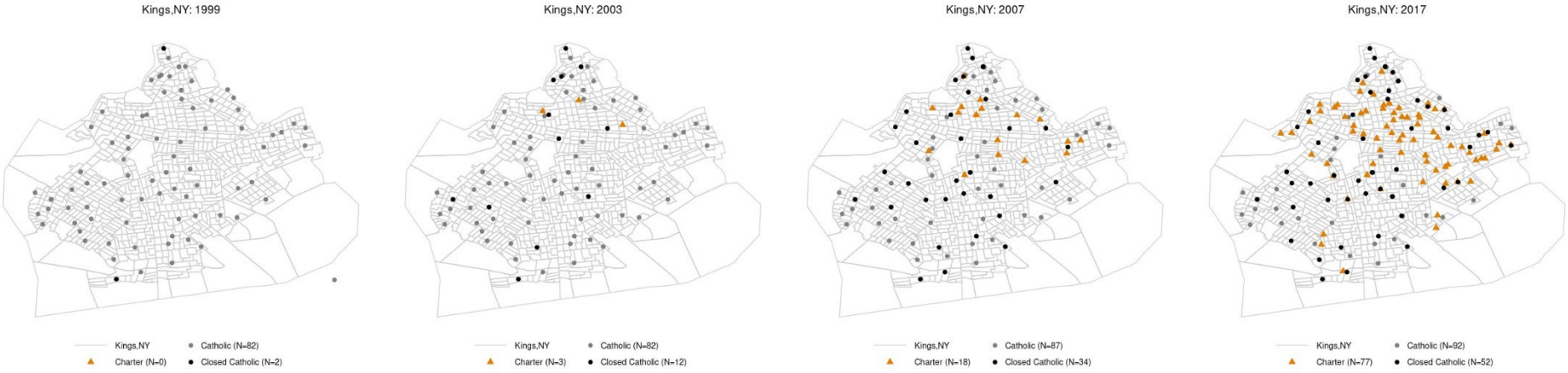
Notes: We present in Table A8 the details of the estimates from Figure 8. Table A9 and Figure A4 show the event study impacts by distances for K8 racial diversity and racial composition outcomes.

Figure 9. Location of Charter, Catholic, and Closed Catholic Schools

9.1. Cook County, IL



9.2. Kings County, NY



9.3. Wayne County, MI

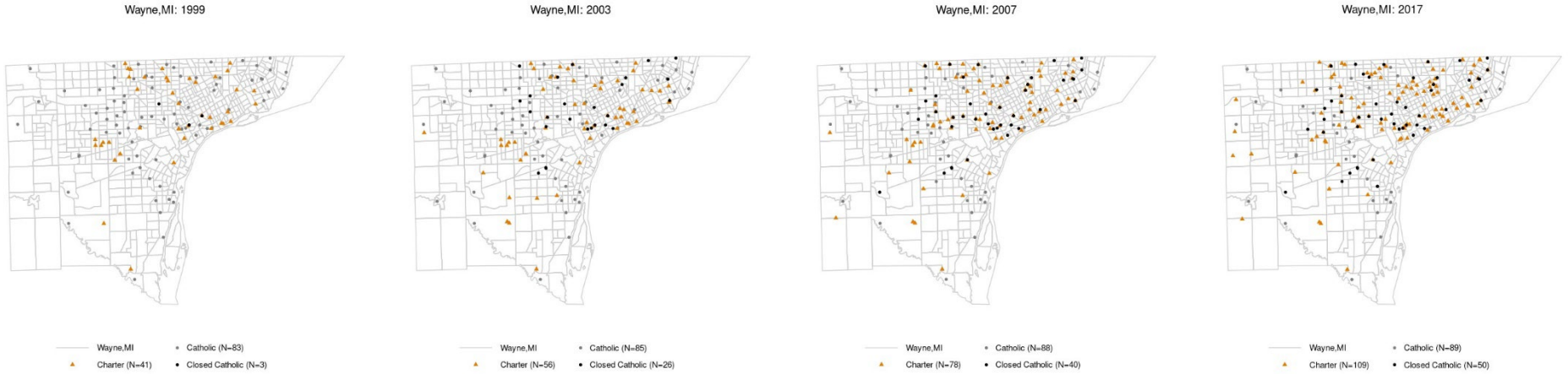
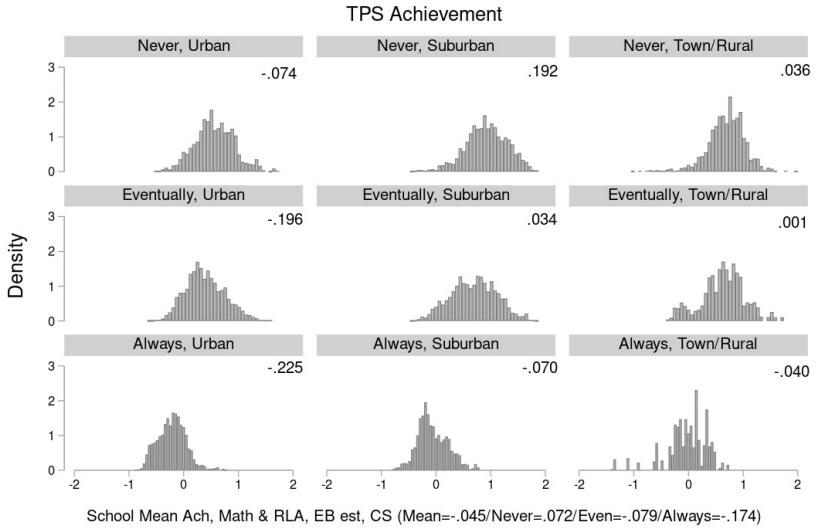
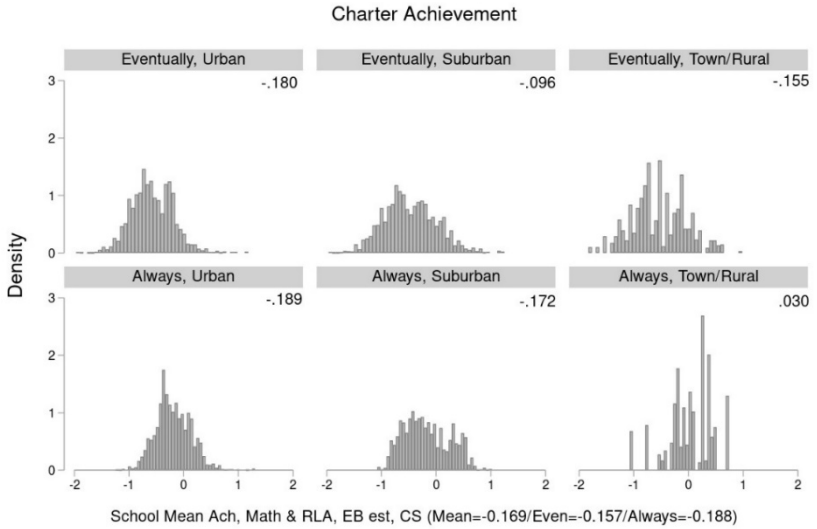


Figure 10. Math & ELA Achievement of Proximal Traditional Public and Charter Schools

10.1. Proximal Traditional Public Schools



10.2. Proximal Charter Schools



Note: To compare the academic performance of nearby free public-school options by treated groups (never, eventually, and always) and indirectly understand the motivations of students and parents to choose charter schools over Catholic schools, we utilize SEDA data within the NLSD. Initially, we compute the distances from Catholic schools to both traditional public schools (TPS) and charter schools, identifying those within a 5-mile radius of each Catholic school. Subsequently, we merge SEDA school-level data on ELA and Math achievement (EB est, CS) using TPS and Charter NCES IDs. Then, we calculate the average achievement of nearby TPS and Charter schools for each Catholic school and school year. Figure 10 presents histograms depicting the achievement levels of nearby public-school options, categorized by the urban status of the Catholic school's location and treated groups. Notably, the figures don't present the average achievement of nearby charter schools for never-treated Catholic schools, because 'never-treated' means that a charter school never existed within 5 miles during our data range.

Table 1. The Number and Total Enrollment of Charter and Catholic Schools by Year

	Charter		Catholic	
Year	N of schools	Enrollment	N of schools	Enrollment
1998	968	203,356		
1999	1,391	293,476	7,846	2,431,755
2000	1,759	390,710		
2001	2,082	493,165	7,978	2,449,689
2002	2,273	572,873		
2003	2,626	691,055	7,804	2,311,671
2004	3,065	790,715		
2005	3,353	902,518	7,530	2,194,821
2006	3,760	1,036,968		
2007	3,941	1,138,929	7,133	2,055,803
2008	4,214	1,293,052		
2009	4,486	1,456,267	7,150	1,986,098
2010	4,829	1,621,314		
2011	5,209	1,856,449	6,881	1,868,838
2012	5,582	2,070,957		
2013	6,039	2,320,998	6,408	1,715,239
2014	6,319	2,515,215		
2015	6,456	2,624,206	6,127	1,557,065
2016	6,556	2,809,546		
2017	6,773	2,912,289	6,479	1,577,583
2018	7,045	3,090,167		
2019	7,039	3,190,143	6,941	1,606,804
% Change 1999 to 2019	406.04%	987.02%	-11.53%	-33.92%

Table 2. Summary Statistics

Treated within **5 miles**	K8 Catholic Schools				High Catholic Schools			
	Never	Eventually	Always	Total	Never	Eventually	Always	Total
Outcome Measures: Mean (SD)								
Enrollment	211.54	285.71	278.39	250.68	411.33	596.45	522.59	506.49
	(154.84)	(177.80)	(179.83)	(171.97)	(307.80)	(366.55)	(384.57)	(355.92)
Racial Entropy	0.36	0.55	0.56	0.47	0.44	0.62	0.68	0.55
	(0.30)	(0.34)	(0.36)	(0.34)	(0.29)	(0.32)	(0.34)	(0.33)
Share of White	0.85	0.68	0.56	0.73	0.83	0.69	0.59	0.74
	(0.21)	(0.32)	(0.37)	(0.31)	(0.20)	(0.29)	(0.33)	(0.28)
Share of Black	0.04	0.10	0.16	0.08	0.05	0.10	0.15	0.08
	(0.11)	(0.21)	(0.28)	(0.20)	(0.10)	(0.17)	(0.23)	(0.16)
Share of Hispanic	0.06	0.15	0.21	0.12	0.06	0.14	0.20	0.12
	(0.13)	(0.23)	(0.29)	(0.21)	(0.13)	(0.20)	(0.25)	(0.19)
County-level Covariates								
Household Median	43242.85	45318.51	44459.95	44209.62	43551.71	44321.35	45552.22	44167.32
Income	(11428.00)	(11052.48)	(8716.64)	(10851.78)	(11890.72)	(10312.39)	(9585.11)	(10942.69)
K-12 Enrollment Size	79105.23	211822.29	391828.03	187129.28	82826.58	274057.73	344453.22	202108.58
	(187681.21)	(366240.60)	(526309.73)	(362191.77)	(175899.80)	(470724.46)	(418776.22)	(380012.62)
Outcome Measures: N (%)								
School Closure	1,131	621	542	2,294	197	100	80	377
	(35.68%)	(22.04%)	(22.76%)	(27.41%)	(27.48%)	(14.86%)	(20.30%)	(21.13%)
Average Distances: miles								
Catholic to Charter	11.27	4.27	2.08	5.60	11.70	4.65	2.43	5.93
	(4.15)	(3.73)	(1.75)	(5.00)	(4.22)	(3.90)	(2.23)	(5.04)
N of Schools	3,170	2,818	2,381	8,369	717	673	394	1,784
N of Observations	47,958	37,109	20,832	105,899	9,169	9,151	3,058	21,378

Notes: In our analysis, Catholic schools always treated by a Charter school and those without pair balanced (observed at t0 and t1) were omitted. School Closure presents the number of Catholic schools eventually closed by 2019 (NLSD alternative measure).

Appendix

Table A1. Charter CAPS and Private Voucher Policy by States

State	**Charter School Policy**					**Private School Voucher Policy** (For Non-Disability Students)				
	Charter	*CAPS Policy*								
	Law Passed	Exist at Least Once	First Implemented	Last Implemented	Decision (16states)	Exist 20/21	Type	Name of Voucher Program	First Enacted	Decision (9states)
Alabama	2015	Yes	2015	2020						
Alaska	1995	Yes	1995	2009	Yes					
Arizona	1994	Yes	1994	1999						
Arkansas	1995	Yes	1995		Yes					
California	1992	Yes	1992		Yes					
Colorado	1993									
Connecticut	1996	Yes	1996		Yes					
Delaware	1995									
District of Columbia	1995	Yes	1995		Yes	Yes	District	D.C. Opportunity Scholarship Program	2004	Yes
Florida	1996									
Georgia	1994									
Hawaii	1994	Yes	1994	2011	Yes					
Idaho	1998									
Illinois	1996	Yes	1996		Yes					
Indiana	2001	Yes	2001	2004		Yes	State	Choice Scholarship Program	2011	Yes
Iowa	2002	Yes	2002	2009						
Kansas	1994									
Kentucky	2017									
Louisiana	1995	Yes	1995	2008	Yes	Yes	State	Student Scholarships for Educational Excellence	2008	Yes
Maine	2011	Yes	2011			Yes	District	Town Tuitioning Program	1873	Yes
Maryland	2003					Yes	State	Broadening Options and Opportunities for Students Today (BOOST) Program	2015	Yes
Massachusetts	1993	Yes	1993		Yes					
Michigan	1993	CAPS on Charter "School of Excellence" and Cyber								
Minnesota	1992									
Mississippi	2013	Yes	2013							
Missouri	2012	Yes	2012							
Nevada	1997									
New Hampshire	1995					Yes	District	Town Tuitioning Program (Non-religious schools)		
New Jersey	1995									
New Mexico	1993	Yes	1993		Yes					
New York	1998	Yes	1998		Yes					

State	Charter School Policy					Private School Voucher Policy (For Non-Disability Students)				
	Charter Law Passed	*CAPS Policy* Exist at Least Once	First Implemented	Last Implemented	Decision (16states)	Exist 20-21	Type	Name of Voucher Program	First Enacted	Decision (9states)
North Carolina	1996	Yes	1996	2010	Yes	Yes	State	Opportunity Scholarships	2013	Yes
Ohio	1997	Yes	1997		Yes	Yes	District	Cleveland Scholarship	1995	Yes
							State	Program	2005	
							State	Educational Choice Scholarship Program	2013	
								Income-Based Scholarship Program		
Oklahoma	1997	Yes	1997		Yes					
Oregon	1999									
Pennsylvania	1997	CAPS on Enrollment in some districts								
Rhode Island	1995	Yes	1995		Yes					
South Carolina	1996									
Tennessee	2002									
Texas	1995	Yes	1995		Yes					
Utah	1998	CAPS on Enrollment								
Vermont	No Charter School Law					Yes	District	Vermont – Town Tuitioning Program	1869	Yes
Virginia	1998									
Washington	2015	Yes	2015							
West Virginia	2019	Yes	2019							
Wisconsin	1993	CAPS on the number of charter schools authorized by the college of Menominee Nation and the Lac Courte Orielles Ojibwa community college				Yes	District	Milwaukee Parental Choice Program	1990	Yes
							State		2013	
							District	Parental Choice Program (Statewide)	2011	
								Parental Private School Choice Program (Racine)		
Wyoming	1995	Yes	2021							

Note: Montana, Nebraska, North Dakota, South Dakota, and Virgin Islands don't have Charter School Law and Private Voucher program by SY 2020-21. We define 'States with CAPS Policy' as the states that 1) had Charter CAPS policy on the number of Charter schools (excluded enrollment-based CAPS policy and CAPS only on specific groups such as community college or some districts), and 2) had Charter CAPS policy for at least 8 years including early 2000s when the expansion of Charter schools was significant. We define 'States with Private Voucher Policy' as the states that 1) had Private Voucher program eligible for non-disability students (excluded Voucher programs for students with disability and those not for religious schools), 2) had Voucher program at least 4 years during our panel.

Table A2.1. Event Study Impacts of Charter Opening on Enrollment, Closure, Racial Diversity, and Shares (With Covariates)

School Level	**K-8**		**High**			**K-8**		
Outcome	Enrollment	Closure	Enrollment	Closure	Racial Entropy	White	Black	Hispanic
Event ATET								
Pre-Avg	-0.177	-0.041***	0.135	-0.033***	0.002*	-0.002***	0.001*	0.001
	(0.360)	(0.002)	(1.117)	(0.003)	(0.001)	(0.001)	(0.000)	(0.000)
Post-Avg	-10.131***	0.015***	6.741	0.008	0.006	-0.014***	0.006***	0.005**
	(1.825)	(0.002)	(10.762)	(0.004)	(0.005)	(0.003)	(0.001)	(0.002)
Duration of Exposure ATET								
Time=0	-1.681**	0.016**	-1.788	0.017	0.000	-0.001	0.001	-0.000
	(0.517)	(0.006)	(1.944)	(0.011)	(0.002)	(0.001)	(0.001)	(0.001)
Time=1	-3.979***	0.010	-0.155	0.009	-0.001	-0.002	0.002	0.000
	(0.984)	(0.006)	(3.433)	(0.013)	(0.002)	(0.002)	(0.001)	(0.001)
Time=2	-5.579***	0.000	2.897	-0.006	0.002	-0.005*	0.003*	0.002
	(1.112)	(0.005)	(4.531)	(0.008)	(0.003)	(0.002)	(0.001)	(0.002)
Time=3	-7.209***	0.009	2.256	0.004	0.003	-0.009***	0.004*	0.004*
	(1.345)	(0.006)	(5.137)	(0.012)	(0.004)	(0.003)	(0.002)	(0.002)
Time=4	-8.932***	0.011	3.220	-0.003	0.006	-0.013***	0.006***	0.005*
	(1.565)	(0.007)	(6.222)	(0.010)	(0.004)	(0.003)	(0.002)	(0.002)
Time=5	-10.614***	0.033***	1.926	0.007	0.005	-0.017***	0.008***	0.006**
	(1.838)	(0.008)	(7.531)	(0.011)	(0.005)	(0.003)	(0.002)	(0.002)
Time=6	-12.235***	0.018*	4.429	0.015	0.003	-0.018***	0.007***	0.009**
	(2.194)	(0.007)	(8.589)	(0.012)	(0.006)	(0.004)	(0.002)	(0.003)
Time=7	-12.936***	0.006	-0.186	0.007	0.006	-0.018***	0.006**	0.007*
	(2.464)	(0.006)	(9.629)	(0.013)	(0.007)	(0.004)	(0.002)	(0.003)
Time=8	-14.289***	0.010	20.542	0.005	0.008	-0.023***	0.007**	0.009**
	(2.877)	(0.006)	(29.735)	(0.010)	(0.009)	(0.004)	(0.002)	(0.003)
Time=9	-16.820***	0.014	22.884	0.026	0.017	-0.025***	0.009***	0.008*
	(4.228)	(0.008)	(36.449)	(0.016)	(0.015)	(0.005)	(0.003)	(0.004)
Time=10	-17.164***	0.035***	18.124	0.006	0.012	-0.025***	0.008**	0.008*
	(4.924)	(0.009)	(36.896)	(0.011)	(0.015)	(0.006)	(0.003)	(0.004)
Simple ATET	-9.367***	0.014***	5.773	0.007	0.005	-0.013***	0.005***	0.005**
	(1.640)	(0.002)	(9.259)	(0.004)	(0.005)	(0.002)	(0.001)	(0.002)
N of Observations	84,167	84,167	17,957	17,957	84,167	84,167	84,167	84,167

Table A2.2. Event Study Impacts of Charter Opening on Enrollment, Closure, Racial Diversity, and Shares (Without Covariates)

School Level	**K-8**		**High**			**K-8**		
Outcome	Enrollment	Closure	Enrollment	Closure	Racial Entropy	White	Black	Hispanic
Event ATET								
Pre-Avg	-0.455	-0.041***	-0.663	-0.035***	0.002**	-0.003***	0.001**	0.001*
	(0.353)	(0.002)	(1.091)	(0.003)	(0.001)	(0.001)	(0.000)	(0.000)
Post-Avg	-11.146***	0.012***	-7.925	0.007	0.001	-0.019***	0.006***	0.009***
	(1.563)	(0.002)	(6.096)	(0.004)	(0.004)	(0.002)	(0.001)	(0.002)
Duration of Exposure ATET								
Time=0	-1.787***	0.015**	-2.056	0.016	0.000	-0.001	0.001	0.000
	(0.516)	(0.006)	(1.916)	(0.011)	(0.002)	(0.001)	(0.001)	(0.001)
Time=1	-4.164***	0.009	-1.721	0.009	-0.002	-0.003	0.002	0.002
	(0.982)	(0.006)	(3.388)	(0.013)	(0.002)	(0.002)	(0.001)	(0.001)
Time=2	-5.886***	-0.001	0.086	-0.007	0.001	-0.007**	0.003*	0.004*
	(1.100)	(0.005)	(4.452)	(0.008)	(0.003)	(0.002)	(0.001)	(0.002)
Time=3	-7.732***	0.006	-1.161	0.003	0.002	-0.012***	0.004**	0.006***
	(1.316)	(0.006)	(4.913)	(0.012)	(0.004)	(0.002)	(0.001)	(0.002)
Time=4	-9.689***	0.009	-2.794	-0.004	0.003	-0.017***	0.006***	0.008***
	(1.527)	(0.007)	(5.744)	(0.010)	(0.004)	(0.003)	(0.002)	(0.002)
Time=5	-11.855***	0.029***	-5.707	0.007	0.001	-0.021***	0.009***	0.010***
	(1.781)	(0.008)	(6.672)	(0.011)	(0.004)	(0.003)	(0.002)	(0.002)
Time=6	-13.805***	0.014	-3.865	0.013	-0.002	-0.023***	0.008***	0.013***
	(2.084)	(0.007)	(7.705)	(0.011)	(0.005)	(0.003)	(0.002)	(0.002)
Time=7	-14.623***	0.004	-10.911	0.002	0.001	-0.023***	0.007***	0.012***
	(2.277)	(0.006)	(8.431)	(0.012)	(0.005)	(0.004)	(0.002)	(0.003)
Time=8	-16.019***	0.006	-14.617	0.003	0.000	-0.029***	0.008***	0.014***
	(2.475)	(0.006)	(9.321)	(0.010)	(0.006)	(0.004)	(0.002)	(0.003)
Time=9	-18.041***	0.012	-20.036	0.028	0.006	-0.035***	0.009***	0.015***
	(2.779)	(0.007)	(10.688)	(0.016)	(0.007)	(0.004)	(0.002)	(0.003)
Time=10	-19.005***	0.034***	-24.398*	0.004	0.003	-0.037***	0.007**	0.015***
	(3.067)	(0.009)	(11.707)	(0.010)	(0.007)	(0.004)	(0.002)	(0.003)
Simple ATET	-10.291***	0.012***	-6.939	0.006	0.001	-0.017***	0.005***	0.008***
	(1.441)	(0.002)	(5.682)	(0.004)	(0.003)	(0.002)	(0.001)	(0.002)
N of Observations	84,167	84,167	17,957	17,957	84,167	84,167	84,167	84,167

Figure A1. Event Study Impacts of Charter Opening on Closure (TWFE Approach)

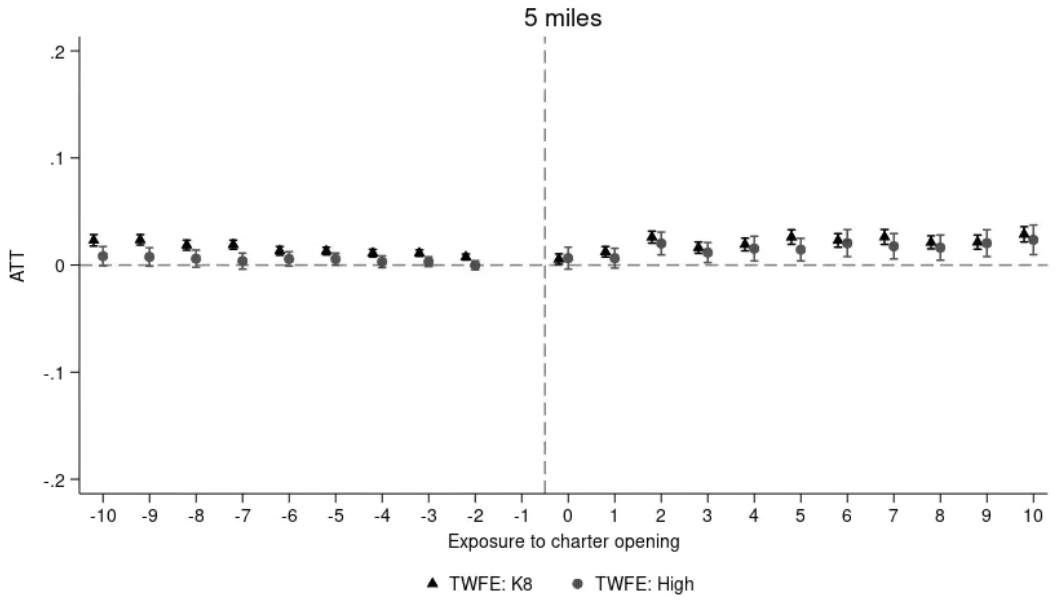


Table A3.1. Heterogeneity by State Choice Policies: K8 Enrollment and Closure (With Covariates)

Outcome	**Total Enrollment**				**School Closure**			
State-level Policy	Charter CAP		Private Voucher		Charter CAP		Private Voucher	
	Yes	No	Yes	No	Yes	No	Yes	No
Event ATET								
Pre-Avg	-0.064	-0.407	-1.580	0.134	-0.046***	-0.041***	-0.042***	-0.040***
	(0.568)	(0.463)	(0.890)	(0.424)	(0.003)	(0.003)	(0.006)	(0.002)
Post-Avg	-6.983**	-10.846***	-17.829*	-7.989***	0.009**	0.016***	0.019***	0.015***
	(2.487)	(2.555)	(9.023)	(1.964)	(0.003)	(0.003)	(0.005)	(0.003)
Duration of Exposure ATET								
Time=0	-1.856*	-1.751**	-3.651**	-1.019	0.006	0.023**	0.045***	0.008
	(0.893)	(0.578)	(1.390)	(0.565)	(0.008)	(0.008)	(0.014)	(0.006)
Time=1	-3.911*	-5.019***	-9.115***	-2.269*	0.019*	-0.005	0.046**	-0.000
	(1.752)	(1.059)	(2.690)	(1.105)	(0.009)	(0.008)	(0.016)	(0.006)
Time=2	-3.633*	-8.495***	-9.626**	-4.046**	0.005	-0.004	0.008	0.000
	(1.802)	(1.551)	(3.622)	(1.274)	(0.008)	(0.006)	(0.009)	(0.006)
Time=3	-4.498*	-10.351***	-10.924*	-5.898***	-0.001	0.017	0.005	0.011
	(2.089)	(1.983)	(4.812)	(1.506)	(0.008)	(0.010)	(0.012)	(0.008)
Time=4	-6.242**	-10.937***	-15.957*	-7.000***	-0.019*	0.035***	0.002	0.010
	(2.340)	(2.379)	(6.443)	(1.750)	(0.008)	(0.010)	(0.024)	(0.008)
Time=5	-7.536**	-11.825***	-21.889*	-8.357***	0.041***	0.017	0.016	0.039***
	(2.693)	(2.752)	(9.012)	(2.098)	(0.012)	(0.011)	(0.013)	(0.010)
Time=6	-8.945**	-13.737***	-23.559	-9.941***	0.005	0.029*	0.036*	0.014
	(3.113)	(3.372)	(14.768)	(2.532)	(0.011)	(0.012)	(0.015)	(0.009)
Time=7	-10.507**	-11.624**	-22.716	-10.160***	0.009	0.000	0.007	0.006
	(3.493)	(3.716)	(15.096)	(2.750)	(0.009)	(0.009)	(0.013)	(0.007)
Time=8	-9.240*	-14.434***	-26.035	-11.383***	0.004	0.015	0.020	0.010
	(3.908)	(4.108)	(15.690)	(3.121)	(0.009)	(0.010)	(0.013)	(0.007)
Time=9	-9.831*	-15.706***	-25.640	-13.879***	0.012	0.009	0.004	0.021*
	(4.807)	(4.762)	(15.672)	(4.028)	(0.011)	(0.011)	(0.012)	(0.009)
Time=10	-10.611	-15.428**	-27.006	-13.927**	0.023	0.043***	0.023	0.042***
	(5.416)	(5.277)	(15.742)	(4.540)	(0.013)	(0.012)	(0.014)	(0.010)
Simple ATET	-6.570**	-10.203***	-16.571*	-7.354***	0.009**	0.017***	0.021***	0.014***
	(2.298)	(2.309)	(8.096)	(1.788)	(0.003)	(0.003)	(0.005)	(0.003)
N of Observations	34,641	45,723	19,305	64,862	34,641	45,723	19,305	64,862

Table A3.2. Heterogeneity by State Choice Policies: K8 Enrollment and Closure (Without Covariates)

Outcome	**Total Enrollment**				**School Closure**			
State-level Policy	Charter CAP		Private Voucher		Charter CAP		Private Voucher	
	Yes	No	Yes	No	Yes	No	Yes	No
Event ATET								
Pre-Avg	-0.257	-0.274	-1.155	-0.213	-0.044***	-0.041***	-0.042***	-0.041***
	(0.562)	(0.434)	(0.680)	(0.416)	(0.003)	(0.002)	(0.004)	(0.002)
Post-Avg	-8.089***	-10.518***	-14.492***	-10.272***	0.009*	0.013***	0.013**	0.012***
	(2.319)	(2.175)	(3.336)	(1.765)	(0.004)	(0.003)	(0.005)	(0.003)
Duration of Exposure ATET								
Time=0	-2.042*	-1.275*	-3.655**	-1.209*	0.006	0.021**	0.039**	0.007
	(0.894)	(0.544)	(1.173)	(0.564)	(0.008)	(0.008)	(0.014)	(0.006)
Time=1	-4.214*	-3.454***	-9.183***	-2.589*	0.019*	-0.004	0.043**	-0.001
	(1.749)	(0.952)	(2.110)	(1.100)	(0.009)	(0.008)	(0.016)	(0.006)
Time=2	-4.090*	-6.077***	-10.403***	-4.530***	0.006	-0.008	0.001	-0.001
	(1.792)	(1.338)	(2.261)	(1.255)	(0.008)	(0.006)	(0.009)	(0.006)
Time=3	-4.970*	-8.294***	-11.350***	-6.755***	-0.003	0.017	0.003	0.008
	(2.069)	(1.684)	(2.920)	(1.465)	(0.008)	(0.010)	(0.011)	(0.008)
Time=4	-6.666**	-9.987***	-14.762***	-8.271***	-0.017*	0.028**	0.011	0.008
	(2.310)	(2.067)	(3.420)	(1.695)	(0.007)	(0.010)	(0.012)	(0.008)
Time=5	-8.138**	-12.041***	-16.501***	-10.427***	0.039**	0.017	0.010	0.035***
	(2.639)	(2.469)	(3.825)	(2.023)	(0.012)	(0.011)	(0.013)	(0.010)
Time=6	-9.784**	-13.574***	-17.708***	-12.670***	0.006	0.019	0.023	0.011
	(2.976)	(3.007)	(4.337)	(2.395)	(0.010)	(0.011)	(0.015)	(0.009)
Time=7	-11.480***	-12.641***	-19.290***	-13.351***	0.006	0.000	0.004	0.003
	(3.303)	(3.246)	(5.014)	(2.547)	(0.009)	(0.009)	(0.013)	(0.007)
Time=8	-10.816**	-15.416***	-19.464***	-15.210***	0.002	0.006	0.006	0.006
	(3.616)	(3.513)	(5.209)	(2.811)	(0.009)	(0.009)	(0.013)	(0.007)
Time=9	-12.571**	-16.565***	-17.971**	-18.468***	0.008	0.009	-0.008	0.019*
	(4.125)	(3.886)	(5.909)	(3.136)	(0.011)	(0.011)	(0.012)	(0.009)
Time=10	-14.205**	-16.376***	-19.124**	-19.508***	0.022	0.039***	0.012	0.042***
	(4.540)	(4.298)	(6.608)	(3.438)	(0.013)	(0.012)	(0.014)	(0.010)
Simple ATET	-7.547***	-9.708***	-13.725***	-9.370***	0.009*	0.013***	0.015**	0.011***
	(2.161)	(1.977)	(3.068)	(1.628)	(0.003)	(0.003)	(0.005)	(0.003)
N of Observations	34,641	45,723	19,305	64,862	34,641	45,723	19,305	64,862

Table A4.1. Heterogeneity by State Choice Policies: K8 Racial Diversity and Shares (With Covariates)

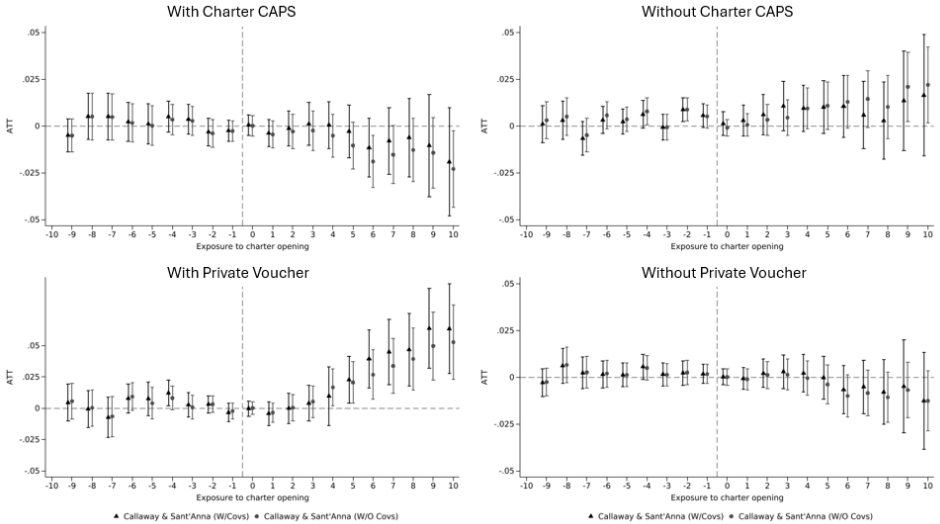
Outcome	**Racial Entropy**				**White Share**				**Black Share**				**Hispanic Share**			
State-level Policy	Charter CAP		Private Voucher		Charter CAP		Private Voucher		Charter CAP		Private Voucher		Charter CAP		Private Voucher	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Event ATET																
Pre-Avg	0.001	0.003*	0.003	0.002	-0.003***	-0.001	-0.002	-0.003***	0.001	0.001*	0.002*	0.000	0.001*	0.000	-0.000	0.001*
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Post-Avg	-0.006	0.008	0.026**	-0.003	-0.005	-0.020***	-0.036***	-0.009**	0.001	0.008***	0.012***	0.003	0.002	0.011***	0.013***	0.004
	(0.007)	(0.007)	(0.009)	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)	(0.002)	(0.002)	(0.004)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)
Duration of Exposure ATET																
Time=0	0.001	0.001	-0.000	0.000	0.000	-0.001	-0.002	-0.000	-0.000	0.002	0.000	0.001	-0.001	0.000	0.001*	-0.000
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Time=1	-0.004	0.003	-0.004	-0.001	0.001	-0.006*	-0.005	-0.001	-0.001	0.004**	0.001	0.001	-0.001	0.003	0.001	0.000
	(0.004)	(0.004)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
Time=2	-0.001	0.006	-0.000	0.002	0.002	-0.012***	-0.010*	-0.003	-0.000	0.006**	0.003	0.002	0.000	0.006*	0.003	0.002
	(0.005)	(0.005)	(0.006)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Time=3	0.001	0.011	0.004	0.003	-0.002	-0.018***	-0.016***	-0.007*	-0.000	0.007**	0.004	0.003	0.001	0.009**	0.007*	0.004
	(0.006)	(0.007)	(0.007)	(0.005)	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)
Time=4	0.001	0.009	0.010	0.002	-0.006	-0.020***	-0.024***	-0.010**	0.003	0.008**	0.009*	0.004*	0.002	0.010***	0.005	0.004
	(0.006)	(0.006)	(0.012)	(0.005)	(0.004)	(0.004)	(0.007)	(0.003)	(0.002)	(0.002)	(0.004)	(0.002)	(0.003)	(0.003)	(0.005)	(0.003)
Time=5	-0.003	0.010	0.023*	-0.000	-0.008	-0.026***	-0.038***	-0.012**	0.004	0.012***	0.016**	0.005*	0.003	0.012***	0.010**	0.006*
	(0.007)	(0.007)	(0.010)	(0.006)	(0.005)	(0.005)	(0.007)	(0.004)	(0.003)	(0.003)	(0.005)	(0.002)	(0.004)	(0.003)	(0.004)	(0.003)
Time=6	-0.012	0.010	0.039***	-0.007	-0.007	-0.027***	-0.046***	-0.014**	0.003	0.011***	0.018***	0.004*	0.004	0.015***	0.015***	0.008*
	(0.008)	(0.008)	(0.012)	(0.006)	(0.005)	(0.005)	(0.008)	(0.004)	(0.003)	(0.003)	(0.005)	(0.002)	(0.004)	(0.004)	(0.004)	(0.003)
Time=7	-0.008	0.006	0.045***	-0.005	-0.007	-0.021***	-0.052***	-0.010*	0.002	0.009**	0.016**	0.004	0.003	0.012**	0.021***	0.005
	(0.009)	(0.009)	(0.013)	(0.007)	(0.006)	(0.006)	(0.008)	(0.004)	(0.003)	(0.003)	(0.005)	(0.002)	(0.004)	(0.005)	(0.005)	(0.004)
Time=8	-0.006	0.003	0.047**	-0.008	-0.012	-0.023***	-0.061***	-0.014**	0.003	0.010***	0.020***	0.003	0.005	0.013*	0.025***	0.006
	(0.011)	(0.011)	(0.015)	(0.009)	(0.006)	(0.007)	(0.009)	(0.005)	(0.004)	(0.003)	(0.006)	(0.002)	(0.005)	(0.006)	(0.005)	(0.004)
Time=9	-0.010	0.013	0.064***	-0.005	-0.012	-0.030***	-0.071***	-0.014**	0.004	0.011***	0.025***	0.003	0.004	0.018***	0.026***	0.007
	(0.014)	(0.014)	(0.016)	(0.013)	(0.007)	(0.007)	(0.010)	(0.006)	(0.004)	(0.003)	(0.006)	(0.002)	(0.005)	(0.005)	(0.006)	(0.004)
Time=10	-0.019	0.016	0.063***	-0.013	-0.009	-0.035***	-0.076***	-0.014*	-0.000	0.011**	0.023***	0.001	0.003	0.021***	0.025***	0.006
	(0.015)	(0.017)	(0.018)	(0.013)	(0.007)	(0.009)	(0.012)	(0.006)	(0.004)	(0.004)	(0.007)	(0.003)	(0.005)	(0.005)	(0.006)	(0.004)
Simple ATET	-0.005	0.008	0.022**	-0.002	-0.005	-0.019***	-0.032***	-0.008**	0.001	0.008***	0.011**	0.003*	0.002	0.010***	0.011***	0.004
	(0.006)	(0.006)	(0.008)	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)	(0.002)	(0.002)	(0.003)	(0.001)	(0.003)	(0.003)	(0.003)	(0.002)
N of Observations	34,641	45,723	19,305	64,862	34,641	45,723	19,305	64,862	34,641	45,723	19,305	64,862	34,641	45,723	19,305	64,862

Table A4.2. Heterogeneity by State Choice Policies: K8 Racial Diversity and Shares (Without Covariates)

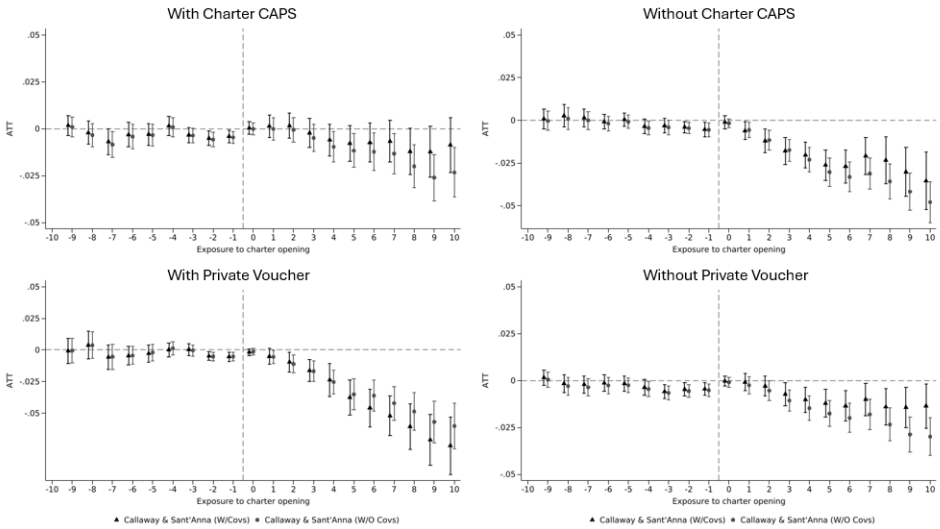
Outcome	**Racial Entropy**				**White Share**				**Black Share**				**Hispanic Share**			
State-level Policy	Charter CAP		Private Voucher		Charter CAP		Private Voucher		Charter CAP		Private Voucher		Charter CAP		Private Voucher	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Event ATET																
Pre-Avg	0.001	0.004***	0.002	0.002*	-0.004***	-0.002**	-0.002	-0.004***	0.001	0.001**	0.002**	0.000	0.002***	0.000	-0.000	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Post-Avg	-0.010	0.010	0.022**	-0.005	-0.011**	-0.025***	-0.031***	-0.016***	0.002	0.010***	0.012***	0.004*	0.007*	0.011***	0.011***	0.008***
	(0.005)	(0.005)	(0.007)	(0.004)	(0.004)	(0.003)	(0.005)	(0.003)	(0.002)	(0.002)	(0.003)	(0.001)	(0.003)	(0.002)	(0.003)	(0.002)
Duration of Exposure ATET																
Time=0	0.000	-0.001	0.000	0.000	-0.000	-0.002	-0.001	-0.001	-0.000	0.002*	0.001	0.001	-0.000	0.001	0.001	-0.000
	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Time=1	-0.005	0.001	-0.004	-0.001	-0.000	-0.006*	-0.005*	-0.003	-0.001	0.004**	0.002	0.002	0.000	0.003	0.001	0.002
	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
Time=2	-0.003	0.003	0.000	0.001	-0.001	-0.012***	-0.011**	-0.005*	0.000	0.006***	0.006*	0.003	0.002	0.005*	0.003	0.004*
	(0.005)	(0.004)	(0.005)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Time=3	-0.002	0.004	0.005	0.001	-0.005	-0.017***	-0.017***	-0.011***	0.000	0.007***	0.005	0.004*	0.004	0.008***	0.007**	0.006**
	(0.005)	(0.005)	(0.006)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
Time=4	-0.005	0.009	0.017*	-0.000	-0.010*	-0.023***	-0.025***	-0.015***	0.003	0.009***	0.010**	0.005**	0.005	0.010***	0.009**	0.008**
	(0.006)	(0.006)	(0.007)	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)
Time=5	-0.011	0.011	0.021*	-0.004	-0.012*	-0.030***	-0.035***	-0.018***	0.005	0.013***	0.017***	0.006**	0.007*	0.012***	0.011**	0.010***
	(0.006)	(0.006)	(0.009)	(0.005)	(0.005)	(0.004)	(0.006)	(0.004)	(0.003)	(0.003)	(0.005)	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)
Time=6	-0.019**	0.013	0.027**	-0.010	-0.012*	-0.033***	-0.036***	-0.020***	0.003	0.013***	0.015***	0.005*	0.009*	0.016***	0.014***	0.013***
	(0.007)	(0.007)	(0.010)	(0.006)	(0.005)	(0.004)	(0.006)	(0.004)	(0.003)	(0.003)	(0.004)	(0.002)	(0.004)	(0.003)	(0.004)	(0.003)
Time=7	-0.015	0.014	0.034**	-0.008	-0.013*	-0.031***	-0.042***	-0.018***	0.003	0.012***	0.014**	0.005*	0.009*	0.015***	0.018***	0.010**
	(0.008)	(0.008)	(0.011)	(0.006)	(0.005)	(0.005)	(0.007)	(0.004)	(0.003)	(0.003)	(0.005)	(0.002)	(0.004)	(0.004)	(0.005)	(0.003)
Time=8	-0.013	0.010	0.039**	-0.011	-0.020***	-0.036***	-0.049***	-0.023***	0.003	0.013***	0.018**	0.004	0.012**	0.016***	0.021***	0.012***
	(0.009)	(0.009)	(0.013)	(0.007)	(0.006)	(0.005)	(0.008)	(0.004)	(0.003)	(0.003)	(0.006)	(0.002)	(0.004)	(0.004)	(0.005)	(0.003)
Time=9	-0.014	0.021*	0.050***	-0.007	-0.026***	-0.042***	-0.057***	-0.029***	0.004	0.014***	0.022***	0.004	0.012**	0.019***	0.020***	0.014***
	(0.010)	(0.009)	(0.014)	(0.008)	(0.006)	(0.006)	(0.008)	(0.005)	(0.004)	(0.003)	(0.006)	(0.002)	(0.005)	(0.004)	(0.006)	(0.004)
Time=10	-0.023*	0.022*	0.053***	-0.013	-0.023***	-0.048***	-0.060***	-0.030***	0.001	0.015***	0.021***	0.003	0.011*	0.020***	0.019**	0.013***
	(0.010)	(0.010)	(0.015)	(0.008)	(0.007)	(0.006)	(0.009)	(0.005)	(0.004)	(0.003)	(0.006)	(0.002)	(0.005)	(0.004)	(0.006)	(0.004)
Simple ATET	-0.009	0.009	0.019**	-0.004	-0.010**	-0.023***	-0.028***	-0.014***	0.002	0.009***	0.011***	0.004**	0.006*	0.010***	0.010***	0.008***
	(0.005)	(0.005)	(0.007)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)	(0.001)	(0.003)	(0.002)	(0.003)	(0.002)
N of Observations	34,641	45,723	19,305	64,862	34,641	45,723	19,305	64,862	34,641	45,723	19,305	64,862	34,641	45,723	19,305	64,862

Figure A2. Heterogeneity by State Choice Policies: K8 Racial Diversity and Shares

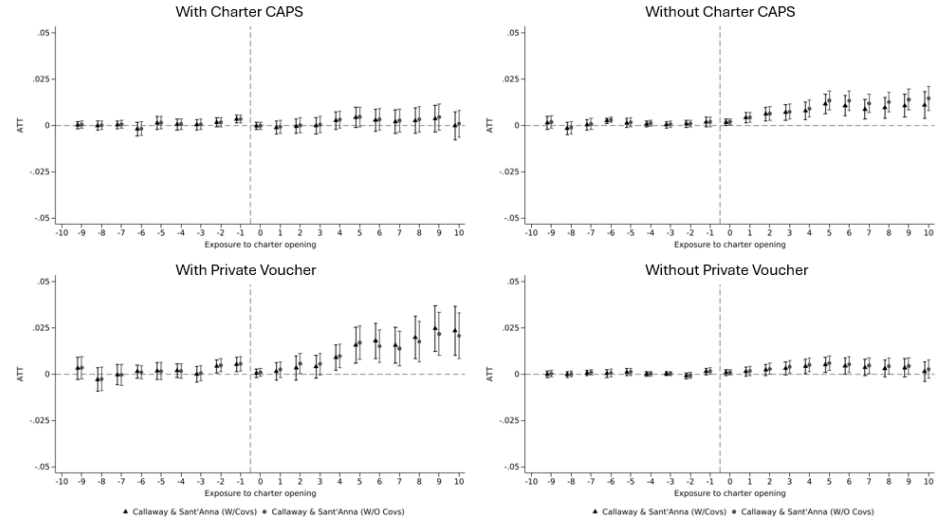
A2.1. Racial Entropy



A2.2. White Share



A2.3. Black Share



A2.4. Hispanic Share

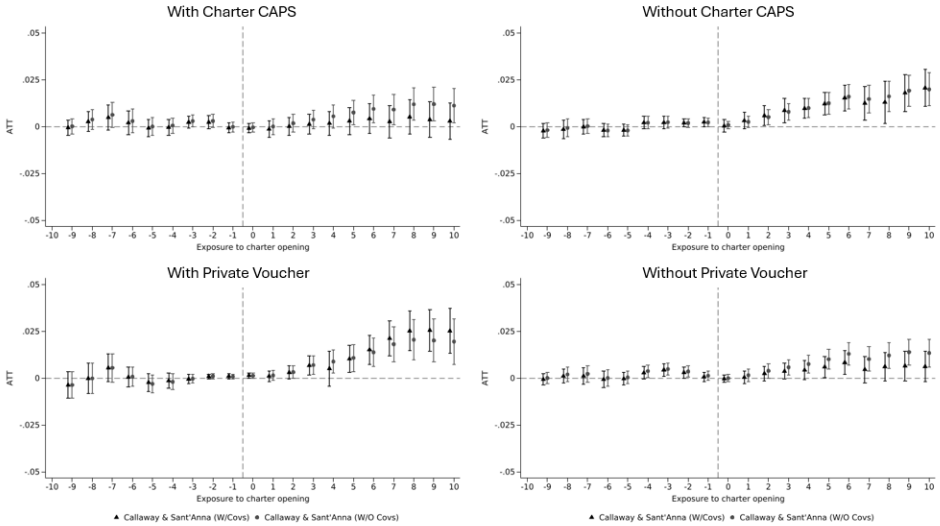


Table A5. Event Study Impacts of Charter Opening Up to 2002 (With Covariates)

School Level	**K-8**		**High**		**K-8**			
Outcome	Enrollment	Closure	Enrollment	Closure	Racial Entropy	White	Black	Hispanic
Event ATET								
Pre-Avg	0.156	-0.026***	2.234	-0.019***	-0.001	-0.003*	0.001	0.002
	(0.665)	(0.003)	(2.767)	(0.004)	(0.002)	(0.002)	(0.001)	(0.001)
Post-Avg	-4.283**	0.004	1.747	-0.013	-0.001	-0.008***	0.000	0.005**
	(1.315)	(0.004)	(4.994)	(0.009)	(0.004)	(0.002)	(0.002)	(0.002)
Duration of Exposure ATET								
Time=0	-1.202	0.010	-2.308	-0.001	0.000	-0.002	0.001	0.000
	(0.649)	(0.006)	(3.062)	(0.011)	(0.003)	(0.001)	(0.001)	(0.001)
Time=1	-2.223	-0.000	-1.749	-0.011	-0.002	-0.004	-0.001	0.002
	(1.392)	(0.008)	(5.029)	(0.020)	(0.003)	(0.002)	(0.001)	(0.002)
Time=2	-5.515**	0.002	5.293	-0.025***	0.001	-0.008*	-0.000	0.006*
	(1.696)	(0.007)	(7.486)	(0.006)	(0.005)	(0.003)	(0.002)	(0.002)
Time=3	-8.193***		5.754		-0.002	-0.019***	0.000	0.013***
	(2.467)		(8.233)		(0.007)	(0.004)	(0.003)	(0.003)
Simple ATET	-3.446**	0.005	0.667	-0.011	-0.001	-0.006**	-0.000	0.004*
	(1.156)	(0.004)	(4.535)	(0.007)	(0.003)	(0.002)	(0.001)	(0.002)
N of Observations	26,072	26,072	5,292	5,292	26,072	26,072	26,072	26,072

Table A6. Heterogeneity by State Choice Policies: K8 Enrollment and Closure (With Covariates)

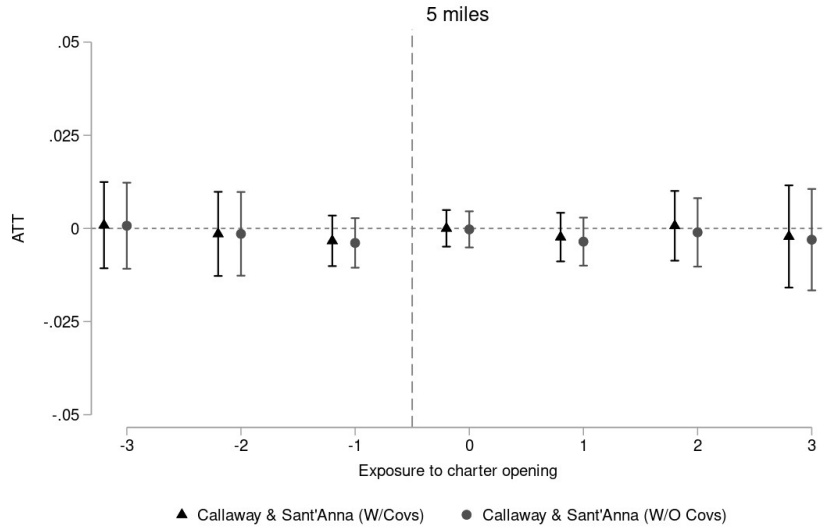
Outcome	**Total Enrollment**				**School Closure**			
State-level Policy	Charter CAP		Private Voucher		Charter CAP		Private Voucher	
	Yes	No	Yes	No	Yes	No	Yes	No
Event ATET								
Pre-Avg	0.996	-1.341	-1.990	0.845	-0.029***	-0.023***	-0.026***	-0.025***
	(0.789)	(1.119)	(1.377)	(0.832)	(0.004)	(0.003)	(0.005)	(0.003)
Post-Avg	-1.708	-8.631***	-5.414	-3.933**	-0.006	0.017*	0.009	0.003
	(2.111)	(1.812)	(4.078)	(1.508)	(0.006)	(0.007)	(0.007)	(0.005)
Duration of Exposure ATET								
Time=0	-0.634	-2.330**	-1.318	-1.248	-0.008	0.027**	0.024	0.008
	(1.053)	(0.815)	(1.185)	(0.765)	(0.007)	(0.010)	(0.015)	(0.007)
Time=1	-0.134	-6.403***	-4.149	-1.789	-0.012	0.022	-0.010**	-0.001
	(2.380)	(1.532)	(2.870)	(1.606)	(0.008)	(0.017)	(0.003)	(0.008)
Time=2	-1.950	-11.433***	-6.767	-5.284**	0.003	0.002	0.014	0.001
	(2.686)	(2.371)	(5.433)	(1.910)	(0.012)	(0.008)	(0.012)	(0.008)
Time=3	-4.116	-14.357***	-9.422	-7.409*				
	(4.017)	(3.417)	(7.856)	(2.881)				
Simple ATET	-1.144	-7.541***	-4.573	-3.153*	-0.007	0.017**	0.016	0.004
	(1.867)	(1.577)	(3.363)	(1.330)	(0.006)	(0.006)	(0.009)	(0.005)
N of Observations	11,147	13,991	5,962	20,110	11,147	13,991	5,962	20,110

Table A7. Heterogeneity by State Choice Policies: K8 Racial Diversity & Shares (With Covariates)

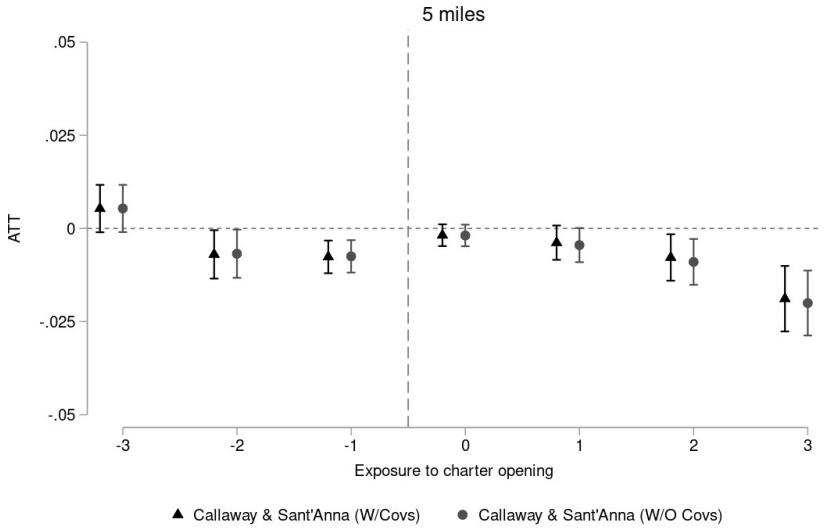
Outcome	**Racial Entropy**				**White Share**				**Black Share**				**Hispanic Share**			
State-level Policy	Charter CAP		Private Voucher		Charter CAP		Private Voucher		Charter CAP		Private Voucher		Charter CAP		Private Voucher	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Event ATET																
Pre-Avg	-0.003	0.003	-0.001	-0.002	-0.004	-0.003	-0.000	-0.004*	0.002	0.001	0.000	0.002	0.002	0.001	0.000	0.002
	(0.003)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
Post-Avg	-0.007	0.005	-0.007	0.001	0.000	-0.016***	-0.008	-0.008**	-0.004	0.003	0.001	-0.000	0.001	0.010**	0.006*	0.005*
	(0.005)	(0.007)	(0.009)	(0.004)	(0.004)	(0.004)	(0.005)	(0.003)	(0.002)	(0.002)	(0.004)	(0.002)	(0.003)	(0.004)	(0.003)	(0.002)
Duration of Exposure ATET																
Time=0	0.002	-0.000	0.000	-0.000	-0.000	-0.002	0.000	-0.002	-0.001	0.001	-0.002	0.001	-0.001	0.001	0.003**	-0.000
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Time=1	-0.006	0.004	-0.010	-0.001	0.001	-0.009**	-0.002	-0.004	-0.003	0.002	0.001	-0.001	-0.001	0.007*	0.003	0.002
	(0.005)	(0.006)	(0.009)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Time=2	-0.002	0.003	-0.008	0.003	0.001	-0.018***	-0.008	-0.008*	-0.005	0.003	0.001	-0.001	0.001	0.012**	0.007*	0.006*
	(0.007)	(0.009)	(0.012)	(0.005)	(0.005)	(0.005)	(0.006)	(0.004)	(0.003)	(0.003)	(0.005)	(0.002)	(0.003)	(0.004)	(0.003)	(0.003)
Time=3	-0.020	0.015	-0.011	0.001	-0.001	-0.035***	-0.021*	-0.020***	-0.006	0.005	0.005	-0.001	0.005	0.022***	0.014**	0.015***
	(0.011)	(0.012)	(0.016)	(0.008)	(0.007)	(0.007)	(0.009)	(0.005)	(0.005)	(0.004)	(0.007)	(0.004)	(0.006)	(0.006)	(0.005)	(0.004)
Simple ATET	-0.004	0.004	-0.006	0.000	0.000	-0.013***	-0.006	-0.006*	-0.003	0.003	0.001	-0.000	-0.000	0.008**	0.005*	0.004
	(0.005)	(0.006)	(0.008)	(0.004)	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
N of Observations	11,147	13,991	5,962	20,110	11,147	13,991	5,962	20,110	11,147	13,991	5,962	20,110	11,147	13,991	5,962	20,110

Figure A3. Event Study Impacts of Charter Opening Up to 2002: K8 Racial Diversity and Shares

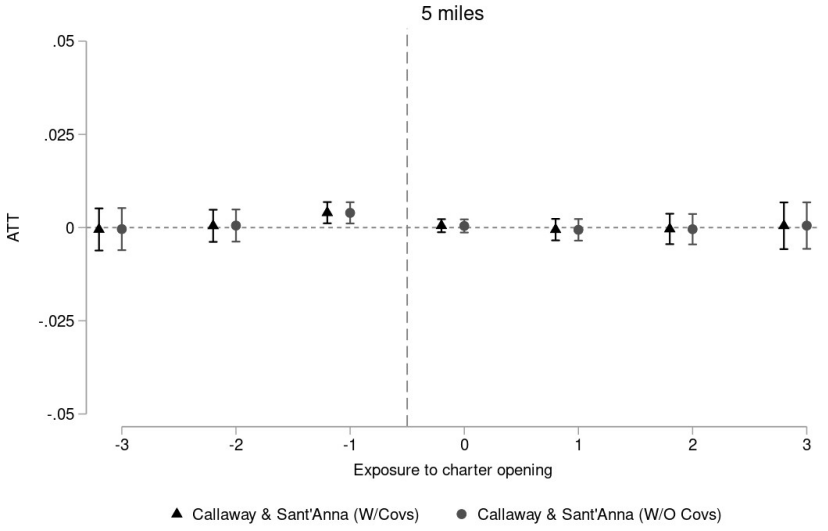
A3.1. Racial Entropy



A3.2. White Share



A3.3. Black Share



A3.4. Hispanic Share

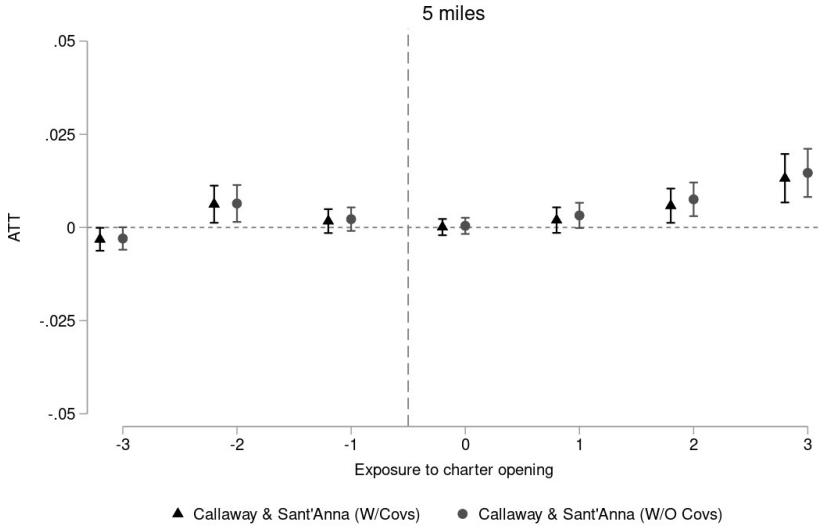


Table A8. Event Study Impacts of Charter Opening by Distances: Enrollment and Closure (With Covariates)

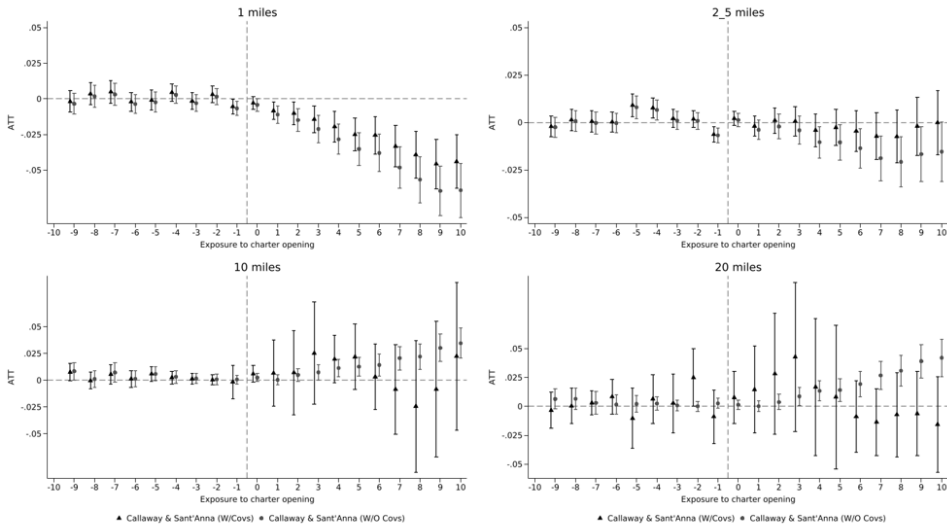
School Level	K-8								High							
Outcome	Enrollment				Closure				Enrollment				Closure			
Distances	1 mile	2.5 miles	10 miles	20 miles	1 mile	2.5 miles	10 miles	20 miles	1 mile	2.5 miles	10 miles	20 miles	1 mile	2.5 miles	10 miles	20 miles
Event ATET																
Pre-Avg	-1.138***	-1.083***	0.378	0.382	-0.041***	-0.041***	-0.035***	-0.034	-1.000	-1.574	0.399	1.495	-0.027***	-0.031***	-0.028***	-0.105***
	(0.337)	(0.328)	(0.445)	(1.231)	(0.001)	(0.002)	(0.004)	(0.027)	(1.235)	(1.130)	(1.185)	(1.659)	(0.002)	(0.003)	(0.008)	(0.026)
Post-Avg	-2.189	-7.517***	-8.321	-15.933**	0.025***	0.016***	0.049***	-0.047*	4.963	3.171	17.031	-25.542*	0.013*	0.002	-0.006	0.005
	(2.095)	(1.605)	(7.498)	(5.167)	(0.003)	(0.002)	(0.014)	(0.020)	(7.324)	(6.221)	(27.919)	(10.051)	(0.006)	(0.004)	(0.013)	(0.007)
Duration of Exposure ATET																
Time=0	-0.760	-0.959	-1.686	-1.764	0.042***	0.024***	0.007	0.020	3.868	0.708	-2.553	-1.799	0.041	0.021	0.006	0.026
	(0.700)	(0.536)	(1.183)	(3.230)	(0.009)	(0.007)	(0.005)	(0.032)	(2.175)	(1.705)	(1.955)	(2.750)	(0.021)	(0.013)	(0.027)	(0.014)
Time=1	-3.204*	-2.548*	-0.942	-6.468	0.025**	0.009	0.016	0.030	4.877	2.666	-2.691	12.119	0.037	0.005	-0.001	0.014
	(1.274)	(1.053)	(5.410)	(7.338)	(0.009)	(0.006)	(0.016)	(0.069)	(3.672)	(3.168)	(3.535)	(14.224)	(0.020)	(0.012)	(0.012)	(0.016)
Time=2	-4.426**	-4.913***	-4.092	-16.392	0.014	0.014*	0.001	-0.010	4.755	3.715	-2.329	14.576	-0.007	-0.008	-0.010	-0.014
	(1.486)	(1.148)	(8.010)	(11.155)	(0.008)	(0.006)	(0.016)	(0.032)	(4.711)	(3.989)	(4.811)	(17.909)	(0.012)	(0.009)	(0.009)	(0.035)
Time=3	-2.981	-6.902***	-14.373	-23.189	0.012	-0.005	0.140	-0.048	7.814	6.432	0.310	18.267	0.011	-0.006	-0.001	0.010
	(1.757)	(1.338)	(9.401)	(12.334)	(0.009)	(0.006)	(0.072)	(0.061)	(5.672)	(4.842)	(6.249)	(20.932)	(0.018)	(0.010)	(0.013)	(0.021)
Time=4	-3.162	-8.568***	-9.490*	-27.479**	0.026**	0.017*	0.009	0.025	13.964	6.199	9.195	-9.656	0.010	-0.000	-0.001	0.000
	(2.061)	(1.561)	(4.472)	(10.295)	(0.009)	(0.007)	(0.009)	(0.078)	(7.756)	(5.704)	(12.730)	(9.001)	(0.018)	(0.011)	(0.022)	(0.014)
Time=5	-2.329	-9.600***	-8.676	-31.171*	0.013	0.026***	0.064*	-0.238***	15.420	4.982	2.934	-15.295	0.008	-0.004	-0.009	0.011
	(2.526)	(1.853)	(8.391)	(12.695)	(0.009)	(0.008)	(0.027)	(0.040)	(8.623)	(6.773)	(16.847)	(10.807)	(0.017)	(0.011)	(0.015)	(0.015)
Time=6	-3.108	-9.707***	-8.657	-17.723*	0.032**	0.021*	0.068*	-0.308***	9.786	9.040	14.835	-27.229*	0.040	0.004	0.009	-0.001
	(2.752)	(2.026)	(11.096)	(7.065)	(0.011)	(0.008)	(0.033)	(0.063)	(9.414)	(8.376)	(21.066)	(13.285)	(0.026)	(0.012)	(0.023)	(0.018)
Time=7	-0.503	-8.630***	-8.509	-15.495***	0.047***	0.013	0.041*	0.010	4.164	0.523	24.636	-50.571***	0.001	0.003	-0.014	0.000
	(3.070)	(2.280)	(13.016)	(3.365)	(0.012)	(0.007)	(0.017)	(0.010)	(11.076)	(9.139)	(30.069)	(15.175)	(0.015)	(0.012)	(0.020)	(0.011)
Time=8	0.786	-8.295**	-10.003	-10.717**	0.019	0.019*	0.038	0.007	-3.284	-0.056	45.609	-67.470***	0.030	0.012	0.011	0.004
	(3.487)	(2.593)	(15.835)	(3.572)	(0.010)	(0.008)	(0.022)	(0.008)	(12.325)	(10.154)	(57.686)	(16.919)	(0.028)	(0.013)	(0.016)	(0.019)
Time=9	-2.307	-10.040***	-13.269	-11.505**	0.020	0.019*	0.062	-0.027	-3.688	-0.939	55.860	-75.195***	-0.001	0.012	-0.039	0.013
	(3.951)	(2.999)	(17.347)	(4.064)	(0.012)	(0.008)	(0.032)	(0.035)	(14.161)	(11.334)	(96.608)	(18.905)	(0.022)	(0.016)	(0.087)	(0.021)
Time=10	-2.085	-12.522***	-11.835	-13.360**	0.029*	0.021*	0.092*	0.025*	-3.085	1.607	41.531	-78.707***	-0.027	-0.012	-0.017	-0.004
	(4.119)	(3.353)	(19.865)	(5.021)	(0.012)	(0.009)	(0.042)	(0.013)	(15.892)	(12.805)	(85.373)	(20.357)	(0.015)	(0.008)	(0.042)	(0.014)
Simple ATET	-2.290	-6.980***	-7.864	-15.626**	0.026***	0.016***	0.048***	-0.046*	5.645	3.295	15.038	-21.808*	0.016*	0.003	-0.004	0.005
	(1.866)	(1.452)	(6.678)	(5.445)	(0.003)	(0.002)	(0.014)	(0.022)	(6.374)	(5.657)	(24.779)	(9.626)	(0.006)	(0.004)	(0.011)	(0.008)
N of Observations	117,362	100,531	65,871	49,730	117,362	100,531	65,871	49,730	24,056	20,874	14,560	11,415	24,056	20,874	14,560	11,415

Table A9. Event Study Impacts of Charter Opening by Distances: K8 Racial Diversity and Share (With Covariates)

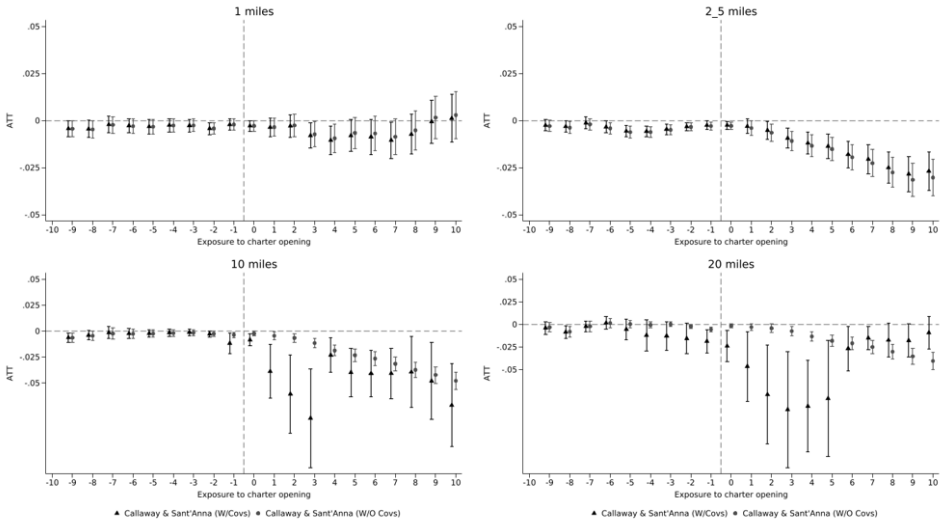
School Level	**K-8**															
Outcome	Racial Entropy				White Share				Black Share				Hispanic Share			
Distances	1 mile	2.5 miles	10 miles	20 miles	1 mile	2.5 miles	10 miles	20 miles	1 mile	2.5 miles	10 miles	20 miles	1 mile	2.5 miles	10 miles	20 miles
Event ATET																
Pre-Avg	0.000	0.002*	0.003*	0.003	-0.003***	-0.004***	-0.004***	-0.009*	0.001	0.002***	0.001**	0.006*	0.002***	0.001***	0.001*	0.003
	(0.001)	(0.001)	(0.001)	(0.004)	(0.001)	(0.000)	(0.001)	(0.003)	(0.000)	(0.000)	(0.000)	(0.003)	(0.001)	(0.000)	(0.000)	(0.001)
Post-Avg	-0.024***	-0.002	0.007	0.006	-0.006	-0.015***	-0.045***	-0.046***	0.003	0.005**	0.025***	0.034**	0.002	0.007**	0.015**	0.014*
	(0.005)	(0.004)	(0.014)	(0.014)	(0.003)	(0.003)	(0.010)	(0.013)	(0.002)	(0.002)	(0.006)	(0.011)	(0.003)	(0.002)	(0.006)	(0.006)
Duration of Exposure ATET																
Time=0	-0.003	0.002	0.006	0.008	-0.003	-0.002*	-0.008**	-0.024**	0.003**	0.000	0.006*	0.017**	-0.000	0.003**	0.001	0.007
	(0.002)	(0.002)	(0.004)	(0.011)	(0.001)	(0.001)	(0.003)	(0.009)	(0.001)	(0.001)	(0.002)	(0.007)	(0.001)	(0.001)	(0.001)	(0.004)
Time=1	-0.008**	-0.002	0.007	0.015	-0.004	-0.003	-0.039**	-0.046*	0.004*	0.001	0.026*	0.036*	-0.002	0.003	0.002	0.017
	(0.003)	(0.003)	(0.016)	(0.019)	(0.002)	(0.002)	(0.013)	(0.020)	(0.002)	(0.001)	(0.012)	(0.016)	(0.002)	(0.002)	(0.004)	(0.010)
Time=2	-0.010*	0.001	0.007	0.028	-0.003	-0.005*	-0.061**	-0.078**	0.002	0.002	0.049*	0.062*	-0.001	0.003	0.004	0.025*
	(0.004)	(0.003)	(0.020)	(0.027)	(0.003)	(0.002)	(0.019)	(0.028)	(0.002)	(0.001)	(0.019)	(0.026)	(0.002)	(0.002)	(0.007)	(0.012)
Time=3	-0.014**	0.001	0.025	0.043	-0.008*	-0.009***	-0.084***	-0.094**	0.005	0.003	0.065**	0.083**	0.001	0.004	0.013	0.024
	(0.005)	(0.004)	(0.024)	(0.033)	(0.003)	(0.003)	(0.024)	(0.033)	(0.002)	(0.002)	(0.024)	(0.030)	(0.003)	(0.002)	(0.008)	(0.013)
Time=4	-0.019***	-0.004	0.020	0.017	-0.010**	-0.012***	-0.023**	-0.091***	0.007**	0.005*	0.008	0.069**	0.003	0.005*	0.015**	0.029**
	(0.005)	(0.004)	(0.011)	(0.030)	(0.004)	(0.003)	(0.008)	(0.026)	(0.003)	(0.002)	(0.007)	(0.023)	(0.003)	(0.002)	(0.005)	(0.011)
Time=5	-0.025***	-0.003	0.022	0.008	-0.008	-0.014***	-0.040***	-0.082*	0.004	0.005**	0.018*	0.065**	0.003	0.005*	0.023**	0.029
	(0.006)	(0.005)	(0.016)	(0.032)	(0.004)	(0.003)	(0.012)	(0.033)	(0.003)	(0.002)	(0.009)	(0.024)	(0.003)	(0.003)	(0.007)	(0.017)
Time=6	-0.025***	-0.005	0.003	-0.009	-0.009	-0.018***	-0.041***	-0.027*	0.003	0.006**	0.022***	0.017*	0.004	0.009**	0.021**	0.001
	(0.007)	(0.005)	(0.016)	(0.016)	(0.005)	(0.004)	(0.011)	(0.012)	(0.003)	(0.002)	(0.006)	(0.008)	(0.004)	(0.003)	(0.007)	(0.010)
Time=7	-0.033***	-0.007	-0.008	-0.014	-0.010*	-0.021***	-0.041***	-0.015*	0.006	0.007***	0.019**	-0.001	0.003	0.011***	0.020**	0.007
	(0.007)	(0.006)	(0.021)	(0.015)	(0.005)	(0.004)	(0.012)	(0.006)	(0.003)	(0.002)	(0.006)	(0.004)	(0.004)	(0.003)	(0.008)	(0.004)
Time=8	-0.039***	-0.007	-0.024	-0.007	-0.007	-0.025***	-0.039*	-0.017	0.002	0.009***	0.018*	0.005	0.005	0.012***	0.022*	0.008
	(0.008)	(0.007)	(0.031)	(0.019)	(0.005)	(0.004)	(0.017)	(0.009)	(0.003)	(0.002)	(0.008)	(0.004)	(0.005)	(0.003)	(0.010)	(0.007)
Time=9	-0.046***	-0.002	-0.008	-0.006	-0.001	-0.028***	-0.048*	-0.018	-0.003	0.008**	0.020*	0.007	0.005	0.012***	0.023*	0.006
	(0.009)	(0.008)	(0.032)	(0.019)	(0.006)	(0.005)	(0.019)	(0.009)	(0.004)	(0.003)	(0.008)	(0.004)	(0.005)	(0.004)	(0.010)	(0.007)
Time=10	-0.044***	-0.000	0.023	-0.016	0.001	-0.027***	-0.071***	-0.009	-0.004	0.006*	0.020*	0.008	0.004	0.010**	0.024*	0.001
	(0.010)	(0.009)	(0.035)	(0.021)	(0.006)	(0.005)	(0.020)	(0.009)	(0.004)	(0.003)	(0.009)	(0.005)	(0.005)	(0.004)	(0.010)	(0.010)
Simple ATET	-0.021***	-0.002	0.007	0.008	-0.006	-0.013***	-0.045***	-0.047***	0.003	0.004**	0.026***	0.035**	0.002	0.006**	0.014**	0.014*
	(0.004)	(0.004)	(0.013)	(0.014)	(0.003)	(0.002)	(0.010)	(0.014)	(0.002)	(0.001)	(0.007)	(0.012)	(0.002)	(0.002)	(0.005)	(0.006)
N of Observations	117,362	100,531	65,871	49,730	117,362	100,531	65,871	49,730	117,362	100,531	65,871	49,730	117,362	100,531	65,871	49,730

Figure A4. Event Study Impacts of Charter Opening by Distances: K8 Racial Diversity and Shares

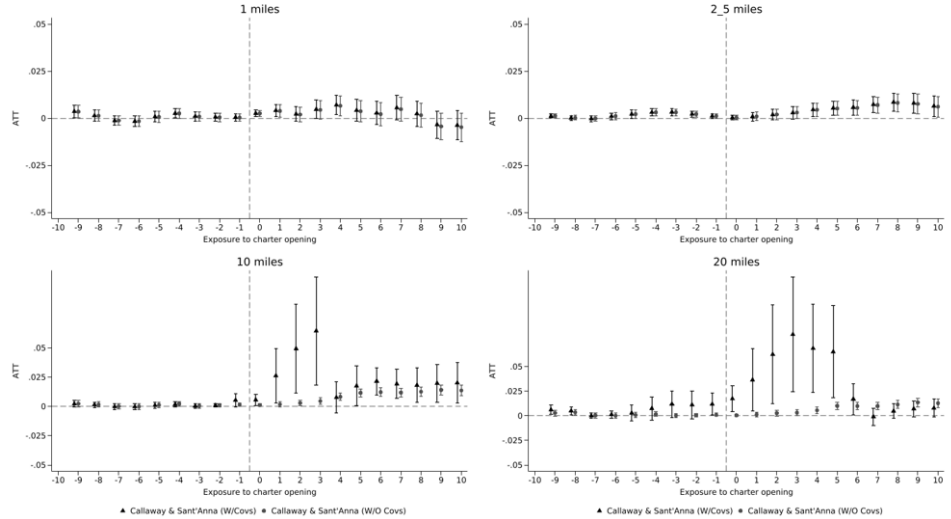
A4.1. Racial Entropy



A4.2. White Share



A4.3. Black Share



A4.4. Hispanic Share

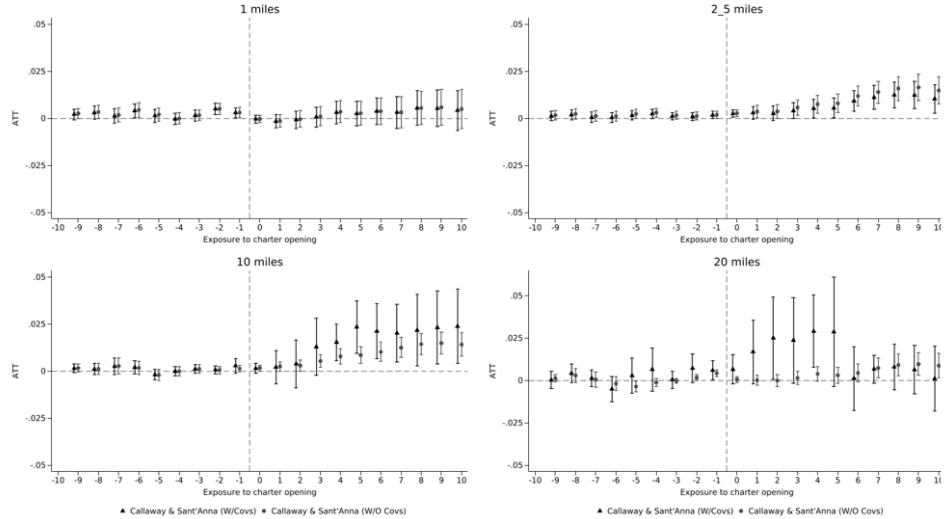


Table A10. Sample Restrictions

		Catholic Schools (Analytic Sample)			Charter Schools (Treatment)	
		N	N schools		N	N schools
Total Population *(1997-1998 to 2019-2020 school years)*		**86,699**	**9,875**		**106,449**	**11,645**
Drop non-regular schools	Yes	86,321	9,783	Yes	97,383	10,693
Drop NA, NR, Prekindergarten, and Ungraded schools	Yes	86,321	9,783	Yes	97,239	10,611
Drop schools where the highest grade offered is pre-k or k	Yes	86,321	9,783	Yes	96,503	10,579
Drop schools without latitude and longitude	Yes	86,094	9,596	Yes	96,398	10,540
Drop schools without enrollment data	Yes	82,593	9,596			
Drop schools without at least 2 years of observations	Yes	82,298	9,301			
Drop 1997-1998 school year	Yes	74,494	9,301	Yes	95,765	10,536
K8 Schools (Analytic Sample)		**65,523**	**8,369**		**78,342**	**9,027**
		[129,604]				
High Schools (Analytic Sample)		**13,350**	**1,784**		**41,149**	**6,565**
		[26,210]				

Note: This table shows the number of observations and schools that remain after applying additional sample restrictions. The full population of Catholic and charter schools in the NLSD dataset is shown in bold in the first row. Our analytic sample of interest is Catholic schools. We use charter school cases to calculate the distance from Catholic schools and generate treatment variables for charter school openings within proximity.

Non-regular schools, listed in the second row, include alternative schools, career and technical high schools, special education schools, early childhood programs, and Montessori schools. To estimate and fill Catholic school enrollment for 1998-1999 school year, we include observations from 1997-1998 school year as our initial sample (i.e. This estimate is the average between 1997-98 and 1999-2000 school years since the PSS reports only in odd-numbered years). The number of observations for K8 and high schools, shown in brackets, reflects the total number of observations included in our analysis. This total includes observations from even-numbered years that were backfilled using values from odd-numbered years. Given the availability of the charter indicator in the CCD dataset, we decided to use observations from 1998-99 through 2019-20 school years as our analytic sample.