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EdWorkingPaper No. 20-332

A Descriptive Analysis of Cream Skimming and Pushout in Choice versus Traditional Public Schools

Adam Kho
University of Southern California

Ron Zimmer
University of Kentucky

Andrew McEachin
RAND Corporation

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VERSION: December 2020

Suggested citation: Kho, Adam, Ron Zimmer, and Andrew McEachin. (2020). A Descriptive Analysis of Cream Skimming and Pushout in Choice versus Traditional Public Schools. (EdWorkingPaper: 20-332). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/2wns-aq26

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Adam Kho
University of Southern California
3470 Trousdale Parkway
Waite Phillips Hall, 901E
Los Angeles, CA 90089
akho@usc.edu

Ron Zimmer
University of Kentucky
423 Patterson Office Tower
Lexington, KY 40506
ron.zimmer@uky.edu

Andrew McEachin
RAND Corporation
1776 Main Street
Santa Monica, CA 90401-3208
mceachin@rand.org

Abstract:

One of the controversies surrounding charter schools is whether these schools may either "cream skim" high-performing students from traditional public schools or "pushout" low-achieving students or students with discipline histories, leaving traditional public schools to educate the most challenging students. We use these terms strictly for brevity and acknowledge that many of the reasons that students are labeled high- or low-performing academically or behaviorally are beyond the control of the student. In this study, we use longitudinal statewide data from Tennessee and North Carolina and linear probability models to examine whether there is evidence consistent with these selective enrollment practices. Because school choice programs managed by districts (magnet and open enrollment programs) have a similar ability to cream skim and pushout students, we also examine these outcomes for these programs. Across the various school choice programs, magnet schools have the most evidence of cream skimming, but this might be expected as they often have selective admissions. For charter schools, we do not find patterns in the data consistent with cream skimming, but we do find evidence consistent with pushout behaviors based on discipline records. Finally, some have raised concerns that students may be pushed out near accountability test dates, but our results suggest no evidence consistent with this claim.

Acknowledgements: We would like to thank Sarah Smith for assistance in editing the manuscript. This paper was generously supported by grant from the Walton Family Foundation. All errors are our own.

1. Introduction

Charter schools are publicly-funded schools of choice that operate outside the direct control of traditional school districts. The charter movement has expanded rapidly from the first charter school in Minnesota in 1992 to more than 7,000 schools operating in 44 states and the District of Columbia today (Center for Education Reform 2019). However, this growth has not been without controversy. While advocates argue that charter schools, freed from bureaucracy, can outperform traditional public schools (TPS) (Finn, Manno, and Vanourek 2000), opponents argue that charter schools drain TPSs of desperately needed resources and selectively enroll students who are easier to educate (Ravitch 2010; Ladd and Singleton 2018). More specifically, opponents argue that charter schools skim the best students from TPSs while pushing out more vulnerable students (e.g. those with lower test scores) (Ravitch 2012; Fingeroot 2014). At the heart of these arguments are two issues. First, if charter schools are selectively enrolling students, this creates inequitable educational opportunities for students. Second, selective enrollment creates a greater burden on the TPS system, which is left educating students with greater challenges (Wells 1993; Lee and Croninger 1994; Cobb and Glass 1999; Fiske and Ladd 2000; Ravitch 2010). However, similar concerns exist for school choice programs managed by public school districts, including magnet and open enrollment schools, as districts promote these programs as a means for meeting the varying needs of students through specialized curriculum (e.g., STEM, performing arts). Because school districts, too, have the ability to cream skim and pushout students through these programs, we observe the entry and exit patterns of other forms of school choice that are within the control of districts to provide context for our charter school estimates.

To examine these issues, we use student-level administrative data from Tennessee and North Carolina and examine whether we can find evidence consistent with the claims that (1) charter schools are more likely to enroll students who had higher test scores or were not suspended/expelled in the prior school year; and (2) students who had lower test scores or were suspended/expelled in the prior school year are more likely to exit charter schools.

While this study provides empirical analyses to help policymakers assess whether there is evidence consistent with the claims of cream skimming and pushout, we cannot definitively say whether charter schools or any other schools of choice actively cream skim or pushout students as student mobility may be based on both *schools'* and *families'* actions. Schools may actively recruit, enroll, and retain certain students; students may choose schools themselves based on individual preferences (e.g., academic, programmatic, demographic); or some combination of both school and student behavior may drive student moves. Using administrative data, we cannot completely disentangle supply side factors (i.e., actions of schools) from the demand side (i.e., families' choices to enroll in or exit schools of choice). Instead, our analysis examines whether we can find differential entry/exit patterns consistent with the claims of cream skimming or pushout, which is a necessary but not sufficient condition for identifying cream skimming and pushout activities. If we find patterns of differential enrollment by students' prior achievement or discipline history, then we will provide some credence to the contention that charter schools or other forms of school choice are inhibiting equitable educational opportunities for students and leaving the burden of educating students with more difficult circumstances to TPSs. On the other hand, if the exit and entry patterns of students are not consistent with claims of cream skimming and pushout, we can be confident that such selective enrollment behavior is less likely to occur at scale.

While prior research has examined student moves between charter schools and TPSs as means to examine cream skimming and pushout in charter schools, this work has often been piecemeal and narrow in focus. Our study provides a more comprehensive view of student moves among charters, TPSs, and other forms of school choice. In addition, our analysis provides a broader perspective on this issue by using two states with different charter contexts and a broader definition of students' academic backgrounds which includes students' discipline histories. Finally, in Tennessee, we track within-year mobility to examine whether students with lower test scores or discipline histories are more likely to exit charter schools near testing periods, a concern of school districts (Clawson 2013; O'Donnell 2014; Strauss 2015). Together, we argue these features provide a more complete analysis and a greater contribution to the school choice literature.

Throughout the remainder of the study, we use the term "high-performing student" to represent students with higher test scores and students who were not suspended or expelled. Similarly, we use the term "low-performing student" to represent students with lower test scores and students who were previously suspended or expelled. We use these terms strictly for brevity and acknowledge that many of the reasons that students are labeled high- or low-performing academically or behaviorally are beyond the control of the student (e.g., whether a student receives an exclusionary punishment for his or her behavior is a complex function of many social phenomena, including the student's behavior, school practices, educator biases, and outside-of-school factors[1]).

2. Conceptual Framework

As noted in previous research (Ravitch 2012; Zimmer and Guarino 2013), the motivation for charter schools to cream skim or pushout students may come from three sources. First,

charter schools do not have catchment zones and depend on students and families to actively enroll in their schools. In doing so, families may examine schools' test scores as an indicator of the academic quality. Families' focus on academic achievement as a marker of school quality can create market pressure for charter schools and incentivize them to recruit high-performing students and pushout low-performing students (Pondiscio 2019). Second, schools may have a financial disincentive to enroll low-performing students, who often require special services and attention, and in turn extra financial and personnel resources; and in some cases, the reimbursement rate may not cover the added expenses (Miron, Urschel, and Saxton 2011). Third, schools may feel strong accountability pressures. Schools have to meet academic targets in order to avoid sanctions under accountability programs and, for charter schools, increase their likelihood of reauthorization. In the current climate, charter schools often face increased scrutiny and media attention, increasing their perceived accountability pressure.

While the extant charter school literature discusses the impact of these incentives, the broader literature on school choice has spent less time on the role of these incentives for magnet and open enrollment schools or TPSs more generally. However, as schools of choice, magnet and open enrollment schools also need to attract students for enrollment. Furthermore, school districts feel market, accountability, and financial pressure as districts receive state allocations based on student enrollment and may only invest in magnet, open enrollment, and TPSs to the degree that they can enroll enough students to justify the costs. Given declining enrollment, districts often use student achievement and school enrollment numbers as key criteria in determining which schools to close (Engberg et al. 2012). Thus, for these reasons, one might expect schools of choice and TPSs to have strong incentives to either recruit high-performing students or pushout low-performing students through counseling or other means.

As noted above, students and their families also make their decisions, which may or may not relate to schools' incentives or actions. For instance, families with low-performing students may choose (with or without any school influence) to exit a school to find a better educational match for their child (Hanushek et al. 2007). Similarly, high-performing students may move to a new school to find larger shares of similarly performing peers. School demographics (e.g. racial/ethnic and/or socioeconomic makeup of the school) also influence how families make enrollment decisions (Clotfelter, Ladd, and Vigdor 2003; Reardon and Yun 2003; Clotfelter et al. 2019; Butler et al. 2013; Clotfelter, Ladd, and Vigdor 2013; Ladd, Clotfelter, and Holbein 2017; Ladd, Clotfelter, and Turaeva 2018). While we take some steps to address students' incentives in our paper, we cannot fully observe their motivation. Nevertheless, we believe our analysis does have the ability to examine whether the patterns in the data are consistent with the schools' incentives to cream skim and pushout students based on their academic and behavioral profiles.

3. Literature Review

The vast majority of the charter school literature today focuses on educational outcomes. However, research is beginning to emerge on the sorting of students by perceived ability in charter schools.[2] Much of this research uses longitudinal student-level data to examine the movement of students from TPSs to charter schools and charter schools to TPSs (Booker, Zimmer, and Buddin 2005; Garcia, McIlroy, and Barber 2008; Zimmer et al. 2011; Zimmer and Guarino 2013; Welsh, Duque, and McEachin 2016; Winters, Clayton, and Carpenter 2017). This method allows researchers to examine whether students differentially exit TPSs versus charter schools based on their prior achievement.

For the cream skimming question, most of the early research using longitudinal data from a number of districts and states generally found little difference between the students transferring

to charter schools relative to their former peers in the TPS they left (Booker, Zimmer, and Buddin 2005; Garcia, McIlory, and Barber, 2008; Zimmer et al. 2011). Two recent studies examined student moves in New Orleans, a district with extensive school choice policies. Welsh, Duque, and McEachin (2016) examined whether students's prior achievement was related to patterns of school mobility. They found that students with higher test scores were more likely to switch to schools with higher average test scores, while the reverse was true for students with lower test scores. The data did not shed light on what mechanisms led to these choices. In contrast, Maroulis et al. (2016) examined the role of school quality as "push" and "pull" factors in parents' decisions to change schools and found that the "push" of low performance at incumbent schools is stronger than the "pull" of high performance at potential destination schools.[3] Together these studies suggest that an extensive choice model of charter schools, such as in New Orleans, can potentially lead to a stratified system by ability and that demand side factors certainly play a role.

For the pushout question, early research by Miron et al. (2007) examined the exit patterns of charter students in Delaware. While providing some important initial insights, they did not include the exit patterns of students in TPSs, without which it is impossible to know whether charter student exit patterns differed from the general trend. More recent research has used longitudinal data in New York, Denver, and a large anonymous district to examine whether there is empirical evidence consistent with charter schools pushing out students with lower test scores (Zimmer & Guarino 2013; Winters, Clayton, and Carpenter 2017) by not only examining whether students with below-average achievement were more likely to exit a charter school than students with above-average achievement, but also whether these patterns differed from students in TPSs. Across these studies, researchers found that students in charter schools are no more

likely to exit their schools than students in TPSs and generally concluded that there is not strong empirical evidence for the pushout claim. Finally, to our knowledge, the only formal investigation of student exit patterns related to discipline issues was a *Washington Post* story, which found that Washington, D.C. charter schools had higher rates of behavior-related expulsions than TPSs, but that these high expulsion rates were concentrated in a select number of charter schools (Brown 2013).

Together, this research provides useful insights but has often been either piecemeal (i.e., exclusively examined the cream skimming or exclusively examined the pushout question) or has not included other publicly funded schools of choice. Additionally, in previous research examining cream skimming and pushout questions, the researchers tracked only moves across years and not moves within a school year as students moved from TPSs to charter schools. In this paper, we leverage longitudinal statewide North Carolina and Tennessee data to further explore whether there is evidence consistent with the claims that charter schools push out low-performing students and cream skim high-performing students, using test score and discipline record indicators. In the analyses, we examine students' entry and exit patterns across various school options for evidence of cream skimming and pushout. Furthermore, we extend the existing literature by leveraging within-year mobility data in Tennessee to examine whether lower-performing students are more likely to exit charter schools near testing periods.[4] In sum, the results of this study are an important contribution to the literature examining the nature of student mobility within school choice contexts by using two statewide datasets and answering a broader set of research questions.

4. Data

We use two statewide student-level datasets provided by the Tennessee Department of Education and the North Carolina Department of Public Instruction that span from 2010-11 to 2014-15. Both datasets include a unique student identifier to track students over time and demographic characteristics including race, gender, free-and-reduced price lunch (FRPL) status, special education status, and English language learner (ELL) status. The datasets also include math and reading test scores for primary grades 3-8 and subject-specific end of course test scores for reading and math subjects in high school (Algebra I, Algebra II, English I, and English II in both Tennessee and North Carolina, and English III in Tennessee). Lastly, the dataset includes all discipline infractions that resulted in a suspension or expulsion.

The key distinction between the two state datasets is that Tennessee collects students' entry and exit dates for the respective schools of attendance. With these data elements, we are able to track students as they move from school to school both across and within years, which each represent about half of all moves. Unfortunately, we do not have the ability to track within school year moves for students in North Carolina. Throughout the analysis, Tennessee results use both within and between year moves; North Carolina only uses between year moves.

School Types

Before describing how magnet, open enrollment, charter schools, and TPSs are defined in our data set, we first describe how these schools are generally defined nationally. While the definition of these schools varies across states and even districts, one consistent distinction is that magnet, open enrollment, and charter schools are considered schools of choice.[5] The schools of choice differ on two dimensions: the pool of eligible students and the curricular focus.

While both open enrollment and charter schools can receive students from within their local district (intradistrict) or from other districts (interdistrict), in the case of open enrollment

schools, participating in an interdistrict open enrollment program is often voluntary (i.e., both the sending and receiving voluntarily participate). In contrast, magnet school enrollment is often reserved for students within a district and can have academic or skill requirements.

Charter and magnet schools often have a narrower curricular focus or specialized academic programs compared to open enrollment schools, as open enrollment schools are largely a means for families to have greater a choice from an array of schools. Finally, magnet and open enrollment schools are typically more closely managed by a local school district whereas charter schools have more autonomy over their operations and are typically independent of direct school district management and oversight.

For our analysis, we identify schools as charter, magnet, open enrollment, or TPS, by using the U.S. Department of Education National Center for Education Statistics Common Core Data (CCD) as well as state, district, and school websites. For our current paper, we define open enrollment schools as schools that are identified as magnet schools in the CCD, but are not identified as academic magnet schools locally by school districts.[6] We label these schools as open enrollment schools because they do not have specialized academic programs targeting gifted and talented students but allow students outside of the attendance zone to enroll. In contrast, we defined magnet schools as those recognized both in the CCD and by the local school district as magnet schools and appear to have specialized programs. Often magnet schools have academic or skill requirements for admissions, so by design their admissions practices may reflect patterns of cream skimming.

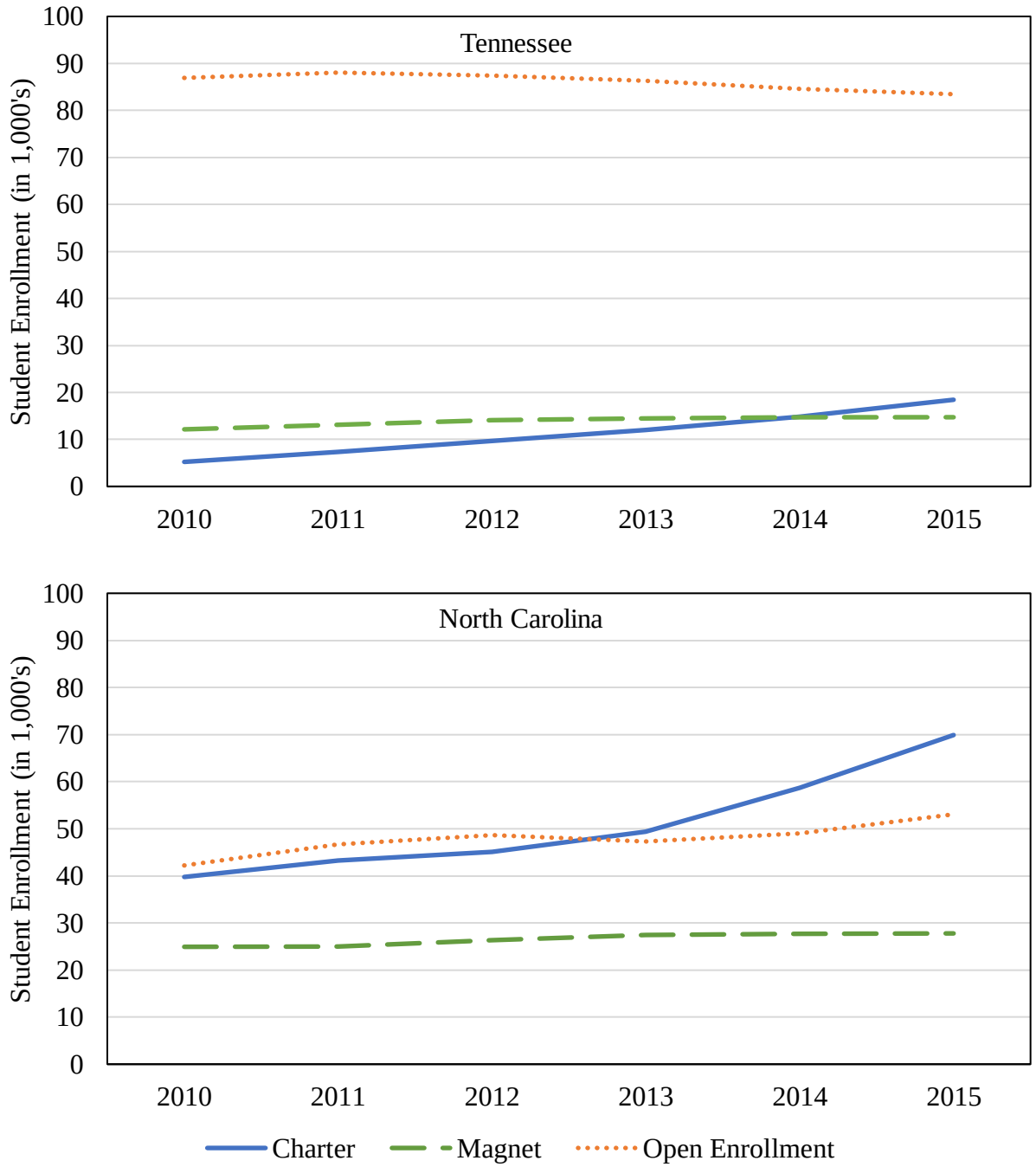
In North Carolina and Tennessee, while open enrollment and magnet schools have similar policies, there are some differences in charter policies across the two states. First, in Tennessee, charter schools can be authorized by either the state Board of Education *or* the local

school districts[7] while North Carolina charter schools must be approved by a charter school advisory board *and* the state Board of Education. The additional layer in the authorizing process may create additional pressure for schools to be fair and accessible in student enrollment policies as part of their original charter agreement, or perhaps increase pressure to perform given a greater bureaucratic burden in authorization. North Carolina also provides additional resources for students with disabilities and English language learners while Tennessee does not, which creates differing financial incentives for enrollment practices for charter schools across the two states. In the past, North Carolina also required charter schools to target a population that reflects the local district's racial and ethnic student composition which may continue to affect the recruitment strategies of charter schools. Finally, many of North Carolina's charter schools reside in suburban and rural areas—approximately 40% and 20% respectively, relative to Tennessee where 95% are located in urban areas. The geographic differences in locations may affect our analysis, as rural students have fewer school choices from which to enter and exit.[8]

In Figure 1, we display the number of students enrolled in charter, magnet, and open enrollment schools across the two states from the 2009-10 through the 2014-15 school years. As the figure suggests, there has been considerable growth in charter school enrollment while both magnet and open enrollment schools have remained relatively constant. The charter growth trend is especially strong in North Carolina from 2011-12 to 2014-15. Prior to 2011, North Carolina capped the number of charter schools in the state to 100, but removed the cap after the 2010-11 school year in order to be eligible for Race to the Top funding. Despite this cap, the larger number of charter schools in North Carolina relative to Tennessee can be attributed to a couple of reasons: 1) North Carolina serves 50% more students than Tennessee; and 2) North Carolina

adopted charter schools fairly early, having opened its first charter in 1997 while Tennessee opened its first charter school in 2003.

Figure 1. Number of Students by School Type Over Time



5. Measures & Methods

Given the incentives for schools outlined above, we use two different performance measures that schools often use as proxies for student ability—student achievement and discipline records—to examine student moves to and from schools.[9] The two measures capture different incentives schools may have to manipulate their student enrollment and may have different implications for schools disproportionally serving these students. Schools face market and accountability pressures, which may lead them to enroll high-performing students and pushout low-performing students. School climate is also important for students, parents, and teachers. We use discipline records as a proxy for schools' desires to minimize disruptions in instruction and costs associated with misbehavior, maintaining the school's reputation, and decreasing the exit rate of high-performing students. We acknowledge, however, that students' discipline records are not a clean proxy for students' own behavior. Whether or not a student receives a suspension or expulsion in a given year is a complex function of his or her own behavior, school practices, educator biases, and other outside-of-school factors (e.g. Welsh and Little 2018; Barrett et al. 2019). Nonetheless, schools may perceive students with discipline histories as more difficult to education. Below we further describe the measures used for each analysis.

Pushout Analysis

Our goal with the pushout analysis is to examine whether low-performing students are more likely to exit a school relative to their high-performing peers and whether there are differences in patterns among charter, magnet, open enrollment, and TPSs. Our dependent variable is a binary variable indicating whether a student makes a nonstructural move out of a school, defined as moves that do not occur in the terminal year of the school (e.g., 5th grade for a

K-5 elementary school). We only include nonstructural moves in the pushout analysis because if a school is engaged in pushout behaviors, there is little reason for the school to push students out in a terminal grade when the student is on the cusp of promotion out of the school. In Tennessee we can identify nonstructural moves that occur at any point during the year (i.e. during or between school years). In North Carolina we can only identify nonstructural moves that occur between school years.

We create three different binary independent variables that are proxies for low-performing students. First, we compare students' prior-year academic performance to his prior school's average in the same year (e.g., to observe exit behaviors in 2014, we compare students' 2013 academic performance to their 2013-enrolled school's average academic performance) – students whose math scores are lower than their school's average take a value of "1", and the rest of the students take a value of "0". Because achievement scores are typically not reported until the end of the school year, by the time schools received the current-year scores, there would be little reason to push students out. Therefore, we use achievement from the prior year. Second, we use state-set proficiency cutoffs to determine low performance. Proficiency rates are easy to define and understand, and prior research documents schools have responded to proficiency-based accountability pressure in maladaptive ways (e.g., Booher-Jennings 2005; Neal and Schanzenbach 2010). Therefore, in this second measure, we define students as low-performing if they scored lower than proficient on the prior year end of grade (or course) state-mandated math assessment. Lastly, we use students' discipline history. Because the average number of discipline infractions in these settings is between zero and one, we define low-performing students as students who had any discipline infractions that resulted in a suspension or expulsion also in the prior year.

With the above defined measures, we employ a linear probability model (LPM)[10] as follows:

$$Y_{it} = \delta T_{it} + \gamma LPS_{it-1} T_{it} + \mu_{it}$$

where $Y_{it} = 1$ if student i makes a nonstructural transfer from his or her school within school year t or between school year t and $t+1$, T_{it} is a vector of binary school type indicators (charter, magnet, open enrollment with TPS as the reference group), and LPS_{it-1} is an indicator for a low-performing student. Specifically, in separate models, we define this variable as: below average achievement, less than proficient, and suspended or expelled in the prior year. We interact these indicators with each of the school types including TPS, and vector γ represents the relative likelihood of transferring for a low-performing student in school type T_{it} compared to high-performing peers in the same school type T_{it}. Given that there is reason to believe the choices of individual students within schools are not independent observations, we cluster our standard errors at the school level. It should also be noted that while researchers often control for student characteristics when analyzing an outcome, we conduct our main analyses without controls for student characteristics as we are examining moves regardless of students' characteristics, the main policy concern here. Our results remain substantively consistent when including student control variables in sensitivity analyses. Finally, while the sample for our analyses based on academic performance is limited to all students who tested in the prior year (grades 4 and up), the discipline analysis includes all students who had discipline records in the prior year – from grade 1 through grade 12.

Cream Skimming Analysis

For the cream skimming analysis, we use slightly different measures for our key dependent and independent variables. While for the pushout analysis, it makes little sense for

schools to pushout students at terminal grades, there can be motivation for a school to cream skim a student, regardless of whether the student is at the entry grade for the school. Therefore, our dependent variable for the cream skimming analysis is a binary variable indicating whether a student makes a move, structural or nonstructural, into a school. Again, for the Tennessee data, we include moves at any point during or after the school year. For the North Carolina data, we can only identify moves between school years.

For the key independent variables, we create four different binary measures, three of which mirror the indicators from the pushout analysis. First, we compare students' prior-year math test scores to their peers in the school they left in the same year (e.g., to observe entrance behaviors in 2014, we compare students' 2013 academic performance to their 2013-enrolled school's average academic performance).[11] Students whose math achievement is higher than their school's average score are identified as high-performing. Second, schools that cream skim may not have perfect information about the relative distribution of schools from which students come, but they may know how the student's performance fits into their own school's performance. Therefore, we use a second measure where we label a student as high-performing if his math achievement in the prior year is higher than the entered school's average score also from the prior year. As with the pushout analysis, we include a third definition based on proficiency status on the state standardized assessment using at least proficient to identify students with higher test scores. Finally, our fourth measure identifies students who were not suspended or expelled in the prior year as high-performing students.

With the above defined measures, we employ a linear probability model (LPM) as follows:

$$Y_{it} = \delta T_{it} + \gamma HPS_{it-1} T_{it} + \mu_{it}$$

where $Y_{it} = 1$ if student i makes a structural or nonstructural transfer into his or her school within school year t or between school year t and $t-1$, T_{it} is again a vector of binary school type indicators (charter, magnet, open enrollment with TPS as the reference group), and HPS_{it-1} is an indicator for a high-performing student. We run separate models for each of the four definitions of HPS_{it-1}: above average achievement in the prior school, above average achievement in the new school, proficient or above, and never suspended or expelled in the prior year. We interact these indicators with each of the school types including TPS, and vector γ represents the relative likelihood of transferring for a high-performing student in school type T_{it} compared to low-performing peers in the same school type T_{it} . Again, we cluster our standard errors at the school level and conduct our main analyses without controls for student characteristics as we are examining moves regardless of students' characteristics, the main policy concern here. Our results remain substantively consistent when including student control variables in sensitivity analyses. Finally, while the sample for our analyses based on test scores is limited to all students who tested in the prior year (grades 4 and up), the discipline analysis includes all students who had discipline records in the prior year – from grade 1 through grade 12.

6. Results

In Table 1, we first display the average student characteristics of each type of school in 2014-15 for both states. We restrict the sample of TPS students to only those TPSs located in the same district as at least one other school of choice. We include all tested students (grades 3 and up) in these districts. For each characteristic, we first show the statistic for students overall in each school type with the denominator representing the total number of students enrolled in the respective school type. In line with our analysis for pushout and cream skimming, we then show the same statistic for students making a nonstructural move out of each school type, where the

denominator represents all students who made a nonstructural move from the respective school type, as well as the same statistic for students making a move, structural or nonstructural, into the respective school type. For instance, 54% of all students in TPSs in Tennessee are white. Of those who made a nonstructural move out of a TPS, 44% are white. Of those who made a move, structural or nonstructural, into a TPS, 49% are white.

In general, Tennessee's charter and open enrollment schools have much higher proportions of black students than TPSs and magnet schools. North Carolina magnet and open enrollment schools have higher proportions of black students compared to TPSs and charter schools. Additionally, charter schools in Tennessee serve greater proportions of students eligible for free and reduced-price meals, while those in North Carolina serve fewer relative to all other sectors. Charter school students in North Carolina and Tennessee also come from different locations in the achievement distribution. Students in Tennessee's charter schools have much lower achievement levels than students in the other types of schools[12], while students in North Carolina's charter schools have achievement levels well above the state average and TPS students. Overall, our analysis covers two distinct contexts; in one state, charter school students are more likely to be black and have lower test scores, and in another, charter school students are more likely to be white and have higher test scores. These differences in charter schools may be a function of differences in geographic context, with North Carolina having many rural and suburban charter schools while Tennessee does not. In both states, on average, students in magnet schools have higher test scores, and students in open enrollment schools have lower test scores.

Table 1. Average Characteristics of Each Type of School, Overall and By Transfer Status (2014-15)

Student Characteristic	Students	Tennessee				North Carolina			
		TPS	Charter	Magnet	OE	TPS	Charter	Magnet	OE
White	**Overall**	**54%**	**6%**	**57%**	**26%**	**49%**	**59%**	**29%**	**29%**
	Transfers Out	44%	6%	47%	20%	41%	47%	24%	23%
	Transfers In	49%	7%	52%	22%	46%	51%	28%	26%
Black	**Overall**	**31%**	**81%**	**32%**	**63%**	**26%**	**26%**	**42%**	**43%**
	Transfers Out	43%	88%	42%	70%	35%	40%	51%	51%
	Transfers In	36%	79%	37%	66%	29%	31%	42%	47%
Hispanic	**Overall**	**12%**	**12%**	**5%**	**9%**	**16%**	**8%**	**16%**	**20%**
	Transfers Out	10%	6%	6%	8%	15%	7%	15%	17%
	Transfers In	12%	14%	5%	9%	17%	9%	17%	20%
FRPL	**Overall**	**53%**	**77%**	**33%**	**67%**	**58%**	**31%**	**50%**	**63%**
	Transfers Out	68%	87%	58%	80%	63%	38%	56%	69%
	Transfers In	58%	79%	39%	70%	61%	35%	52%	68%
Special Education	**Overall**	**13%**	**10%**	**6%**	**13%**	**14%**	**12%**	**9%**	**14%**
	Transfers Out	15%	12%	10%	16%	17%	14%	13%	18%
	Transfers In	13%	11%	6%	13%	14%	11%	9%	14%
ELL	**Overall**	**6%**	**5%**	**1%**	**4%**	**7%**	**2%**	**6%**	**10%**
	Transfers Out	5%	3%	2%	4%	7%	2%	7%	14%
	Transfers In	6%	7%	1%	4%	8%	3%	7%	12%
Standardized Reading Score	**Overall**	**-0.01**	**-0.31**	**0.63**	**-0.13**	**-0.00**	**0.28**	**0.36**	**-0.10**
	Transfers Out	-0.26	-0.47	0.32	-0.50	-0.24	-0.02	0.15	-0.33
	Transfers In	-0.11	-0.45	0.51	-0.25	-0.09	0.11	0.37	-0.27
Standardized Math Score	**Overall**	**0.01**	**-0.25**	**0.54**	**-0.15**	**-0.04**	**0.15**	**0.38**	**-0.19**
	Transfers Out	-0.28	-0.47	0.20	-0.54	-0.31	-0.18	-0.03	-0.42
	Transfers In	-0.07	-0.41	0.50	-0.22	-0.16	-0.05	0.29	-0.33
Suspended/ Expelled	**Overall**	**12%**	**10%**	**11%**	**21%**	**11%**	**5%**	**9%**	**8%**
	Transfers Out	21%	23%	22%	34%	12%	8%	14%	10%
	Transfers In	14%	12%	13%	24%	12%	6%	11%	11%
Number of Students		382,576	17,133	14,380	75,801	1,135,834	69,380	27,575	52,148
Number of Schools		608	61	22	110	1,727	149	36	81

Notes: TPS = Traditional Public Schools. OE = Open Enrollment schools. FRPL = Eligible for Free or Reduced Price Lunch, a proxy for socioeconomic status. ELL = English Language Learner. Reading and math scores are standardized using statewide student-level data. Students in TPS are restricted to only TPS located in districts with at least one other school of choice. Students in all grades are included, except standardized reading and math scores, which are only available for test grades (grades 3 and up). The denominator for "Overall" statistics includes all students in the respective school type. For "Transfers Out" and "Transfers In", the denominator includes all students who transferred out of or transferred in to the respective school type, respectively. Transfers out only includes students who made nonstructural moves. Transfers in include both nonstructural and structural moves.

For comparison, Table 1 also provides the characteristics of students transferring into and out of each sector. In both states, students who move across sectors are disproportionately black and economically disadvantaged (FRPL), regardless of sector. In addition, students who leave a sector generally have lower test scores than their peers who remain in the sector. For example students who exit TPSs have scores 0.24 to 0.29 standard deviations (SDs) lower than their peers that remain, and students who exit charter schools have scores 0.16 to 0.33 SDs lower than their peers who remain. The gap is larger for students in open enrollment or magnet schools. Similarly, as expected, students who exit are more likely to be suspended or expelled than students who remain in the sector.

Finally, students entering all sectors typically have higher test scores relative to those exiting the respective sectors. However, this difference is greatest for students entering magnet schools relative to those exiting magnet schools, which is consistent with cream skimming and pushout behavior. While these descriptive patterns are interesting, in what follows we conduct more formal regression analyses.

Cream Skimming Analysis

In Table 2, we present the results for the cream skimming analysis. As previously described, we display results using four different definitions of high-performing students, labeled across the top row. Note that for the first three measures, which are based on academic performance in the prior year, only students with prior year test scores are included – grades four and up. For the fourth measure using discipline records, students in first grade and up are included since discipline records from the prior year are available for these students (no discipline records are available for the year prior to Kindergarten).

Table 2. Examining the Entrance Patterns of High-Performing Students

High-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Relative to Entered School	Math Achievement Proficiency Status	No Suspensions/ Expulsions
Tennessee				
High-performing students in TPSs	-0.06***	-0.04***	-0.09***	-0.15***
	(0.00)	(0.00)	(0.01)	(0.01)
High-performing students in charters	-0.03**	-0.10***	-0.12***	-0.26***
	(0.01)	(0.02)	(0.03)	(0.04)
High-performing students in magnets	0.18***	0.01	-0.07	-0.08
	(0.05)	(0.02)	(0.04)	(0.04)
High-performing students in OEs	-0.05***	-0.04***	-0.08***	-0.11***
	(0.01)	(0.01)	(0.01)	(0.01)
N	1368687	1347327	1368687	2439954
North Carolina				
High-performing students in TPSs	-0.03***	-0.01*	-0.04***	-0.10***
	(0.00)	(0.00)	(0.00)	(0.00)
High-performing students in charters	0.01	-0.01	-0.07***	-0.25***
	(0.01)	(0.01)	(0.01)	(0.03)
High-performing students in magnets	0.09**	0.03	0.01	-0.12***
	(0.03)	(0.02)	(0.02)	(0.03)
High-performing students in OEs	-0.06***	-0.03*	-0.06***	-0.13***
	(0.01)	(0.01)	(0.01)	(0.02)
N	3847697	3812004	3847697	6800171

*Notes: High-performing is defined in four ways, all using measures in the prior year – student's math achievement is above his prior school's average math achievement, student's math achievement is above the entered schools' average in math achievement, student earns a proficient score on the standardized math assessment, and student has not been suspended or expelled. For the measures based on academic performance, the sample is restricted to grades 4 and up. For the discipline measure, the sample includes grades 1 and up. Dependent variable = student makes a structural or nonstructural move across schools. For Tennessee, we include both within-year and between-year moves. For North Carolina, we only observe between-year moves. TPS = Traditional Public Schools. OE = Open Enrollment Schools. Students in TPS are restricted to only TPS located in districts with at least one other school of choice. Coefficients for each variable indicate the probability of entering for high-performing students minus the probability of entering for low-performing students in the respective school type. Standard errors (in parentheses) are clustered at the school level. * p < 0.05, ** p < 0.01, *** p < 0.001.*

In Table 2, the coefficients represent the probability that a high-performing student is more likely to enter into the respective school type than a low-performing student. For example, students with math scores greater than their prior school's average are 6 percentage points less likely to enter a TPS than students with lower test scores (entering a TPS) in Tennessee.

Generally speaking, except for magnet schools, nearly all of the coefficients across the table are negative, which suggests that high-performing students are less likely to move in to schools, regardless of sector type. Only magnet schools show any evidence consistent with the claim of cream skimming. Students with above average math achievement relative to their prior school are 18 and 9 percentage points more likely to enter magnet schools than students with below average achievement in Tennessee and North Carolina, respectively. This result may not be surprising given that magnet schools often have selective admissions. Of greater interest to policymakers, we find no evidence consistent with cream skimming for charter schools in either Tennessee or North Carolina.[13]

As noted previously, we conduct our main analyses without student controls as we are examining moves regardless of students' characteristics. However, because it may be the case that racial/ethnic considerations or other student characteristics could play a role in student moves, we repeat our analyses controlling for race and then subsequently including gender, socioeconomic status, English language learners, and special education status as well and find substantively similar results as our main analyses (see Appendix Tables A.2-A.3, which are available in a separate online appendix that can be accessed on *Education Finance and Policy*'s Web site at www.mitpressjournals.org/efp), suggesting that our earlier findings on student entrance patterns remain even after controlling for race or other observable student characteristics.

We further investigate the moves of high-performing students in Table 3 by examining structural versus nonstructural moves as well as between- versus within-year moves. For space, we only show the results when using math achievement relative to the prior school to identify high-performing students, as these were the most substantial results from the main analysis. The

first two columns in both tables disaggregate student moves by nonstructural and structural moves. When examining the probability of making a non-structural move, we exclude structural moves from the analysis. When examining the probability of making a structural move, we exclude non-structural moves from the analysis.

Table 3. Examining the Entrance Patterns of High-Performing Students - By Different Types of Moves

High-Quality Indicators	Non-Structural Moves	Structural Moves	Between-Year Moves	Within-Year Moves
Tennessee				
High-performing students in TPSs	-0.06***	-0.00	-0.02***	-0.04***
	(0.00)	(0.00)	(0.00)	(0.00)
High-performing students in charters	-0.02***	-0.01	-0.02	-0.01***
	(0.01)	(0.01)	(0.01)	(0.00)
High-performing students in magnets	0.06**	0.12***	0.19***	-0.01
	(0.02)	(0.03)	(0.04)	(0.01)
High-performing students in OEs	-0.06***	0.00	-0.01	-0.04***
	(0.01)	(0.01)	(0.01)	(0.00)
N	1368687	1368687	1368687	1368687
North Carolina				
High-performing students in TPSs	-0.04***	0.01***		
	(0.00)	(0.00)		
High-performing students in charters	-0.01	0.02**		
	(0.01)	(0.01)		
High-performing students in magnets	-0.01	0.10***		
	(0.01)	(0.02)		
High-performing students in OEs	-0.05***	-0.01		
	(0.01)	(0.01)		
N	3847697	3847697		

Notes: See Table 2 for respective notes. However, in this table, high-performing is defined only as students whose prior-year math achievement is above his prior school's average prior-year math achievement.
On the left half of the table, we examine for differences between non-structural and structural moves. In column 1, we exclude any structural moves from the analysis. In column 2, we exclude any nonstructural moves.
On the right half of the table, we examine for differences between between-year and within-year moves, which we can only do for Tennessee. In column 1, we exclude within-year moves from the analysis. In column 2, we exclude between-year moves.

In examining these results, some differences do appear across the analyses disaggregating structural versus nonstructural moves. In Table 3, both coefficients for magnet schools are statistically significant in Tennessee, but high-performing students are 12 percentage points more likely to make structural moves into magnets relative to low-performing students whereas they are only 6 percentage points more likely to make nonstructural moves into magnets. In North Carolina, we observe positive and statistically significant probabilities for TPSs, charters, and magnets for nonstructural moves, although only magnets have a meaningfully large probability of 10 percent (TPSs and charters have probabilities of 1 and 2 percent, respectively).

The last two columns in Table 3 show the results when disaggregating the moves by between-year versus within-year moves, but only for Tennessee as the North Carolina data do not provide this level of detail. When examining the probability of exiting between years, we exclude any within-year moves. When examining the probability of exiting within years, we exclude any between-year moves. In this analysis, only the between school year estimates for magnet schools is positive and statistically significant, suggesting that the between year moves appear to be driving the results for magnet schools in Tennessee. In summary, the results seem to indicate that the difference in high- and low-performing student moves into magnet schools are concentrated between school years and at terminal grades of elementary and middle schools.

Pushout Analysis

We report the results of our pushout analyses in Table 4 as we show the exit patterns of low-performing students relative to high-performing students within school types. Again, for the academic measures, only students with prior year test scores are included – grades 4 and up. For

the discipline measure, all students with discipline records in the prior year are included – grades 1 and up.

Table 4. Examining the Exit Patterns of Low-Performing Students

Low-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Proficiency Status	Suspensions/ Expulsions	Zero Tolerance Infractions Only
Tennessee				
Low-performing students in TPSs	0.06***	0.10***	0.14***	0.42***
	(0.00)	(0.01)	(0.01)	(0.02)
Low-performing students in charters	0.07***	0.09***	0.23***	0.50***
	(0.00)	(0.01)	(0.02)	(0.06)
Low-performing students in magnets	0.04*	0.08***	0.11***	0.45***
	(0.02)	(0.02)	(0.02)	(0.04)
Low-performing students in OEs	0.08***	0.10***	0.13***	0.42***
	(0.00)	(0.01)	(0.01)	(0.03)
N	1360055	1360055	2833856	2833856
North Carolina				
Low-performing students in TPSs	0.05***	0.07***	0.10***	
	(0.00)	(0.00)	(0.00)	
Low-performing students in charters	0.04***	0.08***	0.15***	
	(0.00)	(0.01)	(0.01)	
Low-performing students in magnets	0.05***	0.08***	0.14***	
	(0.01)	(0.01)	(0.02)	
Low-performing students in OEs	0.07***	0.09***	0.13***	
	(0.01)	(0.01)	(0.02)	
N	3249851	3249851	6435371	

*Notes: Low-performing is defined in three ways, all using measures in the prior year – student's math achievement is below his prior school's average math achievement, student earns a below-proficient score on the standardized math assessment, and student has been suspended or expelled at least once. For the measures based on academic performance, the sample is restricted to grades 4 and up. For the discipline measure, the sample includes grades 1 and up. Dependent variable = student makes a nonstructural move across schools. For Tennessee, we include both within-year and between-year moves. For North Carolina, we only observe between-year moves. TPS = Traditional Public Schools. OE = Open Enrollment Schools. Students in TPS are restricted to only TPS located in districts with at least one other school of choice. Coefficients for each variable indicate the probability of exiting for low-performing students minus the probability of exiting for high-performing students in the respective school type. Standard errors (in parentheses) are clustered at the school level. * p < 0.05, ** p < 0.01, *** p < 0.001.*

As shown in the first three columns of Table 4, across nearly all measures and sectors in both states, low-performing students are more likely to exit than high-performing students as indicated by consistent positive coefficients. Academically low-performing students are 4 to 10 percentage points more likely to exit, with estimates of relatively similar magnitudes across all sectors. With one exception, students with a prior year suspensions/expulsions are 10 to 15 percent more likely to exit. However, students with prior year suspensions/expulsions are 23 percent more likely to exit charter schools in Tennessee, a magnitude much larger than other school types[14]. Overall, these results suggest that low-performing students exit schools at a higher rate and, when comparing students with prior year discipline events to their peers without such an event, our results provide evidence consistent with the claim of pushout for charter schools.[15,16]

As with the cream skimming results, we repeat our analyses controlling for student characteristics (see Appendix Tables A.6-A.7, which are available in the online appendix). We again find substantially similar results, suggesting that the exit behaviors occur regardless of student race/ethnicity, gender, socioeconomic status, special education status, or English language learner status. We further disaggregate the types of exits into between- and within-year moves to better understand which moves are driving the large, positive coefficients when using discipline infractions. See Table 5. Again, only the Tennessee data provides this level of granularity. Our results show that evidence consistent with pushout behaviors by charter schools only appears when considering within-year moves. This makes sense in that if schools are to pushout students with past suspensions/expulsions, they will not wait until the end of the school year in order to remove them, but rather address the student at the time of the incident.

Table 5. Examining the Exit Patterns of Low-Performing Students Using Discipline Measures – Between- vs. Within-Year Moves

Low-Quality Indicators	Between-Year Moves	Within-Year Moves
Tennessee		
Low-performing students in TPSs	0.04***	0.10***
	(0.01)	(0.00)
Low-performing students in charters	0.02	0.22***
	(0.02)	(0.03)
Low-performing students in magnets	0.06***	0.05***
	(0.01)	(0.01)
Low-performing students in OEs	0.04***	0.09***
	(0.00)	(0.01)
N	2833856	2833856

Notes: See Table 4 for respective notes. However, in this table, low-performing is defined only as students who committed a discipline infraction in the prior year.

Lastly, some have suggested that charter schools act strategically about the timing of pushout—e.g., pushing out low-performing students near testing dates (Clawson 2013; O'Donnell 2014; Strauss 2015). Given the within-year results from Table 5, it is particularly important that we examine the credibility of this concern. Using the Tennessee data, we examine whether low-performing students are more likely to exit a school near the test date. For the analysis, we restrict the sample to the set of students who exit a school at some point in the year and then conduct a similar linear probability model in which we examine whether, conditional on exiting, low-performing students are more likely to exit a school within one month of the testing window than their high-performing peers. In Table 6, we observe estimates ranging from -0.01 to 0.03. Some estimates are statistically significant but they are substantially small. In an additional analysis (not shown here), we extend the pushout window to two months before the testing date and find similar results. In summary, we do not find any evidence of accountability-based

differential exit patterns, suggesting that if schools are pushing out students, they are either not doing it for accountability purposes or are unable to effectively identify which students to target and systematically encourage to leave.

Table 6. Examining the Exit Patterns of Low-Performing Students – Before the Testing Date in Tennessee

Low-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Proficiency Status	Suspensions/ Expulsions
Tennessee			
Low-performing students in TPSs	0.01***	0.01***	0.03***
	(0.00)	(0.00)	(0.00)
Low-performing students in charters	0.01	0.01	0.02**
	(0.01)	(0.01)	(0.01)
Low-performing students in magnets	-0.01	0.01	0.02
	(0.01)	(0.02)	(0.01)
Low-performing students in OEs	0.00	0.00	0.03***
	(0.00)	(0.00)	(0.00)
N	143860	143860	345942

Notes: See Table 4 for respective notes. However, the sample in the above analyses only includes students who made a nonstructural move within-year. Dependent variable = student makes a nonstructural move within one month of the accountability testing window.

Heterogenous Effects

So far, we have provided average estimates across various school sectors, but it may be possible that schools within these sectors have differential incentives to cream skim or to pushout students. For instance, larger schools may have less financial pressure and, as a result, could afford to cream skim or push out students, while smaller schools may have greater financial pressure to recruit and retain all students, regardless of their performance or behavior. To assess this possibility, we identified average school enrollments for each district for each school level (elementary, middle, or high) and then assigned schools based on whether they were above or below the district, school-level average. The results are displayed in Tables A.8 and A.9, which

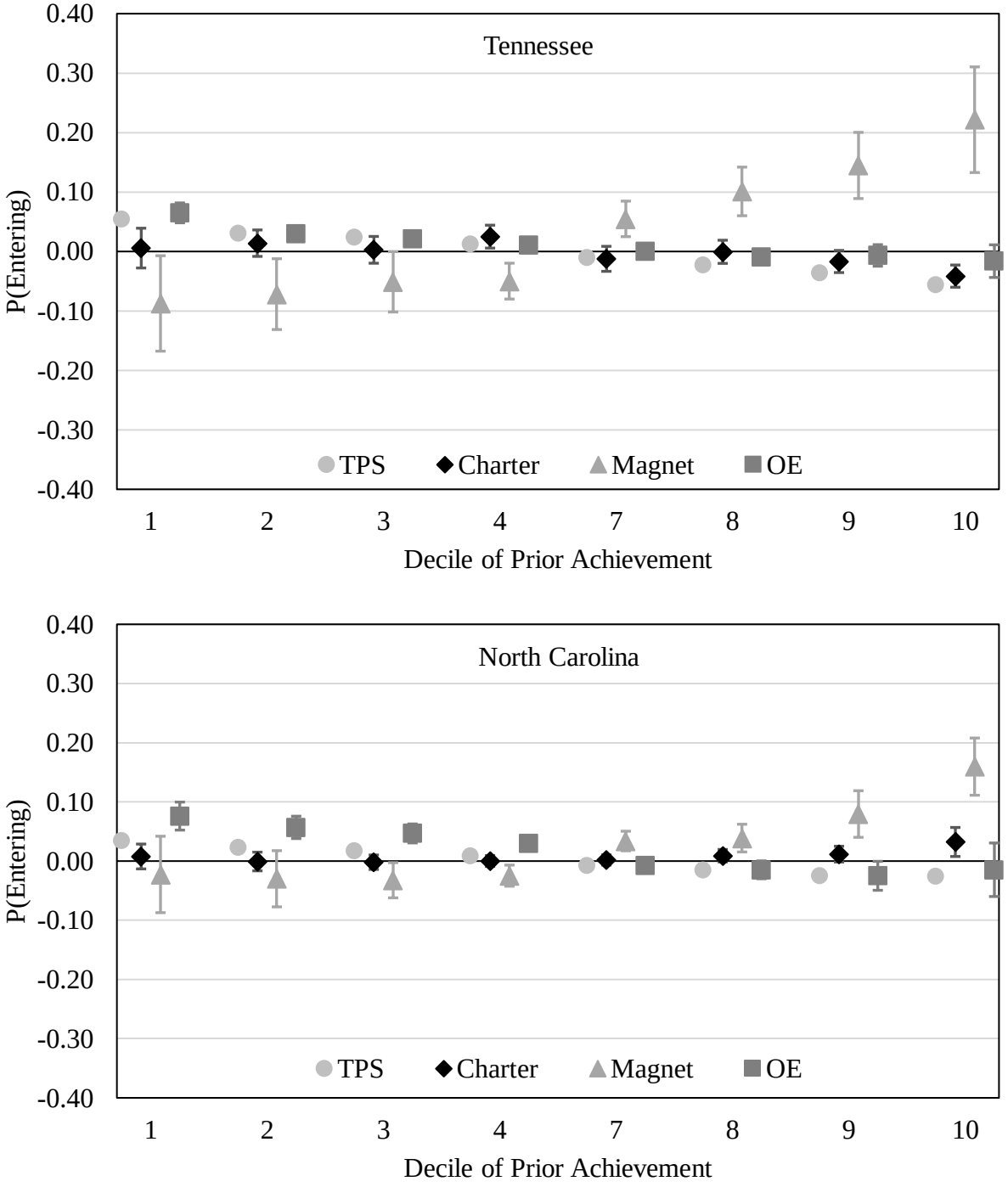
are available in the online appendix. The estimates suggest that, in most cases, there are not large differential estimates across the two groups. However, we do observe differential exit patterns across small and large schools in Tennessee based on discipline infractions. The estimates for large schools is greater than that of small schools, which is consistent with our theoretical assumption. This suggests that there could be differential effects across schools with different characteristics. Because of space constraints, we did not explore the full range of possible differences across schools types, but it does suggest that this should be explored in future research.

7. Robustness Checks

Restricting the Definition of High- and Low-Performing Students

To assess the robustness of our results, we conduct a number of sensitivity checks. In our main analyses, we use above school average achievement and below school average achievement to classify students for our cream skimming and pushout analysis, respectively. In this section we test the robustness of our results against more flexibile definitions of test scores and discipline history. In particular, we split students into deciles of prior academic performance with the lowest-performing students in the first decile and the highest-performing students in the tenth decile. Similar to our main analyses, we then interact each performance decile with school type, omitting the middle two deciles (40^{th} to 60^{th} percentile). In Figure 2, we provide the probability of entering each school type by performance decile relative to the middle 20%. In Figure 3, we provide the probability of exiting each school type by performance decile, also relative to the middle 20%. We include 95% confidence intervals for each estimate.

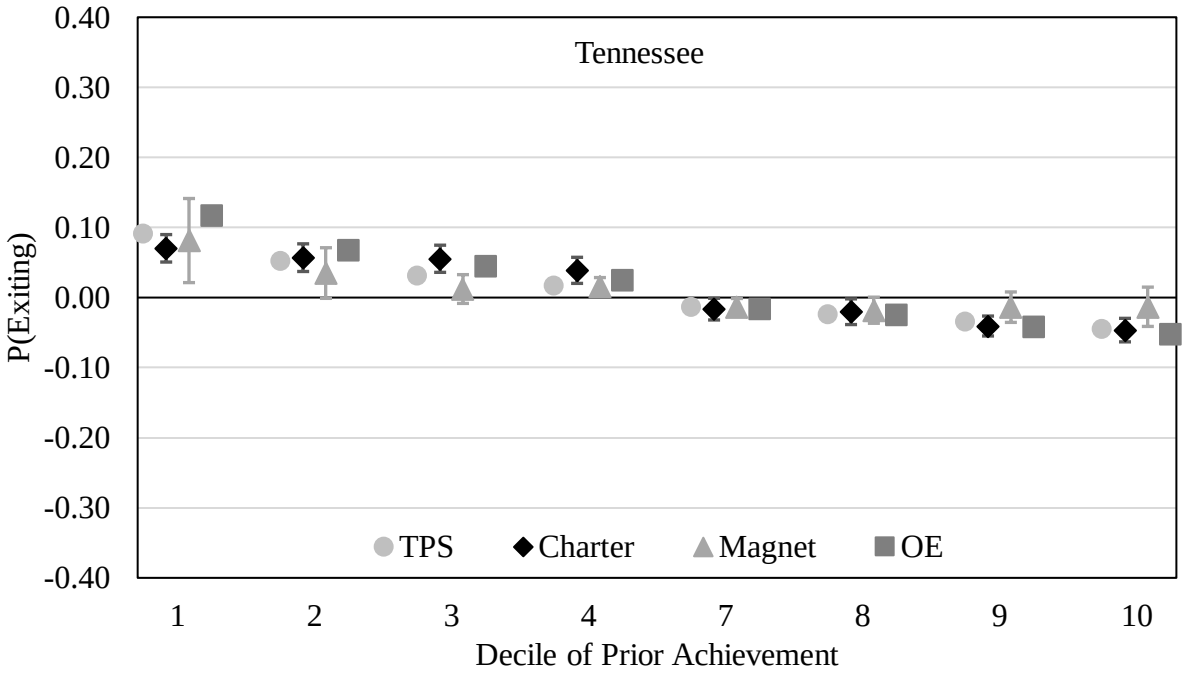
Figure 2. Examining the Entrance Patterns of High-Performing Students – By Decile of Performance

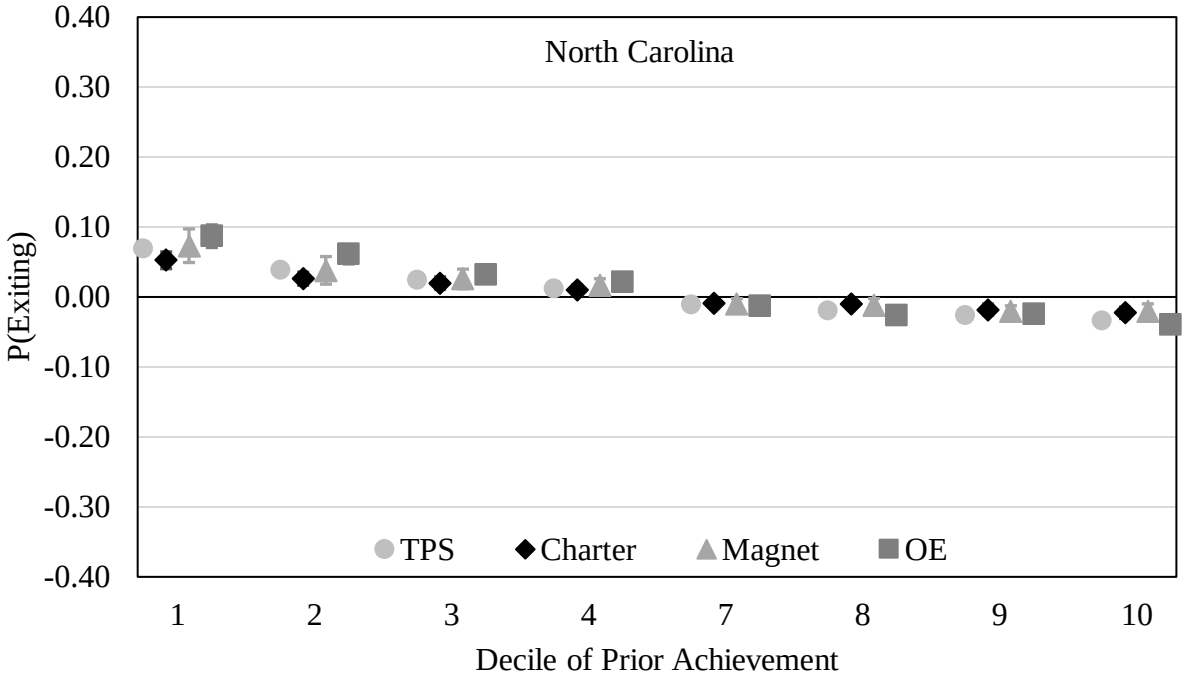


Notes: These figures show the probability of making a nonstructural or structural move into each school type for students in each decile of prior math achievement relative to the middle 20% of prior math achievement, for each sector. 95% confidence intervals are included. Students in TPS are restricted to only TPS located in districts with at least one other school of choice. Only students in grades 4 and up are included. TPS = Traditional Public Schools. OE = Open Enrollment Schools.

In Figure 2, we again see in both states only small or insignificant differences in the likelihood of entering charter schools, open enrollment schools, and TPSs across deciles. However, higher-performing students are more likely to enter magnet schools, with increasing probabilities of 0.05 to 0.22 greater starting with students in the 4th highest decile in Tennessee. In North Carolina, the pattern is similar, though the large probability of entering magnet schools only manifests in the top two deciles. In figure 3, we see relatively small differences in the likelihood of exiting and similar patterns across school types. Generally speaking, the conclusions from the main analysis remain substantively the same.

Figure 3. Examining the Exit Patterns of Low-Performing Students – By Decile of Performance





Notes: These figures show the probability of making a nonstructural exit from a school for students in each decile of prior math achievement relative to the middle 20% of prior math achievement, for each sector. 95% confidence intervals are included. Students in TPS are restricted to only TPS located in districts with at least one other school of choice. Only students in grades 4 and up are included. TPS = Traditional Public Schools. OE = Open Enrollment Schools.

Discipline Measures

Schools may have different discipline policies or differential levels of reporting and enforcement, which could affect some of our measures of performance. Some of this concern is mitigated by the fact that many discipline policies are set either by the state or district, which may create more consistency in reporting and enforcement. For instance, both the state of Tennessee and North Carolina have established guidelines for all schools to follow with regards to property damage, fighting, bullying, drug and alcohol use, conduct towards school staff, among other issues (Child Trends 2019a; Child Trends 2019b; Tennessee State Board of Education 2019; Duke Law 2020). These guidelines are then developed into policies and monitored by the district.[17] Because we restrict the sample to districts that have schools of choice

and exclude all other districts, we assume that TPSs, magnet, and open enrollment schools within the same district have consistent policies across schools. This, however, does not imply that charter schools will have the same policies. While they do receive the same guidelines, which may help minimize some variation from school to school, it does not necessarily mean they cannot adopt more stringent (or more lenient) policies with stricter (or less strict) enforcement and reporting. Ultimately, the implication is that the same behavior could be punished and reported differently among charter schools or across charter and non-charter sectors.

To address this, we specify an alternative discipline variable to only include zero tolerance offenses, which are the most severe discipline incidents that are mandated by state law to be recorded and have uniform consequences across the state. Possession of illegal drugs, firearms, or explosives and assaulting a teacher are examples of zero tolerance offenses. Only the Tennessee data provides this level of granularity, so we are unable to include North Carolina for this check. We compare students who committed a zero tolerance infraction in the prior year to students in the same sector who did not commit a zero tolerance infraction in the prior year. Note that zero tolerance data are also available for all students, so those with zero tolerance data in the prior year are included in the analysis (grades 1 and up). For the cream skimming analysis, we found no evidence consistent with this practice, as was the case with discipline records in the original analysis. For the pushout analysis, we display the results in the last column of the original pushout results in Table 4. The magnitude of the estimates are much larger than when considering all discipline infractions, as expected, ranging from 0.42 to 0.50. The largest estimate again lies in charter schools[18]. In summary, the main results for both pushout and cream skimming are robust to a more stringent definition of discipline.[19]

Restricting the Cream Skimming Analysis to Moves from TPS Only

In the main cream skim analyses, we include students who transfer from all school sectors. However, as noted in the introduction, critics that claim cream skimming activity from charter schools often argue that this practice particularly harms TPSs. While the vast majority of transfers come from TPSs – in Tennessee, 86% of all transferring students are transferring from TPSs; in North Carolina, 92% of all transferring students are transferring from TPSs—we nevertheless assess this concern by adding analyses that only include students transferring from TPSs. Students transferring from other school types are excluded from the analysis. To conserve space, the results are not displayed but are consistent with our main conclusions.

Examining Results By Year

In both the cream skimming and pushout analyses, one unavoidable concern is that as students leave schools, the composition of the student population to which they are compared changes as a function of that movement. In Tennessee, about 18% of the overall student population transferred by the end of the school year, and in North Carolina, this transfer rate was about 15%. However, only 2.5% of the student population in Tennessee transferred to a school of choice (less than 1% to a charter school), and only 1.5% of the student population in North Carolina transferred to a school of choice (less than 1% to a charter school). Therefore, we do not see the changing population to be a major threat to our analysis. Nonetheless, if school populations are changing over time, we would expect the effects in our analysis to change over time as well. To guard against this, we conduct a sensitivity check by assessing for evidence consistent with cream skimming and pushout practices for each year in our data and compare these results across years. To conserve space, we do not include the results here. Overall, we find the same substantive conclusions regardless of year.

8. Discussion

Since the inception of charter schools, some have expressed concerns as to whether charter schools would equitably serve all students and whether TPSs would be left serving the most-challenging students. However, up to this point, there has been limited evidence to shed light on these concerns and researchers have often dealt with these questions in a piecemeal way. In this paper, we address the questions of cream skimming and pushout for charter schools while also examining these concerns for TPS as well as other forms of school choice – magnet and open enrollment schools— in two states.

For the cream skimming question, we examined the entrance patterns of high-performing students using multiple definitions of academic and behavioral performance. We find no evidence consistent with the claim of charter schools, TPS, or other open enrollment schools cream skimming the best students. In contrast, we do find results consistent with cream skimming behaviors for magnet schools, where the highest-performing students are up to 18% more likely to enter these schools than low-performing students. Further examination of the types of moves in Tennessee revealed that this behavior tended to occur between school years (during the summer) and in terminal grades. This suggests that the timing of moves are intentional as these moves occur when students are switching schools anyway. Regardless of whether these moves were the result of magnet schools' recruiting practices or because of the decisions of families, these moves drain TPSs of some of their best students. However, it should be noted that these results for magnet schools are not surprising given the academic and skill requirements magnet schools often require.

For the question of pushout, we examined the likelihood of low-performing students exiting relative to high-performing students. We found that exit rates for low-performing

students were particularly high in charter schools when considering students' discipline records. In particular, Tennessee students who had been suspended or expelled were 23 percentage points more likely to exit charter schools than students had not been suspended or expelled. In North Carolina, suspended/expelled students were 15 percentage points more likely to exit charter schools. Various robustness checks confirmed this behavior. These moves appeared to be driven by within-year moves, at least in Tennessee, suggesting that discipline concerns were addressed immediately, whether by the student or by the school. We did not find substantial evidence consistent with the claim that charter schools (or any other choice school type) are pushing out low-performing students near the test date. Nonetheless, the magnitude of these findings overall merits some concern and suggests greater monitoring of charter schools' enrollment practices.

Despite these results, we cannot definitively state that charter schools are in fact pushing out problematic students or that magnet schools are indeed cream skimming students as these moves may be initiated by students and families rather than schools' strategic actions. For instance, students (and their families) may prefer to attend higher-performing schools or enroll in schools with particular racial or socioeconomic characteristics. They may choose a school that offers certain curriculum, programs, or services that better align with their academic and social needs. Students may also experience "negative shocks" such as disciplinary proceedings or changes in academic success that could spur a desire to change school environments. Distinguishing between school-led and student-led student moves is inconsequential from a TPS perspective—regardless of who is driving the moves, TPS are still left with the most challenging students. The more relevant concern is that these results may suggest inequitable opportunities for students. In other words, if these results are student-driven decisions, students at least still have the opportunity to enroll in these schools, but if school-driven, then the least attractive and

most challenging students will not have access to the same educational opportunities as their more advantaged peers.

While we cannot tease out all of the potential motivations of students and their families, we conduct some descriptive analyses to explore whether some demand side factors may be driving the patterns identified in the study. We first compare the academic and behavioral profile of schools that high-performing and low-performing students enter and leave in both Tennessee and North Carolina (see Table A.10 for further details, which is available in the online appendix). We find that for students moving into magnet schools, the differences in moved-to and moved-from school performance between high- and low-performing students for students are 0.41 and 0.23 standard deviations, magnitudes greater than all other sectors in Tennessee and North Carolina, respectively. Similarly, in Tennessee, the difference of school-level average number of offenses per student between high- and low-performing students moving into magnet schools is 0.39 incidents, again a magnitude much greater than other sectors in Tennessee. We find a similar pattern for North Carolina's charter schools when defining performance by discipline records. These results suggest that students and their families entering magnet schools (and charter schools in North Carolina) may be actively seeking to move into school environments with greater academic success and fewer discipline problems.

To further explore the students' motivation, we provide the results of a similar analysis examining differences in the demographic make-up of schools in Table A.11, which is available in the online appendix. In Tennessee, we find that the difference in both racial and socioeconomic make-up between high- and low-performing students moving into magnet schools is much greater in magnitude than that of all other sectors. In particular, high-performing students moving into magnet schools are enrolling in schools with a greater white student

population and fewer black and economically disadvantaged students than low-performing students. In North Carolina, we find a similar pattern for charter schools (though we did not find any evidence of cream skimming for charter schools). Together, these results suggest that the movement to magnet schools may not necessarily be supply side (school) recruitment of students but decisions made by students' and their families' preferences.

It is also plausible that students may move because of a poor fit with a prior school. To explore this factor, we controlled for students' prior math achievement, prior math achievement gains, and prior discipline records, which are likely highly correlated with students' and families' attitudes towards schools, in our original analyses. While in some cases, prior math achievement and whether the student had previously been suspended or expelled significantly predicted the likelihood of moving (both in the entrance and exit analyses), the coefficients were small in magnitude (0.01 to 0.03) and the key coefficients of interest yielded substantively similar conclusions. Therefore we do not believe these to be plausible factors for differential movements between high- and low-performing students.

In sum, while our cream skimming results are largely consistent with previous studies (Booker, Zimmer, and Buddin 2005; Zimmer et al. 2011) that have used longitudinal student level data to examine the issue for charter schools, our results for pushout are not entirely consistent and do raise more concerns than found in the previous literature (Zimmer and Guarino 2013; Winters et al. 2017). Given that our analytical approach is largely consistent with the previous literature, this may mean the addition of discipline as a measure of student performance sheds new light on the issue. Our exploratory analyses suggest that we cannot completely rule out demand side factors from producing the differential patterns in student mobility we find in charter and magnet schools. Nevertheless, our findings do suggest at least greater oversight in

both Tennessee and North Carolina as students with behavioral problems may disproportionately leave charter schools, leaving the burden of educating challenging students to TPSs. In future research, it may be useful to examine whether these patterns are associated with different policies or different levels of oversight.

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Appendix

Table A.1. Examining the Entrance Patterns of High-Performing Students, with District Fixed Effects

High-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Relative to Entered School	Math Achievement Proficiency Status	No Suspensions/ Expulsions
Tennessee				
High-performing students in TPSs	-0.06***	-0.05***	-0.04***	-0.03*
	(0.01)	(0.00)	(0.01)	(0.01)
High-performing students in charters	-0.03	-0.11**	-0.12*	-0.22*
	(0.02)	(0.03)	(0.06)	(0.08)
High-performing students in magnets	0.17***	0.01	-0.03	0.00
	(0.04)	(0.02)	(0.03)	(0.03)
High-performing students in OEs	-0.06***	-0.05***	-0.05**	-0.05**
	(0.01)	(0.01)	(0.01)	(0.02)
N	1368687	1347327	1368687	2439954
North Carolina				
High-performing students in TPSs	-0.03***	-0.01*	-0.04***	-0.10***
	(0.00)	(0.00)	(0.00)	(0.00)
High-performing students in charters	0.01	-0.01	-0.07***	-0.24***
	(0.01)	(0.01)	(0.01)	(0.03)
High-performing students in magnets	0.09**	0.03	0.01	-0.12***
	(0.03)	(0.02)	(0.02)	(0.03)
High-performing students in OEs	-0.06***	-0.02*	-0.06***	-0.13***
	(0.01)	(0.01)	(0.01)	(0.02)
N	3847697	3812004	3847697	6800171

Notes: See Table 2 for respective notes. We also include district effects in the above analyses.

Table A.2. Examining the Entrance Patterns of High-Performing Students, including Controls for Race/Ethnicity

High-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Relative to Entered School	Math Achievement Proficiency Status	No Suspensions/ Expulsions
Tennessee				
High-performing students in TPSs	-0.05***	-0.03***	-0.07***	-0.12***
	(0.00)	(0.00)	(0.01)	(0.01)
High-performing students in charters	-0.03*	-0.10***	-0.12***	-0.25***
	(0.01)	(0.02)	(0.03)	(0.04)
High-performing students in magnets	0.19***	0.02	-0.04	-0.03
	(0.05)	(0.02)	(0.04)	(0.04)
High-performing students in OEs	-0.05***	-0.03**	-0.06***	-0.09***
	(0.01)	(0.01)	(0.01)	(0.01)
N	1367662	1346340	1367662	2438352
North Carolina				
High-performing students in TPSs	-0.02***	0.00	-0.02***	-0.08***
	(0.00)	(0.00)	(0.00)	(0.00)
High-performing students in charters	0.02	0.00	-0.05***	-0.22***
	(0.01)	(0.01)	(0.01)	(0.03)
High-performing students in magnets	0.11***	0.05*	0.02	-0.09**
	(0.03)	(0.02)	(0.02)	(0.03)
High-performing students in OEs	-0.05**	-0.01	-0.04**	-0.11***
	(0.01)	(0.01)	(0.01)	(0.02)
N	3845601	3810109	3845601	6795861

Notes: See Table 2 for respective notes. We also control for student race/ethnicity in the above analyses.

Table A.3. Examining the Entrance Patterns of High-Performing Students, Controlling for Student Characteristics

High-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Relative to Entered School	Math Achievement Proficiency Status	No Suspensions/ Expulsions
Tennessee				
High-performing students in TPSs	-0.05***	-0.02***	-0.06***	-0.10***
	(0.00)	(0.00)	(0.01)	(0.01)
High-performing students in charters	-0.03**	-0.10***	-0.12***	-0.25***
	(0.01)	(0.02)	(0.03)	(0.04)
High-performing students in magnets	0.19***	0.03	-0.03	-0.02
	(0.05)	(0.02)	(0.04)	(0.04)
High-performing students in OEs	-0.04***	-0.02*	-0.05***	-0.08***
	(0.01)	(0.01)	(0.01)	(0.01)
N	1367326	1346037	1367326	2437786
North Carolina				
High-performing students in TPSs	-0.02***	0.01***	-0.01***	-0.06***
	(0.00)	(0.00)	(0.00)	(0.00)
High-performing students in charters	0.02	0.00	-0.04***	-0.21***
	(0.01)	(0.01)	(0.01)	(0.03)
High-performing students in magnets	0.11***	0.06**	0.04	-0.07*
	(0.03)	(0.02)	(0.02)	(0.03)
High-performing students in OEs	-0.04**	0.00	-0.03*	-0.09***
	(0.01)	(0.01)	(0.01)	(0.02)
N	3818727	3783552	3818727	6123417

Notes: See Table 2 for respective notes. We also control for student race/ethnicity, gender, socioeconomic status, English language learner, and special education status in the above analyses.

Table A.4. Examining the Exit Patterns of Low-Performing Students, with District Fixed Effects

Low-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Proficiency Status	Suspensions/ Expulsions
Tennessee			
Low-performing students in TPSs	0.06***	0.05***	0.11***
	(0.00)	(0.00)	(0.01)
Low-performing students in charters	0.07***	0.06***	0.23***
	(0.00)	(0.00)	(0.03)
Low-performing students in magnets	0.03	0.03	0.08***
	(0.02)	(0.03)	(0.01)
Low-performing students in OEs	0.08***	0.07***	0.13***
	(0.01)	(0.01)	(0.01)
N	1360055	1360055	2833856
North Carolina			
Low-performing students in TPSs	0.05***	0.07***	0.10***
	(0.00)	(0.00)	(0.00)
Low-performing students in charters	0.04***	0.07***	0.15***
	(0.00)	(0.01)	(0.01)
Low-performing students in magnets	0.05***	0.09***	0.14***
	(0.01)	(0.01)	(0.02)
Low-performing students in OEs	0.07***	0.09***	0.13***
	(0.01)	(0.01)	(0.02)
N	3249851	3249851	6435371

Notes: See Table 4 for respective notes. We also include district effects in the above analyses.

Table A.5. Examining the Exit Patterns of Low-Performing Students, Combining Academic and Behavioral Factors

Low-Quality Indicators	Tennessee		North Carolina	
	Math Achievement Relative to Prior School	Math Achievement Proficiency Status	Math Achievement Relative to Prior School	Math Achievement Proficiency Status
Tennessee				
Low-performing students in TPSs	0.04***	0.07***	0.04***	0.05***
	(0.00)	(0.00)	(0.00)	(0.00)
Low-performing students in charters	0.05***	0.06***	0.03***	0.06***
	(0.00)	(0.01)	(0.00)	(0.01)
Low-performing students in magnets	0.03	0.05*	0.03***	0.06***
	(0.01)	(0.02)	(0.01)	(0.01)
Low-performing students in OEs	0.05***	0.07***	0.05***	0.07***
	(0.00)	(0.01)	(0.01)	(0.01)
Suspended/Expelled students in TPSs	0.14***	0.13***	0.09***	0.09***
	(0.01)	(0.01)	(0.00)	(0.00)
Suspended/Expelled students in charters	0.21***	0.20***	0.14***	0.15***
	(0.03)	(0.03)	(0.01)	(0.01)
Suspended/Expelled students in magnets	0.10***	0.10***	0.15***	0.13***
	(0.02)	(0.02)	(0.02)	(0.02)
Suspended/Expelled students in OEs	0.13***	0.12***	0.12***	0.11***
	(0.01)	(0.01)	(0.02)	(0.01)
Low-performing & Suspended/ Expelled students in TPSs	0.02***	0.03***	0.02***	0.02***
	(0.00)	(0.01)	(0.00)	(0.00)
Low-performing & Suspended/ Expelled students in charters	0.06***	0.06*	0.03**	0.00
	(0.02)	(0.03)	(0.01)	(0.01)
Low-performing & Suspended/ Expelled students in magnets	0.03	-0.00	-0.02	-0.00
	(0.02)	(0.03)	(0.02)	(0.01)
Low-performing & Suspended/ Expelled students in OEs	0.02***	0.01	0.02	0.02*
	(0.00)	(0.01)	(0.01)	(0.01)
N	1360055	1360055	3249851	3249851

Notes: See Table 4 for respective notes.

Table A.6. Examining the Exit Patterns of Low-Performing Students, including Controls for Race/Ethnicity

Low-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Proficiency Status	Suspensions/ Expulsions
Tennessee			
Low-performing students in TPSs	0.05***	0.08***	0.11***
	(0.00)	(0.00)	(0.01)
Low-performing students in charters	0.07***	0.08***	0.24***
	(0.00)	(0.01)	(0.02)
Low-performing students in magnets	0.03	0.04	0.07***
	(0.02)	(0.02)	(0.01)
Low-performing students in OEs	0.07***	0.08***	0.11***
	(0.00)	(0.01)	(0.01)
N	1358819	1358819	2831023
North Carolina			
Low-performing students in TPSs	0.04***	0.06***	0.08***
	(0.00)	(0.00)	(0.00)
Low-performing students in charters	0.03***	0.06***	0.13***
	(0.00)	(0.01)	(0.01)
Low-performing students in magnets	0.03***	0.07***	0.12***
	(0.01)	(0.01)	(0.02)
Low-performing students in OEs	0.05***	0.07***	0.11***
	(0.01)	(0.01)	(0.01)
N	3247762	3247762	6429032

Notes: See Table 4 for respective notes. We also control for student race/ethnicity in the above analyses.

Table A.7. Examining the Exit Patterns of Low-Performing Students, Controlling for Student Characteristics

Low-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Proficiency Status	Suspensions/ Expulsions
Tennessee			
Low-performing students in TPSs	0.04***	0.05***	0.10***
	(0.00)	(0.00)	(0.01)
Low-performing students in charters	0.07***	0.08***	0.23***
	(0.00)	(0.01)	(0.02)
Low-performing students in magnets	0.02	0.02	0.05***
	(0.02)	(0.02)	(0.01)
Low-performing students in OEs	0.06***	0.06***	0.10***
	(0.00)	(0.01)	(0.01)
N	1358472	1358472	2830237
North Carolina			
Low-performing students in TPSs	0.03***	0.05***	0.08***
	(0.00)	(0.00)	(0.00)
Low-performing students in charters	0.02***	0.05***	0.12***
	(0.00)	(0.01)	(0.01)
Low-performing students in magnets	0.02***	0.05***	0.12***
	(0.01)	(0.01)	(0.02)
Low-performing students in OEs	0.04***	0.06***	0.11***
	(0.01)	(0.01)	(0.01)
N	3220966	3220966	5415465

Notes: See Table 4 for respective notes. We also control for student race/ethnicity, gender, socioeconomic status, English language learner, and special education status in the above analyses.

Table A.8. Examining the Exit Patterns of Low-Performing Students - By School Size

a) Sample = Large Schools

Low-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Proficiency Status	Suspensions/ Expulsions
Tennessee			
Low-performing students in TPSs	0.06***	0.09***	0.14***
	(0.00)	(0.01)	(0.02)
Low-performing students in charters	0.09**	0.12***	0.34***
	(0.03)	(0.01)	(0.09)
Low-performing students in magnets	0.04*	0.09*	0.12***
	(0.02)	(0.04)	(0.02)
Low-performing students in OEs	0.08***	0.11***	0.14***
	(0.01)	(0.01)	(0.01)
N	904469	904469	1861115
North Carolina			
Low-performing students in TPSs	0.05***	0.08***	0.11***
	(0.00)	(0.00)	(0.00)
Low-performing students in charters	0.03***	0.06***	0.15***
	(0.00)	(0.01)	(0.01)
Low-performing students in magnets	0.06***	0.09***	0.16***
	(0.01)	(0.01)	(0.02)
Low-performing students in OEs	0.08***	0.10***	0.16***
	(0.01)	(0.01)	(0.02)
N	2301102	2301102	4506758

b) Sample = Small Schools

Low-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Proficiency Status	Suspensions/ Expulsions
Tennessee			
Low-performing students in TPSs	0.06***	0.11***	0.13***
	(0.00)	(0.00)	(0.01)
Low-performing students in charters	0.07***	0.09***	0.23***
	(0.01)	(0.01)	(0.02)
Low-performing students in magnets	0.04	0.06*	0.10***
	(0.02)	(0.02)	(0.02)
Low-performing students in OEs	0.07***	0.10***	0.12***
	(0.01)	(0.01)	(0.01)
N	455562	455562	972652
North Carolina			
Low-performing students in TPSs	0.05***	0.06***	0.07***
	(0.00)	(0.00)	(0.00)
Low-performing students in charters	0.05***	0.09***	0.15***
	(0.01)	(0.01)	(0.02)
Low-performing students in magnets	0.02**	0.07***	0.12***
	(0.01)	(0.01)	(0.03)
Low-performing students in OEs	0.04***	0.06***	0.07***
	(0.01)	(0.01)	(0.01)
N	948749	948749	1928613

Notes: See Table 4 for respective notes. Additionally, for (a) only large schools are included in the sample. For (b) only small schools are included in the sample. We define large and small schools as schools above and below, respectively, the district's average student enrollment for the respective school level (elementary, middle, high).

Table A.9. Examining the Entrance Patterns of High-Performing Students - By School Size

a) Sample = Large Schools

High-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Relative to Entered School	Math Achievement Proficiency Status	Suspensions/ Expulsions
Tennessee				
High-performing students in TPSs	-0.05***	-0.03***	-0.09***	-0.15***
	(0.00)	(0.01)	(0.01)	(0.02)
High-performing students in charters	-0.08***	-0.13*	-0.17***	-0.31**
	(0.01)	(0.06)	(0.03)	(0.10)
High-performing students in magnets	0.19**	0.01	-0.06	-0.01
	(0.06)	(0.03)	(0.04)	(0.05)
High-performing students in OEs	-0.05***	-0.04***	-0.09***	-0.10***
	(0.01)	(0.01)	(0.02)	(0.01)
N	909908	898897	909908	1603449
North Carolina				
High-performing students in TPSs	-0.04***	-0.00	-0.04***	-0.11***
	(0.00)	(0.00)	(0.00)	(0.01)
High-performing students in charters	0.03*	-0.01	-0.04**	-0.18***
	(0.01)	(0.01)	(0.01)	(0.03)
High-performing students in magnets	0.08*	0.03	-0.00	-0.10*
	(0.04)	(0.03)	(0.03)	(0.04)
High-performing students in OEs	-0.07***	-0.02	-0.06**	-0.14***
	(0.02)	(0.02)	(0.02)	(0.02)
N	2713886	2696222	2713886	4788080

b) Sample = Small Schools

High-Quality Indicators	Math Achievement Relative to Prior School	Math Achievement Relative to Entered School	Math Achievement Proficiency Status	Suspensions/ Expulsions
Tennessee				
High-performing students in TPSs	-0.07***	-0.05***	-0.09***	-0.14***
	(0.00)	(0.01)	(0.01)	(0.01)
High-performing students in charters	-0.03*	-0.10***	-0.12***	-0.25***
	(0.01)	(0.02)	(0.03)	(0.04)
High-performing students in magnets	0.16*	0.00	-0.07	-0.14**
	(0.07)	(0.03)	(0.06)	(0.04)
	-0.07***	-0.03	-0.09**	-0.14***

High-performing students in OEs	(0.02)	(0.02)	(0.03)	(0.02)
N	1368687	1347327	1368687	2439954
North Carolina				
High-performing students in TPSs	-0.03***	-0.01***	-0.03***	-0.08***
	(0.00)	(0.00)	(0.00)	(0.01)
High-performing students in charters	-0.02	-0.01	-0.09***	-0.30***
	(0.02)	(0.02)	(0.02)	(0.03)
High-performing students in magnets	0.11*	0.04	0.02	-0.12***
	(0.04)	(0.02)	(0.03)	(0.03)
High-performing students in OEs	-0.05*	-0.04***	-0.06***	-0.10***
	(0.02)	(0.01)	(0.02)	(0.02)
N	1133811	1115782	1133811	2012091

Notes: See Table 2 for respective notes. Additionally, for (a) only large schools are included in the sample. For (b) only small schools are included in the sample. We define large and small schools as schools above and below, respectively, the district's average student enrollment for the respective school level (elementary, middle, high).

Table A.10. Differences in the Performance of Schools Students Leave and Enter, by Student Performance or Discipline Incidents and School Type

			Performance Defined by School Average				**Performance Defined by Having Been Suspended/Expelled**			
			Tennessee		North Carolina		Tennessee		North Carolina	
			Std. Math Score	Avg. No. of Offenses	Std. Math Score	Avg. No. of Offenses	Std. Math Score	Avg. No. of Offenses	Std. Math Score	Avg. No. of Offenses
Move to TPS	High-Performing	School Moved From	-0.02	0.37	-0.19	0.43	-0.01	0.25	-0.14	0.22
		School Moved To	-0.04	0.58	-0.10	0.41	-0.03	0.43	-0.11	0.34
		Difference	-0.02	0.21	0.09	-0.01	-0.02	0.18	0.03	0.11
	Low-Performing	School Moved From	-0.01	0.37	-0.16	0.42	-0.22	0.83	-0.34	0.91
		School Moved To	-0.06	0.59	-0.15	0.44	-0.25	0.92	-0.26	0.60
		Difference	-0.05	0.22	0.01	0.02	-0.03	0.09	0.08	-0.31
	Difference Between HPS and LPS		0.02	-0.01	0.09	-0.03	0.01	0.09	-0.05	0.42
Move to Charter	High-Performing	School Moved From	-0.48	0.61	-0.12	0.28	-0.42	0.43	-0.09	0.19
		School Moved To	-0.31	0.38	0.07	0.15	-0.33	0.34	-0.02	0.16
		Difference	0.16	-0.23	0.19	-0.13	0.09	-0.09	0.08	-0.04
	Low-Performing	School Moved From	-0.40	0.57	-0.12	0.31	-0.53	1.08	-0.29	0.69
		School Moved To	-0.33	0.41	-0.14	0.26	-0.41	0.44	-0.40	0.70
		Difference	0.07	-0.16	-0.02	-0.05	0.12	-0.65	-0.11	0.00
	Difference Between HPS and LPS		0.10	-0.08	0.21	-0.09	-0.02	0.56	0.18	-0.04
Move to Magnet	High-Performing	School Moved From	0.07	0.60	-0.08	0.44	0.12	0.44	-0.04	0.27
		School Moved To	0.56	0.40	0.23	0.28	0.50	0.38	0.18	0.27
		Difference	0.49	-0.20	0.31	-0.16	0.38	-0.05	0.23	0.00
	Low-Performing	School Moved From	0.15	0.62	-0.03	0.42	-0.22	1.33	-0.22	0.87
		School Moved To	0.23	0.81	0.05	0.37	0.01	1.24	-0.07	0.53
		Difference	0.08	0.18	0.08	-0.05	0.23	-0.10	0.16	-0.35
	Difference Between HPS and LPS		0.41	-0.39	0.23	-0.11	0.15	0.04	0.07	0.35
Move to OE	High-Performing	School Moved From	-0.27	0.73	-0.23	0.40	-0.22	0.51	-0.15	0.20
		School Moved To	-0.28	1.00	-0.20	0.40	-0.28	0.81	-0.21	0.32
		Difference	-0.02	0.27	0.03	0.01	-0.06	0.29	-0.06	0.13
	Low-Performing	School Moved From	-0.22	0.74	-0.15	0.38	-0.42	1.18	-0.26	0.77
		School Moved To	-0.32	1.07	-0.26	0.42	-0.44	1.28	-0.30	0.54
		Difference	-0.11	0.33	-0.11	0.05	-0.02	0.09	-0.04	-0.24
	Difference Between HPS and LPS		0.09	-0.06	0.14	-0.04	-0.04	0.20	-0.02	0.36

Notes: HPS = high-performing student; LPS = low-performing student
This table compares the academic and behavioral profile of schools that students enter and leave in both Tennessee and North Carolina. For moves into each school type, it shows the average standardized math test score and average number of offenses per student of the school students move from, the average standardized math test score and average number of offenses of the school students enter, and the respective difference of the two, separately for high- and low-performing students as operationalized by two different definitions – above/below the prior school's average math score and whether the student had been suspended or expelled. The highlighted rows show the difference of these differences between high- and low-performing students for the respective school type. Students in TPS are restricted to only TPS located in districts with at least one other school of choice.

Table A.11. Differences in the Racial Composition and Poverty Status of Schools Students Leave and Enter, by Student Performance or Discipline Incidents and School Type

a) Tennessee

			Performance Defined by School Average				Performance Defined by Having Been Suspended/Expelled			
			School Percent White	School Percent Black	School Percent Hispanic	School Percent FRPM	School Percent White	School Percent Black	School Percent Hispanic	School Percent FRPM
Move to TPS	High-Performing	School Moved From	67%	23%	7%	58%	67%	22%	8%	58%
		School Moved To	69%	22%	7%	54%	68%	22%	8%	56%
		Difference	1%	-1%	-1%	-4%	1%	-1%	0%	-2%
	Low-Performing	School Moved From	67%	23%	7%	57%	50%	41%	7%	66%
		School Moved To	67%	24%	7%	56%	51%	40%	7%	64%
		Difference	0%	0%	0%	-2%	1%	-1%	0%	-2%
	Difference Between HPS and LPS		1%	-1%	0%	-2%	0%	0%	0%	0%
Move to Charter	High-Performing	School Moved From	8%	80%	11%	86%	10%	77%	11%	85%
		School Moved To	5%	85%	9%	74%	5%	84%	10%	76%
		Difference	-3%	5%	-1%	-12%	-5%	8%	-2%	-9%
	Low-Performing	School Moved From	12%	75%	11%	82%	10%	80%	8%	84%
		School Moved To	6%	83%	10%	75%	5%	88%	7%	74%
		Difference	-7%	9%	-1%	-8%	-5%	8%	-1%	-10%
	Difference Between HPS and LPS		3%	-3%	0%	-4%	0%	0%	0%	1%
Move to Magnet	High-Performing	School Moved From	46%	42%	8%	56%	49%	39%	8%	54%
		School Moved To	54%	35%	4%	35%	53%	36%	5%	39%
		Difference	8%	-7%	-4%	-21%	4%	-3%	-3%	-15%
	Low-Performing	School Moved From	49%	41%	6%	53%	38%	53%	7%	68%
		School Moved To	43%	49%	4%	48%	30%	62%	4%	58%
		Difference	-7%	8%	-2%	-6%	-8%	10%	-3%	-10%
	Difference Between HPS and LPS		15%	-14%	-2%	-16%	12%	-13%	0%	-5%
Move to OE	High-Performing	School Moved From	26%	62%	9%	71%	29%	59%	10%	70%
		School Moved To	26%	64%	8%	65%	25%	65%	8%	67%
		Difference	-1%	2%	-1%	-6%	-4%	5%	-2%	-3%
	Low-Performing	School Moved From	30%	58%	9%	68%	21%	69%	8%	75%
		School Moved To	26%	63%	8%	66%	19%	71%	8%	72%
		Difference	-4%	5%	-1%	-2%	-2%	2%	0%	-4%
	Difference Between HPS and LPS		4%	-3%	0%	-4%	-2%	3%	-1%	0%

b). North Carolina

			Performance Defined by School Average				Performance Defined by Having Been Suspended/Expelled			
			School Percent White	School Percent Black	School Percent Hispanic	School Percent FRPM	School Percent White	School Percent Black	School Percent Hispanic	School Percent FRPM
Move to TPS	High-Performing	School Moved From	52%	27%	13%	55%	51%	27%	14%	55%
		School Moved To	55%	27%	11%	49%	52%	27%	13%	52%
		Difference	3%	0%	-2%	-5%	2%	0%	-1%	-3%
	Low-Performing	School Moved From	51%	28%	13%	55%	43%	36%	13%	61%
		School Moved To	52%	29%	12%	52%	46%	35%	12%	56%
		Difference	1%	1%	-1%	-3%	3%	-2%	-1%	-6%
	Difference Between HPS and LPS			-1%	-1%	-2%	-1%	2%	0%	3%
Move to Charter	High-Performing	School Moved From	44%	35%	13%	54%	43%	35%	14%	54%
		School Moved To	58%	29%	5%	26%	53%	34%	6%	32%
		Difference	14%	-6%	-8%	-28%	9%	-1%	-8%	-23%
	Low-Performing	School Moved From	41%	37%	14%	55%	31%	47%	15%	64%
		School Moved To	45%	42%	6%	39%	33%	55%	7%	48%
		Difference	4%	5%	-7%	-16%	2%	8%	-8%	-16%
	Difference Between HPS and LPS			-11%	-1%	-12%	8%	-8%	0%	-6%
Move to Magnet	High-Performing	School Moved From	31%	42%	16%	52%	32%	41%	16%	51%
		School Moved To	31%	47%	10%	44%	30%	47%	11%	44%
		Difference	-1%	5%	-5%	-8%	-2%	5%	-5%	-6%
	Low-Performing	School Moved From	33%	41%	15%	49%	27%	49%	16%	59%
		School Moved To	29%	48%	11%	46%	22%	56%	11%	52%
		Difference	-5%	7%	-4%	-3%	-5%	7%	-5%	-6%
	Difference Between HPS and LPS			-1%	-1%	-6%	3%	-2%	0%	0%
Move to OE	High-Performing	School Moved From	32%	42%	17%	58%	33%	41%	17%	57%
		School Moved To	30%	48%	13%	53%	29%	48%	15%	55%
		Difference	-2%	6%	-4%	-5%	-4%	8%	-2%	-2%
	Low-Performing	School Moved From	34%	41%	16%	56%	33%	43%	15%	57%
		School Moved To	28%	50%	14%	55%	27%	52%	13%	55%
		Difference	-6%	9%	-2%	-1%	-5%	8%	-2%	-2%
	Difference Between HPS and LPS			-4%	-1%	-5%	1%	-1%	0%	0%

Notes: HPS = high-performing student; LPS = low-performing student
This table compares the demographic student make-up of schools that students enter and leave in both Tennessee and North Carolina. For moves into each school type, it shows the percent of white, black, Hispanic, and free-or-reduced-price lunch students of the school students move from and the school student enter. It then shows the respective difference of the two, separately for high- and low-performing students as operationalized by two different definitions – above/below the prior school's average math score and whether the student had been suspended or expelled. The highlighted rows show the difference of these differences between high- and low-performing students for the respective school type. Students in TPS are restricted to only TPS located in districts with at least one other school of choice.

Endnotes

[1] Welsh and Little 2018; Barrett, McEachin, Mills, and Valant 2019

[2] Despite the fact that in some districts open enrollment and magnet schools enroll as many (if not more) students as charter schools, there has been relatively little research on these schools. What research does exist has generally examined the effectiveness or racial integration of these schools (Cullen, Jacob, and Levitt 2006; Ballou 2009; Engberg et al. 2014; Betts et al. 2015) and has not addressed the question of student sorting by ability.

[3] Similarly, Hanushek et al. (2007) examined whether there are differential exit rates among charter schools of varying quality. They found that higher-achieving charter schools have lower exit rates than lower-achieving charter schools. The authors suggest that much of the student mobility in charter schools is motivated by a desire to improve one's educational situation.

[4] The North Carolina data does not capture within school year moves, nor does it include entry and exit dates.

[5] It should be noted that families can pick a TPS based on where they pick to live.

[6] To see more about North Carolina and Tennessee school choice programs, see http://www.ncsl.org/research/education/interactive-guide-to-school-choice.aspx

[7] In Tennessee, charter schools can also be authorized by the Achievement School District, but these charter schools are not schools of choice and are therefore not part of our analysis.

[8] However in a sensitivity analysis, we do not find geographic differences in charter enrollment or exit patterns across urban, rural, suburban, and town districts in North Carolina.

[9] For test scores, we chose to only show math results to keep our analysis as parsimonious as possible, although we conducted the analysis using reading scores as well and found qualitatively similar results.

[10] We checked the sensitivity of the choice of a linear probability model to the choice of a probit and logit analyses and found that the results were nearly identical. We chose to present the linear probability model for ease of interpretation.

[11] For students making structural moves, one could argue that comparing the student to the average of the school he left is not the appropriate counterfactual. To illustrate this point, assume a student transfers from a TPS to a charter school after the terminal grade for the elementary school – 5th grade. The student would not have attended the elementary school in the 6th grade. Rather, the student would have moved to a middle school. Therefore, the previous elementary school does not serve as a good counterfactual. Assuming the student would have attended the assigned TPS middle school (which may or may not be a safe assumption), the middle school would actually be the correct counterfactual. To examine the sensitivity of this, we identify the school we believe the student would have attended by examining the patterns of all other students in the terminal grade of the previous school and use the majority-attended school. We then assume the student's place in the distribution using this school. Our results are robust to this counterfactual.

[12] Test scores are standardized using statewide student-level data.

[13] We also run models including district fixed effects to capture similar "markets" of schools. The results are substantively similar and are included in Appendix Table A.1, which is available in a separate online appendix that can be accessed on *Education Finance and Policy's* Web site at www.mitpressjournals.org/efp.

[14] We conduct Wald F-tests between the coefficient for charter schools and each of the other three school sectors and find statistically different estimates ($p < 0.001$) in all cases. Note,

however, that there could be different mobility patterns observed for reasons other than the sector of the school, making the estimates not directly comparable.

[15] We also run models including district fixed effects to capture similar "markets" of schools. The results are substantively similar and are included in Appendix Table A.4, which is available in the online appendix.

[16] In an analysis assessing whether the *most*-challenging students who are both low-achieving and have had discipline infractions are more likely to exit schools, we do not find this to be the case. See Appendix Table A.5, which is available in the online appendix.

[17] In North Carolina, the state also requires all districts to report discipline incidents (North Carolina State Board of Education 2019).

[18] We again conduct Wald F-tests between the coefficient for charter schools and each of the other three school sectors. We do not find any statistically different estimates. Note that there could be different mobility patterns observed for reasons other than the sector of the school, making the estimates not directly comparable.

[19] As an additional check on potentially inconsistent reporting and enforcement of discipline across schools, we re-ran our main discipline analyses using school fixed effects. This ensures that students are only compared to other students leaving the same school—where we assume students are treated equally—thereby ensuring better consistency among these practices. In both states, the inclusion of the prior school fixed effect did not substantively change the main results across either the pushout or cream skimming analysis.