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THE EFFECT OF CHARTER SCHOOLS ON IDENTIFICATION, SERVICE PROVISION,  
AND ACHIEVEMENT OF STUDENTS WITH DISABILITIES

Scott A. Imberman  
Andrew S. Johnson

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The Effect of Charter Schools on Identification, Service Provision, and Achievement of Students with Disabilities

Scott A. Imberman and Andrew S. Johnson

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**ABSTRACT**

Students with disabilities (SWDs) encompass a sizable share of charter students and have an array of individualized needs. Charter schools may operate differently than traditional public schools with respect to SWDs and special education (SPED), as funding incentives may induce charter schools to underserve SWDs. Nonetheless, there is little empirical evidence regarding how enrollment in charter schools affects SWDs' educational environments and outcomes. We use data from Michigan to estimate charter impacts using a heterogeneous difference-in-differences model that compares students who enter charters to students who have not yet but will eventually enter charters. We find that charters are slightly more likely to identify students as SWDs after charter entry. While assignments to SPED programs increase comparably, there is a significant reduction and subsequent reversion in time spent in SPED-specific environments and services provided. Despite these changes, SWDs realize achievement and attendance gains after charter entry at similar levels to non-SWDs.

Scott A. Imberman  
Michigan State University  
and NBER  
imberman@msu.edu

Andrew S. Johnson  
Boston University  
john7369@msu.edu

## **I. Introduction**

School choice reforms in the United States attempt to improve educational systems through market mechanisms theorized to foster competition among schools for students and funding. Charter schools, intra-district, and inter-district open enrollment policies offer examples of such reforms, enabling students to attend schools other than their district-assigned traditional public school (TPS). Charter schools, our focus in this study, provide students with a free, public option that is run independently of the district. In exchange for such flexibility, states specify criteria that charter schools must achieve to maintain their educational charter.

While enrollment is the market's method to hold schools accountable, researchers evaluate schools via standardized measures, with academic performance at the fore. Several studies have examined how charters compare to TPS in terms of student performance (Angrist et al., 2013; Bifulco & Ladd, 2006; Chabrier et al., 2016; Clark et al., 2015; Cohodes et al., 2021; Dobbie & Fryer, 2015; Gleason et al., 2010; Imberman, 2011; Sass, 2006; Winters & Shanks, 2022). These studies generally find variation in performance, with some charter schools outperforming TPS, while others perform similarly or worse.

Although the school choice literature is extensive, students with disabilities (SWDs) seldom are the focus of analysis, with only one study providing a causal estimate of the effect of charter schools on SWDs (Setren, 2021). Further, Setren's study is the only paper, to our knowledge, that provides lottery-based estimates of charter impacts on SWDs. One potential reason for this gap in the literature is that charter schools, which make up the bulk of out-of-district school choice options in the U.S. have historically enrolled disproportionately fewer SWDs than TPS (Epple et al., 2015). As of 2018, about 10.6% of charter students had a disability

compared to 12.5% of TPS students (Samuels, 2018). This disparity suggests a potential reluctance among SWDs to enroll in charter schools, an expression of their dissatisfaction by returning to TPS, a reclassification of students in charter schools from special education to general education, a pushing out of SWDs from charter schools, or a combination of the above. From a theoretical standpoint, charters have different incentives than TPS that some researchers and advocates fear may result in charters failing to provide a free appropriate public education (FAPE) as required by law (Cullen & Rivkin, 2003; Estes, 2004; Lubienski & Weitzel, 2008; Welner, 2013). Recent research has indicated substantial obstacles to SWD enrollment, including charter schools being less responsive to questions about special education services, thus dissuading SWDs from enrolling (Bergman & McFarlin, 2018). Charters may also discourage SWD enrollment by providing fewer or less intensive special education services (Jessen, 2013). For SWDs who enroll, there remains a concern that they are unfairly counseled out of charters (Waitoller et al., 2019).

Our research attempts to shed light on how the theory of perverse incentives is reflected in practice by focusing on Michigan public schools, where school choice options are abundant, special education funding from the state is low – prior to 2022 only about 30% of special education expenses for districts and charters were covered by the state (Altavena, 2023) – and local support varies considerably.<sup>1</sup>

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<sup>1</sup>In Michigan, special education in charter schools is overseen by the Intermediate School Districts (ISDs) at the county level and are “considered to be a local school district” under the ISD’s jurisdiction (Michigan Revised School Code Act of 1976, 2010). Under the ISD’s purview, charter schools, as well as other local school districts, must provide SPED programs and services or contract with the ISD or another school district to provide students with a free appropriate public education. Unlike TPSs, Michigan charters may also contract out instructional services and related educational services to other companies approved by the State Board of Education, with a requirement that all applicable state and federal laws are followed (ibid.).



We aim to provide insight into how special educational changes upon entering charter schools. In contrast to Setren’s (2021) lottery study on Boston charter schools, our analysis of the effect of charter schools on special education uses an entire state’s context and a quasi-experimental design to generalize the effect of charter schools more broadly. We also provide more detailed analysis of impacts on educational environments and services for special education students using the rich data available in Michigan.

In this study we answer two primary questions: (1) how does the educational environment (i.e., special education identification, program assignment, service provision and amount of inclusion) change once enrolled in a charter school, and (2) what is the impact of charter enrollment on SWDs’ educational outcomes (i.e., English/language arts (ELA) and math test scores along with absence rates)? We use difference-in-difference models that account for time-cohort heterogeneous effects to provide causal estimates.

Our basic approach examines the effects of charter enrollment on special education using switchers from TPS to charters. We rely on the staggered treatment adoption of students who enter charter schools, comparing students who enter charters early in the data to other students who we eventually observe entering charters. The validity of this “early” vs. “late” charter entry comparison is predicated on the assumption that early and late enterers are on a similar trajectory prior to entry and would continue in this manner if not for the change in school environments. We leverage the unique Michigan data that includes information from students’ Individualized Education Programs (IEPs) – legal documents determined in cooperation between parents and school officials that outline the services and educational environment for students with disabilities, along with developmental goals – to analyze the effect of charter enrollment on special education identification, educational environment, and service provision. Federal law

requires that every SWD be provided an IEP and that schools adhere to them (U.S. Department of Education, 2023). Nevertheless, whether the student receives the needed support can vary widely. Thus, while we cannot say with certainty if students received education in line with their IEPs, our data shed light on schools' *intentions* to provide various supports.

We find that while special education classification and program assignment, primarily to resource programs, increase slightly after charter entry among all students who enter, the educational environments and services provided to charter students differ compared to students in TPS who enter charters later in their careers.<sup>2</sup> Students have less of their education allocated to special education in terms of full-time equivalency and time in general education classrooms. We also find significant reductions in SPED services in the first year. However, these reverse course the following year and trend positively thereafter. Although speech-language services strongly influence the results, the other services evidence a similar outcome, albeit more limited. Combined, these suggest students entering charters see an overall shift from more to less intensive special education environments even as identification rises.

Despite these changes in students' special education environments, we show that SWDs see improvements in achievement and attendance after a move to Michigan charter schools that match and even surpass non-SWDs. For both groups of students, math and ELA achievement decline prior to entering a charter but then improve afterward. Empirical analyses show continuous increases in achievement scores that range from 0.1-0.4 standard deviations after

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<sup>2</sup> We choose to focus on movement from TPS to charters rather than from charters to TPS as it is likely that selection problems are more substantial in the latter as students with SWDs try a charter school and then realize it does not work for them. Hence, we consider the former to be a cleaner natural experiment. Nonetheless, results using charter exits are provided in the online appendix and described in more detail in Section VI.

entry. With respect to absence rates, both student groups demonstrate significant, sustained improvement in attendance after charter entry.

In what follows, we first provide background on special education and charter schools in the U.S. We then detail the school choice theories that are the basis of our conceptual framework. Next, we set up the context of our study, providing details on our data and descriptive statistics. After providing our empirical strategy, we highlight our results. We conclude with a discussion of our results and their implications.

## **II. Background**

### **A) Special Education and Its Effectiveness in the U.S.**

Special education plays a crucial role in supporting SWDs in the United States. In recent years, there has been an increase in the number and percentage of students receiving special education services under the Individuals with Disabilities Education Act (IDEA), with 14% of all public school students – approximately 7.5 million – now identified as SWDs (Hussar et al., 2020; U.S. Department of Education, 2023). SWDs have diverse disability categories and racial/ethnic backgrounds. However, as disabilities are, in part, a social construct (Stern et al., 2015), the identification process for disabilities is subjective, leading to disparities in identification rates (Ballis & Heath, 2021; Cullen & Rivkin, 2003; Skiba et al., 2008). Upon entering school, boys, racially minoritized students, and low-income students are disproportionately identified for special education (Hussar et al., 2020; Stevens & Schulte, 2017) and disproportionality levels vary with the racial composition of schools (Elder et al., 2021).

Few studies have quantitatively tested the effect of special education on school outcomes for SWDs. These generally show students experience benefits in academic achievement and absenteeism after being identified for special education. For instance, one identifies a reduction in absenteeism for marginally low-achieving students who receive special education (Cohen, 2007). With respect to academics, others find evidence of math achievement increases for SWDs after classification, with the largest effects for students who enter and remain in special education (Hanushek et al., 2002). In a more recent analysis, both math and English/Language Arts (ELA) scores were found to improve for students with a specific learning disability (SLD), the largest disability category, comprising 33% of all SWDs (Hussar et al., 2020), after identification (Schwartz et al., 2021). Looking instead at how losing special education affects students, an analysis of a Texas policy that mandated a reduction in the share of students classified for special education noted significant declines in educational attainment, with marginalized students and those in lower resourced and lower performing districts experiencing the most drastic declines (Ballis & Heath, 2021).

Importantly, the context in which SWDs are provided special education is changing. Whereas it was once common to isolate SWDs in separate classrooms, there is a growing movement for inclusive education settings, with 64% of SWDs now spending at least 80% of their school days in a general education setting as compared to 47% in 2000 (Hussar et al., 2020). Moreover, the landscape of schools in which students are educated has shifted dramatically. While the above studies have primarily focused on special education within TPS, the effectiveness of special education may not extend consistently to charter schools.

It has been demonstrated that schools of choice, especially charter schools, have lower enrollment totals and proportions of students with disabilities compared to TPS (Epple et al.,

2015; Powers et al., 2018). This discrepancy could in part be due to perceived differences in the ability of charter schools to educate SWDs. In many cases, charter schools lack the same special education resources as TPS, including certified special education teachers and teachers with experience (Epple et al., 2015). However, it is worth noting that Setren (2021) finds that Boston charters have similar proportions of special education staff. Despite the disparities in resources, common charter school practices may compensate for these differences if their practices reach all students.

## **B) Charter School Impacts**

Evidence on the effectiveness of charter schools, more generally, in raising student performance has been mixed. Multiple studies find positive achievement effects, particularly for “no-excuses” charter schools (Abdulkadiroglu et al., 2016; Angrist et al., 2013; Baude et al., 2020; Cohodes et al., 2021; Curto & Fryer, 2014; Gleason et al., 2014; Hoxby & Murarka, 2008; Ladd et al., 2017; Wong et al., 2014). However, other studies reveal null (Bifulco & Ladd, 2006; Booker et al., 2007; Cremata et al., 2013; Hanushek et al., 2007; Imberman, 2011; Sass, 2006; Zimmer et al., 2003) or even negative (Gleason et al., 2010) results. The sample of schools and methodology used in studies contribute to the ambiguity in the reported effectiveness of charter schools. Research that uses lottery-based assignment and value-added methods generally show positive results, but studies using student fixed-effects often report null results (Epple et al., 2015).<sup>3</sup>

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<sup>3</sup> Notable for our context, a lottery study in a group of Michigan for-profit managed charters found positive, albeit much smaller, effects than other lottery studies (Dynarski et al., 2018).

Beyond test scores, charter schools have consistently demonstrated positive effects on various outcomes, such as attendance, discipline, high school graduation rates, college attendance, earnings, and risky behaviors (Dobbie & Fryer, 2015, 2020; Epple et al., 2015; Imberman, 2011; Zimmer et al., 2009). However, there is wide variation in some of these impacts (Dobbie & Fryer, 2020). Overall, the research on charter school impacts is characterized by mixed findings, highlighting the complex and multifaceted nature of their effects on student outcomes both within and outside charter schools.

### **C) SWDs in Charters**

There are many potential reasons why charter enrollment is more limited for SWDs (Blackwell, 2013; Estes, 2009; Miron et al., 2010; Waitoller et al., 2017). Beyond typical school choice factors, including prior experience, word of mouth endorsements, test scores, and geography, families with SWDs have unique concerns, such as availability of services (Cullen & Rivkin, 2003; Finn et al., 2006; Jessen, 2013; Lange & Lehr, 2000). For instance, there may be a dearth of certified special education teachers in charters (Drame, 2011). Parents of SWDs may prioritize finding physically and psychologically safe schools and inclusive educational environments that increase the amount of time SWDs are educated with their peers in general education classes (Waitoller & Lubienski, 2019). Moreover, the intersection of disability with race and class adds another layer of complexity to families' decisions, as certain families may face greater restrictions in accessing the full range of choice schools. Notably, TPS have a greater proportion of Latinx, ELL, poor, and urban SWDs than charter schools (Garcy, 2011). A couple of studies have provided causal estimates for identification and deidentification of students for special education in charter schools. Using propensities for students enrolling in a charter based on data – parental school rankings, schools' defined admissions priorities, and

lottery numbers – from the unified public school (TPS and charter) enrollment application in Newark, NJ, one study identified that charter entry had no effect on new special education identification but increased the probability that a student was deidentified (Gilmour et al., 2023). Setren (2021) also finds that charters are likely to declassify SWDs, with the probability of declassification increasing 12 pp.

There is also a concern and some evidence to suggest that schools may discourage applications from and/or counsel out SWDs for a variety of factors, including prohibitive costs, concern about how SWDs will affect the school's statistics, and inflexible behavior standards that disregard IEPs (Bergman & McFarlin, 2018; Drame, 2011; Estes, 2009; Jessen, 2013; Waitoller et al., 2019). Contrary to these findings, one study identified that students with IEPs are no more likely to leave a charter school than they are to exit a TPS, suggesting limited evidence of schools counseling out SWDs (Winters, 2015). Nevertheless, certain practices may inadvertently or subtly discriminate against SWDs. One study highlights that many independent charters in Wisconsin left special education provision, training, compliance, facilities, and funding unmentioned in their charter applications (Drame, 2011), and an audit study finds charters to be less responsive to people who ask questions about SWDs (Bergman & McFarlin, 2018).

Studies examining the characteristics and educational costs of SWDs in charters as compared to TPS conclude that fewer SWDs participate in choice and those who do have milder disabilities, especially learning disabilities and speech/language impairments (Blackwell, 2013; Cullen & Rivkin, 2003; Drame, 2011; Epple et al., 2015; Estes, 2009; Garcy, 2011; Stern et al., 2015; Waitoller et al., 2017). Winters (2015) notes that the gap in SWD charter enrollment is partly attributable to differences in application rates and mobility rates – the movement of SWDs

into charters shrinks the gap but an even greater movement of non-SWDs into charters exacerbates it.

Regarding academic achievement, studies on the effect of schools of choice on SWDs have been limited and yield conflicting results. One early study found no significant differences in reading and math scores for SWDs in charter schools as compared to TPS (Nelson et al., 2004). In contrast, another found that SWDs in charters performed marginally better than their TPS counterparts (Rhim & McLaughlin, 2007). An exploratory study of 4<sup>th</sup> graders in four urban charter schools to compare achievement growth scores of SWDs to their non-SWD peers in the same schools found that the math growth scores of SWDs were significantly lower than their peers (Drame, 2010). However, the difference in reading growth rate was statistically insignificant. A major caveat, though, is that none of these studies provide causal estimates. Setren (2021), on the other hand, uses lotteries in Boston charter schools for causal identification, demonstrating large positive impacts on math and English scores that build in the first two years after choice before leveling off. Importantly, the gains for SWDs in this study are comparable to those of their general education peers, suggesting that charter schools can have positive effects for all groups.

Thus far, the research on the effect of charter schools on SWDs has been limited to enrollment patterns, academic achievement, and special education classification. However, we know little quantitatively about how charter schools change students' special education experience. Further, while Setren (2021) provides causal estimates of charter impacts on achievement and some broad measures of educational setting for students with disabilities in Boston, it is important to see if these results extend to other locations. Our study fills this gap by using unique data on all students in Michigan to examine how charter enrollment affects SWDs'



time spent in general education classrooms, as well as assignment to specific special education programs and services as reported in students' IEPs.

### **III. Conceptual Framework and Research Questions**

The school choice movement is built on the theory that privatization of public goods and the addition of private service providers in competition with public providers will improve public services and public welfare (Chubb & Moe, 1990; Friedman, 2002; Loeb & Valant, 2019). With respect to education, charter schools were established and promoted as one solution to an often inefficient and ineffective public school system (Hoxby, 2003). While every school in the market has incentives to attract and retain students, charter schools have additional incentives to increase revenues, lower costs, and demonstrate high student achievement so as to maintain their state charter to receive public funding for providing a privately run education (Brown, 2009; Lacireno-Paquet et al., 2002; Loeb & Valant, 2019; Lubienski & Weitzel, 2008). These incentives have been theorized to drive charters' educational operations, from student enrollment and teacher recruitment to classroom practices, teacher evaluation, and even to ancillary services, including food, transportation, and building operations (Cohodes, 2016; Lubienski & Lee, 2016; Singleton, 2017, 2019).

As one of the costliest school expenses, special education may be a domain in which charter schools take a different approach than TPS. The cost of special education is one of the primary reasons that the U.S. Congress wrote the Individuals with Disabilities in Education Act to guarantee that public schools would provide education to SWDs (Martin et al., 1996; Spaulding & Pratt, 2015; Yell et al., 1998). Without it, schools may either exclude SWDs or provide SWDs a substandard education, with families bearing the responsibility for determining

and providing needed accommodations for their children. Under current requirements, federal, state, and district funds are provided to help offset special education costs that schools may not otherwise be able to afford. Though each state has different funding arrangements, all states have budget shortfalls with respect to special education (Dhuey & Lipscomb, 2013; Kolbe, 2021; Kolbe et al., 2023). Accordingly, schools must find ways to make ends meet, which often leads to encroachment – reallocating general education funds for special education or vice versa (Baker et al., 2018).

Charter schools as compared to typically larger TPSs and entire school districts may be less able to achieve economies of scale to provide special education efficiently. Charters that are in large networks or have large student populations, however, may be able to deliver special education with efficiency comparable to TPSs. Nevertheless, the legal and financial orientation of charter schools may still lead to differing approaches to special education. Instead of maintaining a high level of special education spending, schools could attempt to minimize special education responsibilities by limiting enrollment of SWDs, particularly those with the most cost-intensive accommodations. This could be done by not recruiting (certain) SWDs, declassifying students from special education, being more reluctant to identify students, or counseling students with high-cost disabilities out of their school. Charter schools might also find that they can limit program and service expenditures by encouraging certain accommodations in students' IEPs. When SWDs are removed from general education classrooms to receive special education services, the school must provide space and specially trained faculty. Therefore, increasing “inclusive” instruction might be justified educationally, socially, or financially. Similarly, charter schools may find that certain programs and services can be provided more efficiently than others. Programs and services that are more universally applicable

to SWDs and/or the entire student body may be privileged over those that are specific to a type of disability.

Considering these incentives and prior research, we seek to answer the following questions:

- 1) How does enrolling in a charter affect the likelihood of being identified for special education?
- 2) After charter entry, do students spend the same amount of time in special education settings as they do in TPS?
- 3) How does enrolling in a charter affect participation in special education programs and receipt of special education services?
- 4) How does the success of SWDs, in terms of academic achievement and attendance, change upon entering a charter and how does that compare to non-SWDs?

#### **IV. Data & Descriptive Statistics**

##### **A) The Study Context: Michigan**

Michigan, the location of our study, has a robust schools of choice system (SoC), complete with charter schools, inter-district choice, and intra-district choice. About a quarter of all Michigan public school students are enrolled in a charter or a TPS via inter-district choice (Arsen et al., 2019). SoC in Michigan is used more by Black and low-income students, yet there is a counter pull, such that those same students are also more likely to exit and return to their assigned TPS (Cowen et al., 2015). Similarly, there is a high rate of bidirectional entry and exit for low-performing students, as well as evidence of lower retention in SoC for SWDs, English language learners and Hispanic students. Michigan also has a relatively high share of charters

managed by for-profit education management organizations (EMOs) – roughly 74% of charter students in our data attend a charter managed by an EMO.

The role of school funding in Michigan likely shapes how schools and districts approach SWDs and special education. Since money follows the student, schools and districts have strong incentives to recruit and retain general education students, as “students with disabilities almost always represent a financial loss to districts and charter schools, and the more serious a student’s disabilities, the larger the financial loss” (Arsen et al., 2019, p. 37). This is because Michigan uses a percentage reimbursement model for special education, with only approximately 70% of transportation and 29% of special education costs being reimbursed by the state (Rhim et al., 2015).

Additional inequities in special education funding are rooted in disparities in district and county (Intermediate School Districts, ISDs) wealth and their ability to raise taxes (Conlin & Jalilevand, 2015; Jalilevand, 2016). Special education funding is primarily the responsibility of districts and ISDs in Michigan. However, only ISDs have the authority to raise additional taxes for special education, with charter schools in the ISD receiving a percentage of what is raised. Consequently, in the areas with the lowest property taxes, there is a greater concentration of SWDs, lower per pupil spending, and greater encroachment/cross-subsidization – using general school funds to pay for special education services (Arsen et al., 2019; Conlin & Jalilevand, 2015; Jalilevand, 2016; Reckhow & Thiel, 2017)

With such an underfunding of special education in Michigan, there are perhaps distinct pressures and incentives to provide special education at reduced costs. These pressures create an environment where the status quo for special education only leads to greater encroachment. While this may seem like a flaw in the setting, this context demands innovation in a way that

charter schools were theorized to provide, and which may be more apt to extend to special education. To the extent that we find Michigan charter schools performing as well as or better than TPSs with respect to special education, special education researchers, practitioners, and advocates may wish to further explore special education in Michigan charters. However, skepticism is still warranted, as the (mis)identification of students for special education may be one such “innovation.”

Regarding the general performance effects of charter schools in Michigan, evidence has shown a negative effect on student achievement that has improved over time (Murphy & Izraeli, 2019). While earlier estimates of Michigan charter school effectiveness identified detriments (Bettinger, 2005), those relied on data while charters were still in their infancy. More recently, Murphy and Izraeli (2019), show that by 2012, Michigan charter schools were having the same effect on student achievement as TPSs. Around the same time frame, Dynarski et al. (2018) use lotteries in a single large for-profit EMO in Michigan to estimate relatively small (0.04 SD per year in math) effects. It is important to note, however, the aforementioned studies do not directly examine the academic effect on SWDs.

These characteristics of the Michigan special education and charter context situate the results of this study to provide insight into the broader potential of charters to impact special education. Given that Michigan is both relatively friendly to school choice and less financially supportive of special education than most other states, we might consider this to be what might happen to students with disabilities in a “worst case” scenario of a strong choice environment with weak oversight and disincentives to provide full supports to special education students. Nevertheless, as we will show below, our results suggest that SWDs do well academically even with fewer supports when they enter charters, and their performance improves as time progresses

and their IEPs are further updated, suggesting that charters may have adopted, identified, and developed effective approaches to teaching SWDs that warrant further study.

### **B) Data**

In this study we use a panel dataset from the Michigan Department of Education (MDE) and Michigan's Center for Educational Performance and Information (CEPI) that includes administrative records from the 2012-13 through 2017-18 school years on all K – 8 public and charter school students in Michigan. In our sample, we exclude observations for students attending an alternative school, such as vocational education schools. After these exclusions, there are a total of 6,220,474 student-year observations for 1,712,068 students.

We merge student enrollment and assessment data to create a dataset with demographic, enrollment, special education, attendance, and standardized assessment information. Demographic variables include a binary gender label, race/ethnicity, economic disadvantage as measured by free/reduced price lunch (FRPL) status, and whether a student is an English language learner (ELL). From the enrollment data, we ascertain whether and in what years the student is enrolled in a charter school and their absence rates. The data capture the student's special education status, including the type of educational setting, primary disability category, disability program, and services received. These measures are taken from the student's IEP so implementation may deviate somewhat from these measures, though the school is legally obligated to follow the IEP. Typically, IEP decisions are made in the spring of the prior year with input from parents, school officials, teachers, and specialists as appropriate. When a student transfers into a charter school, the charter must provide services comparable to what the child received beforehand until the charter either adopts the old IEP or a new one is developed

(Michigan Department of Education, Office of Special Education, 2021). IEPs can be amended at other times of the year, though making such changes can be a hassle and are thus uncommon.

Assessment data include students' math and English/language arts (ELA) scores in grades 3-8 from 2012-2018 on the Michigan Educational Assessment Program (MEAP) or M-STEP criterion referenced exams, with the latter replacing the former in 2015. Scores are standardized for each grade in each school year. We do not include scores for SWDs who take an alternative assessment since the tests are not directly comparable to the regular exams and suffer from significant nonrandom missingness. While this limits our achievement results to students with less severe cognitive disabilities, only 8% of testing observations for SWDs are from alternative assessments. Further, all SWDs, regardless of the assessment they take, are included in the analyses of non-testing outcomes.

### **C) Descriptive Statistics**

Table 1 provides the summary statistics for all students in the dataset, detailing the proportion of SWDs and non-SWDs in our data who are enrolled in TPS or charters.<sup>4</sup> Sixteen percent of students in our sample are observed in a charter school at some point. On an annual basis, 10.5 - 11.8% of non-SWDs and 8.6 - 10.1% of SWDs in Michigan public schools are enrolled in charters. Although the percentage for each demographic is greater than the 7% national rate of charter enrollment for public school students (National Center for Education Statistics, 2023), Michigan reflects the national trend of SWDs enrolling in charter schools at lower rates than non-SWDs. Observations of Michigan charter students are overwhelmingly

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<sup>4</sup> While the focus of this study is on charter schools, in Online Appendix F we provide evidence on the effect of inter-district choice on SWDs. In general, the impacts are smaller and less consistent than charter schools.

(nearly  $\frac{3}{4}$ ) in charters run by for-profit education management organizations (EMOs), well more than the 13% of students nationally in EMO-run charters 2020-21 (White & Xu, 2022).

With such a large proportion of charter schools operated by for-profit EMOs, our setting may be questioned for its external validity. In a charter landscape with fewer schools managed by EMOs, one may expect cost saving innovations to be more limited than in Michigan. Accordingly, our study examines charters under conditions that arguably would be most divergent from TPS. However, our analysis extends to states with a smaller percentage of EMO-run charters as well. In Online Appendix A, we parse out the effects by management profit status, noting that the results are similar regardless of management organization type, though we caution that we are limited as we have little power to detect distinct effects across CMO (non-profit) and EMO (for-profit) sectors in our data.

Special education identification rates in Michigan are similar to those nationally. Eighteen percent of students in our sample are observed with a disability at some point during our sample period. When broken down by primary disability, 4.5% are observed with a speech or language impairment (SLI), 4.1% a specific learning disability (SLD), and 5.3% some other disability. As is the case nationally, boys, Black students (in charters), and low-income students are overrepresented in special education with respect to the total state proportions. When comparing SWDs and non-SWDs within sectors, we see that although Black students are disproportionately represented in special education in TPS (comprising 18% SWDs vs 13% non-SWDs in TPS), the rates of Black students in special and general education are similar in charter schools, where Black students are the majority (53%) in each disability status group. SWDs are also more likely than non-SWDs to be eligible for free/reduced-price lunch in both sectors, but the gap is much narrower in charter schools (16 pp in TPS vs 4 pp in charters).



## CHARTER SCHOOLS AND STUDENTS WITH DISABILITIES

The fourth panel of Table 1 provides information regarding the educational environment, programming, and services provided to students in special education. Conditional on having an IEP, and thus being enrolled in special education, SWDs in charters experience considerably different educational environments. In Michigan, mean SPED FTE are calculated as average over the school year of the ratio of time spent in special education instruction to the time in the general education instruction. These values are considerably higher in TPS (0.2 vs 0.1 in charters) meaning SWDs in TPS spend more time in special education settings than their charter school counterparts.

# CHARTER SCHOOLS AND STUDENTS WITH DISABILITIES

**Table 1**

*Summary Statistics by Charter Enrollment and Special Education Status*

| VARIABLES                              |                              | All Students K-8 |       | Not SPED |       |         |       | SPED   |       |         |       |
|----------------------------------------|------------------------------|------------------|-------|----------|-------|---------|-------|--------|-------|---------|-------|
|                                        |                              | mean             | sd    | TPS      |       | Charter |       | TPS    |       | Charter |       |
|                                        |                              |                  |       | mean     | sd    | mean    | sd    | mean   | sd    | mean    | sd    |
| Charter                                | Ever charter student         | 0.160            | 0.367 | 0.053    | 0.224 | 1.000   | 0.000 | 0.058  | 0.234 | 1.000   | 0.000 |
|                                        | CMO (Non-Profit)             |                  |       |          |       | 0.115   | 0.319 |        |       | 0.108   | 0.310 |
|                                        | EMO (For-Profit)             |                  |       |          |       | 0.748   | 0.434 |        |       | 0.732   | 0.443 |
|                                        | Profit type not applicable   |                  |       |          |       | 0.080   | 0.272 |        |       | 0.103   | 0.303 |
|                                        | Profit type unreported       |                  |       |          |       | 0.057   | 0.231 |        |       | 0.058   | 0.234 |
| Demographics                           | Gender (female)              | 0.486            | 0.500 | 0.507    | 0.500 | 0.517   | 0.500 | 0.337  | 0.473 | 0.338   | 0.473 |
|                                        | Black/African American       | 0.183            | 0.387 | 0.132    | 0.338 | 0.527   | 0.499 | 0.182  | 0.386 | 0.525   | 0.499 |
|                                        | Latinx/Hispanic              | 0.079            | 0.269 | 0.079    | 0.269 | 0.085   | 0.279 | 0.077  | 0.267 | 0.084   | 0.277 |
|                                        | White/Caucasian              | 0.660            | 0.474 | 0.708    | 0.455 | 0.306   | 0.461 | 0.676  | 0.468 | 0.327   | 0.469 |
|                                        | Other race (or multiracial)  | 0.078            | 0.268 | 0.081    | 0.273 | 0.082   | 0.274 | 0.065  | 0.246 | 0.064   | 0.244 |
|                                        | Free/reduced price lunch     | 0.530            | 0.499 | 0.477    | 0.499 | 0.743   | 0.437 | 0.642  | 0.479 | 0.783   | 0.412 |
|                                        | English Language learner     | 0.074            | 0.261 | 0.077    | 0.266 | 0.102   | 0.303 | 0.060  | 0.238 | 0.080   | 0.271 |
| SPED Identification                    | Ever special education       | 0.182            | 0.386 | 0.051    | 0.220 | 0.051   | 0.220 | 1.000  | 0.000 | 1.000   | 0.000 |
|                                        | Speech-Language Impairment   | 0.045            | 0.207 | 0.002    | 0.041 | 0.001   | 0.035 | 0.311  | 0.463 | 0.331   | 0.471 |
|                                        | Specific Learning Disability | 0.041            | 0.198 | 0.000    | 0.014 | 0.000   | 0.016 | 0.288  | 0.453 | 0.319   | 0.466 |
|                                        | All Other Disabilities       | 0.053            | 0.223 | 0.000    | 0.017 | 0.000   | 0.016 | 0.393  | 0.488 | 0.327   | 0.469 |
| SPED Environment, Programs, & Services | Mean SPED FTE                | 0.026            | 0.120 | 0.000    | 0.003 | 0.000   | 0.000 | 0.202  | 0.286 | 0.087   | 0.161 |
|                                        | Gen Ed class 80+%            | 0.099            | 0.299 | 0.002    | 0.043 | 0.002   | 0.040 | 0.685  | 0.465 | 0.858   | 0.349 |
|                                        | Gen Ed class 40-79%          | 0.018            | 0.134 | 0.000    | 0.007 | 0.000   | 0.005 | 0.140  | 0.347 | 0.050   | 0.218 |
|                                        | Gen Ed class <40%            | 0.012            | 0.110 | 0.000    | 0.007 | 0.000   | 0.003 | 0.100  | 0.300 | 0.013   | 0.115 |
|                                        | Any SPED program             | 0.095            | 0.294 | 0.001    | 0.024 | 0.001   | 0.029 | 0.686  | 0.464 | 0.742   | 0.438 |
|                                        | Resource program             | 0.079            | 0.269 | 0.000    | 0.020 | 0.001   | 0.026 | 0.551  | 0.497 | 0.696   | 0.460 |
|                                        | Cognitive program            | 0.010            | 0.099 | 0.000    | 0.007 | 0.000   | 0.001 | 0.079  | 0.269 | 0.026   | 0.158 |
|                                        | Other SPED program           | 0.009            | 0.095 | 0.000    | 0.010 | 0.000   | 0.012 | 0.072  | 0.259 | 0.036   | 0.186 |
|                                        | Any SPED service             | 0.106            | 0.308 | 0.002    | 0.045 | 0.001   | 0.035 | 0.766  | 0.423 | 0.726   | 0.446 |
|                                        | Speech/language service      | 0.082            | 0.275 | 0.002    | 0.043 | 0.001   | 0.033 | 0.593  | 0.491 | 0.541   | 0.498 |
|                                        | Social worker                | 0.036            | 0.187 | 0.000    | 0.013 | 0.000   | 0.013 | 0.265  | 0.441 | 0.281   | 0.450 |
|                                        | Teacher consultant           | 0.010            | 0.102 | 0.000    | 0.009 | 0.000   | 0.006 | 0.079  | 0.270 | 0.036   | 0.187 |
|                                        | Occupational therapy         | 0.020            | 0.141 | 0.000    | 0.010 | 0.000   | 0.009 | 0.149  | 0.356 | 0.145   | 0.352 |
|                                        | Other SPED service           | 0.009            | 0.093 | 0.000    | 0.007 | 0.000   | 0.004 | 0.069  | 0.253 | 0.035   | 0.184 |
| Academic Outcomes                      | ELA/reading z-score          | 0.001            | 1.000 | 0.142    | 0.961 | -0.209  | 0.983 | -0.776 | 0.901 | -0.975  | 0.861 |
|                                        | Math z-score                 | 0.001            | 0.999 | 0.149    | 0.964 | -0.257  | 0.963 | -0.741 | 0.927 | -0.956  | 0.875 |
|                                        | Absence rate                 | 0.058            | 0.087 | 0.054    | 0.082 | 0.070   | 0.096 | 0.074  | 0.104 | 0.082   | 0.105 |

Note: There are a total of 6,220,474 student observations for 1,712,068 individual students in our sample. Of those observations, 857,824 (13.8%) are for students with an IEP in the given year. Among the special education observations, 713,992 represent students who remained in their assigned TPS; 82,048 student observations were in charter schools; and an additional 61,783 are inter-district choice student observations. For students who were not classified for special education, 4,330,440 observations were in their assigned TPS, 611,455 attended a charter, and 420,755 participated in inter-district choice.

The underlying contributors to this difference are seen in how SWDs are assigned to time in the general education classroom and participation in special education programming. 86% of charter SWDs as compared to 69% of SWDs in TPS spend more than 80% of their time in general education classrooms, and only 1% of SWDs in charters but 10% in TPS are in a general education classroom less than 40% of the time. Turning to programming, while charter SWDs have greater assignment rates to any program, this is primarily driven by resource rooms, where

students spend part of the day getting assistance with their work from a resource teacher.

Resource program rates are 55% in TPS but 70% in charters. The comparatively more intensive self-contained classroom programming (“cognitive” and “other” programming in the table) is quite uncommon in charters – just 6% of SWDs are in these programs in charters while 15% of SWDs are in them in TPS. In terms of receipt of services provided by specialists, charter SWDs do not appear to differ much from TPS SWDs in the inclusion of these services in their IEPs.

Finally, a comparison of student outcomes for charter and TPS students reveals that students who enroll in charters have lower ELA and math test scores than their counterparts who stay put, regardless of disability status, though this achievement gap is smaller for SWDs. Students who choose to enroll in charters also have higher absence rates, regardless of disability status.

## **V. Empirical Strategy**

In this study, we take a deep look at both how educational environments change for SWDs upon entering a charter school and what effect charter enrollment has on educational outcomes. In particular, we consider (1) how the educational environment for SWDs (i.e., special education identification, service provision and amount of inclusion) change once they enroll in a charter school; and (2) what is the impact on educational outcomes (i.e., ELA and math test scores and absence rates) for SWDs who enroll in charter schools.

One challenge is our estimated effects of charter attendance on student outcomes may be biased if there is non-random selection into charter schools. Students may exit their assigned TPS and enter a charter for numerous reasons that may be correlated with the outcomes of interest (e.g., student ability and parent motivation). Previous studies of charter school impacts have tried various strategies to account for this, most prominently using entry lotteries

(Abdulkadiroğlu et al., 2011; Angrist et al., 2013; Cohodes et al., 2021; Dobbie & Fryer, 2015; Dynarski et al., 2018), matched cohort analyses (Cremata et al., 2013), or fixed-effects analyses (Bifulco & Ladd, 2006; Imberman, 2011; Ladd et al., 2017; Sass, 2006).

Lotteries are generally considered to be the best option for identifying causal effects among those motivated to enter charter schools since admission offers are randomized. However, these studies are often limited in their external validity, as the results are specific to schools that are oversubscribed, often because they are better performing. Beyond concerns for generalizability, lottery studies are not always available, as in our case. Given that families self-select their participation in choice, there is no exogenous selection that is identifiable in our dataset. In the absence of a lottery, we rely on difference-in-difference models that account for time-cohort heterogeneous effects to compare students who enter charter schools early to those who eventually enter.

We start with our baseline two-way fixed-effects (TWFE) model and restrict to students who enroll in a charter school as their first school of choice. We start by looking at what happens to special education identification rates, educational setting, program participation, and service provision after charter entry:

$$SPED_{idt} = \beta_0 + \sum_{t=-4}^4 (\beta_t \times 1(YearsSinceEntry_i = t)) + \Gamma \mathbf{X}_{idt} + \omega_i + \gamma_t + \delta_d + \epsilon_{idt} \quad (1)$$

where  $SPED_{idt}$  is the special education outcome for student  $i$  in district  $d$  and year  $t$ ,

$1(YearsSinceEntry_i = t)$  is an indicator for the number of years before or after the student first

entered a charter<sup>5</sup>,  $\omega_i$  is a student fixed-effect,  $\gamma_t$  is a set of year fixed-effects,  $\delta_d$  is a district fixed-effect, and  $\mathbf{X}_{idt}$  is a set of student level time-varying controls, including economic disadvantage (as measured by FRPL eligibility), ELL status, the student's grade, the school year, and a cohort/grade-by-school year interaction. We control for district fixed effects for a few reasons: (1) the resident district largely encompasses students' choice sets; (2) the bulk (60%) of special education funding in Michigan is at the district level (Arsen et al., 2019) and; (3) special education policies and coordination are often set at the district or higher level.<sup>6</sup>

Prior research has shown that these kinds of TWFE models are subject to bias under heterogeneous and dynamic treatment effects (Callaway & Sant'Anna, 2021; de Chaisemartin & D'Haultfœuille, 2020; Goodman-Bacon, 2021; Sun & Abraham, 2021). To address this, we use the methods developed by Callaway and Sant'Anna (2021) to estimate our models.

We interpret our coefficients of interest,  $\beta_t$ , as the overall school effect in relation to the year before entering a charter. The coefficients when  $t$  is negative provide us with trends while students are in TPS; the charter effect refers to the coefficients for time values of 0 (first year in the charter) and greater. Our post-entry charter outcomes include students who may later return to a TPS.<sup>7</sup> As time-invariant demographic controls are subsumed in student fixed effects, we exclude gender and race, though we do recognize that a very small proportion of students have multiple classifications, especially for race. We cluster the standard errors by resident district.

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<sup>5</sup> Note that students who either are never observed in a charter or are enrolled in a charter from first observation are excluded from this analysis.

<sup>6</sup> Overall difference-in-difference estimates (non event-study) are provided in Appendix Table B1.

<sup>7</sup> Although combining students who return to TPS muddles the precise charter effect, the exit decision is endogenous, and would potentially bias estimates restricted to those who remain in charters.

## CHARTER SCHOOLS AND STUDENTS WITH DISABILITIES

Our estimation strategy relies on the staggered treatment adoption of students who enter charter schools, as we compare students who enter charters to other students who will enter charters later (“early” vs. “late” enterers). For example, we use students in 2014 who will enter charters between 2015 and 2018 as a natural comparison group for those who have already entered charters by 2014. In doing so, we rely on the parallel trends assumption – that students who enter charters earlier are on similar trends to those who enter later – which is supported by the lack of significant pre-trending in our event study estimates below. Table 2 highlights the characteristics of the various charter entry cohorts. Note that students observed in 2012-13 may have entered charters in any year up to and including 2012-13.

**Table 2**

| Summary statistics by year of first charter observation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |       |            |       |            |       |            |       |            |       |            |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2012-2013  |       | 2013-2014  |       | 2014-2015  |       | 2015-2016  |       | 2016-2017  |       | 2017-2018  |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Mean/Prop. | SD    | Mean/Prop. | SD    | Mean/Prop. | SD    | Mean/Prop. | SD    | Mean/Prop. | SD    | Mean/Prop. | SD    |
| Ever district choice                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0.080      | 0.272 | 0.100      | 0.300 | 0.093      | 0.290 | 0.086      | 0.280 | 0.082      | 0.275 | 0.095      | 0.294 |
| Charter in observation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.792      | 0.406 | 0.689      | 0.463 | 0.650      | 0.477 | 0.614      | 0.487 | 0.554      | 0.497 | 0.420      | 0.494 |
| CMO (Non-Profit)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.112      | 0.316 | 0.122      | 0.327 | 0.113      | 0.316 | 0.114      | 0.317 | 0.112      | 0.315 | 0.120      | 0.325 |
| EMO (For-Profit)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.735      | 0.441 | 0.738      | 0.440 | 0.756      | 0.429 | 0.767      | 0.423 | 0.778      | 0.416 | 0.792      | 0.406 |
| Profit type not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.079      | 0.270 | 0.082      | 0.274 | 0.090      | 0.286 | 0.091      | 0.288 | 0.091      | 0.288 | 0.088      | 0.284 |
| Profit type unreported                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.074      | 0.262 | 0.059      | 0.235 | 0.041      | 0.198 | 0.029      | 0.167 | 0.019      | 0.137 | 0.000      | 0.000 |
| Ever special education                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.171      | 0.376 | 0.191      | 0.393 | 0.185      | 0.388 | 0.179      | 0.384 | 0.176      | 0.381 | 0.185      | 0.389 |
| SPED in observation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0.125      | 0.330 | 0.131      | 0.337 | 0.129      | 0.335 | 0.129      | 0.335 | 0.128      | 0.334 | 0.138      | 0.345 |
| SPED in relation to choice                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |       |            |       |            |       |            |       |            |       |            |       |
| never SPED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.829      |       | 0.809      |       | 0.815      |       | 0.821      |       | 0.824      |       | 0.815      |       |
| SPED prior                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.000      |       | 0.067      |       | 0.076      |       | 0.092      |       | 0.107      |       | 0.141      |       |
| SPED after                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.059      |       | 0.084      |       | 0.067      |       | 0.051      |       | 0.036      |       | 0.018      |       |
| SPED upon entry                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.112      |       | 0.040      |       | 0.041      |       | 0.037      |       | 0.033      |       | 0.026      |       |
| Absence rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.070      | 0.097 | 0.084      | 0.109 | 0.086      | 0.109 | 0.089      | 0.107 | 0.092      | 0.110 | 0.097      | 0.114 |
| ELA/reading z-score                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -0.262     | 1.003 | -0.412     | 0.986 | -0.426     | 0.979 | -0.501     | 0.966 | -0.501     | 0.968 | -0.483     | 0.953 |
| Math z-score                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | -0.297     | 0.987 | -0.473     | 0.945 | -0.483     | 0.946 | -0.565     | 0.929 | -0.580     | 0.938 | -0.561     | 0.936 |
| Mean SPED FTE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.015      | 0.076 | 0.015      | 0.084 | 0.014      | 0.082 | 0.014      | 0.080 | 0.015      | 0.085 | 0.016      | 0.089 |
| Any SPED program                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.100      | 0.299 | 0.096      | 0.294 | 0.089      | 0.284 | 0.085      | 0.280 | 0.084      | 0.277 | 0.084      | 0.277 |
| Any SPED service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.089      | 0.285 | 0.097      | 0.297 | 0.099      | 0.299 | 0.101      | 0.301 | 0.103      | 0.303 | 0.110      | 0.313 |
| Gender (female)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.496      | 0.500 | 0.487      | 0.500 | 0.497      | 0.500 | 0.490      | 0.500 | 0.491      | 0.500 | 0.505      | 0.500 |
| Black/African American                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.535      | 0.499 | 0.521      | 0.500 | 0.510      | 0.500 | 0.505      | 0.500 | 0.496      | 0.500 | 0.453      | 0.498 |
| Latinx/Hispanic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.075      | 0.263 | 0.092      | 0.290 | 0.090      | 0.286 | 0.089      | 0.285 | 0.088      | 0.283 | 0.095      | 0.293 |
| White/Caucasian                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.315      | 0.465 | 0.308      | 0.462 | 0.315      | 0.464 | 0.322      | 0.467 | 0.331      | 0.470 | 0.368      | 0.482 |
| Other race (or multiracial)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.075      | 0.263 | 0.079      | 0.269 | 0.086      | 0.280 | 0.084      | 0.278 | 0.086      | 0.280 | 0.084      | 0.277 |
| Free/reduced price lunch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0.725      | 0.447 | 0.773      | 0.419 | 0.773      | 0.419 | 0.786      | 0.410 | 0.788      | 0.409 | 0.795      | 0.404 |
| English Language learner                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0.074      | 0.262 | 0.100      | 0.300 | 0.110      | 0.312 | 0.116      | 0.321 | 0.110      | 0.313 | 0.102      | 0.303 |
| Note: There are 997,502 student-year observations for 254,568 students who enroll in a charter school during the research period. There are 461,267 student-year observations (108,663 individuals) for students who are observed in a charter in 2012-2013, 153,549 student-year observations (33,884 individuals) for students who enter in 2013-2014, 127,360 student-year observations (29,929 individuals) for students who enter in 2014-2015, 106,554 student-year observations (28,194 individuals) for students who enter in 2015-2016, 86,538 student-year observations (27,756 individuals) for students who enter in 2016-2017, 62,234 student-year observations (26,142 individuals) for students who enter in 2017-2018. |            |       |            |       |            |       |            |       |            |       |            |       |

Finally, we turn to our analysis of achievement effects. In the outcomes listed above, we do not differentiate by whether a student was special education prior to charter entry because this can create a mechanical relationship between current and future outcomes (since all values for non-SPED students equal zero during the pre-charter period by construction). However, this is not a concern in analyses of achievement outcomes. Thus, in our framework for educational outcomes, we again estimate equation (1) but conduct separate analyses for students who were identified for special education at any time before charter entry (Prior SPED) and for students who were not in SPED at any point before entering (GenEd), so as to allow for comparisons across the two student types.

Given the nature of our study design, all our analyses yield estimates identified from students who switch from any Michigan TPS to charter schools. The extent to which these charter effects generalize to all students with disabilities in charter schools is supported by a comparison of student characteristics of students who switch from TPS to charter as compared to students who either change schools in the other direction or who begin and remain in charter schools. Table 3 shows the descriptive statistics of this comparison.



**Table 3**

| Summary Statistics by Charter Mobility |               |       |                |       |                |       |                |       |
|----------------------------------------|---------------|-------|----------------|-------|----------------|-------|----------------|-------|
|                                        | Never charter |       | Always charter |       | Enters charter |       | Leaves charter |       |
|                                        | Mean/Prop.    | SD    | Mean/Prop.     | SD    | Mean/Prop.     | SD    | Mean/Prop.     | SD    |
| Ever district choice                   | 0.135         | 0.342 | 0.000          | 0.000 | 0.125          | 0.330 | 0.186          | 0.389 |
| Charter in observation                 | 0.000         | 0.000 | 1.000          | 0.000 | 0.435          | 0.496 | 0.499          | 0.500 |
| CMO (Non-Profit)                       |               |       | 0.115          | 0.319 | 0.116          | 0.320 | 0.108          | 0.311 |
| EMO (For-Profit)                       |               |       | 0.757          | 0.429 | 0.751          | 0.433 | 0.703          | 0.457 |
| Profit type not applicable             |               |       | 0.080          | 0.271 | 0.087          | 0.282 | 0.088          | 0.284 |
| Profit type unreported                 |               |       | 0.047          | 0.213 | 0.046          | 0.210 | 0.100          | 0.300 |
| Ever special education                 | 0.183         | 0.386 | 0.144          | 0.351 | 0.219          | 0.414 | 0.185          | 0.388 |
| SPED in observation                    | 0.140         | 0.347 | 0.109          | 0.312 | 0.154          | 0.361 | 0.127          | 0.333 |
| <i>SPED in relation to choice</i>      |               |       |                |       |                |       |                |       |
| never SPED                             | 0.817         |       | 0.856          |       | 0.781          |       | 0.815          |       |
| SPED prior                             | 0.008         |       |                |       | 0.138          |       |                |       |
| SPED after                             | 0.006         |       | 0.044          |       | 0.058          |       | 0.083          |       |
| SPED upon entry                        | 0.009         |       | 0.100          |       | 0.008          |       | 0.102          |       |
| Absence rate                           | 0.054         | 0.083 | 0.065          | 0.091 | 0.094          | 0.116 | 0.085          | 0.107 |
| ELA/reading z-score                    | 0.064         | 0.987 | -0.194         | 1.008 | -0.505         | 0.955 | -0.359         | 0.994 |
| Math z-score                           | 0.073         | 0.987 | -0.226         | 0.988 | -0.579         | 0.918 | -0.399         | 0.976 |
| Mean SPED FTE                          | 0.028         | 0.126 | 0.010          | 0.067 | 0.020          | 0.093 | 0.016          | 0.083 |
| Any SPED program                       | 0.096         | 0.294 | 0.081          | 0.272 | 0.112          | 0.316 | 0.093          | 0.291 |
| Any SPED service                       | 0.109         | 0.311 | 0.082          | 0.275 | 0.115          | 0.319 | 0.094          | 0.291 |
| Gender (female)                        | 0.484         | 0.500 | 0.502          | 0.500 | 0.491          | 0.500 | 0.485          | 0.500 |
| Black/African American                 | 0.119         | 0.324 | 0.521          | 0.500 | 0.506          | 0.500 | 0.526          | 0.499 |
| Latinx/Hispanic                        | 0.078         | 0.268 | 0.088          | 0.284 | 0.092          | 0.289 | 0.064          | 0.245 |
| White/Caucasian                        | 0.725         | 0.446 | 0.309          | 0.462 | 0.326          | 0.469 | 0.330          | 0.470 |
| Other race (or multiracial)            | 0.078         | 0.268 | 0.081          | 0.273 | 0.076          | 0.265 | 0.080          | 0.271 |
| Free/reduced price lunch               | 0.487         | 0.500 | 0.722          | 0.448 | 0.812          | 0.391 | 0.739          | 0.439 |
| English Language learner               | 0.070         | 0.255 | 0.112          | 0.315 | 0.086          | 0.281 | 0.067          | 0.249 |

Note: There are 5,222,972 student-year observations for 1,457,500 students who never enroll in a charter school during the time period. For the 135,131 students who are in a charter school throughout the data, there are 430,794 total observations. 65,272 students enter a charter school after being first observed in a traditional public school. In total, these students have 312,052 student-year observations. As for the 54,165 students who begin in a charter school and subsequently exit to a TPS, they have a total of 254,656 observations.

Note that while there are shared characteristics between students with respect to charter school mobility categories, there are some statistically significant distinguishing features to highlight. The proportion of students with disabilities who are in charter schools is greatest among those who enter charters after we observe them in public schools (0.219). Conversely, for students who attend a charter school throughout the observation period, they are the least likely to ever be in special education (0.144). The academic outcomes – absence rates and standardized test scores – for students who begin and remain in charter schools are better, on average, than students who enter or leave charter schools, with students who enter charter schools having the lowest



outcomes on average. There are also some demographic differences between student mobility groups. Whereas charter students skew economically disadvantaged, a greater proportion of students who enter charters (0.81) as compared to those who begin in charters (0.72-0.74) qualify for free or reduced-price lunch.<sup>8</sup> With the empirical strategy employed, the effective sample in the main estimates are from the 59,719 students (285,036 student-year observations) who switch from TPS to charter schools.

## **VI. Results**

We organize our results by first detailing the effect of charter enrollment on special education identification, educational setting, program assignment, and services. We then analyze how charter enrollment affects student outcomes (academic and attendance). While we present our main results visually, we include the coefficient estimates in Online Appendix B.

### **A) Special Education Identification**

We start our analysis of the impacts of charter school enrollment on special education by looking at the identification of students for special education. Given that identification (i.e., the opening/continuation of an IEP) is a necessary condition for receiving most special education services and program participation, if charters reduce (increase) the likelihood of identification this could contribute to lower (higher) program participation and service provision.<sup>9</sup> By

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<sup>8</sup> To get an idea of how representative our SWDs in our sample of switchers are of all SWDs in charters, in Online Appendix Table B4 we look at comparisons of switchers and non-switchers restricting to students who are ever observed, in a charter or TPS, in special education. Overall, while there are some small differences, the SWDs who are always in charters look broadly similar to those who enter from a TPS, buttressing the external validity of our estimates.

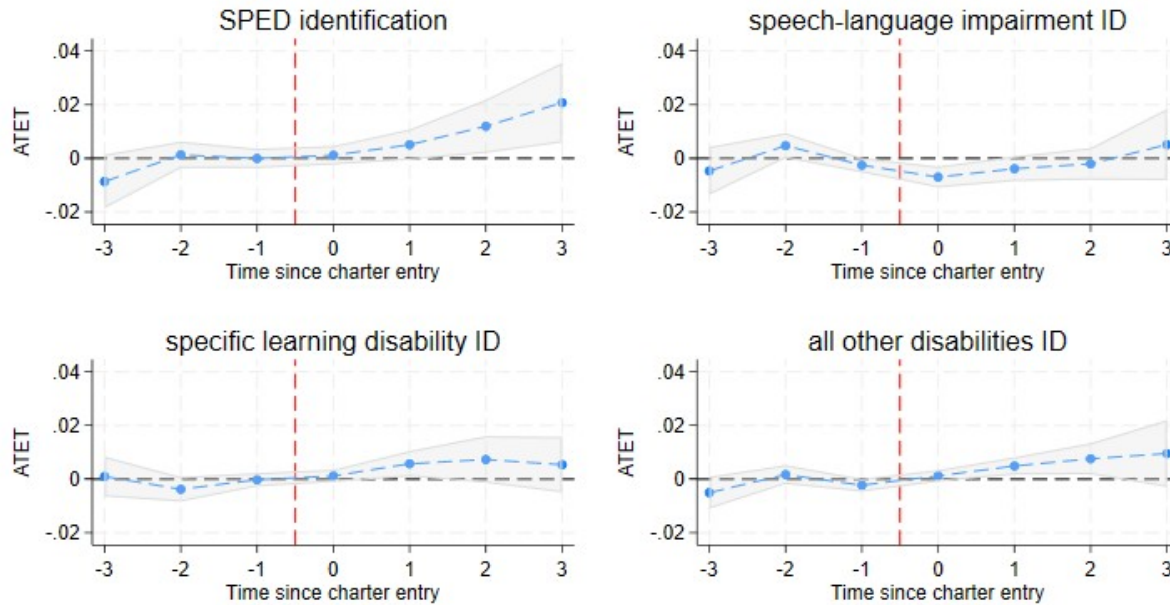
<sup>9</sup> Instead of an IEP, some students receive a 504 plan that provides the students with certain accommodations during testing and in the classroom. While there is some overlap in the accommodations provided to IEP and 504 students, the measures we consider are only available to students with IEPs.

restricting to students who will eventually enter a charter school, our model essentially estimates the probability of being identified for special education in a given year for students who have transitioned to a charter school compared to students who have not yet but eventually will enter a charter (Callaway & Sant'Anna, 2021).

Figure 1 provides event study estimates for identifications after charter entry both overall and by disability type. Special education identification rates are relatively unchanged in the first two years after entry, and identification significantly increases by 1-2 pp two to three years after entering. The exception to this trend is speech-language impairment identification, which decreases 1 pp in the entry year ( $p < 0.05$ ) before returning to the baseline three years after entry. Hence, overall, we find that Michigan charter schools generally identify students at rates slightly higher than the year before entering.

**Figure 1**

*The Relationship between SPED Identification and Charter Schools*



The estimated average treatment effect on the treated of charter entry on SPED identification. Estimates for all students who enter charters. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

## B) Time in Special Education

In Figures 2 through 4 we shift focus to our main outcomes of interest and begin to answer the question of what happens to the educational environment, program participation, and service provision of SWDs as specified on their IEPs when they enter charter schools. These analyses incorporate students who were identified for SPED before entry as well as those who are identified after enrolling in a charter.

Figure 2 starts with measures of the educational environment – how much time students spend in a special education or general education setting. The first panel shows what happens to special education full-time equivalent (FTE) values that, as mentioned previously, are calculations of the share of a student’s time in a special education program rather than general

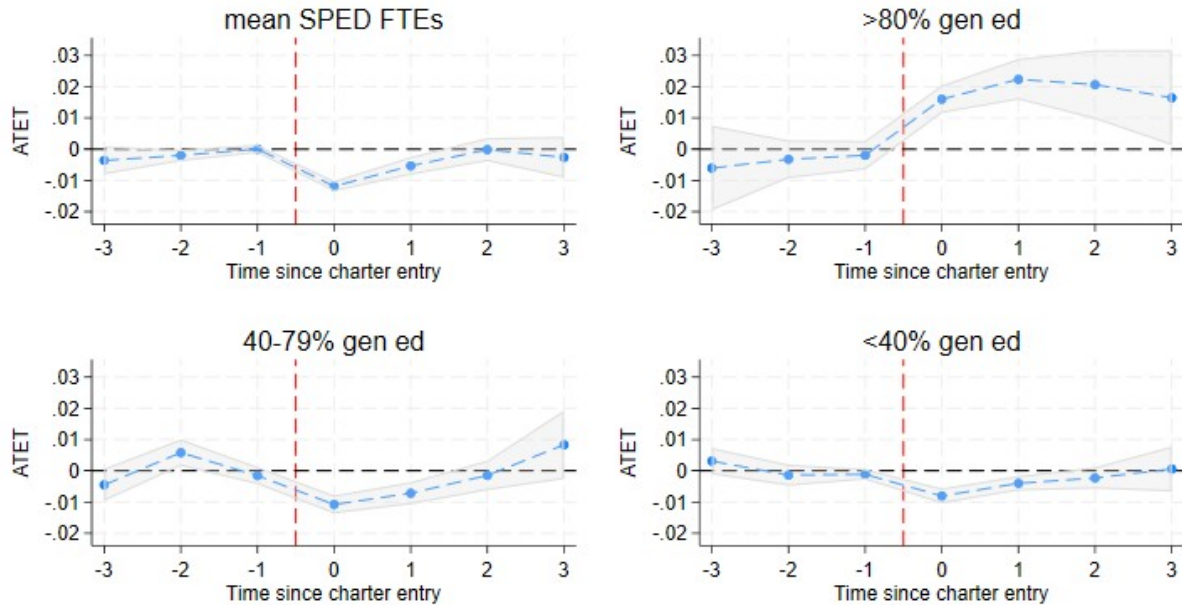
education. Economic theory suggests that charter schools would be likely to reduce the intensity of special education services and programming, and our results demonstrate this occurs in the short-run, though not in the medium-run. In the year before entry, the average SPED FTE among all students who changed from a TPS to a charter student was 0.023. In other words, when averaged over all TPS to charter switchers, regardless of special education status, students average 2.3% more of the day in special education while in TPS. After charter entry, there is a significant decrease of about 0.012 in FTE – a drop of more than 50% of the base rate. This is quite substantial, though it is likely dominated by reductions for students who are already SPED prior to entry (“Prior SPED”). These students have an average FTE of 0.139 prior to entering the charters. This indicates that there is up to a 9% drop in FTE if it entirely comes from students with existing IEPs.

The rest of the panels in Figure 2 provide categorical measures of the share of time in general education. These categories – >80%, 40% - 79%, and <40% general education – are the categories input into IEPs and hence cannot be broken down further with our data. Nonetheless, these measures allow us to consider to what extent charters determine students as needing minimal (>80% gen ed), moderate (40%-79% gen ed), or substantial (<40% gen ed) time in a special education classroom. We first note an inverse trend for spending minimal time in special education as compared to moderate or substantial time. Specifically, in the year after charter entry, while there is a significant increase of 1.6 pp in the probability of only spending minimal time in special education (>80% gen ed), students are less likely to spend moderate or substantial time in special education (decreasing 1.1 and 0.8 pp, respectively). This is from a mix of newly identified students and a reduction of time spent in the special education environment for students with existing identifications. However, the shift to a more general education

environment appears to be short-lived. After the first year, the likelihood of spending moderate (40%-79% gen ed) or substantial (<40% gen ed) time in special education begins to return to the baseline and is statistically non-distinguishable two years after entry. At the same time, the increase in minimal time (>80% gen ed) in special education is maintained, likely due to the additional identifications shown in Figure 1.

**Figure 2**

*The Relationship between Charter Schools and SPED FTEs and Educational Setting*



The estimated average treatment effect on the treated of charter entry on SPED FTEs and educational setting. Estimates for all students who enter charters. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

## Special Education Programs

We now turn to assessing what changes occur in the special education programs and services the students receive as indicated in their IEPs. Services typically include teacher consultancy time and/or direct student access to specialists like social workers and speech

pathologists. These may be independent from or part of special education programs that provide access to special education services in an educational environment. For example, resource programs provide students with small group supports in separate classrooms for part of the class day, and cognitive programs help students overcome challenges stemming from cognitive impairments and can include self-contained class environments.

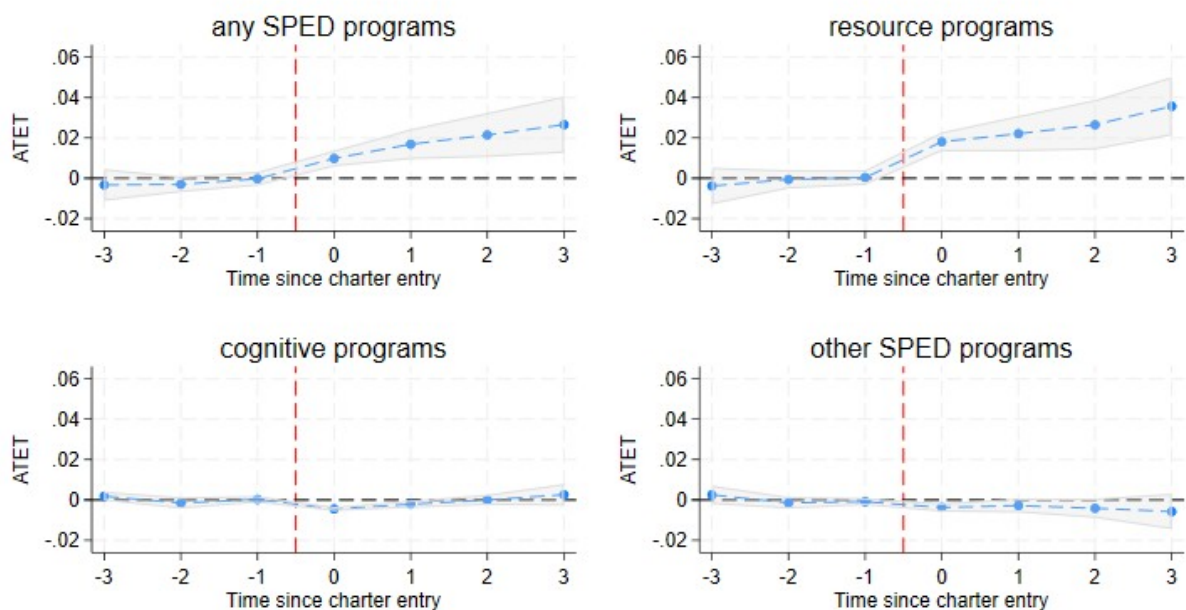
We start by looking at charter impacts on program participation in Figure 3. Upon charter enrollment, we observe an increase of 1 pp in assignment to any special education program. The effect on assignment to any program continues its upward trajectory, rising to 2.7 pp three years from entry – a statistically significant increase each year. Note that the baseline TPS program participation rate is 9.5% among all students (56% for SPED students), and so this is a sizable effect.

In the second and third panels, we parse out the charter effect on the two largest program categories – resource and cognitive programs – and all other special education programs in the fourth panel. In general, resource programs are less intensive with students spending a class period or pull-out time in a “resource room” with a special education instructor. Cognitive programs, on the other hand, are more typically separate classrooms focused on students with cognitive disabilities. As such, we see that essentially all the increase in SPED programs comes from greater use of resource programs. In the first charter year, the likelihood of assignment to a resource program increases by 1.8 pp ( $p < 0.05$ ). In contrast, the probability of assignment to a cognitive program or other SPED programs (last panel) significantly decreases 0.4 pp in the year of matriculation ( $p < 0.05$ ). In subsequent years, the change is not statistically distinguishable from pre-charter levels. These more intensive and costly programs begin with many fewer students, with only 0.6-1% of all students who enter charters (3-4% of Prior SPED students) in

cognitive programs or the combination of programs other than cognitive or resource (e.g. emotionally impaired, autism). This decline in cognitive program participation is despite a slight *increase* of 0.1 pp ( $p < 0.01$ ) in cognitive impairment identification after entry. We interpret that finding as additional evidence that the more marginally disabled students saw reductions in their special education intensity, but more severely disabled students, perhaps after some short term reductions, largely kept similar services, at least as measured through IEP intentions.

**Figure 3**

*The Relationship between Charter Schools and Special Education Programs*



The estimated average treatment effect on the treated of charter entry on SPED programs. Estimates for all students who enter charters. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

### C) Special Education Services

In Figure 4, we turn to the impacts of enrolling in a charter school on special education service provision. These results reflect specific services students receive outside of the classroom and consultations teachers receive to aid with their instruction of SWDs. We start with the upper

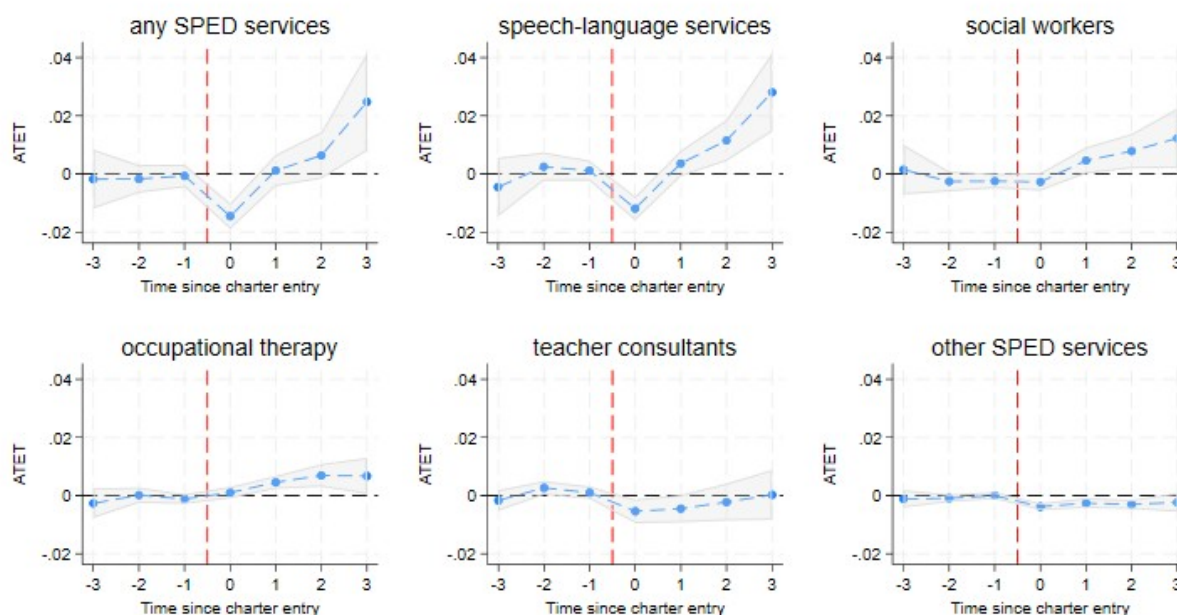
left panel by looking at the impact on having access to any service. Prior to enrolling in the charter, 11.5% of students (61% of Prior SPED students) received any service. However, there is a sudden decline of 1.5 pp ( $p < 0.01$ ) in probability of receiving any service during the year of entry. The following year, the service rate is corrected back to baseline and eventually increases 2.5 pp ( $p < 0.05$ ) three years after entry.

Looking at the most used services – speech (8.5% of students and 45% of Prior SPED students in the year before entry), social work (4.4%, 25%), occupational therapy (1.5%, 9%), and teacher consultancy (1%, 4%) – we see that the trend for any SPED service is driven by speech-language services. The pattern almost perfectly matches that for any service. The probability of receiving social work services has an analogous but more modest decline and reversion. Teacher consultancy and other services, excluding occupational therapy, also drop significantly in the first year by ~0.5 pp then recover slowly. Only occupational therapy services remain statistically unchanged in the first charter year, after which they increase by 0.5-0.7 pp ( $p < 0.05$ ).



**Figure 4**

*The Relationship between Charter Schools and Special Education Services*



The estimated average treatment effect on the treated of charter entry on SPED services. Estimates for all students who enter charters. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

To summarize, we find that overall rates of special education identification increase slowly after enrolling in Michigan charter schools. In turn, students who enter charters are more likely to be assigned to a SPED program, especially a resource program. However, it appears that many students with existing IEPs see the intensity of their educational setting, program participation, and services drop initially after entering the charter. However, these tend to quickly return to baseline. Hence, these patterns suggest that there is a medium-run reduction in special education intensity for students with milder disabilities combined with an opportunity for some students to be newly identified, but little change for students with more severe disabilities.

**D) Achievement and Attendance**

Given that we have identified changes in special education programs and services on students' IEPs after charter entry, it is essential that we understand the impact these reductions have on students' academic outcomes. While we are limited by our administrative data to achievement and attendance outcomes, it is important to note that there are many other outcomes including socio-emotional learning, social skills, and other non-cognitive skills, that we cannot observe. Hence, we are only able to paint a partial picture of the impacts of charter schools on outcomes for students with SWDs.

Accordingly, we turn to achievement and attendance outcomes for charter entrants who are ever identified for special education at some point before entering a charter (*Prior SPED*) and those who we do not observe in special education at any point before entry (*GenEd Prior*). Figure 5 provides event study estimates for math and ELA achievement on the state standardized test in each respective school year, the Michigan Educational Assessment Program (MEAP, 2012-2014) and Michigan Student Test of Educational Progress (M-STEP, 2014-18) assessment – standardized within grade and year and provided in standard deviation units – and absence rates. Given the difference in timing of the MEAP and M-STEP exams, we assign the Fall MEAP test scores to the previous year (e.g., Fall 2013 assigned to the 2012-13 school year). With the implementation of M-STEP, Michigan moved test administration to the spring, thus we apply those exams to the current academic year. We report our results using both exams.

The patterns for students entering charters are similar regardless of special education status. Upon entering the charter, Figure 5 illustrates significant improvement (after the first

year) that crescendos from 0.11 to 0.26 SD in math for Prior SPED students.<sup>10</sup> The effect of charter entry on ELA achievement was similarly increasing, ranging from 0.04 SD in the entry year to 0.20 SD three years later (Appendix Table B2). Notably, the math increase for Prior SPED students briefly surpasses that of GenEd prior students two years after entry, though otherwise both math and ELA gains are similar for both groups. While these impacts are large, they are comparable to estimates from some lottery-based studies of charter impacts for general student populations. For example, Abdulkadiroğlu et al. (2011) find impacts of 0.2 to 0.4 SD per year, while Setren (2021) finds impacts of 0.21 to 0.26 SD per year for SWDs. Nonetheless, when looking specifically at Michigan general education student populations, we find estimates 3 to 10 times greater than Dynarski et al. (2018) though they are directionally similar. Note, however, that the data in the present study are more recent and only partially overlap with their analysis. Moreover, our findings include the universe of Michigan charter schools while they focus on a single for-profit charter management network.

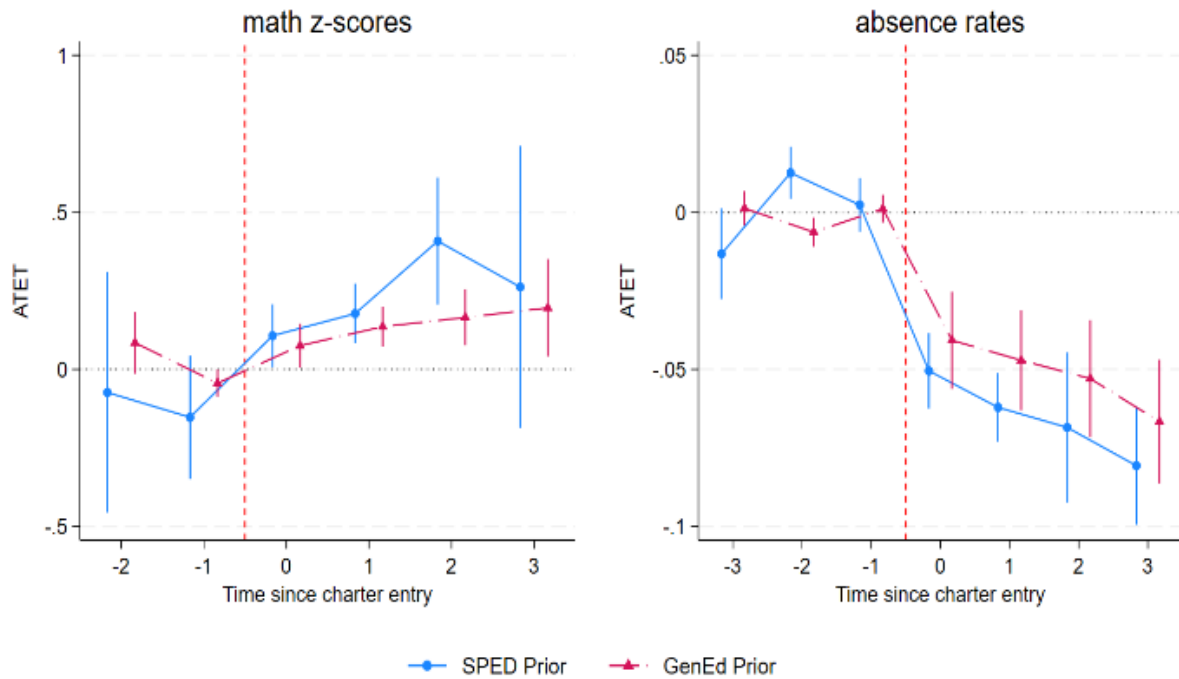
Absences also improve immediately after transferring to a charter. In the first year, absences decrease by 5 pp ( $p < 0.01$ ), relative to a baseline absence rate among SWDs in TPS of 7.4%, and this improvement in attendance continues to build throughout students' tenure, reaching a 8.1 pp reduction in absences. These results are consistent with lottery estimates for both students with and without disabilities (Abdulkadiroğlu et al., 2011; Angrist et al., 2013; Cohodes et al., 2021) and SWDs (Setren, 2021).

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<sup>10</sup> Coefficient estimates and standard errors provided in Appendix Table B2.

**Figure 5**

*The Relationship between Charter Schools and Math Achievement and Absence Outcomes*



The estimated average treatment effect on the treated of charter entry on achievement and absences. Separate estimates for students classified for SPED before entry. Heterogeneous effects are aggregated by time since entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

### G) Comparisons to TPS-TPS Switches

One concern regarding the validity of these results is that rather than picking up something unique about how SWDs perform and spend their time in charters, we instead are merely picking up the effects of school switching. To address that, in Online Appendix C, we provide estimates of impacts on SPED students from the first time they switch schools and distinguish between within-district switches between TPS and TPS to charter switches. Note that

the estimates for TPS-charter in this model differ slightly from our main estimates since we are restricting to students' first switch between any schools, thus shrinking the sample.

The results here show that our findings above of immediate increased time in general education, reduced SPED FTEs, speech-language service reduction, occupational therapy increase, achievement gains, and absence reductions, are largely a result of moving to charters rather than general moves as we find little indication of similar changes for TPS to TPS moves. We also see little change in achievement or absences among TPS-TPS movers with the exception of a *decrease* in ELA scores after 2 years.

#### **H) Charter Entry vs. Exit**

Our main analysis focuses on what happens to SWDs upon entry into a charter. Our reason for focusing on this decision rather than including exits, is that we believe that selection out of charters based on the revelation to the student and parents of insufficient special education resources is a larger concern than selection upon entry. Nonetheless, if our model appropriately accounts for this exit selection and we estimate impacts that are the opposite of the entry effects, this provides some evidence that our estimates have external validity beyond the subset of charter students who switch from TPS to charters.

In Appendix D, we provide estimates for the 54,165 students who begin in charters but later exit to TPS, replacing the treatment with being in a period after charter exit (return to TPS) rather than charter entry. While we see an increase in SPED identifications, the results mostly demonstrate opposing and similar magnitude effects for special education outcomes to what we see from charter entry. SPED FTEs increase while time in general education falls after charter exit. At the same time, there is a slight shift away from resource programs and increases to

cognitive programs. The effects of charter exit on services also mirror those from charter entry. When students exit to TPS, service provision apart from occupational therapy increases, which was the opposite of what we saw upon charter entry. Impacts on achievement are for the most part not statistically significant but the estimates are noisy, limiting our ability to draw clear conclusions.

#### **I) Heterogeneity by Race/Ethnicity, Gender, Economic Status**

In Online Appendix E, we provide impacts on all our main outcomes split by race/ethnicity, gender, and economic status. For race/ethnicity comparisons of SWDs, we compare students of color (SOC) to White students. Unfortunately, to ensure we have sufficient precision, we must aggregate the SOCs into a single group. We recognize, however, that such aggregation may hide important patterns and thus remains a limitation of our study. SOCs who enter charters are more likely to be identified for special education after entering a charter than their White peers. However, we find differences in time spent in special education settings, with White students spending relatively *more* time than SOCs in special education classrooms.

For gender, females see largely similar SPED impacts to males, though the latter exhibit significant increases in resource room assignments and smaller improvements in attendance as after entry. Finally, when we look by economic status, SWDs who are eligible for free or reduced-price lunch (FRPL) have similar changes in SPED time, program assignment, and services as their more well-resourced peers, but the achievement outcomes on standardized tests diverge, with FRPL students having greater long-run gains in math but lower long-run ELA improvements than non-FRPL SWDs.

## VII. Discussion and Conclusion

Charter schools entered the American education toolbox in large part to inject market mechanisms (i.e., incentives and other motivators) into school systems that had features of a public monopoly. To a certain extent, charter schools and school choice accountability measures, more broadly, have operated as theorized. Families have enrolled their children in charters (National Center for Education Statistics, 2023), thus putting pressure on traditional public schools to adapt. Schools have placed greater emphasis on achieving measurable performance improvements (Cohodes, 2016; Jennings & Bearak, 2014). Schools that have been under-enrolled and/or under-performing have faced more stringent consequences, including an increase in school closures (Duncan-Shippy, 2019; Redding & Nguyen, 2020). Overall, there has been a movement towards greater efficiency and cost savings in school operations. Nevertheless, these changes have not been without controversy. The focus of schools has often swung too far in its myopic focus on math and ELA test scores, such that perverse incentives have led to corruption and/or marginalization of students (Aronson et al., 2016; Martinelli et al., 2018; Patrick et al., 2018). School closures have not always been fairly applied and often devastate communities (Duncan-Shippy, 2023; Ewing, 2018), and some charter schools continue operating despite evidence of their ineffectiveness (Gilblom & Sang, 2019).

Accountability through school choice creates incentives for schools to make decisions that directly affect students' education. While researchers have widely studied the effects of school choice on general education students, students with disabilities are rarely a focus in these analyses, though there are important exceptions, such as Setren (2021). Special education is significantly more expensive than general education, which may make it especially ripe for

schools searching for cost-saving and profit-making measures. Our research sheds light on how charter schools affect the education of SWDs and the special education they receive.

First, we estimate the impact of charter schools on special education. Counter to what is hypothesized, there is a marginally significant *increase* in SPED identification and an increased likelihood of being assigned to special education programs. However, entry into charter schools results in students spending less of their time in special education environments as measured by SPED FTEs and percentage of time spent in a general education classroom. Furthermore, there is an immediate reduction in SPED services, though both time and services subsequently return to baseline. We argue that the increase in minimal time categories of SPED educational settings and programming are likely due to the newly identified students while the brief reduction in more substantial categories of these along with service provision followed by reversion to baseline are likely from students with existing IEPs, though we cannot check this directly due to the sample restrictions necessary for it creating a mechanical relationship in our regression models. Despite these changes, we find increases in achievement and lower absence rates, noting that, on average, students benefit on these measures from a move to Michigan charters regardless of their special education classification.

Prior research has found that providing special education to students improves their academic and attendance outcomes (Cohen, 2007; Hanushek et al., 2002; Schwartz et al., 2021) and conversely removing access to special education is detrimental (Ballis & Heath, 2021). Unlike those studies, which focused on special education in traditional public schools, we find that despite a *temporary* reduction in special education time and services for some students, Michigan charter schools were able to improve the outcomes for SWDs at rates similar to what we estimate for non-SWDs. Additionally, we note that these student improvements continue to



trend positively as SWDs' IEPs are further refined, with some SPED services returning to baseline or increasing. However, it remains unknown how charters determine and prioritize services and which combination of services are most instructionally effective.

While our research estimates the causal impact of charter entry on special education and educational outcomes, it is not without limitations. Our estimates are based on the legally binding intent to provide special education as specified in student's Individualized Education programs. Nevertheless, intent may not be reality. It is possible that charters, and schools more generally, do not uphold their guarantee to provide the accommodations and services spelled out in IEPs. Even if schools provide what they say they will, our study cannot determine what special education should have been provided from an educationally optimal level – we can only show if what is promised in charters differs from that in traditional public schools.

Nonetheless, our results indicate that even with providing fewer services and an educational environment that is geared away from special education intensity, students with SWDs see large achievement and attendance gains in charters, of magnitudes similar to those seen for non-SWDs. Critical points remain for future analysis with respect to determining how and to what extent the change in environment, services, and pedagogical practices drive these results. We do not think our results indicate that programs and services offered in TPS are ineffective. In fact, there is substantial overlap in service provision between TPS and charters that both types of schools have found essential. However, in seeking a more efficient assemblage of SPED services, charters are likely reluctant to provide the level of support found in TPS to benefit a relative handful of students. Taken together, our results suggest that education in Michigan charter schools is more effective, as measured by standardized test scores and

attendance, on average for all students, regardless of special education status. As such, charter schools can be a useful tool in servicing SWDs.

As previously mentioned, the charter environment in Michigan is ripe for educational innovation. With a concentration of contracted EMO-operated charters much more extensive than elsewhere, these charters are perhaps more motivated to reduce costs and increase revenues than charters in other states. Providing special education in Michigan is cost prohibitive, but student enrollment is fundamental to schools' revenues. These charter schools have an incentive to provide a general education that is as or more effective than special education regardless of students' disability status. In Michigan, the charter schools seem to have done that for the students with disabilities who enroll in them. Notwithstanding, there may be additional educational benefits available to these students if the unique general education in charter schools were supplemented by special education.

Beyond the effect on SWDs, there is the question of how teachers and students' peers are affected by the greater time SWDs spend in general education (Gilmour, 2018). Also left out of this analysis are the family and students' voices. Our results cannot speak to how SWDs and their families find the level of special education they receive. What we show, though, is evidence that charter schools approach special education distinctly from TPS. Nevertheless, student outcomes – math and ELA achievement and attendance – show improvement. This evidence suggests that charter schools might have made modifications to special education for some students that are both more efficient and effective than the TPS approach, a possibility that demands further research.

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## **Online Appendix**

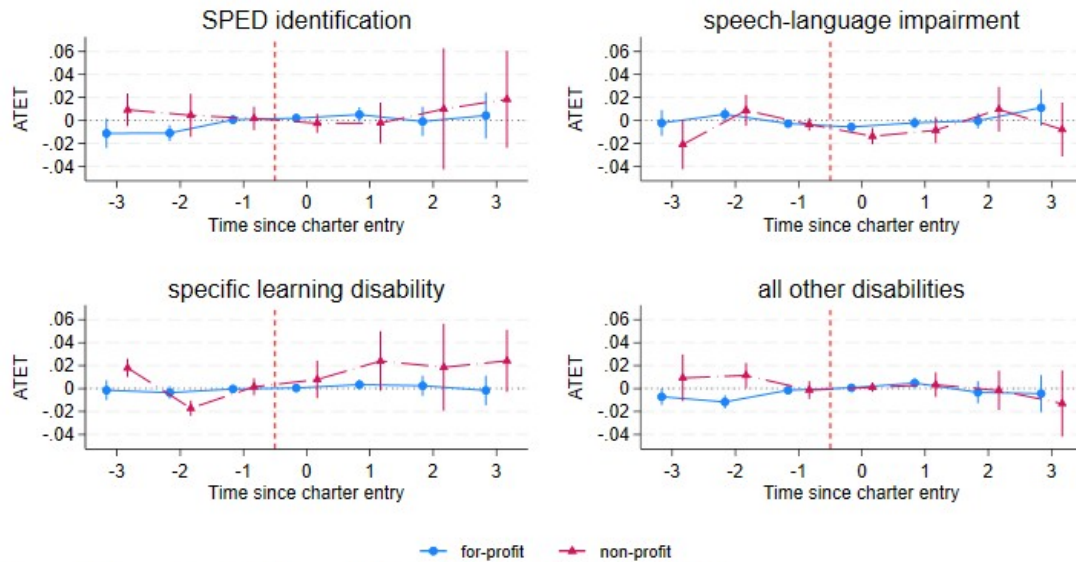
**\*\*\*Not for Publication\*\*\***

### **Appendix A) For-Profit vs. Non-Profit Managed Charters**

Although charter schools tend to have similar incentives built into their contracts with authorizers, charter schools managed by for-profit education management organizations (EMOs) may have even greater motivation to pursue cost-saving measures and to make decisions that would maximize profits than non-profit charter management organizations (CMOs). Therefore, we now look separately at how charter schools managed by CMOs compare to their EMO-managed peer institutions. Nonetheless, we caution that our estimates by management profit status are relatively imprecise. Hence, while we generally find little difference between the two, that may simply be a function of the estimates being noisy.

**Figure A1**

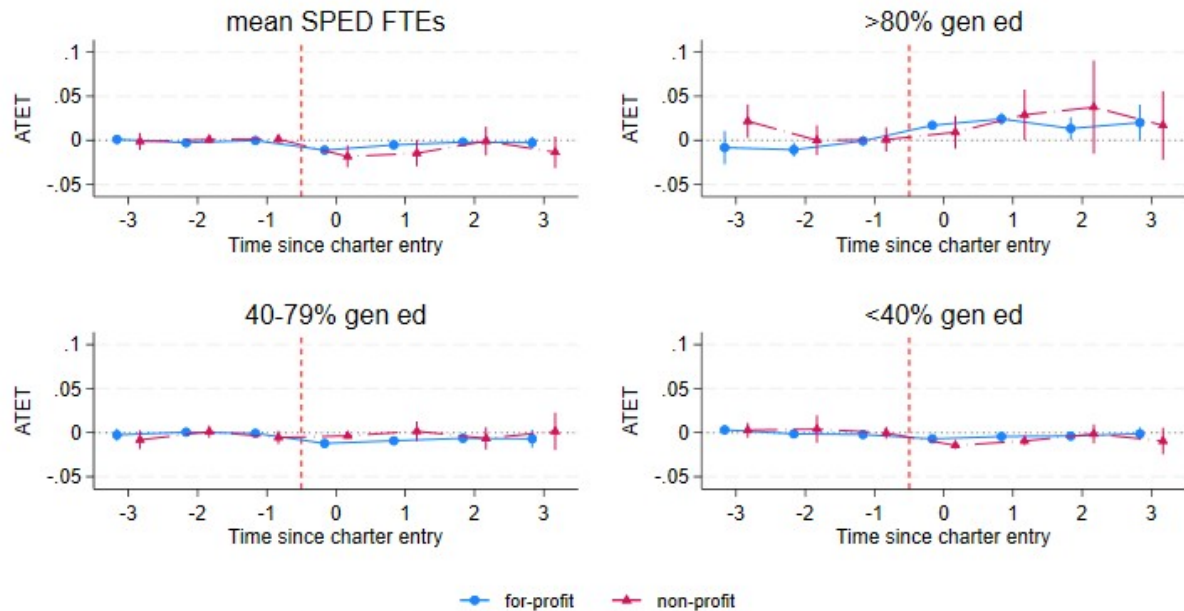
*Special Education Identification by Charter School Management Type*



The estimated average treatment effect on the treated of charter entry on SPED identification. Separate estimates for all for-profit students. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

**Figure A2**

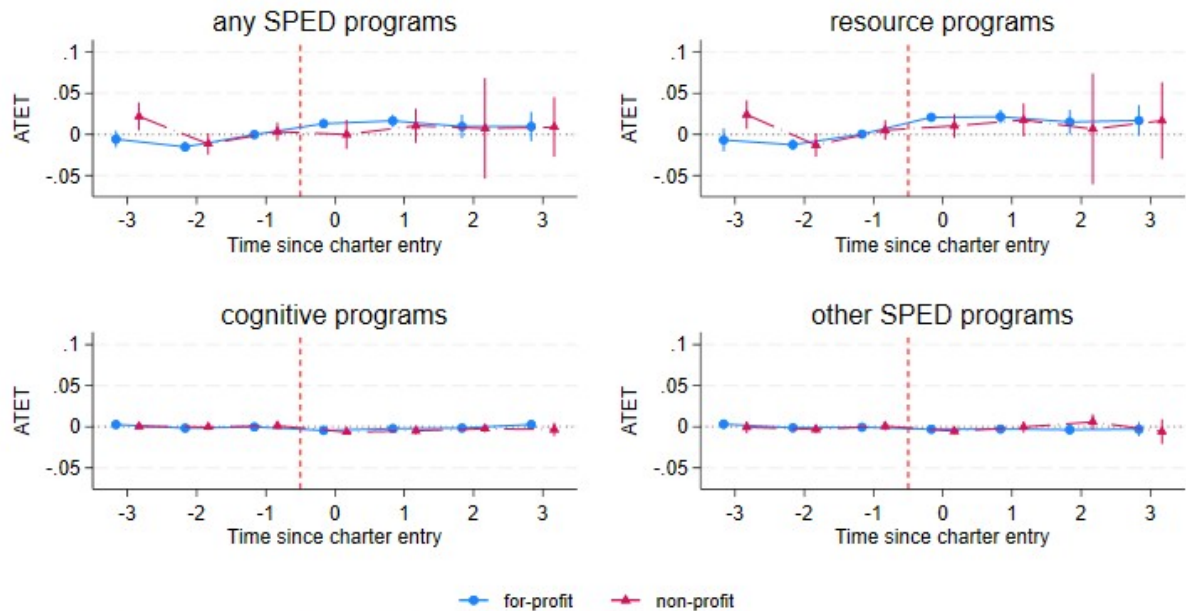
*Special Education FTEs and Educational Setting by Charter School Management Type*



The estimated average treatment effect on the treated of charter entry on SPED FTEs and educational setting. Separate estimates for all for-profit students. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

**Figure A3**

*Special Education Programs by Charter School Management Type*

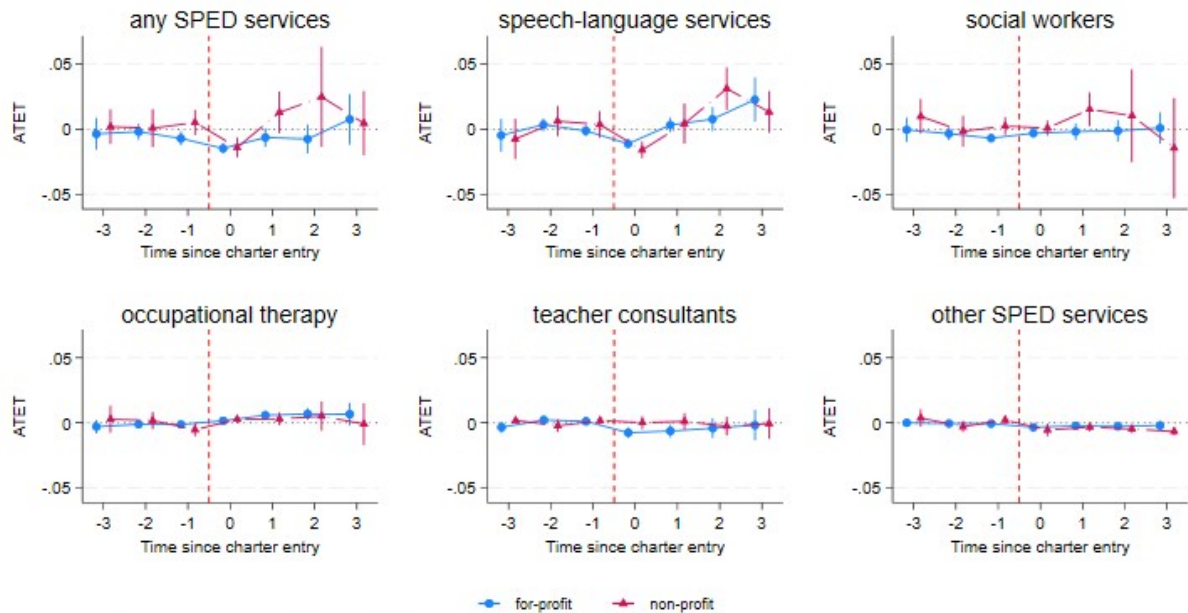


The estimated average treatment effect on the treated of charter entry on SPED programs.  
 Separate estimates for all for-profit students. Heterogeneous effects are aggregated by time since charter entry.  
 Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.



**Figure A4**

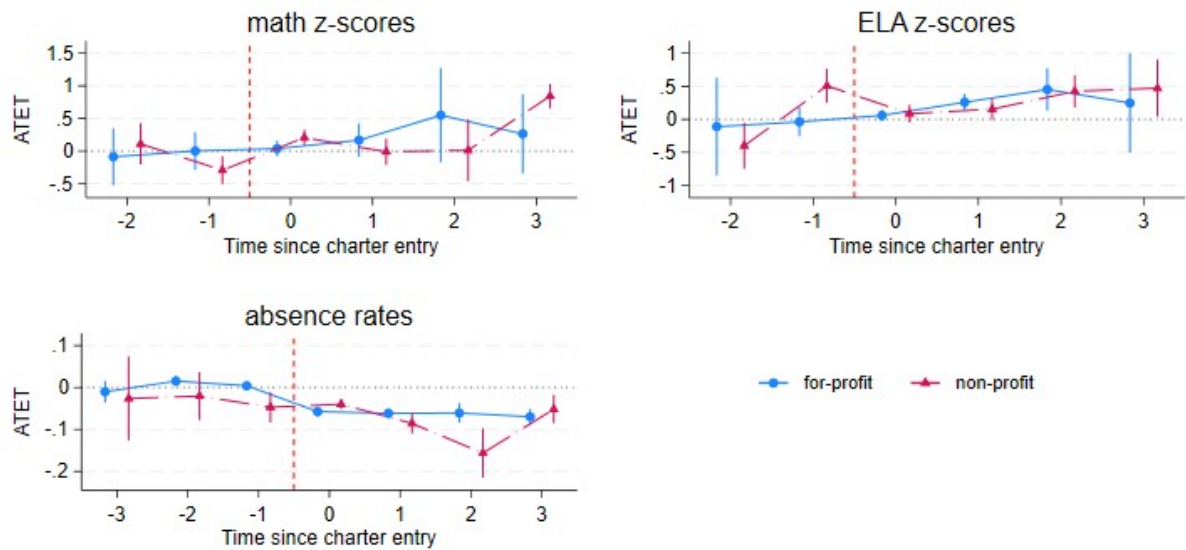
*Special Education Services by Charter School Management Type*



The estimated average treatment effect on the treated of charter entry on SPED services. Separate estimates for all for-profit students. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

**Figure A5**

*Special Education Achievement and Absence Outcomes by Charter School Management Type*



The estimated average treatment effect on the treated of charter entry on achievement and absences. Separate estimates for for-profit students in SPED before entry. Heterogeneous effects are aggregated by time since entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

## Appendix B – Main Charter Entry Estimates and Additional Summary Statistics

**Table B1– Overall Difference-in-Differences Estimate**

| <b>SPED Charter Entry Heterogeneous DID Estimates - Overall Average Treatment Effect on the Treated</b> |        |       |       |        |        |
|---------------------------------------------------------------------------------------------------------|--------|-------|-------|--------|--------|
| <i>After Charter v. Not Yet Charter</i>                                                                 |        |       |       |        |        |
| Outcome                                                                                                 | ATET   | SE    | P     | 95% CI |        |
| absence rates (SPED)                                                                                    | -0.059 | 0.006 | 0.000 | -0.071 | -0.048 |
| math z-scores (SPED)                                                                                    | 0.184  | 0.049 | 0.000 | 0.088  | 0.280  |
| ELA z-scores (SPED)                                                                                     | 0.086  | 0.036 | 0.019 | 0.014  | 0.157  |
| SPED identification                                                                                     | 0.006  | 0.002 | 0.010 | 0.001  | 0.011  |
| speech-language impairment ID                                                                           | -0.004 | 0.002 | 0.060 | -0.008 | 0.000  |
| specific learning disability ID                                                                         | 0.004  | 0.002 | 0.046 | 0.000  | 0.008  |
| all other disabilities ID                                                                               | 0.004  | 0.002 | 0.008 | 0.001  | 0.007  |
| cognitive impairment ID                                                                                 | 0.004  | 0.001 | 0.001 | 0.001  | 0.006  |
| mean SPED FTEs                                                                                          | -0.007 | 0.001 | 0.000 | -0.009 | -0.005 |
| >80% gen ed                                                                                             | 0.019  | 0.003 | 0.000 | 0.014  | 0.024  |
| 40-79% gen ed                                                                                           | -0.006 | 0.001 | 0.000 | -0.009 | -0.003 |
| <40% gen ed                                                                                             | -0.005 | 0.001 | 0.000 | -0.008 | -0.002 |
| any SPED programs                                                                                       | 0.016  | 0.003 | 0.000 | 0.010  | 0.021  |
| resource programs                                                                                       | 0.022  | 0.003 | 0.000 | 0.016  | 0.029  |
| cognitive programs                                                                                      | -0.002 | 0.001 | 0.003 | -0.004 | -0.001 |
| other SPED programs                                                                                     | -0.004 | 0.002 | 0.021 | -0.007 | -0.001 |
| any SPED services                                                                                       | -0.003 | 0.002 | 0.267 | -0.007 | 0.002  |
| speech-language services                                                                                | 0.000  | 0.002 | 0.829 | -0.003 | 0.004  |
| social work service                                                                                     | 0.003  | 0.002 | 0.135 | -0.001 | 0.006  |
| occupational therapy                                                                                    | 0.004  | 0.001 | 0.002 | 0.001  | 0.006  |
| teacher consultants                                                                                     | -0.004 | 0.002 | 0.094 | -0.009 | 0.001  |
| other SPED services                                                                                     | -0.003 | 0.001 | 0.000 | -0.004 | -0.002 |

# CHARTER SCHOOLS AND STUDENTS WITH DISABILITIES

**Table B2**

| Charter Entry Heterogeneous DID Estimates - Dynamic |                |                 |             |              |            |             |         |            |            |          |         |          |            |
|-----------------------------------------------------|----------------|-----------------|-------------|--------------|------------|-------------|---------|------------|------------|----------|---------|----------|------------|
|                                                     | 1              | 1b              | 2           | 2b           | 3          | 3b          | 4       | 5          | 6          | 7        | 8       | 9        | 10         |
| Time since charter                                  | absence (SPED) | absence (GenEd) | math (SPED) | math (GenEd) | ela (SPED) | ela (GenEd) | sped    | sli        | sld        | oth_dis  | cog_imp | sped_fte | gen_ed_80p |
| -3                                                  | -0.013         | 0.001           |             |              |            |             | -0.009  | -0.005     | 0.001      | -0.005   | 0.000   | -0.004   | -0.006     |
|                                                     | (0.007)        | (0.003)         |             |              |            |             | (0.005) | (0.005)    | (0.004)    | (0.003)  | (0.001) | (0.002)  | (0.007)    |
| -2                                                  | 0.013          | -0.006          | -0.074      | 0.085        | -0.186     | 0.180       | 0.001   | 0.005      | -0.004     | 0.002    | 0.000   | -0.002   | -0.003     |
|                                                     | (0.004)        | (0.002)         | (0.195)     | (0.051)      | (0.289)    | (0.052)     | (0.003) | (0.002)    | (0.002)    | (0.002)  | (0.001) | (0.001)  | (0.003)    |
| -1                                                  | 0.002          | 0.001           | -0.153      | -0.044       | -0.162     | -0.036      | 0.000   | -0.003     | 0.000      | -0.002   | -0.001  | 0.000    | -0.002     |
|                                                     | (0.004)        | (0.002)         | (0.100)     | (0.022)      | (0.074)    | (0.019)     | (0.002) | (0.001)    | (0.001)    | (0.001)  | (0.001) | (0.001)  | (0.002)    |
| 0                                                   | -0.050         | -0.041          | 0.107       | 0.075        | 0.039      | 0.092       | 0.001   | -0.007     | 0.001      | 0.001    | 0.001   | -0.012   | 0.016      |
|                                                     | (0.006)        | (0.008)         | (0.051)     | (0.036)      | (0.047)    | (0.020)     | (0.002) | (0.002)    | (0.001)    | (0.001)  | (0.000) | (0.001)  | (0.002)    |
| 1                                                   | -0.062         | -0.047          | 0.178       | 0.136        | 0.090      | 0.123       | 0.005   | -0.004     | 0.006      | 0.005    | 0.004   | -0.005   | 0.022      |
|                                                     | (0.006)        | (0.008)         | (0.049)     | (0.032)      | (0.052)    | (0.017)     | (0.003) | (0.002)    | (0.002)    | (0.002)  | (0.001) | (0.001)  | (0.003)    |
| 2                                                   | -0.069         | -0.053          | 0.409       | 0.165        | 0.180      | 0.212       | 0.012   | -0.002     | 0.007      | 0.008    | 0.006   | 0.000    | 0.021      |
|                                                     | (0.012)        | (0.009)         | (0.103)     | (0.046)      | (0.062)    | (0.036)     | (0.005) | (0.003)    | (0.004)    | (0.003)  | (0.002) | (0.002)  | (0.006)    |
| 3                                                   | -0.081         | -0.067          | 0.262       | 0.196        | 0.199      | 0.389       | 0.021   | 0.005      | 0.005      | 0.010    | 0.007   | -0.003   | 0.016      |
|                                                     | (0.010)        | (0.010)         | (0.229)     | (0.079)      | (0.125)    | (0.076)     | (0.008) | (0.007)    | (0.005)    | (0.006)  | (0.003) | (0.003)  | (0.008)    |
| Observations                                        | 45847          | 234187          | 15022       | 81539        | 14953      | 81515       | 285036  | 285036     | 285036     | 285036   | 285036  | 282135   | 285036     |
| Individuals                                         | 9557           | 49663           | 4596        | 24293        | 4562       | 24226       | 59719   | 59719      | 59719      | 59719    | 59719   | 59193    | 59719      |
|                                                     | 11             | 12              | 13          | 14           | 15         | 16          | 17      | 18         | 19         | 20       | 21      | 22       |            |
| Time since charter                                  | gen_ed_40_79   | gen_ed_u40      | any_pgm     | rsc_pgm      | cog_pgm    | oth_pgm     | any_svc | speech_svc | socialwork | occ_ther | consult | oth_svc  |            |
| -3                                                  | -0.004         | 0.003           | -0.003      | -0.004       | 0.002      | 0.003       | -0.002  | -0.004     | 0.002      | -0.003   | -0.002  | -0.001   |            |
|                                                     | (0.003)        | (0.002)         | (0.004)     | (0.005)      | (0.001)    | (0.002)     | (0.005) | (0.005)    | (0.004)    | (0.003)  | (0.002) | (0.002)  |            |
| -2                                                  | 0.006          | -0.001          | -0.003      | -0.001       | -0.002     | -0.001      | -0.002  | 0.003      | -0.003     | 0.000    | 0.003   | -0.001   |            |
|                                                     | (0.002)        | (0.002)         | (0.002)     | (0.002)      | (0.001)    | (0.001)     | (0.002) | (0.002)    | (0.002)    | (0.001)  | (0.001) | (0.001)  |            |
| -1                                                  | -0.002         | -0.001          | 0.000       | 0.000        | 0.000      | -0.001      | -0.001  | 0.001      | -0.002     | -0.001   | 0.001   | 0.000    |            |
|                                                     | (0.001)        | (0.001)         | (0.002)     | (0.002)      | (0.001)    | (0.001)     | (0.002) | (0.002)    | (0.001)    | (0.001)  | (0.001) | (0.001)  |            |
| 0                                                   | -0.011         | -0.008          | 0.010       | 0.018        | -0.004     | -0.004      | -0.015  | -0.012     | -0.003     | 0.001    | -0.005  | -0.004   |            |
|                                                     | (0.001)        | (0.001)         | (0.002)     | (0.002)      | (0.001)    | (0.001)     | (0.002) | (0.002)    | (0.002)    | (0.001)  | (0.002) | (0.001)  |            |
| 1                                                   | -0.007         | -0.004          | 0.017       | 0.022        | -0.002     | -0.003      | 0.001   | 0.004      | 0.005      | 0.005    | -0.005  | -0.003   |            |
|                                                     | (0.002)        | (0.001)         | (0.004)     | (0.004)      | (0.001)    | (0.002)     | (0.003) | (0.002)    | (0.002)    | (0.001)  | (0.002) | (0.001)  |            |
| 2                                                   | -0.001         | -0.002          | 0.021       | 0.027        | 0.000      | -0.004      | 0.006   | 0.012      | 0.008      | 0.007    | -0.002  | -0.003   |            |
|                                                     | (0.002)        | (0.002)         | (0.006)     | (0.006)      | (0.001)    | (0.002)     | (0.004) | (0.004)    | (0.003)    | (0.002)  | (0.003) | (0.001)  |            |
| 3                                                   | 0.008          | 0.001           | 0.027       | 0.036        | 0.003      | -0.006      | 0.025   | 0.028      | 0.012      | 0.007    | 0.000   | -0.002   |            |
|                                                     | (0.006)        | (0.004)         | (0.007)     | (0.007)      | (0.003)    | (0.005)     | (0.009) | (0.007)    | (0.005)    | (0.003)  | (0.004) | (0.002)  |            |
| Observations                                        | 285036         | 285036          | 285036      | 285036       | 285036     | 285036      | 285036  | 285036     | 285036     | 285036   | 285036  | 285036   |            |
| Individuals                                         | 59719          | 59719           | 59719       | 59719        | 59719      | 59719       | 59719   | 59719      | 59719      | 59719    | 59719   | 59719    |            |

Standard errors in parentheses



**Table B3 – Observation Counts**

| Count of Observations |                                    |          |                   |          |                  |          |              |          |          |
|-----------------------|------------------------------------|----------|-------------------|----------|------------------|----------|--------------|----------|----------|
|                       | Charter                            |          |                   |          |                  |          |              |          |          |
|                       | <i>Total Observed Before Entry</i> |          | <i>Never SPED</i> |          | <i>Ever SPED</i> |          |              |          |          |
|                       |                                    |          |                   |          | Prior SPED       |          | SPED After   |          |          |
| Variables             | Observations                       | Students | Observations      | Students | Observations     | Students | Observations | Students | Students |
| absent_rate           | 281377                             | 59712    | 219454            | 46948    | 45957            | 9602     | 15966        |          | 3162     |
| math_z_score2         | 152894                             | 51676    | 122309            | 41030    | 22866            | 7911     | 7719         |          | 2735     |
| ela_z_score2          | 153199                             | 51702    | 122499            | 41060    | 22929            | 7912     | 7771         |          | 2730     |
| sped                  | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| sli                   | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| sld                   | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| othdis                | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| cognitive_imp         | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| mean_sped_FTE         | 283334                             | 59718    | 220900            | 46953    | 46361            | 9603     | 16073        |          | 3162     |
| gen_ed_80p            | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| gen_ed_40_79          | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| gen_ed_u40            | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| any_sped_pgm          | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| resource_pgm          | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| cognitive_pgm         | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| oth_sped_p            | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| any_sped_svc          | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| speech_svc            | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| socialworker          | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| occ_ther              | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| consult               | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| oth_svc               | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |
| Total                 | 285037                             | 59719    | 222265            | 46954    | 46576            | 9603     | 16196        |          | 3162     |

**Table B4 – SPED Summary Statistics by Charter Mobility**

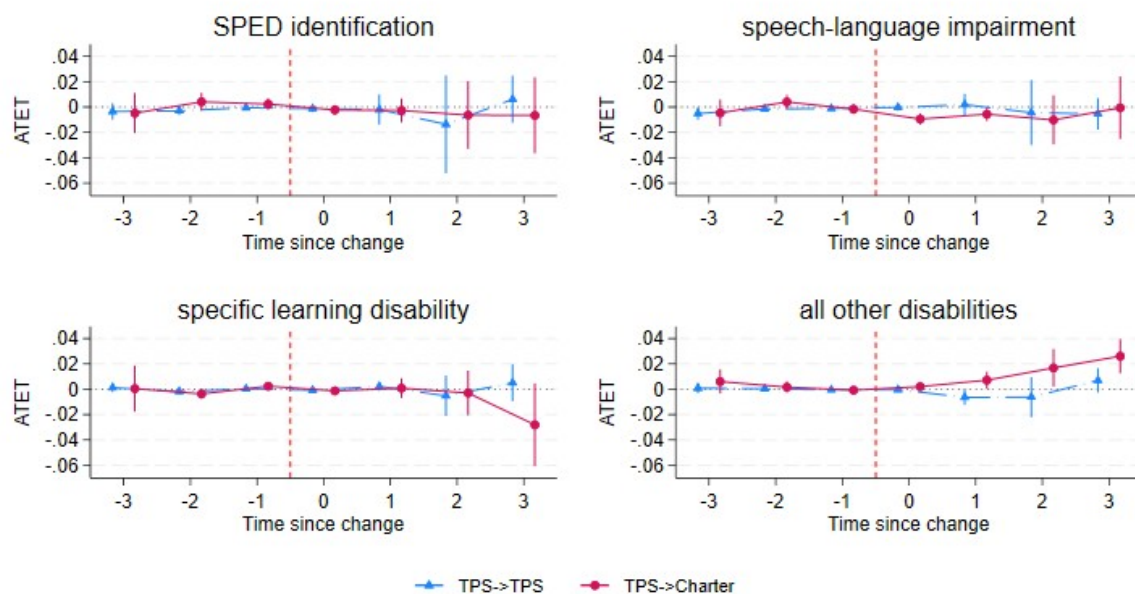
| Summary statistics: Ever SPED students by Charter Mobility |               |       |                |       |                |       |                |       |
|------------------------------------------------------------|---------------|-------|----------------|-------|----------------|-------|----------------|-------|
|                                                            | Never charter |       | Always charter |       | Enters charter |       | Leaves charter |       |
|                                                            | Mean/Prop.    | SD    | Mean/Prop.     | SD    | Mean/Prop.     | SD    | Mean/Prop.     | SD    |
| Ever district choice                                       | 0.137         | 0.344 | 0.000          | 0.000 | 0.118          | 0.322 | 0.167          | 0.373 |
| Charter in observation                                     | 0.000         | 0.000 | 1.000          | 0.000 | 0.419          | 0.493 | 0.481          | 0.500 |
| CMO (Non-Profit)                                           |               |       | 0.109          | 0.312 | 0.105          | 0.307 | 0.115          | 0.319 |
| EMO (For-Profit)                                           |               |       | 0.734          | 0.442 | 0.757          | 0.429 | 0.686          | 0.464 |
| Profit type not applicable                                 |               |       | 0.106          | 0.308 | 0.090          | 0.287 | 0.093          | 0.291 |
| Profit type unreported                                     |               |       | 0.050          | 0.219 | 0.047          | 0.212 | 0.106          | 0.308 |
| Ever special education                                     | 1.000         | 0.000 | 1.000          | 0.000 | 1.000          | 0.000 | 1.000          | 0.000 |
| SPED in observation                                        | 0.765         | 0.424 | 0.761          | 0.427 | 0.703          | 0.457 | 0.684          | 0.465 |
| Cognitive impairment                                       | 0.061         | 0.240 | 0.056          | 0.230 | 0.049          | 0.216 | 0.049          | 0.215 |
| Emotional impairment                                       | 0.039         | 0.193 | 0.019          | 0.136 | 0.051          | 0.220 | 0.041          | 0.198 |
| Speech & language impairment                               | 0.247         | 0.432 | 0.283          | 0.450 | 0.202          | 0.402 | 0.203          | 0.402 |
| Specific Learning Disability                               | 0.224         | 0.417 | 0.243          | 0.429 | 0.218          | 0.413 | 0.232          | 0.422 |
| Autism spectrum disorder                                   | 0.065         | 0.247 | 0.047          | 0.212 | 0.036          | 0.186 | 0.030          | 0.171 |
| All other disabilities                                     | 0.297         | 0.457 | 0.236          | 0.424 | 0.265          | 0.441 | 0.238          | 0.426 |
| Absence rate                                               | 0.068         | 0.097 | 0.075          | 0.097 | 0.104          | 0.124 | 0.102          | 0.120 |
| ELA/reading z-score                                        | -0.624        | 0.945 | -0.825         | 0.928 | -0.960         | 0.867 | -0.925         | 0.881 |
| Math z-score                                               | -0.584        | 0.964 | -0.795         | 0.926 | -0.990         | 0.872 | -0.934         | 0.904 |
| Mean SPED FTE                                              | 0.153         | 0.262 | 0.072          | 0.164 | 0.090          | 0.183 | 0.086          | 0.177 |
| Gen Ed class 80+%                                          | 0.534         | 0.499 | 0.663          | 0.473 | 0.547          | 0.498 | 0.536          | 0.499 |
| Gen Ed class 40-79%                                        | 0.108         | 0.311 | 0.035          | 0.184 | 0.068          | 0.252 | 0.072          | 0.259 |
| Gen Ed class <40%                                          | 0.074         | 0.262 | 0.008          | 0.089 | 0.039          | 0.192 | 0.042          | 0.200 |
| Any SPED program                                           | 0.523         | 0.499 | 0.559          | 0.497 | 0.512          | 0.500 | 0.503          | 0.500 |
| Any SPED service                                           | 0.591         | 0.492 | 0.570          | 0.495 | 0.524          | 0.499 | 0.504          | 0.500 |
| Gender (female)                                            | 0.346         | 0.476 | 0.348          | 0.476 | 0.358          | 0.479 | 0.335          | 0.472 |
| Black/African American                                     | 0.152         | 0.359 | 0.532          | 0.499 | 0.466          | 0.499 | 0.550          | 0.497 |
| Latinx/Hispanic                                            | 0.076         | 0.266 | 0.088          | 0.283 | 0.083          | 0.276 | 0.062          | 0.241 |
| White/Caucasian                                            | 0.707         | 0.455 | 0.319          | 0.466 | 0.382          | 0.486 | 0.323          | 0.468 |
| Other race (or multiracial)                                | 0.064         | 0.245 | 0.062          | 0.240 | 0.069          | 0.254 | 0.064          | 0.245 |
| Free/reduced price lunch                                   | 0.620         | 0.485 | 0.753          | 0.431 | 0.835          | 0.371 | 0.794          | 0.404 |
| English Language learner                                   | 0.057         | 0.232 | 0.094          | 0.292 | 0.061          | 0.239 | 0.048          | 0.213 |

Note: There are 1,131,668 student-year observations for 287,259 students who ever are identified for special education during the analytical period. Of the observations, 954,138 (246,254 unique students) are for students who never enroll in a Michigan charter; 61,953 (17,375 students) are for students who always attend a charter during the observation period; 68,404 student-observations (13,885 students) are for students who begin in a TPS and switch to a charter; and 47,173 observations (9,745 students) are for students who begin in a charter but later exit to a TPS.

## Appendix C – Charter Entry Compared to TPS-TPS Switches

To look at whether our estimates reflect entry into a charter school rather than just school switches, in this section we estimate separate models for school changes from TPS to TPS and from TPS to charters.

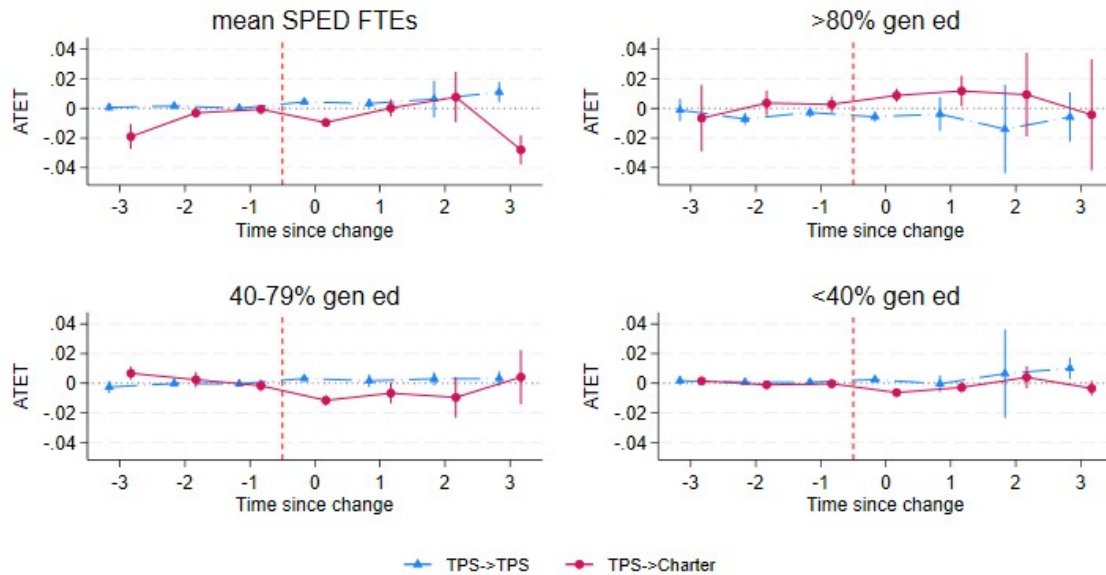
**Figure C1 – SPED Identification Effects for Charter and TPS School Switches**



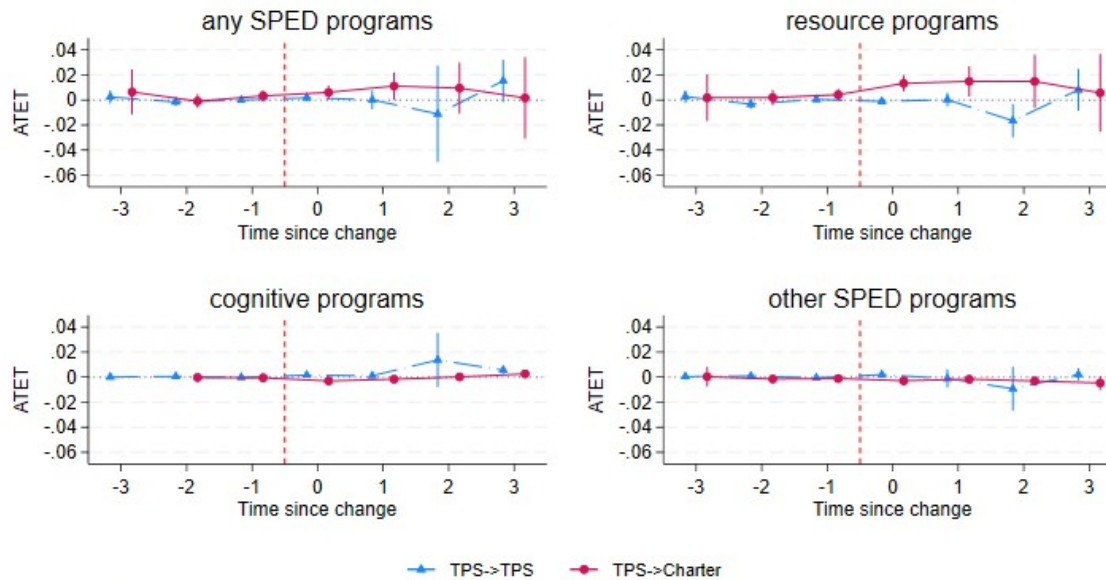
The estimated average treatment effect on the treated of school changes on SPED identification. Separate estimates for all TPS-to-charter changes. Heterogeneous effects are aggregated by time since change. Model compares students to future changers. Controls for resident district, demographics and grade-by-year effects.



**Figure C2 – SPED Outcome Effects for Charter and TPS School Switches**



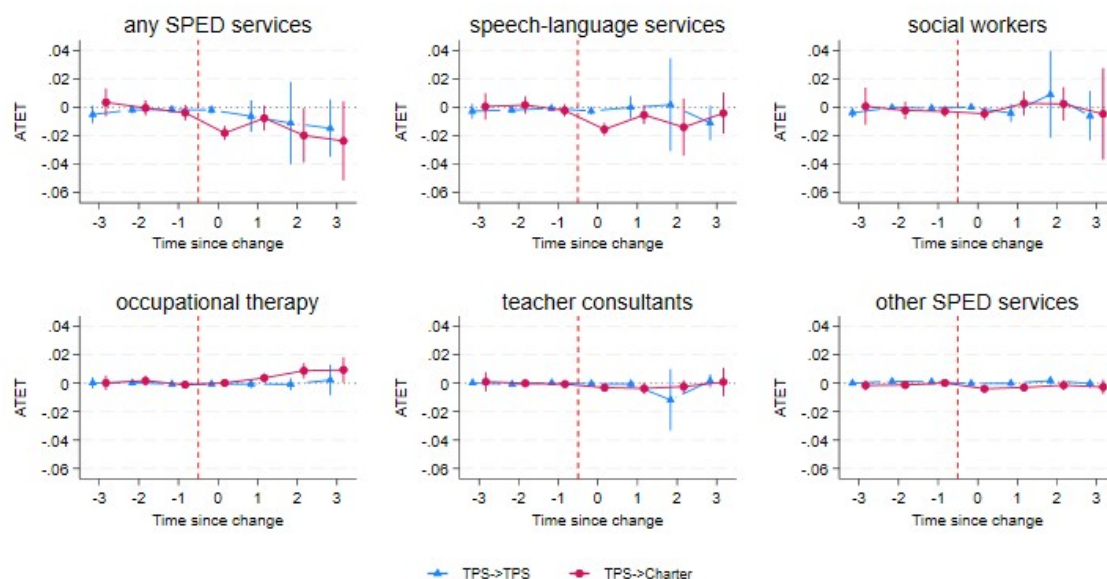
The estimated average treatment effect on the treated of school changes on SPED FTEs and educational setting. Separate estimates for all TPS-to-charter changes. Heterogeneous effects are aggregated by time since change. Model compares students to future changers. Controls for resident district, demographics and grade-by-year effects.



The estimated average treatment effect on the treated of school changes on SPED programs. Separate estimates for all TPS-to-charter changes. Heterogeneous effects are aggregated by time since change. Model compares students to future changers. Controls for resident district, demographics and grade-by-year effects.

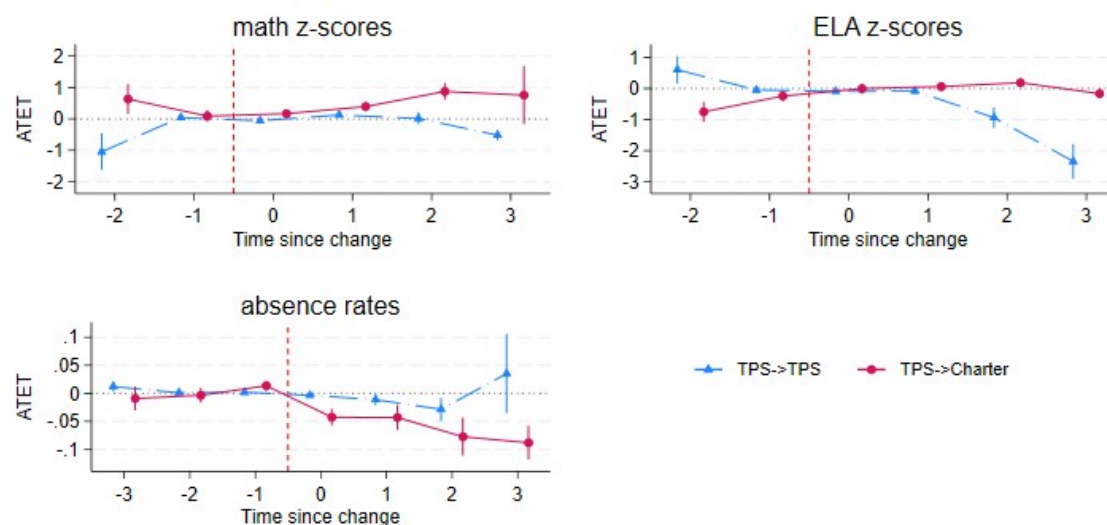


## CHARTER SCHOOLS AND STUDENTS WITH DISABILITIES



The estimated average treatment effect on the treated of school changes on SPED services. Separate estimates for all TPS-to-charter changes. Heterogeneous effects are aggregated by time since change. Model compares students to future changers. Controls for resident district, demographics and grade-by-year effects.

**Figure C3 – Achievement and Absence Effects for Charter and TPS School Switches: Restricted to Prior SPED**

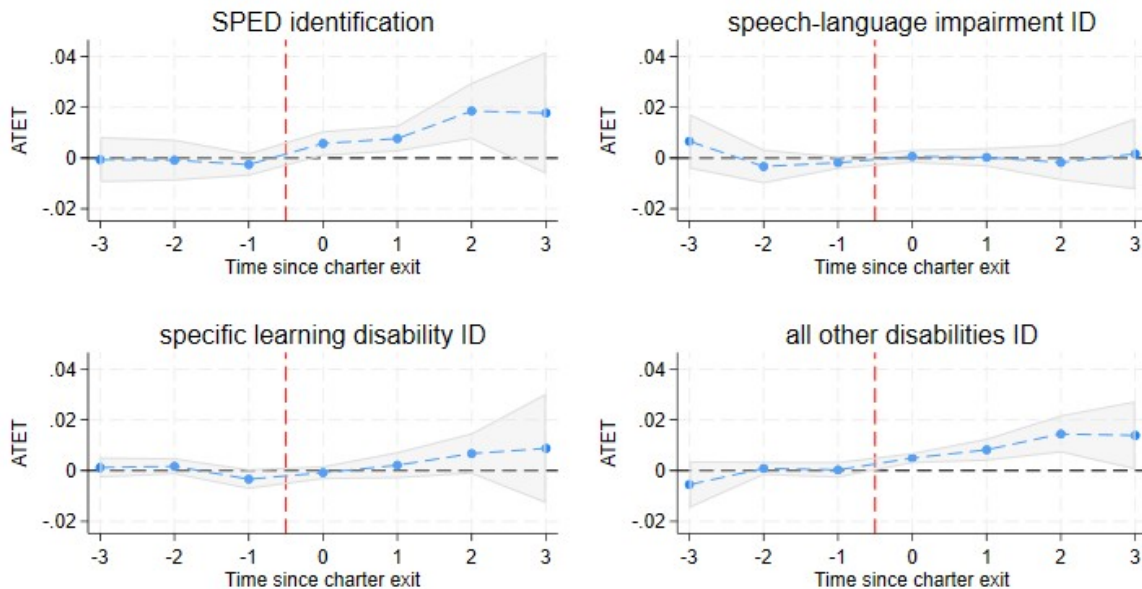


The estimated average treatment effect on the treated of school changes on achievement and absences. Separate estimates for TPS-to-charter changes for students in SPED. Heterogeneous effects are aggregated by time since change. Model compares students to future changers. Controls for resident district, demographics and grade-by-year effects.

## Appendix D – Impacts of Charter Exit

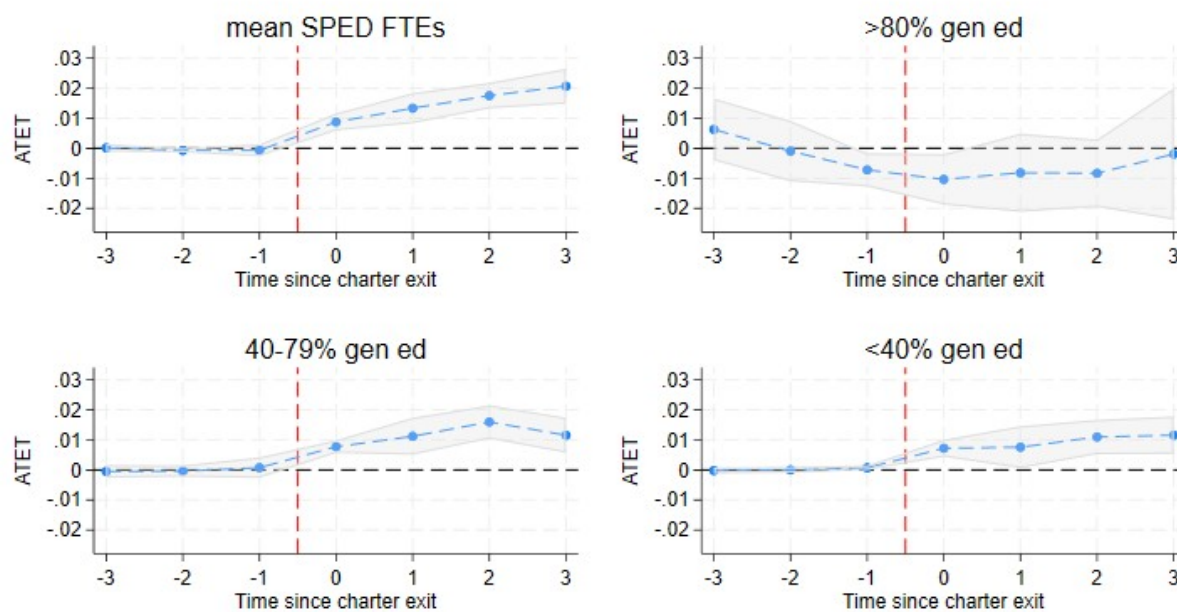
In this section, we analyze the impacts of charter exit for students who begin in charter schools and eventually leave for a TPS. The econometric model is the same as in equation (1) with the exception that instead of setting  $t=0$  as charter entry, we set it to charter exit. We also restrict to students who exit a charter at some point in our sample frame. The results show that, while there is a small increase in identification after charter exit, the patterns for educational setting, program participation, and service provision are the opposite of what we see upon charter entry.

**Figure D1 – SPED Identification Effects of Charter Exit**



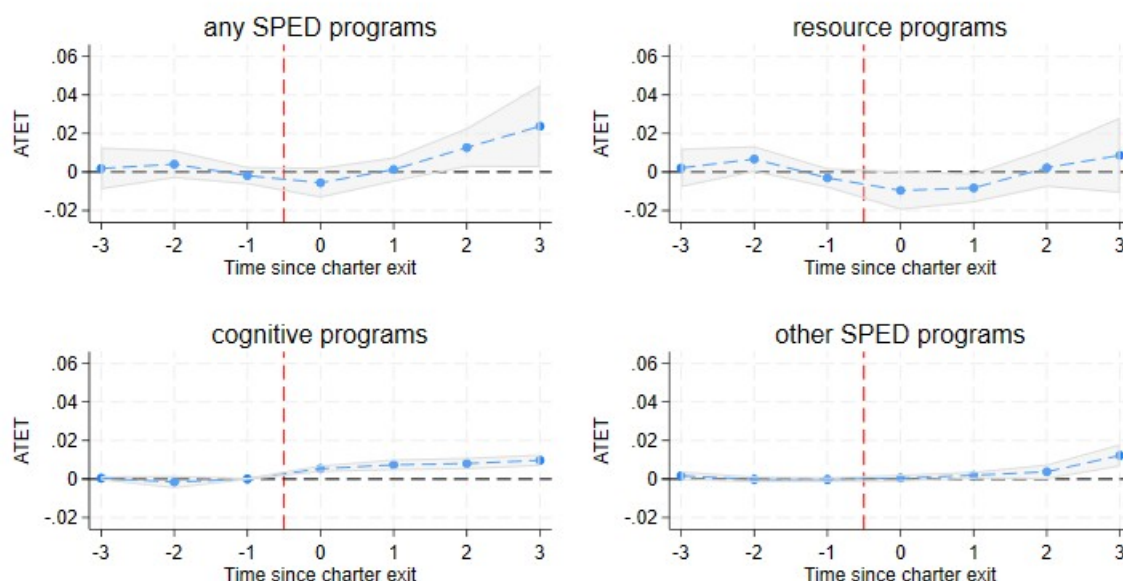
The estimated average treatment effect on the treated of charter exit on SPED identification. Estimates for students who begin in charter and exit. Heterogeneous effects are aggregated by time since charter exit. Model compares students to future exiters. Controls for resident district, demographics and grade-by-year effects.

**Figure D2 – SPED Outcome Effects of Charter Exit**

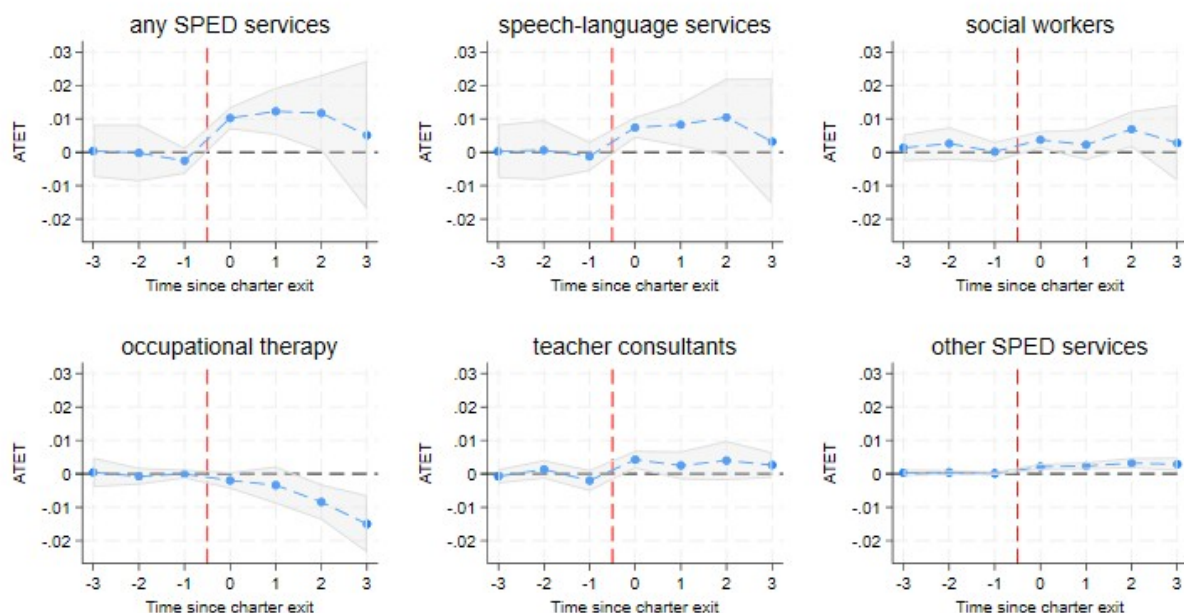


The estimated average treatment effect on the treated of charter exit on SPED FTEs and educational setting. Estimates for students who begin in charter and exit. Heterogeneous effects are aggregated by time since charter exit. Model compares students to future exiters. Controls for resident district, demographics and grade-by-year effects.

## CHARTER SCHOOLS AND STUDENTS WITH DISABILITIES

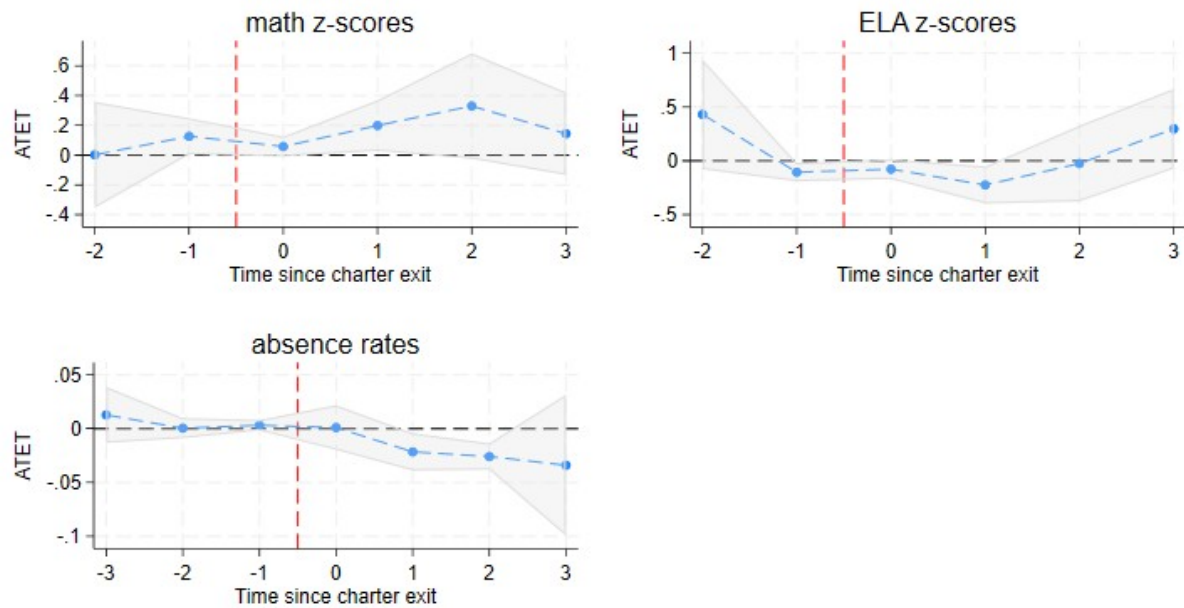


The estimated average treatment effect on the treated of charter exit on SPED programs. Estimates for students who begin in charter and exit. Heterogeneous effects are aggregated by time since charter exit. Model compares students to future exiters. Controls for resident district, demographics and grade-by-year effects.



The estimated average treatment effect on the treated of charter exit on SPED services. Estimates for students who begin in charter and exit. Heterogeneous effects are aggregated by time since charter exit. Model compares students to future exiters. Controls for resident district, demographics and grade-by-year effects.

**Figure D3 – Achievement and Absence Effects of Charter Exit: Restricted to SPED Prior to Exit**



The estimated average treatment effect on the treated of charter exit on achievement and absences. Estimates for students ever classified for SPED before exit. Heterogeneous effects are aggregated by time since exit. Model compares students to future exiters. Controls for resident district, demographics and grade-by-year effects.

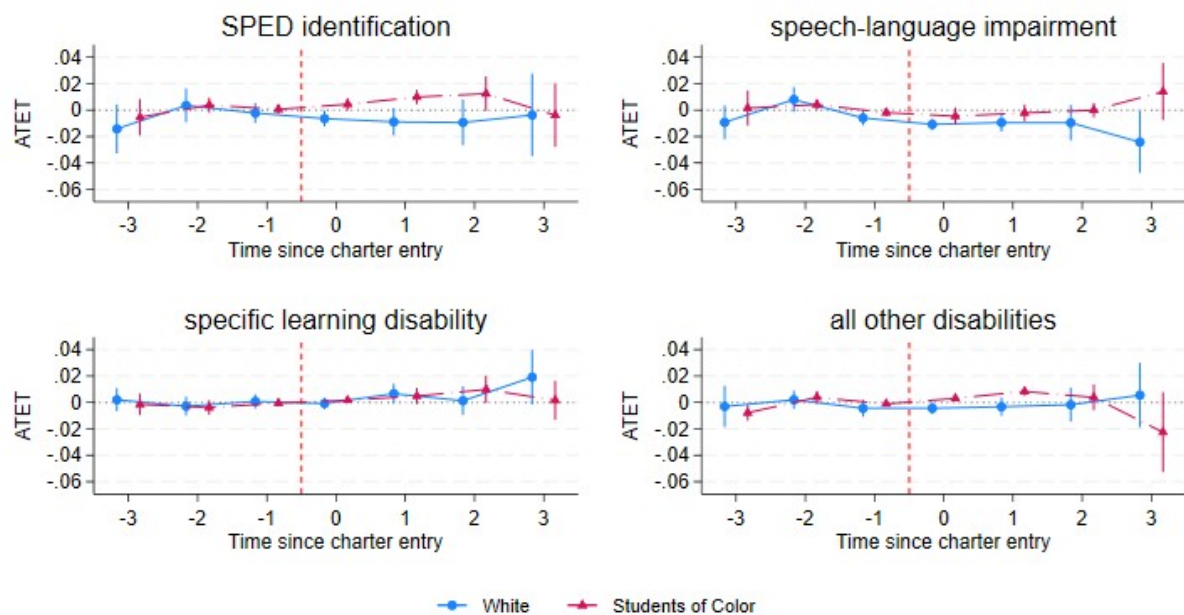


## Appendix E - Heterogeneity by Race, Gender, Economic Status

### A) Race

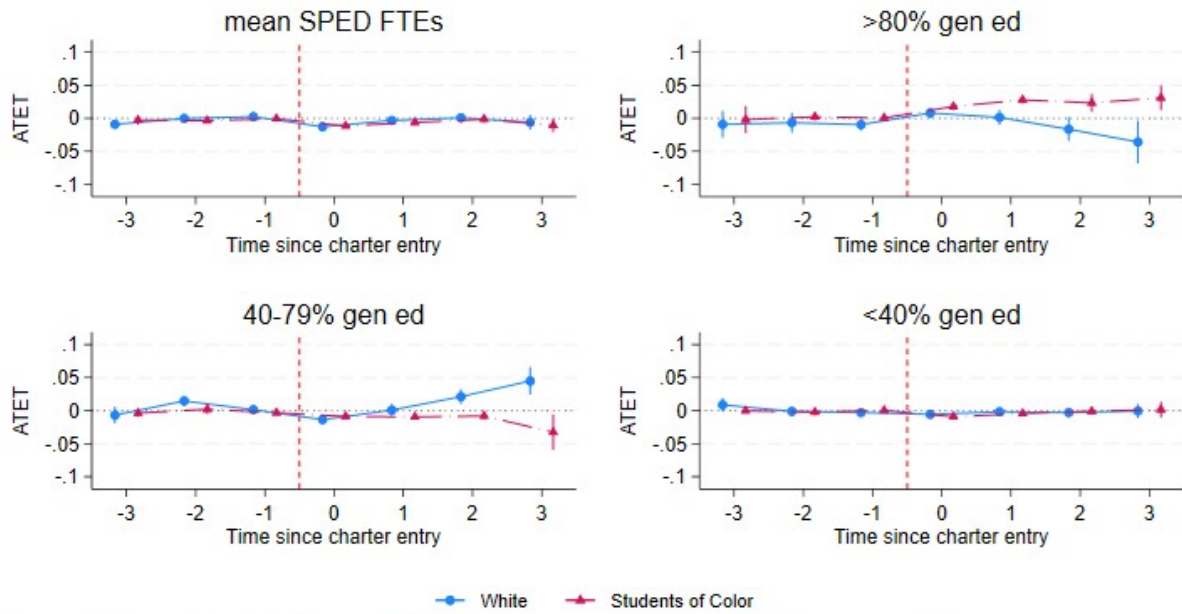
Although the outcomes for students of color and White students are largely consistent after entering charters, the effect of charter entry are less uniform between races.

**Figure E1 – SPED Identification Effects by Race**

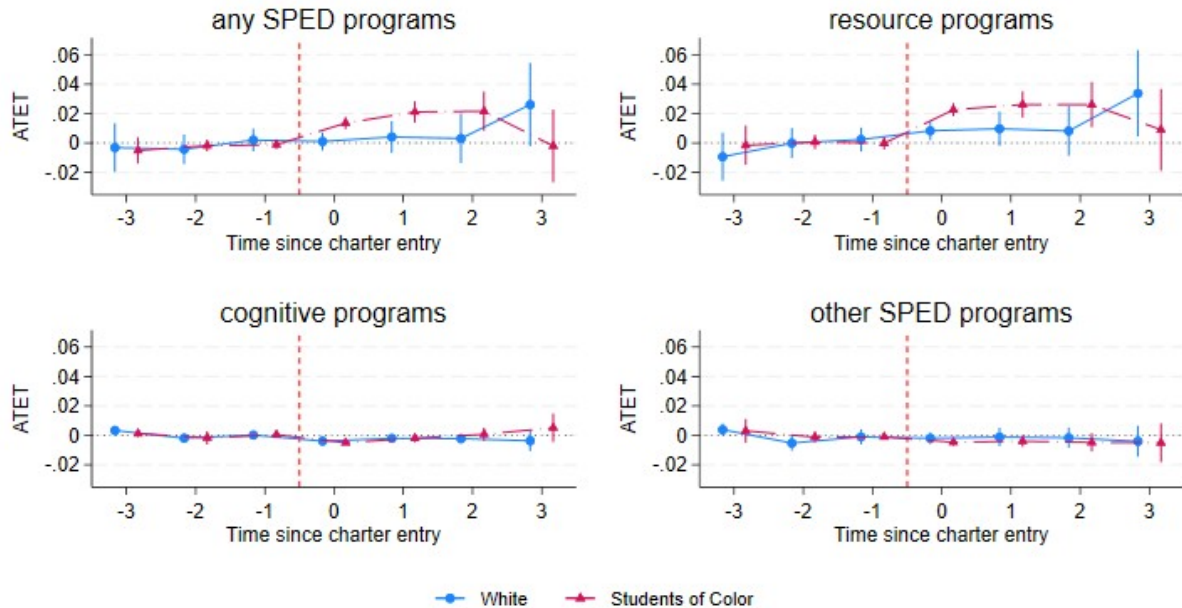


The estimated average treatment effect on the treated of charter entry on SPED identification. Separate estimates for students of color. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

**Figure E2 – SPED Outcome Effects by Race**

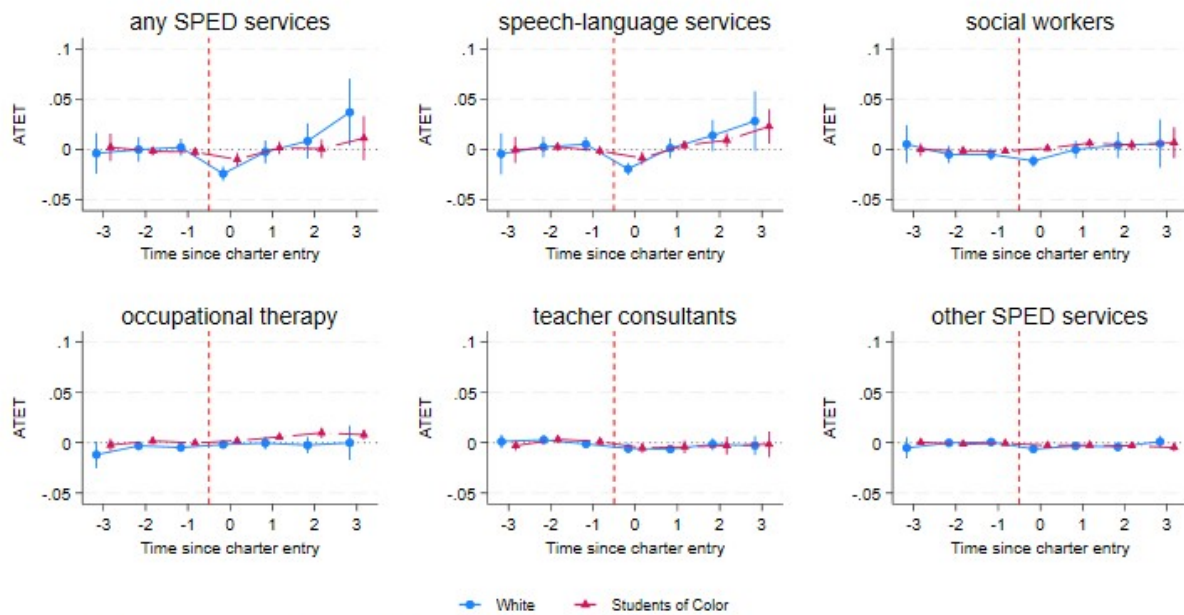


The estimated average treatment effect on the treated of charter entry on SPED FTEs and educational setting. Separate estimates for students of color. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.



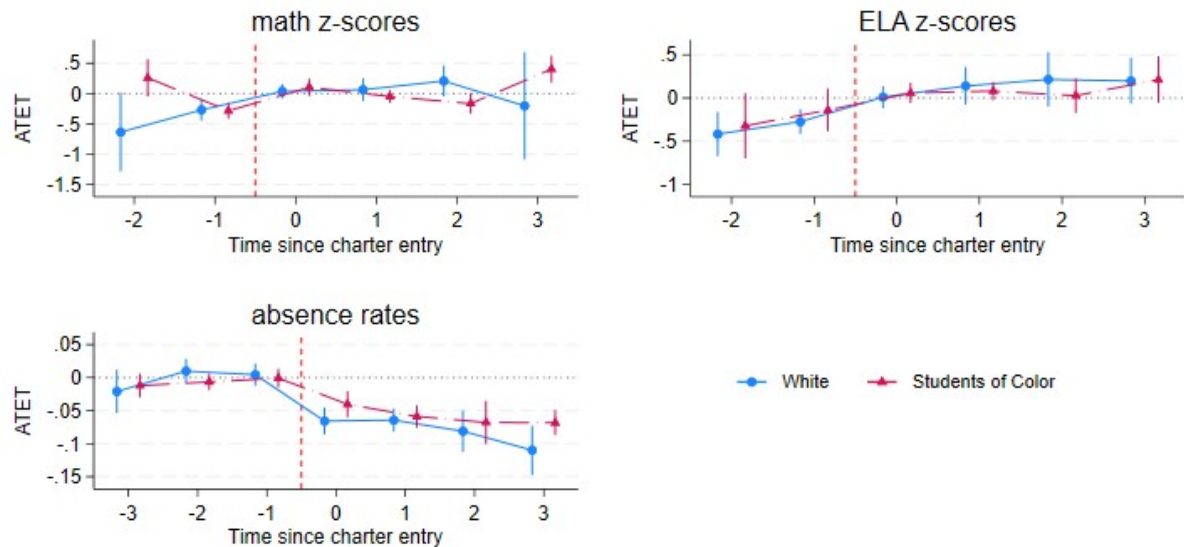
The estimated average treatment effect on the treated of charter entry on SPED programs. Separate estimates for students of color. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

## CHARTER SCHOOLS AND STUDENTS WITH DISABILITIES



The estimated average treatment effect on the treated of charter entry on SPED services. Separate estimates for students of color. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

**Figure E3 – Achievement and Absence Effects by Race: Restricted to Prior SPED**



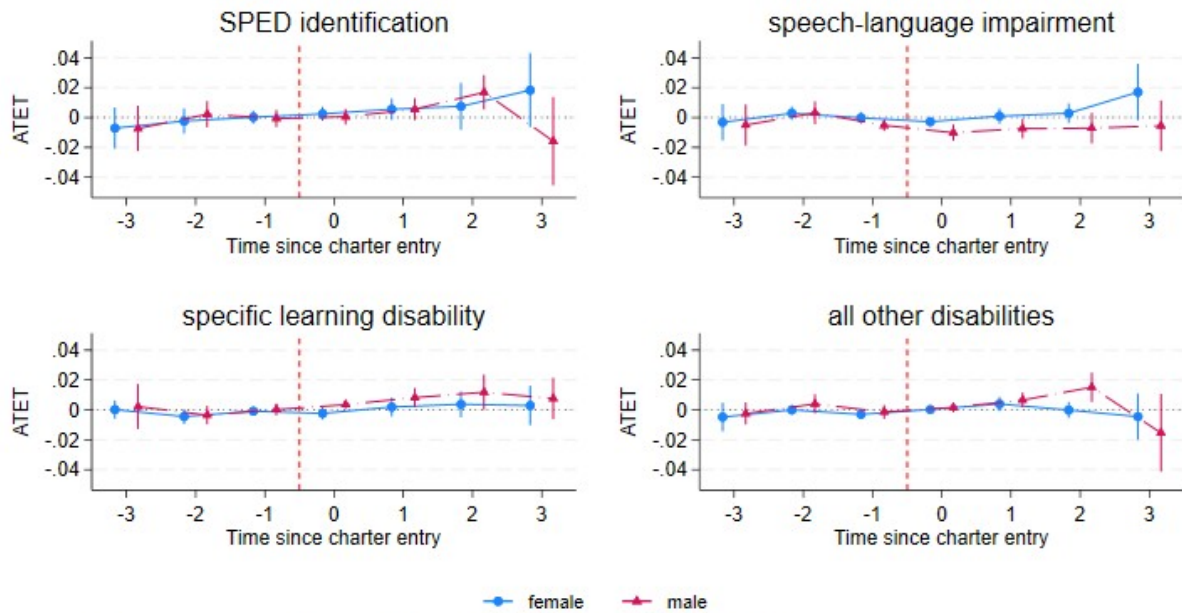
The estimated average treatment effect on the treated of charter entry on achievement and absences. Separate estimates for students of color in SPED before entry. Heterogeneous effects are aggregated by time since entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.



## Gender

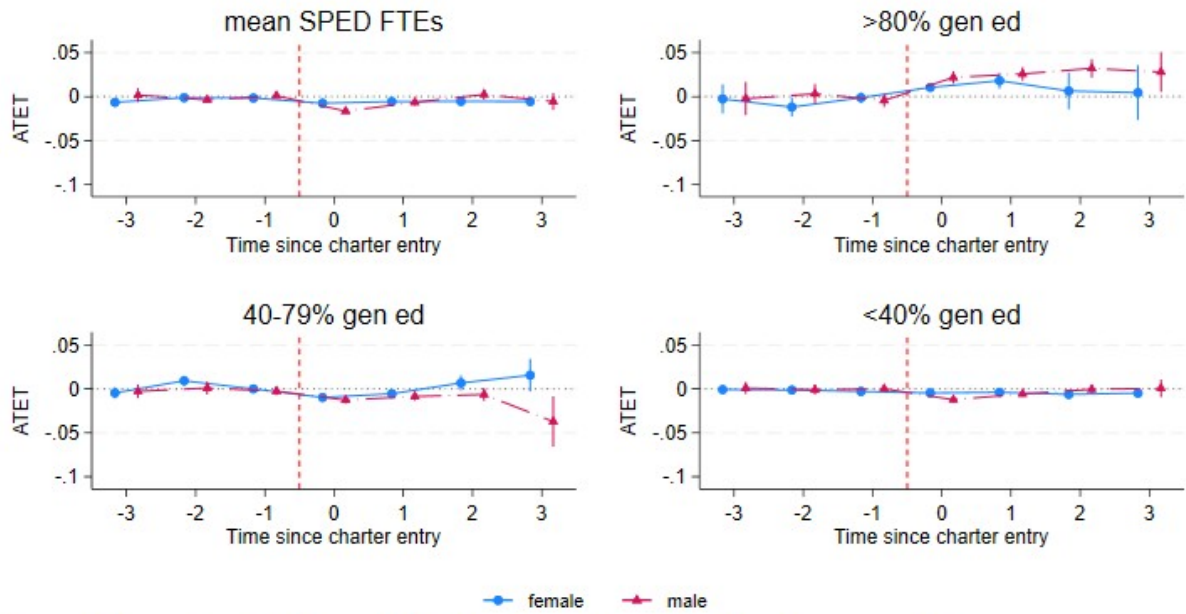
The effects of charter entry on special education are largely consistent between boys and girls.

**Figure E4 – SPED Identification Effects by Gender**

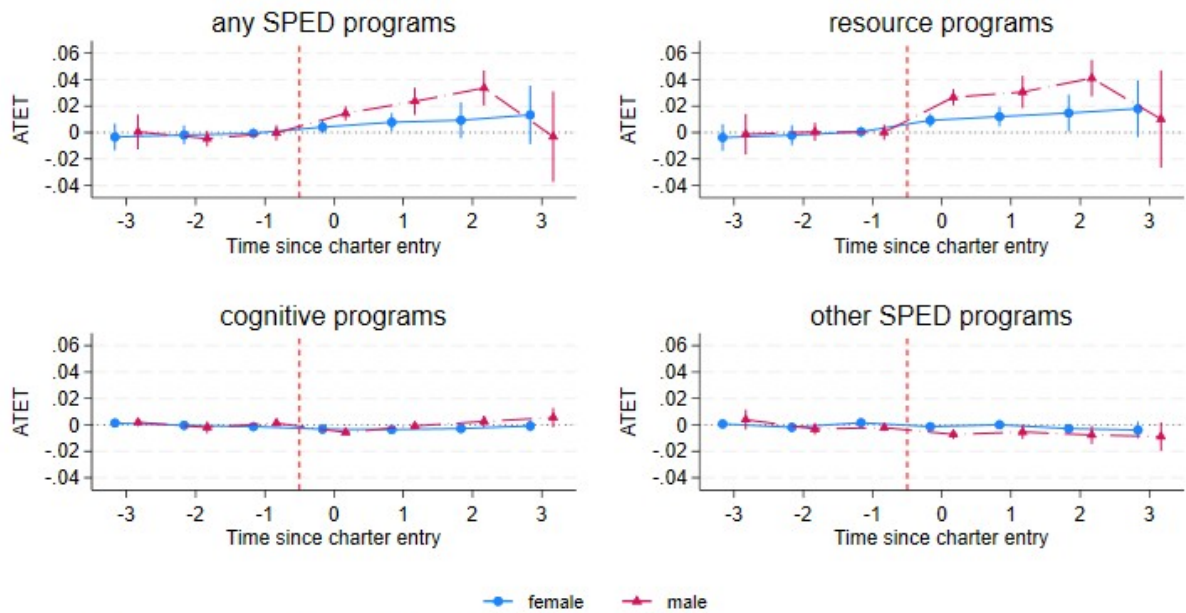


The estimated average treatment effect on the treated of charter entry on SPED identification. Separate estimates for females ever in SPED before entry. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

**Figure E5 – SPED Outcome Effects by Gender**

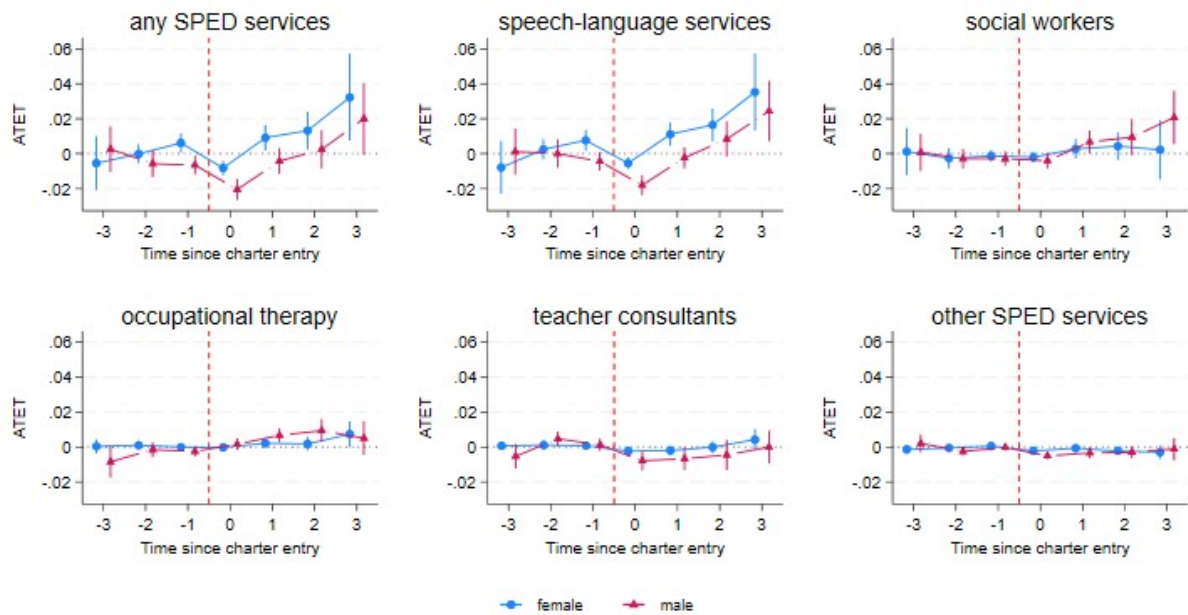


The estimated average treatment effect on the treated of charter entry on SPED FTEs and educational setting. Separate estimates for all females who enter. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.



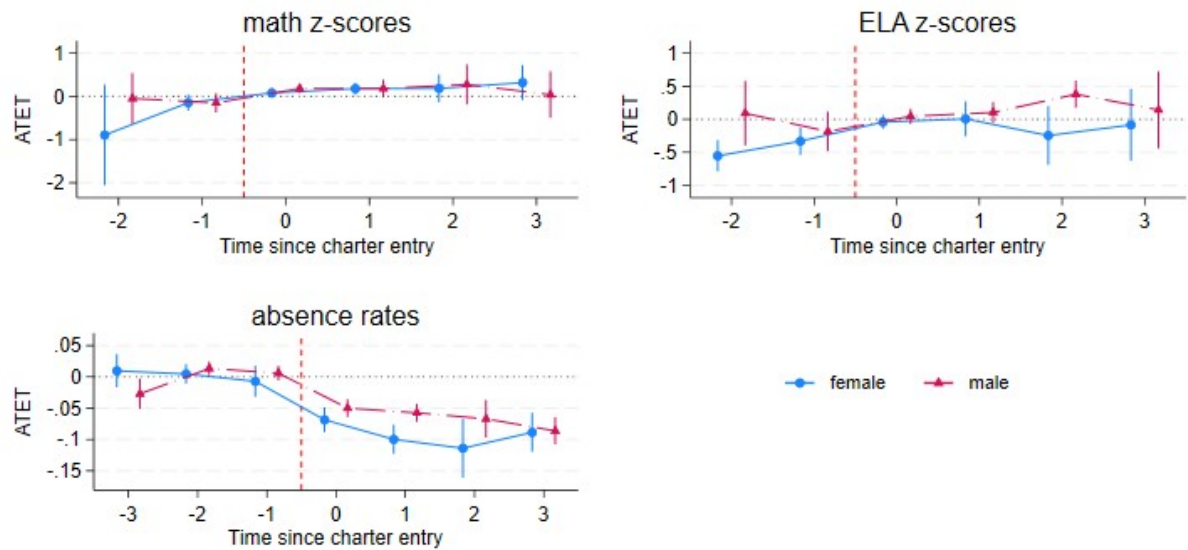
The estimated average treatment effect on the treated of charter entry on SPED programs. Separate estimates for all females who enter. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

## CHARTER SCHOOLS AND STUDENTS WITH DISABILITIES



The estimated average treatment effect on the treated of charter entry on SPED services. Separate estimates for all females who enter. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

**Figure E6 – Achievement and Absence Effects by Gender: Restricted to Prior SPED**

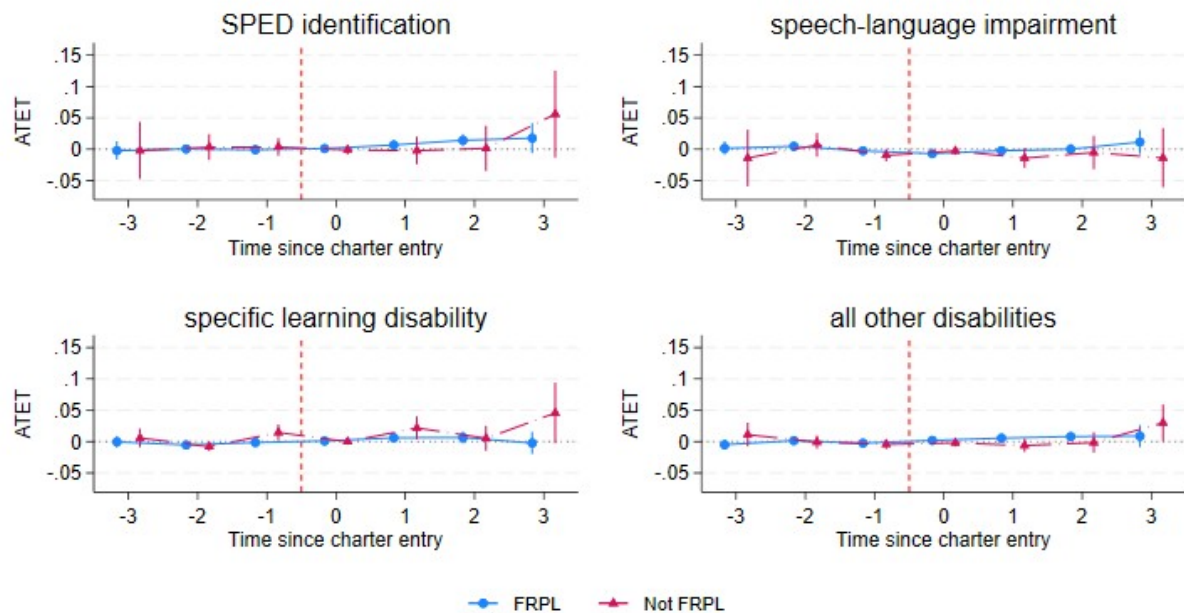


The estimated average treatment effect on the treated of charter entry on achievement and absences. Separate estimates for females ever in SPED before entry. Heterogeneous effects are aggregated by time since entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

## SES

The estimated charter effects are comparable between students who do and do not qualify for free or reduced-price lunch, with some divergence in achievement outcomes.

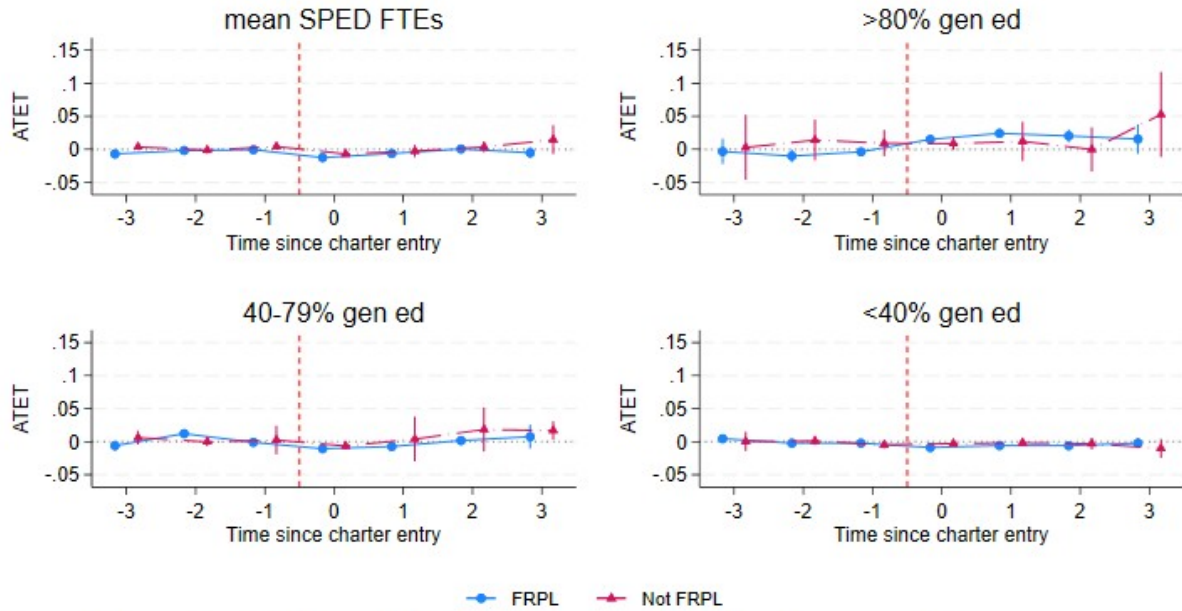
**Figure E7 – SPED Identification Effects by FRPL Eligibility**



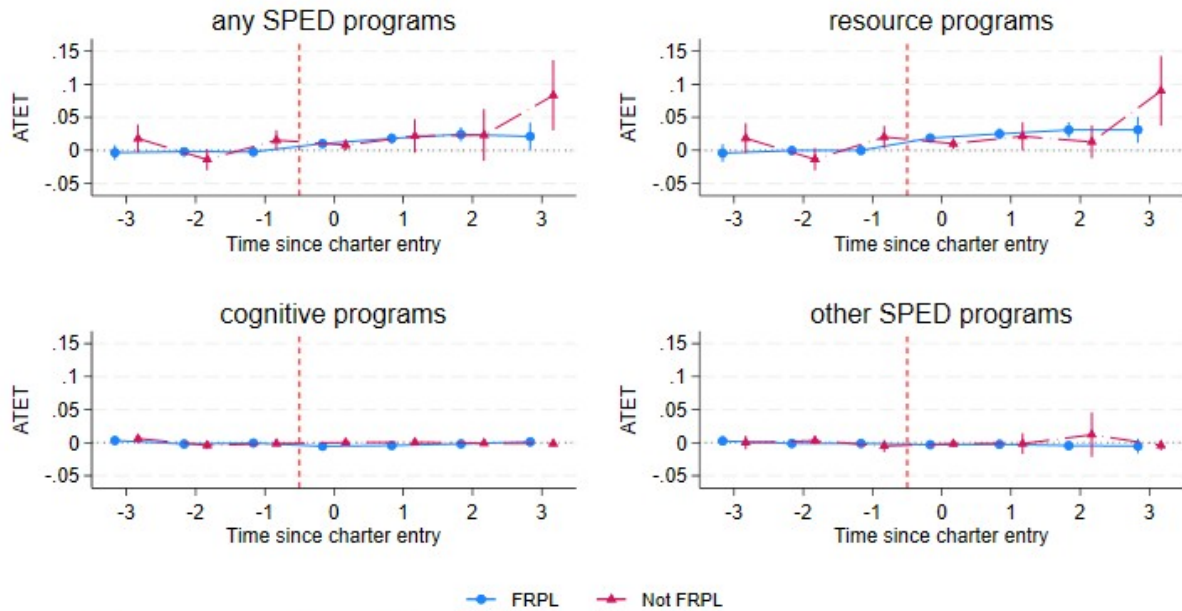
The estimated average treatment effect on the treated of charter entry on SPED identification. Separate estimates for FRPL-eligible students. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.



**Figure E8 – SPED Outcome Effects by FRPL Eligibility**

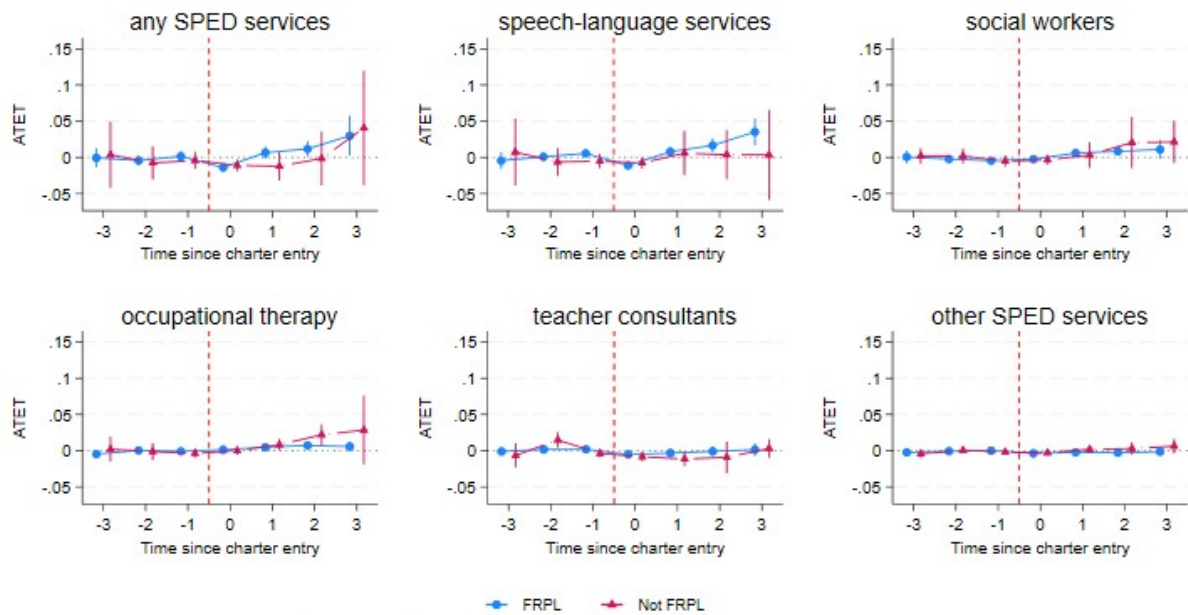


The estimated average treatment effect on the treated of charter entry on SPED FTEs and educational setting. Separate estimates for FRPL-eligible students. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.



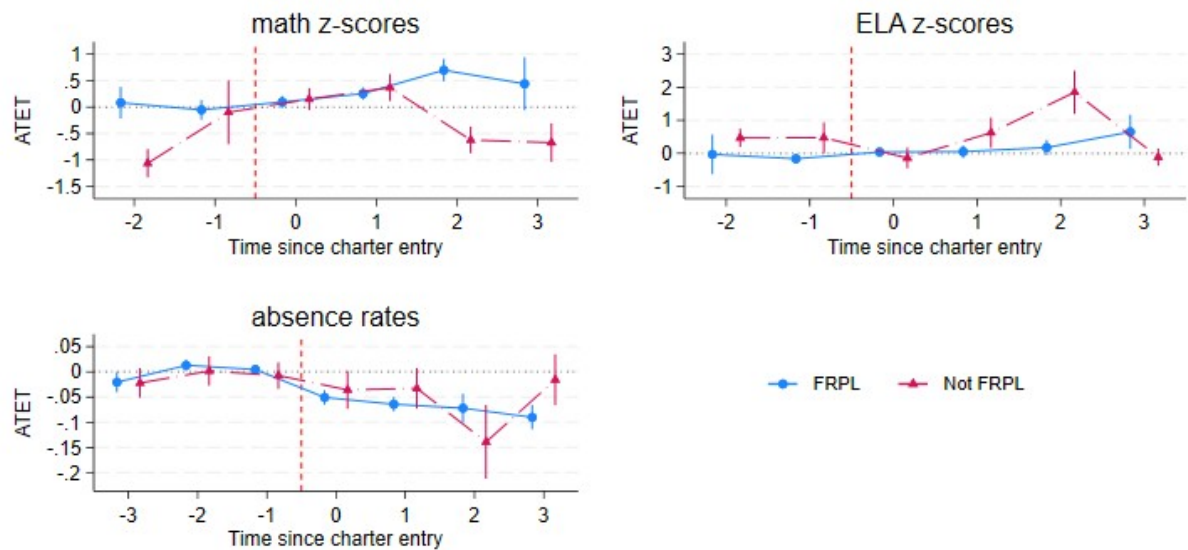
The estimated average treatment effect on the treated of charter entry on SPED programs. Separate estimates for FRPL-eligible students. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

## CHARTER SCHOOLS AND STUDENTS WITH DISABILITIES



The estimated average treatment effect on the treated of charter entry on SPED services. Separate estimates for FRPL-eligible students. Heterogeneous effects are aggregated by time since charter entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

**Figure E9 – Achievement and Absence Effects by FRPL Eligibility: Restricted to Prior SPED**



The estimated average treatment effect on the treated of charter entry on achievement and absences. Separate estimates for FRPL-eligible students with disabilities. Heterogeneous effects are aggregated by time since entry. Model compares charter students to future entrants. Controls for resident district, demographics and grade-by-year effects.

**\*\*WP Version Only\*\***

## **Appendix F) Analysis of Inter-district Choice**

In addition to charter schools, Michigan also has a unique inter-district choice program – part of the Schools of Choice (SoC) program – that allows students to choose to enroll in nearby participating districts outside their own. Unlike charter schools, the schools in the inter-district option are also TPS, with the same or similar bureaucratic governance and oversight present in the student’s assigned school. However, students can take advantage of differences in resources, classes, teachers, peers, etc. that exist within and across districts.

To discern whether the differences in special education between TPS and charter schools are a function of the school type or just a reflection of families finding a more suitable school as based on their preferences, we conduct the same analysis for students switching schools via inter-district choice as we did for students moving to charters. We begin this analysis first by providing important background information on inter-district choice. Next, we provide the results of our estimates. We then conclude with a brief discussion of how the contrast between the changes in special education for students who switch to charter schools as compared to students who partake in inter-district choice lends support to our conclusion of charter schools providing a different model of special education than TPS.

### **Background on Inter-district Choice**

While states may have inter-district policies, how they operate is unique to each one (Carlson et al., 2018). Some states require mandatory acceptance or give priority to students from certain demographics or schools, others give districts discretion on how they will set their policies. How states allocate funds and resources, including transportation, to districts with

transfer students is a major consideration when establishing these policies, again with states differing in how they handle them.

Unsurprisingly, districts that receive more students than they lose tend to be more advantaged on traditional measures, greater family income, achievement scores and per pupil expenditures (Carlson et al., 2011, 2018; Holme & Richards, 2009; Lavery & Carlson, 2015; Welsch et al., 2010; Welsch & Zimmer, 2012). However, districts with high achievement also had high rates of student movement from their district, with students moving from high performing districts to even higher performing ones (Hong & Choi, 2015; Powers et al., 2018). As with charter school students, inter-district choice participants are less likely to be in special education (Carlson et al., 2018; Holme & Richards, 2009; Lavery & Carlson, 2015; Powers et al., 2012). One study in Minneapolis, found that students who participate in choice are more likely to attend schools with a lower percentage of SWDs (Hong & Choi, 2015). Furthermore, SWDs who initially transfer are more likely to return to their assigned TPS (Carlson et al., 2018).

Evidence on the effectiveness of inter-district choice is limited relative to that of charter schools. A couple of scholars have found some positive achievement effects (Bifulco et al., 2009; Carlson et al., 2018; Welsch & Zimmer, 2012). However, in one study it appears that the positive effects are rather a regression to the mean, with those who participate in inter-district choice experiencing declining achievement scores prior to choice (Carlson et al., 2018). Moreover, if participants left choice and returned to their assigned TPS, their scores continued to decline. Another study from Hong & Choi (2015) offered additional sobering results, with inter-district choice having null effects on academic achievement, except for in 3<sup>rd</sup> grade. More positively, Welsch & Zimmer (2012) find evidence that Wisconsin school districts that have



greater student out-migration successfully respond by improving quality and raising standardized test scores, even once accounting for lower performing students leaving.

In Michigan, inter-district school choice has been found to have little effect on student achievement (Cowen & Creed, 2017). There were small positive effects on math achievement for students who moved to the highest performing districts, but for students who went to the lowest performing districts, there was a slight decline in reading scores. The authors also mention evidence of statistically significant positive effects for SWDs; however, further specification checks did not include SWDs. In an earlier study, Cowen et al. (2015) reveal that Michigan's inter-district choice is used more by Black and low-income (FRPL) students. Yet, there's a counter pull, such that those same students are also more likely to exit and return to their assigned TPS. The authors find a similarly high rate of bidirectional entry and exit for low-performing students, as well as evidence of lower retention for SWDs, English language learners and Latinx students.

**Table F1***Summary Statistics for Interdistrict Choice*

| VARIABLES                              |                              | All Students K-8 |       | Not SPED |       |               |       | SPED   |       |               |       |
|----------------------------------------|------------------------------|------------------|-------|----------|-------|---------------|-------|--------|-------|---------------|-------|
|                                        |                              |                  |       | TPS      |       | Interdistrict |       | TPS    |       | Interdistrict |       |
|                                        |                              | mean             | sd    | mean     | sd    | mean          | sd    | mean   | sd    | mean          | sd    |
| Choice                                 | Ever charter/district choice | 0.274            | 0.446 | 0.103    | 0.304 | 1.000         | 0.000 | 0.112  | 0.315 | 1.000         | 0.000 |
|                                        | Ever charter student         | 0.160            | 0.367 | 0.053    | 0.224 | 0.067         | 0.250 | 0.058  | 0.234 | 0.063         | 0.244 |
|                                        | Ever district choice         | 0.127            | 0.333 | 0.053    | 0.224 | 1.000         | 0.000 | 0.057  | 0.233 | 1.000         | 0.000 |
| Demographics                           | Gender (female)              | 0.486            | 0.500 | 0.507    | 0.500 | 0.517         | 0.500 | 0.337  | 0.473 | 0.347         | 0.476 |
|                                        | Black/African American       | 0.183            | 0.387 | 0.132    | 0.338 | 0.151         | 0.358 | 0.182  | 0.386 | 0.161         | 0.368 |
|                                        | Latinx/Hispanic              | 0.079            | 0.269 | 0.079    | 0.269 | 0.069         | 0.253 | 0.077  | 0.267 | 0.072         | 0.259 |
|                                        | White/Caucasian              | 0.660            | 0.474 | 0.708    | 0.455 | 0.714         | 0.452 | 0.676  | 0.468 | 0.706         | 0.456 |
|                                        | Other race (or multiracial)  | 0.078            | 0.268 | 0.081    | 0.273 | 0.067         | 0.250 | 0.065  | 0.246 | 0.061         | 0.239 |
|                                        | Free/reduced price lunch     | 0.530            | 0.499 | 0.477    | 0.499 | 0.507         | 0.500 | 0.642  | 0.479 | 0.663         | 0.473 |
| SPED Identification                    | English Language learner     | 0.074            | 0.261 | 0.077    | 0.266 | 0.028         | 0.165 | 0.060  | 0.238 | 0.027         | 0.163 |
|                                        | Ever special education       | 0.182            | 0.386 | 0.051    | 0.220 | 0.051         | 0.220 | 1.000  | 0.000 | 1.000         | 0.000 |
|                                        | Speech-Language Impairment   | 0.045            | 0.207 | 0.002    | 0.041 | 0.002         | 0.044 | 0.311  | 0.463 | 0.338         | 0.473 |
|                                        | Specific Learning Disability | 0.041            | 0.198 | 0.000    | 0.014 | 0.000         | 0.015 | 0.288  | 0.453 | 0.347         | 0.476 |
| SPED Environment, Programs, & Services | All Other Disabilities       | 0.053            | 0.223 | 0.000    | 0.017 | 0.000         | 0.014 | 0.393  | 0.488 | 0.305         | 0.460 |
|                                        | Mean SPED FTE                | 0.026            | 0.120 | 0.000    | 0.003 | 0.000         | 0.000 | 0.202  | 0.286 | 0.137         | 0.199 |
|                                        | Gen Ed class 80+%            | 0.099            | 0.299 | 0.002    | 0.043 | 0.002         | 0.046 | 0.685  | 0.465 | 0.751         | 0.432 |
|                                        | Gen Ed class 40-79%          | 0.018            | 0.134 | 0.000    | 0.007 | 0.000         | 0.006 | 0.140  | 0.347 | 0.151         | 0.358 |
|                                        | Gen Ed class <40%            | 0.012            | 0.110 | 0.000    | 0.007 | 0.000         | 0.003 | 0.100  | 0.300 | 0.049         | 0.216 |
|                                        | Any SPED program             | 0.095            | 0.294 | 0.001    | 0.024 | 0.000         | 0.022 | 0.686  | 0.464 | 0.649         | 0.477 |
|                                        | Resource program             | 0.079            | 0.269 | 0.000    | 0.020 | 0.000         | 0.021 | 0.551  | 0.497 | 0.588         | 0.492 |
|                                        | Cognitive program            | 0.010            | 0.099 | 0.000    | 0.007 | 0.000         | 0.003 | 0.079  | 0.269 | 0.041         | 0.198 |
|                                        | Other SPED program           | 0.009            | 0.095 | 0.000    | 0.010 | 0.000         | 0.006 | 0.072  | 0.259 | 0.031         | 0.175 |
|                                        | Any SPED service             | 0.106            | 0.308 | 0.002    | 0.045 | 0.002         | 0.046 | 0.766  | 0.423 | 0.728         | 0.445 |
|                                        | Speech/language service      | 0.082            | 0.275 | 0.002    | 0.043 | 0.002         | 0.045 | 0.593  | 0.491 | 0.577         | 0.494 |
|                                        | Social worker                | 0.036            | 0.187 | 0.000    | 0.013 | 0.000         | 0.011 | 0.265  | 0.441 | 0.217         | 0.413 |
|                                        | Teacher consultant           | 0.010            | 0.102 | 0.000    | 0.009 | 0.000         | 0.009 | 0.079  | 0.270 | 0.085         | 0.279 |
|                                        | Occupational therapy         | 0.020            | 0.141 | 0.000    | 0.010 | 0.000         | 0.009 | 0.149  | 0.356 | 0.115         | 0.318 |
| Academic Outcomes                      | Other SPED service           | 0.009            | 0.093 | 0.000    | 0.007 | 0.000         | 0.007 | 0.069  | 0.253 | 0.038         | 0.191 |
|                                        | ELA/reading z-score          | 0.001            | 1.000 | 0.142    | 0.961 | 0.098         | 0.919 | -0.776 | 0.901 | -0.796        | 0.862 |
|                                        | Math z-score                 | 0.001            | 0.999 | 0.149    | 0.964 | 0.058         | 0.891 | -0.741 | 0.927 | -0.785        | 0.879 |
| Academic Outcomes                      | Absence rate                 | 0.058            | 0.087 | 0.054    | 0.082 | 0.055         | 0.078 | 0.074  | 0.104 | 0.068         | 0.087 |

Note: There are a total of 6,220,474 student observations for 1,712,068 individual students in our sample. Of those observations, 857,824 (13.8%) are for students with an IEP in the given year. Among the special education observations, 713,992 represent students who remained in their assigned TPS; 82,048 student observations were in charter schools; and an additional 61,783 are inter-district choice student observations. For students who were not classified for special education, 4,330,440 observations were in their assigned TPS, 611,455 attended a charter, and 420,755 participated in inter-district choice.

Table F1 provides summary statistics for students with and without disabilities who participate in inter-district choice. In general, district choice participants with disabilities do not differ much demographically or in terms of achievement from TPS students with disabilities.

Like in charter schools, however, they do have a lower SPED FTE rate than TPS students, at 14% relative to 20%.

## Results

Our baseline empirical model for district choice the same as equation (1) except we restrict to students who participated in interdistrict choice and use entry into the first interdistrict choice school as  $t=0$ . Again, we account for time-cohort heterogeneity. Table F2 compares the entry cohorts, with students in the 2012-2013 school year cohort entering in or before 2012.

**Table F2**

### *Inter-district Cohorts*

| Summary statistics by year of first inter-district observation |            |      |            |      |            |      |            |      |            |      |            |      |
|----------------------------------------------------------------|------------|------|------------|------|------------|------|------------|------|------------|------|------------|------|
|                                                                | 2012-2013  |      | 2013-2014  |      | 2014-2015  |      | 2015-2016  |      | 2016-2017  |      | 2017-2018  |      |
|                                                                | Mean/Prop. | SD   | Mean/Prop. | SD   | Mean/Prop. | SD   | Mean/Prop. | SD   | Mean/Prop. | SD   | Mean/Prop. | SD   |
| Ever charter student                                           | .051       | .219 | .108       | .310 | .130       | .336 | .150       | .357 | .160       | .367 | .181       | .385 |
| District choice in observation                                 | .763       | .425 | .651       | .477 | .597       | .491 | .537       | .499 | .457       | .498 | .317       | .465 |
| Ever special education                                         | .177       | .382 | .196       | .397 | .188       | .391 | .191       | .393 | .198       | .398 | .182       | .386 |
| SPED in observation                                            | .132       | .339 | .138       | .345 | .133       | .340 | .137       | .344 | .145       | .352 | .132       | .339 |
| <i>SPED in relation to choice</i>                              |            |      |            |      |            |      |            |      |            |      |            |      |
| never SPED                                                     | .823       |      | .804       |      | .812       |      | .809       |      | .802       |      | .818       |      |
| SPED prior                                                     | .000       |      | .081       |      | .089       |      | .108       |      | .125       |      | .134       |      |
| SPED after                                                     | .052       |      | .071       |      | .058       |      | .046       |      | .037       |      | .024       |      |
| SPED upon entry                                                | .125       |      | .044       |      | .041       |      | .036       |      | .035       |      | .024       |      |
| Absence rate                                                   | .054       | .086 | .061       | .087 | .062       | .087 | .064       | .084 | .065       | .083 | .064       | .079 |
| ELA/reading z-score                                            | .019       | .958 | -.087      | .952 | -.108      | .957 | -.159      | .958 | -.176      | .955 | -.124      | .961 |
| Math z-score                                                   | -.015      | .934 | -.130      | .919 | -.139      | .928 | -.205      | .927 | -.212      | .935 | -.164      | .942 |
| Mean SPED FTE                                                  | .021       | .092 | .019       | .090 | .017       | .084 | .017       | .085 | .019       | .098 | .017       | .092 |
| Any SPED program                                               | .097       | .296 | .091       | .287 | .083       | .276 | .086       | .280 | .086       | .280 | .077       | .266 |
| Any SPED service                                               | .091       | .288 | .104       | .306 | .101       | .302 | .107       | .309 | .117       | .322 | .108       | .310 |
| Gender (female)                                                | .492       | .500 | .497       | .500 | .493       | .500 | .495       | .500 | .495       | .500 | .503       | .500 |
| Black/African American                                         | .141       | .348 | .165       | .371 | .175       | .380 | .201       | .401 | .208       | .406 | .222       | .415 |
| Latinx/Hispanic                                                | .065       | .246 | .068       | .251 | .070       | .255 | .072       | .259 | .076       | .265 | .082       | .274 |
| White/Caucasian                                                | .735       | .441 | .697       | .459 | .683       | .465 | .653       | .476 | .644       | .479 | .623       | .485 |
| Other race (or multiracial)                                    | .059       | .235 | .070       | .255 | .072       | .259 | .073       | .261 | .072       | .258 | .073       | .261 |
| Free/reduced price lunch                                       | .502       | .500 | .592       | .491 | .608       | .488 | .638       | .481 | .637       | .481 | .642       | .479 |
| English Language learner                                       | .021       | .144 | .030       | .169 | .033       | .178 | .035       | .183 | .035       | .184 | .038       | .192 |

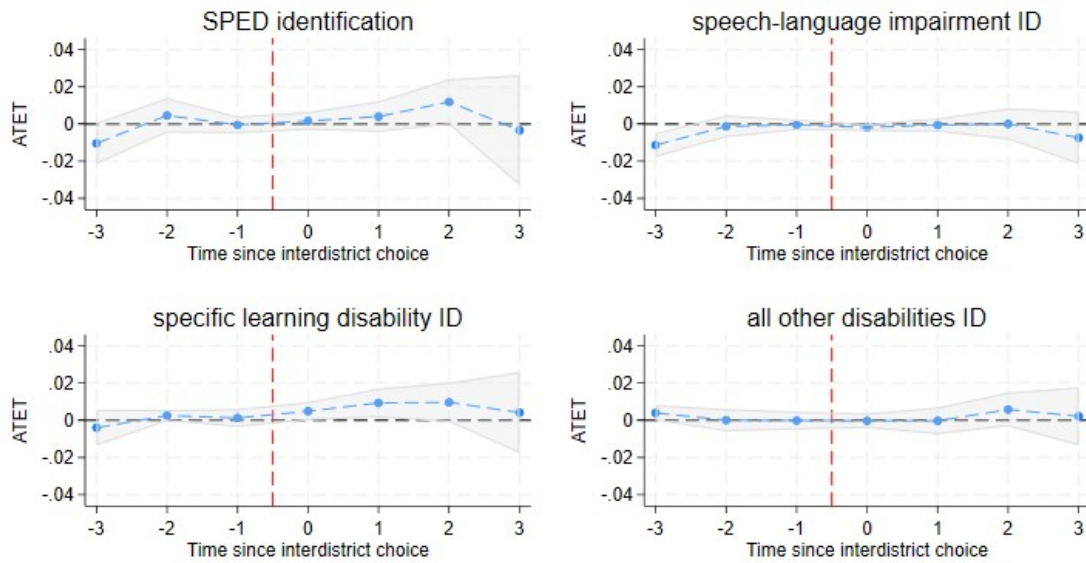
Note: There are 790,615 student-year observations for 194,153 students who use inter-district choice during the research period. There are 295,461 student-year observations (70,468 individuals) for students who are observed in inter-district choice in 2012-2013, 105,861 student-year observations (23,019 individuals) for students who enter in 2013-2014, 101,689 student-year observations (22,561 individuals) for students who enter in 2014-2015, 102,909 student-year observations (24,355 individuals) for students who enter in 2015-2016, 97,285 student-year observations (26,071 individuals) for students who enter in 2016-2017, 87,410 student-year observations (27,679 individuals) for students who enter in 2017-2018.

One potential challenge to our primary conclusion of there being differences in how special education is practiced in charter schools is that the change in special education is driven by changing schools regardless of the type. Parents of students with disabilities may transfer their child to a different school because of the type of special education the parent desires their child to receive. Although there may be endogeneity in the type of households that use inter-district choice as compared to charter schools, our results lend support to the difference in special education being attributable to the type of school.

In Figure F1, we see that identification for special education changes little after inter-district entry. While students who entered charters were marginally more likely to be identified with a disability, students who enter a new school using inter-district choice have non-statistically significant changes in identification.

**Figure F1**

*The Relationship between SPED Identification and Inter-district Choice*



The estimated average treatment effect on the treated of interdistrict choice on SPED identification. Estimates for all students who enter interdistrict choice. Heterogeneous effects are aggregated by time since interdistrict choice. Model compares interdistrict students to future entrants. Controls for resident district, demographics and grade-by-year effects.

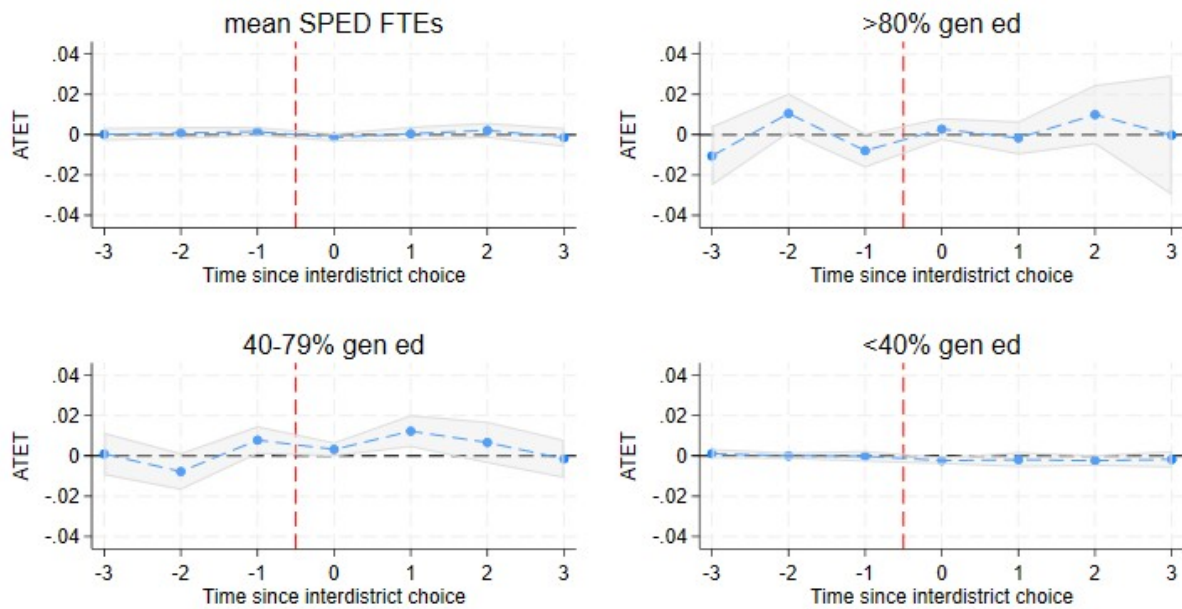
Turning our attention to the special education settings, we identify distinctions between the special education settings for inter-district and charter students. While students entering charters had a sudden drop in special education time, inter-district participants' time in special education (mean SPED FTE) is largely unchanged after entry (Figure G2). Students do appear marginally more likely to spend 40-79% of the school day in special education a year after entry, but this quickly reverses and may simply reflect noise. As such, time spent in special education largely remains flat after interdistrict choice.

**Figure F2**

*The Relationship between inter-district choice and SPED FTEs and Educational Setting*



## CHARTER SCHOOLS AND STUDENTS WITH DISABILITIES

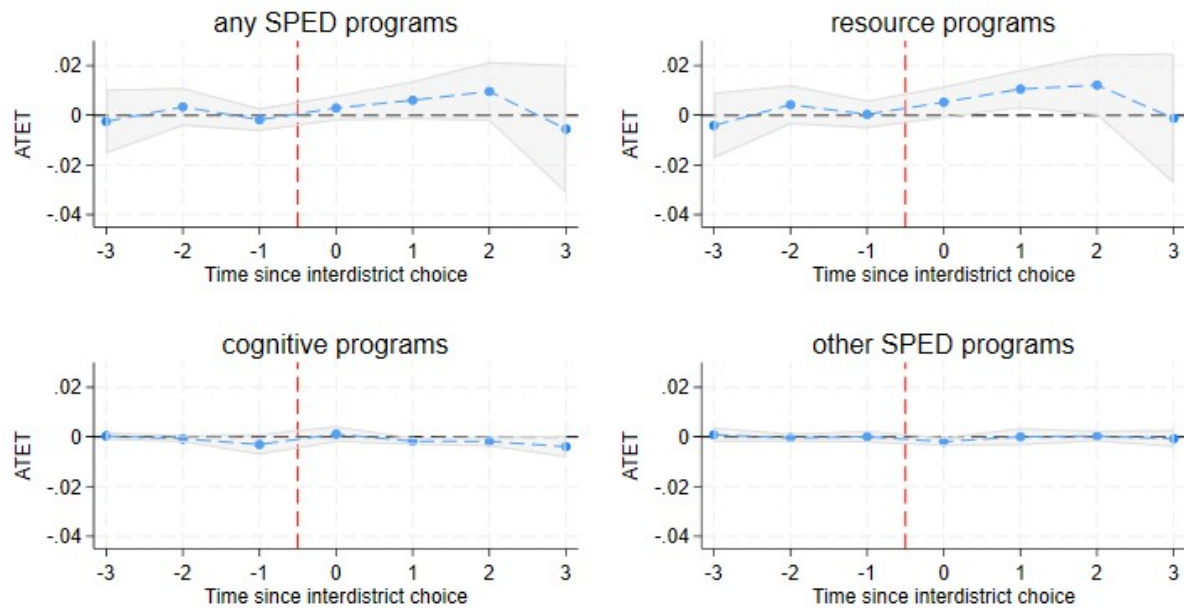


The estimated average treatment effect on the treated of interdistrict choice on SPED FTEs and educational setting. Estimates for all students who enter interdistrict choice. Heterogeneous effects are aggregated by time since interdistrict choice. Model compares interdistrict students to future entrants. Controls for resident district, demographics and grade-by-year effects.

With respect to special education programs, in contrast to charter entry, which brought resource room use increases and cognitive room use decreases, the latter temporarily, interdistrict choice shows far less change (Figure F3). Resource program assignments do see a slight increase by year three, matching the charter impacts in direction if at a smaller magnitude. However, we see little impact on cognitive or other SPED programs.

**Figure F3**

*The Relationship between inter-district choice and SPED Programs*

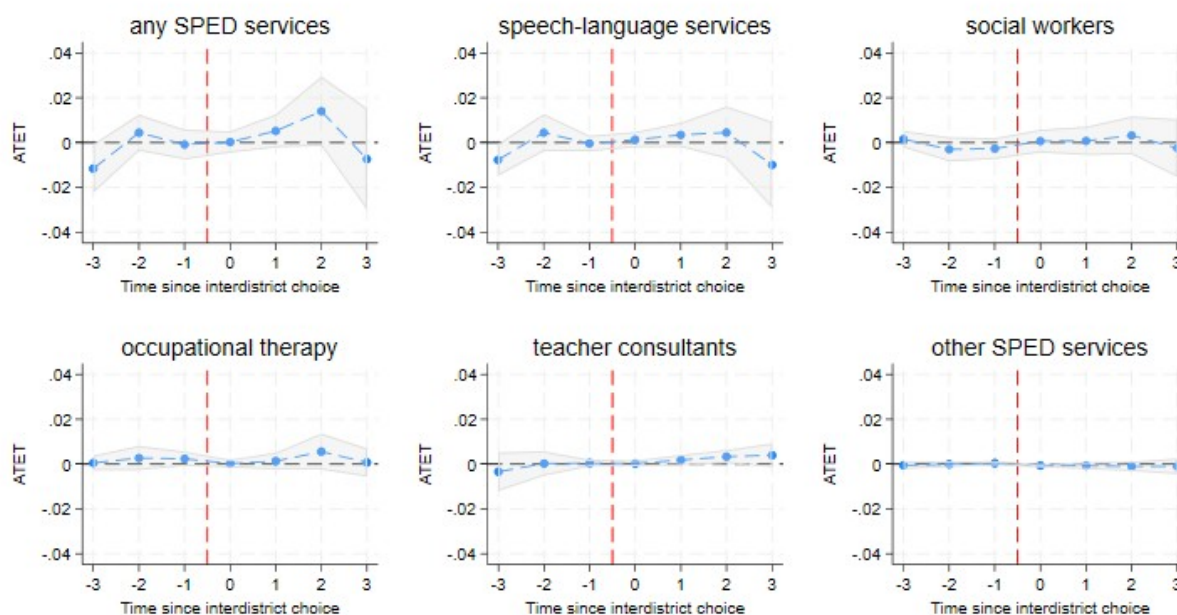


The estimated average treatment effect on the treated of interdistrict choice on SPED programs. Estimates for all students who enter interdistrict choice. Heterogeneous effects are aggregated by time since interdistrict choice. Model compares interdistrict students to future entrants. Controls for resident district, demographics and grade-by-year effects.

We finish our analysis of the impact of inter-district choice on special education by looking at the change in SPED services (Figure F4). Again, the impacts of interdistrict choice are largely null, even though we saw some temporary reductions for charter entries.

**Figure F4**

*The Relationship between inter-district choice and SPED Services*



The estimated average treatment effect on the treated of interdistrict choice on SPED services. Estimates for all students who enter interdistrict choice. Heterogeneous effects are aggregated by time since interdistrict choice. Model compares interdistrict students to future entrants. Controls for resident district, demographics and grade-by-year effects.

The results of our inter-district analyses provide evidence in support of there being a difference in how charter schools provide special education. The patterns of identification for both charter and inter-district choice may indicate the degree of subjectivity that IEP teams have on diagnosing a disability, with charter schools and/or the parents attending charter schools being *more* likely to identify a disability two or three years after entry. From the different diagnosed disabilities, charter schools then use different models of special education than TPS whether a student is in their assigned school or using inter-district choice. While students using inter-district choice, in the aggregate, spend similar amounts of time in special education before and after entry, students entering charters spend less time in special education, are more likely to be

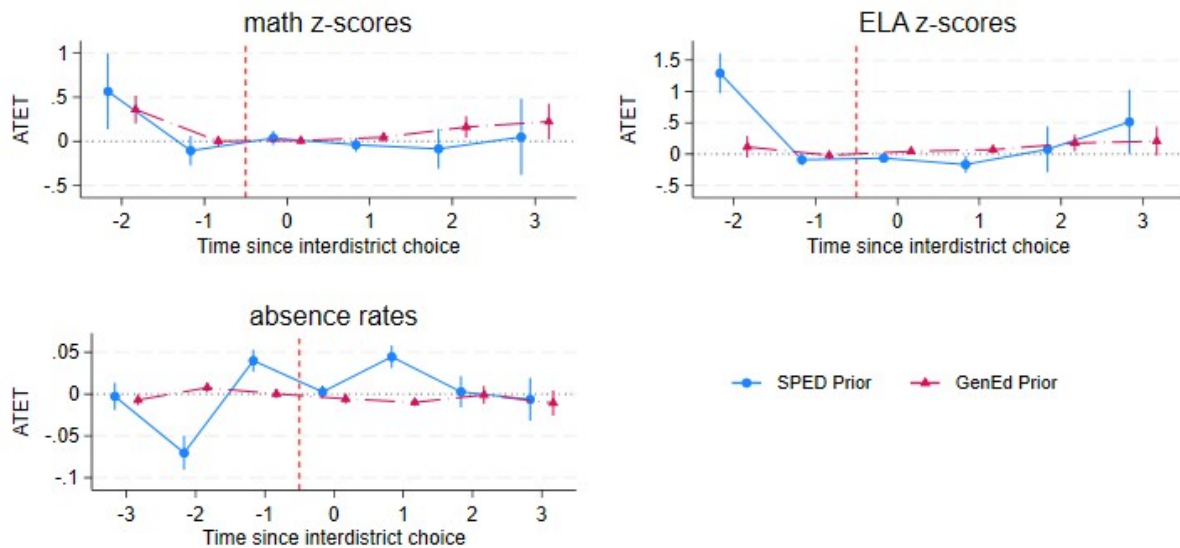


assigned to a resource program after entry, and are assigned fewer special education services in the first year, all of which evidence fewer disability-specific programs and services.

Critically, however, the results for the inter-district choice participants underscore that the use of school choice and the accompanying changes in special education do not guarantee improvement in student outcomes. While students who entered Michigan charter schools had academic achievement and attendance benefits, inter-district choice participants did not realize the same benefits. Academic achievement, as measured by standardized tests, are statistically unchanged despite using inter-district choice, and the effect on absence rates is too noisy to ascertain whether the effect of the district change on attendance is at best null.

**Figure F5**

*The Relationship between Student Achievement and Absence Outcomes and Inter-district Choice*



The estimated average treatment effect on the treated of interdistrict choice on achievement and absences. Separate estimates for students classified for SPED before entry. Heterogeneous effects are aggregated by time since entry. Model compares interdistrict students to future entrants. Controls for resident district, demographics and grade-by-year effects.

**Interdistrict Choice Heterogeneous DID Estimates - Dynamic**

|                    | 1 1b              |                   | 2 2b              |                   | 3 3b              |                   | 4                 | 5                 | 6                 | 7                | 8                 | 9                 | 10                |
|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Time since charter | absence (SPED)    | absence (GenEd)   | math (SPED)       | math (GenEd)      | ela (SPED)        | ela (GenEd)       | sped              | sli               | sld               | oth_dis          | cog_imp           | sped_fte          | gen_ed_80p        |
| -3                 | -0.003<br>(0.008) | -0.007<br>(0.003) |                   |                   |                   |                   | -0.010<br>(0.006) | -0.011<br>(0.003) | -0.004<br>(0.005) | 0.004<br>(0.002) | 0.002<br>(0.001)  | 0.000<br>(0.002)  | -0.011<br>(0.008) |
| -2                 | -0.070<br>(0.010) | 0.008<br>(0.003)  | 0.567<br>(0.219)  | 0.361<br>(0.081)  | 1.293<br>(0.163)  | 0.116<br>(0.088)  | 0.005<br>(0.005)  | -0.001<br>(0.003) | 0.003<br>(0.002)  | 0.000<br>(0.003) | 0.000<br>(0.001)  | 0.001<br>(0.002)  | 0.011<br>(0.005)  |
| -1                 | 0.040<br>(0.007)  | 0.000<br>(0.003)  | -0.106<br>(0.085) | 0.003<br>(0.029)  | -0.089<br>(0.047) | -0.018<br>(0.032) | 0.000<br>(0.002)  | 0.000<br>(0.001)  | 0.001<br>(0.002)  | 0.000<br>(0.002) | 0.002<br>(0.002)  | 0.002<br>(0.001)  | -0.008<br>(0.004) |
| 0                  | 0.003<br>(0.004)  | -0.006<br>(0.003) | 0.038<br>(0.041)  | 0.009<br>(0.020)  | -0.064<br>(0.039) | 0.045<br>(0.019)  | 0.002<br>(0.002)  | -0.002<br>(0.001) | 0.005<br>(0.003)  | 0.000<br>(0.002) | 0.000<br>(0.000)  | -0.001<br>(0.001) | 0.003<br>(0.003)  |
| 1                  | 0.045<br>(0.007)  | -0.010<br>(0.002) | -0.039<br>(0.040) | 0.047<br>(0.028)  | -0.166<br>(0.069) | 0.072<br>(0.032)  | 0.004<br>(0.004)  | -0.001<br>(0.002) | 0.009<br>(0.004)  | 0.000<br>(0.004) | 0.004<br>(0.002)  | 0.001<br>(0.002)  | -0.002<br>(0.004) |
| 2                  | 0.003<br>(0.010)  | -0.001<br>(0.005) | -0.084<br>(0.116) | 0.163<br>(0.062)  | 0.078<br>(0.187)  | 0.176<br>(0.068)  | 0.012<br>(0.006)  | 0.000<br>(0.004)  | 0.010<br>(0.005)  | 0.006<br>(0.005) | 0.003<br>(0.003)  | 0.002<br>(0.002)  | 0.010<br>(0.008)  |
| 3                  | -0.006<br>(0.013) | -0.011<br>(0.008) | 0.050<br>(0.221)  | 0.224<br>(0.104)  | 0.516<br>(0.260)  | 0.208<br>(0.118)  | -0.003<br>(0.015) | -0.007<br>(0.007) | 0.004<br>(0.011)  | 0.002<br>(0.008) | -0.001<br>(0.003) | -0.001<br>(0.002) | 0.000<br>(0.015)  |
| Observations       | 50783             | 244803            | 16783             | 97174             | 16568             | 97222             | 298192            | 298192            | 298192            | 298192           | 298192            | 296572            | 298192            |
| Individuals        | 10351             | 50853             | 4858              | 27756             | 4811              | 27748             | 61472             | 61472             | 61472             | 61472            | 61472             | 61158             | 61472             |
|                    | 11                | 12                | 13                | 14                | 15                | 16                | 17                | 18                | 19                | 20               | 21                | 22                |                   |
| Time since charter | gen_ed_40_79      | gen_ed_u40        | any_pgm           | rsc_pgm           | cog_pgm           | oth_pgm           | any_svc           | speech_svc        | socialwork        | occ_ther         | consult           | oth_svc           |                   |
| -3                 | 0.001<br>(0.005)  | 0.001<br>(0.001)  | -0.002<br>(0.007) | -0.004<br>(0.007) | 0.000<br>(0.001)  | 0.001<br>(0.002)  | -0.012<br>(0.006) | -0.008<br>(0.004) | 0.001<br>(0.002)  | 0.001<br>(0.002) | -0.003<br>(0.004) | 0.000<br>(0.001)  |                   |
| -2                 | -0.008<br>(0.005) | 0.000<br>(0.001)  | 0.003<br>(0.004)  | 0.004<br>(0.004)  | -0.001<br>(0.001) | 0.000<br>(0.001)  | 0.004<br>(0.004)  | 0.004<br>(0.004)  | -0.003<br>(0.003) | 0.003<br>(0.003) | 0.000<br>(0.003)  | 0.000<br>(0.001)  |                   |
| -1                 | 0.008<br>(0.004)  | 0.000<br>(0.001)  | -0.002<br>(0.002) | 0.000<br>(0.003)  | -0.003<br>(0.002) | 0.000<br>(0.001)  | -0.001<br>(0.003) | 0.000<br>(0.002)  | -0.003<br>(0.002) | 0.002<br>(0.002) | 0.000<br>(0.001)  | 0.000<br>(0.000)  |                   |
| 0                  | 0.003<br>(0.002)  | -0.002<br>(0.001) | 0.003<br>(0.003)  | 0.005<br>(0.003)  | 0.001<br>(0.002)  | -0.002<br>(0.001) | 0.000<br>(0.002)  | 0.001<br>(0.002)  | 0.001<br>(0.003)  | 0.000<br>(0.001) | 0.000<br>(0.001)  | -0.001<br>(0.000) |                   |
| 1                  | 0.012<br>(0.004)  | -0.002<br>(0.002) | 0.006<br>(0.004)  | 0.011<br>(0.004)  | -0.002<br>(0.001) | 0.000<br>(0.002)  | 0.005<br>(0.004)  | 0.003<br>(0.003)  | 0.001<br>(0.003)  | 0.001<br>(0.002) | 0.002<br>(0.001)  | -0.001<br>(0.001) |                   |
| 2                  | 0.007<br>(0.005)  | -0.002<br>(0.001) | 0.010<br>(0.006)  | 0.012<br>(0.006)  | -0.002<br>(0.001) | 0.000<br>(0.001)  | 0.014<br>(0.008)  | 0.004<br>(0.006)  | 0.003<br>(0.004)  | 0.006<br>(0.004) | 0.003<br>(0.002)  | -0.001<br>(0.001) |                   |
| 3                  | -0.001<br>(0.005) | -0.002<br>(0.002) | -0.006<br>(0.013) | -0.001<br>(0.013) | -0.004<br>(0.002) | -0.001<br>(0.002) | -0.007<br>(0.012) | -0.010<br>(0.010) | -0.002<br>(0.007) | 0.001<br>(0.003) | 0.004<br>(0.003)  | -0.001<br>(0.002) |                   |
| Observations       | 298192            | 298192            | 298192            | 298192            | 298192            | 298192            | 298192            | 298192            | 298192            | 298192           | 298192            | 298192            |                   |
| Individuals        | 61472             | 61472             | 61472             | 61472             | 61472             | 61472             | 61472             | 61472             | 61472             | 61472            | 61472             | 61472             |                   |

Standard errors in parentheses

| Count of Observations |                             |                 |              |                 |            |       |                  |                 |
|-----------------------|-----------------------------|-----------------|--------------|-----------------|------------|-------|------------------|-----------------|
| Variables             | Interdistrict               |                 |              |                 |            |       |                  |                 |
|                       | Total Observed Before Entry |                 | Never SPED   |                 | Ever SPED  |       |                  |                 |
|                       | Observations                | Unique students | Observations | Unique students | Prior SPED |       | Prop. prior SPED | Unique students |
|                       |                             |                 |              |                 | No         | Yes   |                  |                 |
| absent_rate           | 265825                      | 59018           | 209860       | 48642           | 10233      | 45732 | 0.817153578      | 10376           |
| absent_ratel          | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| mth_z_score2          | 137188                      | 47378           | 112253       | 39766           | 4298       | 20637 | 0.827631843      | 7612            |
| mth_z_score2l         | 170836                      | 49221           | 137846       | 40597           | 5148       | 27842 | 0.843952713      | 8624            |
| ela_z_score2          | 137118                      | 47374           | 112310       | 39781           | 4296       | 20512 | 0.826830055      | 7593            |
| ela_z_score2l         | 170836                      | 49221           | 137846       | 40597           | 5148       | 27842 | 0.843952713      | 8624            |
| sped                  | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| sli                   | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| sld                   | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| othdis                | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| sub_disability        | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| obj_disability        | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| autism_dis            | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| cognitive_imp         | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| emotional_imp         | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| other_dis             | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| mean_sped_FTE         | 266691                      | 59020           | 210518       | 48644           | 10260      | 45913 | 0.817349972      | 10376           |
| gen_ed_80p            | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| gen_ed_40_79          | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| gen_ed_u40            | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| any_sped_pgm          | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| resource_pgm          | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| cognitive_pgm         | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| oth_sped_p            | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| any_sped_svc          | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| speech_svc            | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| socialworker          | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| occ_ther              | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| consult               | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| oth_svc               | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |
| oth_svc2              | 267474                      | 59021           | 211156       | 48645           | 10306      | 46012 | 0.817003445      | 10376           |



| Summary statistics: Ever SPED students by District Mobility |                     |       |                      |       |                      |       |                      |       |
|-------------------------------------------------------------|---------------------|-------|----------------------|-------|----------------------|-------|----------------------|-------|
|                                                             | Never interdistrict |       | Always interdistrict |       | Enters interdistrict |       | Leaves interdistrict |       |
|                                                             | Mean/Prop.          | SD    | Mean/Prop.           | SD    | Mean/Prop.           | SD    | Mean/Prop.           | SD    |
| Ever charter student                                        | 0.164               | 0.370 | 0.000                | 0.000 | 0.164                | 0.370 | 0.117                | 0.321 |
| Current district choice                                     | 0.000               | 0.000 | 1.000                | 0.000 | 0.392                | 0.488 | 0.429                | 0.495 |
| Ever special education                                      | 1.000               | 0.000 | 1.000                | 0.000 | 1.000                | 0.000 | 1.000                | 0.000 |
| Current special education                                   | 0.762               | 0.426 | 0.766                | 0.423 | 0.710                | 0.454 | 0.724                | 0.447 |
| Cognitive impairment                                        | 0.063               | 0.243 | 0.033                | 0.178 | 0.041                | 0.199 | 0.041                | 0.198 |
| Emotional impairment                                        | 0.039               | 0.195 | 0.024                | 0.154 | 0.030                | 0.172 | 0.044                | 0.205 |
| Speech & language impairment                                | 0.244               | 0.429 | 0.291                | 0.454 | 0.238                | 0.426 | 0.237                | 0.425 |
| Learning disability                                         | 0.222               | 0.415 | 0.259                | 0.438 | 0.240                | 0.427 | 0.244                | 0.430 |
| Autism spectrum disorder                                    | 0.064               | 0.244 | 0.050                | 0.217 | 0.043                | 0.203 | 0.044                | 0.205 |
| All other disabilities                                      | 0.298               | 0.457 | 0.222                | 0.415 | 0.229                | 0.420 | 0.240                | 0.427 |
| Absence rate                                                | 0.072               | 0.102 | 0.058                | 0.080 | 0.075                | 0.095 | 0.073                | 0.105 |
| ELA/reading z-score                                         | -0.667              | 0.948 | -0.598               | 0.930 | -0.737               | 0.882 | -0.723               | 0.898 |
| Math z-score                                                | -0.630              | 0.968 | -0.572               | 0.917 | -0.731               | 0.912 | -0.714               | 0.917 |
| Mean SPED FTE                                               | 0.147               | 0.259 | 0.099                | 0.178 | 0.103                | 0.193 | 0.106                | 0.195 |
| Gen Ed class 80+%                                           | 0.540               | 0.498 | 0.591                | 0.492 | 0.535                | 0.499 | 0.543                | 0.498 |
| Gen Ed class 40-79%                                         | 0.100               | 0.300 | 0.109                | 0.311 | 0.105                | 0.306 | 0.105                | 0.307 |
| Gen Ed class <40%                                           | 0.071               | 0.256 | 0.034                | 0.180 | 0.043                | 0.204 | 0.043                | 0.203 |
| Any SPED program                                            | 0.531               | 0.499 | 0.474                | 0.499 | 0.478                | 0.500 | 0.488                | 0.500 |
| Any SPED service                                            | 0.588               | 0.492 | 0.570                | 0.495 | 0.528                | 0.499 | 0.546                | 0.498 |
| Gender (female)                                             | 0.345               | 0.475 | 0.352                | 0.477 | 0.365                | 0.481 | 0.357                | 0.479 |
| Black/African American                                      | 0.213               | 0.410 | 0.131                | 0.337 | 0.202                | 0.402 | 0.171                | 0.376 |
| Latinx/Hispanic                                             | 0.078               | 0.268 | 0.073                | 0.260 | 0.068                | 0.252 | 0.067                | 0.250 |
| White/Caucasian                                             | 0.644               | 0.479 | 0.741                | 0.438 | 0.661                | 0.473 | 0.706                | 0.456 |
| Other race (or multiracial)                                 | 0.065               | 0.246 | 0.055                | 0.229 | 0.068                | 0.252 | 0.057                | 0.231 |
| Free/reduced price lunch                                    | 0.641               | 0.480 | 0.571                | 0.495 | 0.754                | 0.430 | 0.704                | 0.456 |
| English Language learner                                    | 0.064               | 0.244 | 0.025                | 0.157 | 0.027                | 0.162 | 0.024                | 0.154 |

Note: There are 1,131,668 student-year observations for 287,259 students who ever are identified for special education during the analytical period. Of the observations, 954,138 (246,254 unique students) are for students who never enroll in a Michigan charter; 40,280 (11,656 students) are for students who always attend a TPS via interdistrict choice during the observation period; 73,928 student-observations (14,846 students) are for students who later use interdistrict choice; and 32,789 observations (6,910 students) are for students who begin in interdistrict choice but later exit.