

Online Appendix for Explaining Charter School Effectiveness

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Data Appendix

The data used for this study come from charter school lottery records, student demographic and school attendance information in the Massachusetts Student Information Management System (SIMS), and test scores from the Massachusetts Comprehensive Assessment System (MCAS) database. This appendix describes each data source and details the procedures used to clean and match them. The steps used here are an updated version of the methods described in the data appendix to Angrist et al. (2010).

1 Data Sets

1.1 Charter School Entrance Lotteries

Data description and sample restrictions

Our sample of applicants is obtained from records of lotteries held at 20 Massachusetts charter schools between 2002 and 2010. The participating schools and lottery years are listed in Table A1, along with schools eligible for the lottery study that did not contribute records. A total of 100 school-specific entry cohorts are included in the analysis. Lotteries at three schools contribute observations to both the middle and high school samples.

The raw lottery records typically include applicants' names, dates of birth, contact information, and other information used to define lottery groups, such as sibling and out-of-area status. The first five rows in each panel of Table A7 show the sample restrictions we impose on the raw lottery records, separately by lottery cohort and school level. We exclude duplicate applicants and applicants listed as applying to the wrong entry grade. We also drop late applicants, out-of-area applicants, and sibling applicants, as these groups are typically not included in the standard lottery process. Imposing these restrictions reduces the number of middle school lottery records from 13,038 to 11,220 and reduces the number of high school records from 9,506 to 9,009.

Lottery offers

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In addition to the data described above, the lottery records also include information regarding offered seats. We used this information to reconstruct indicator variables for whether lottery participants received randomized offers. For most schools and years, we code the offer variable as one for applicants who received offered seats at any time after the lottery, including offers to waitlisted students. This definition corresponds to the “ever offer” instrument used by Abdulkadiroğlu et al. (2011). For a few schools, information on waitlist offers was unavailable, but records were sufficient to determine the students who received offers on the day of the lottery. The offer variables for these schools are coded as one for the initially offered students and zero otherwise. The instrument Z_i used in our analyses is one for any student who received an offer from any school included in our lottery sample. Offer rates were 67 percent and 64 percent in our middle and high school samples, respectively.

1.2 Student Information Management System Data

Data description

Our study uses SIMS data from the 2001-2002 school year through the 2010-2011 school year. Each year of data includes an October file and an end-of-year file. The SIMS records information on demographics and schools attended for all students in Massachusetts’ public schools. An observation in the SIMS refers to a student in a school in a year, though there are some student-school-year duplicates for students that switch grades or programs within a school and year.

Coding of demographics and attendance

The SIMS variables used in our analysis include grade, year, name, town of residence, date of birth, sex, race, special education and limited English proficiency status, free or reduced price lunch, and school attended. We constructed a wide-format data set that captures demographic and attendance information for every student in each year in which he or she is present in Massachusetts’ public schools. This file uses information from the longest-attended school in the first calendar year spent in each grade. Attendance ties were broken at random; this affects only 0.007 percent of records. Students classified as SPED, LEP, or free/reduced price lunch in any record within a school-year-grade retain that designation for the entire school-year-grade.

We measure charter school attendance in calendar years. A student is coded as attending a charter school in a particular year when there is any SIMS record reporting charter attendance in that year. Students who attend more than one charter school within a year are assigned to the charter they attended longest.

1.3 Massachusetts Comprehensive Assessment System Data

Data description and sample restrictions

We use MCAS data from the 2001-2002 school year through the 2010-2011 school year. Each observation in the MCAS database corresponds to a student’s test results in a particular grade and year. We use math and English Language Arts (ELA) tests in grades 3 through 8 and 10, as well as Writing Topic and Writing Composition scores in grades 4, 7, and 10. The test score variables are standardized to have mean zero and standard deviation one within a subject-grade-year in Massachusetts. Repetitions of the same test subject and grade are dropped. In cases with multiple records within a year and grade, ties are broken at random; this affected 0.10 percent of MCAS records.

In the lottery-based middle school analysis, all post-lottery test scores through 8th grade are used as outcomes. High school outcomes are from 10th grade. The most recent pre-lottery score in a subject defines a student’s baseline score. For the observational analysis, outcome grades are 5th through 8th for middle school 10th for high school; baseline scores are from 4th grade for middle school and 7th or 8th grade for high school.

2 Matching Data Sets

2.1 Match from the MCAS to the SIMS

The processed SIMS and MCAS files were merged by grade, year, and a state student identifier known as the SASID. Scores that could not be matched to the SIMS were dropped. This restricted eliminated 0.7 percent of MCAS scores statewide.

2.2 Match from the Lottery Records to the State Database

Match procedure

Lottery records were matched to the state SIMS/MCAS database by name, application year, and application grade. In some cases, this procedure did not produce a unique match. We accepted some matches based on fewer criteria where the information on grade, year, and town of residence seemed to make sense.

Match success rate

Our matching procedure successfully located most applicants in the SIMS database. Table A8 reports cohort-specific match rates from the lottery records to the combined SIMS/MCAS file, separately for middle and high school. The overall match rates for middle and high school were 92.1 percent and 93.7 percent, respectively. Table A8 also reports separate match rates for offered and non-offered students. In middle school, offered students were slightly more likely to be matched (94.0 percent compared to 89.4 percent). Offered and non-offered applicants to charter high schools were matched to the SIMS at almost similar rates (94.0 percent compared to 93.3 percent).

3 Construction of the Outcome Data Sets

3.1 Lottery Sample

Further sample restrictions

Once matched to the SIMS, each student is associated with a unique SASID; at this point, we can therefore determine which students applied to multiple schools in our lottery sample. Following the match, we reshape the lottery data set to contain a single record for each student. If students applied in more than one year to lotteries at a particular school level (middle or high), we keep only the records associated with their first year of application. In our basic lottery analyses, we also exclude students without baseline demographics in the SIMS; in effect, this rule limits the sample to students in Massachusetts’ public schools at baseline. Rows 6-9 in each panel of Table A7 report the impact of these restrictions on sample sizes for middle and

high school. The set of matched first-time applicants with baseline demographics includes 7,530 middle school students and 5,260 high school students.

Final set of outcomes and students

To generate the middle school analysis file, the matched lottery/SIMS/MCAS file is reshaped to long format, with each observation referring to a test score outcome for a student in a particular year. The high school analysis file uses only 10th grade outcomes, so it includes a single observation for each student. Table A9 summarizes the analysis files for middle and high school. Columns (1) and (2) list the application and outcome grades for each cohort, and column (3) lists the number of applicants satisfying the sample restrictions from Table A7. In middle school, 7,307 of 7,530 students contribute at least one test score to the analysis. In high school, 4,025 of 5,260 students have at least one score. Middle school applicants contribute different numbers of scores to the analysis depending on their years and grades of application; math and ELA tests were not given in every middle school grade until 2006, and some cohorts are not observed through 8th grade. Table A10 lists the grades and years in which math and ELA subjects were administered. As shown in columns (5) through (8) of Table A9, we find 16,543 out of 18,798 expected scores for middle school math, 16,285 of 18,515 for middle school ELA, 4,047 of 5,260 for high school math, and 4,100 of 5,260 for high school ELA. These outcomes are used to produce the 2SLS estimates reported in Tables 4 and 5.

3.2 Observational Sample

To produce the analysis file used for the observational analysis, we begin with the matched SIMS/MCAS state database. As described in Section V, we define cells based on baseline school, baseline year, race, and sex, separately for middle school and high school. We then count the number of students in each cell who go on to spend time in eligible charter schools and regular public schools in the relevant range of grades (5th through 8th for middle school and 10th for high school). Observations in cells that do not include at least one student who attends eligible charter schools and one student who attends regular public schools are dropped. We then produce a long format data file containing the full set of test score outcomes for the remaining sample of matched students at the relevant school level, as well as variables counting years of attendance at each eligible charter school. This file is used to produce the observational estimates. Our matching procedure excludes 23 percent of students who attend eligible charter schools in middle or high school.

Survey Appendix

This appendix describes the information collected in our survey of school administrators. The survey responses were used to construct the variables used in tables 2, 8, and A6. The survey was organized in six sections: general school structure, school philosophy and curriculum, areas of emphasis, classroom setting and practices, school day and policies, and teacher profile. We next describe the format and content of each section of the survey.

General School Structure

Survey respondents were asked to answer the following questions about school structure [possible responses in brackets]:

- How did your charter school originate? Check all that apply. [Founded as charter, Charter restart of a traditional public school, Another conversion model of an existing public school or a previously operating charter, Other]
- Who founded your school? Check all that apply [Parents, Teachers, Business leaders, Philanthropist, Management company, Nonprofit organization, Community members, Other]
- Since the initial approval of your charter, has this group changed? If yes, please explain briefly. [Yes, No]
- Please indicate sources of funding. Check all that apply. [Federal, State, Foundations, Individuals, Corporations, Other]

School Philosophy and Curriculum

Survey respondents were asked to rate their schools' adherence to a variety of instructional approaches, with the prompt: "Please indicate the *degree* to which the educational experience at your school *reflects* the following approaches to teaching and learning." For each area, respondents checked boxes corresponding to numbers from 1 to 5, with 1 indicating "not at all," 3 indicating "somewhat," and 5 indicating "strongly." An additional box corresponded to "don't know." The approaches were as follows: Common core values (unique to your school, NOT Common Core Standards), No Excuses, traditional reading and math skills, college preparation, preparation for specific careers, STEM (Science, Technology, Engineering, Mathematics), Leadership. In addition, the prompt for "preparation for specific careers" included a request to "please list relevant careers, if any." A final prompt asked respondents to list any philosophy or curricular focus not mentioned on the survey.

Areas of Emphasis

Survey respondents were asked to rate the emphasis placed on a variety of areas, with the prompt: "Please indicate the *extent* to which the educational program at your school *emphasizes* the following principles." For each area, respondents checked boxes corresponding to numbers from 1 to 5, with 1 indicating "not at all," 3 indicating "somewhat," and 5 indicating "strongly." An additional box corresponded to "don't know." The areas were as follows: Cultural awareness, strict adherence to a set of school-wide standards and practices, social and physical well-being, individually-tailored instruction, discipline and comportment, speech and writing development,

measurable results (for example, gains on state achievement tests), qualitative achievement (for example, leadership, creativity, and community involvement).

Classroom Setting and Practices

Survey respondents were asked to rate their schools' use of a variety of classroom practices, with the prompt: "Please indicate the *extent* to which the following settings and practices are *present* in classrooms at your school." For each practice, respondents checked boxes corresponding to numbers from 1 to 5, with 1 indicating "not at all," 3 indicating "somewhat," and 5 indicating "strongly." An additional box corresponded to "don't know." The practices were as follows: Group projects, cold calling, checks for understanding (informal tests to gauge understanding during the lesson), DEAR or SSR (Drop Everything and Read/Sustained Silent Reading), reading aloud, math drills, college icons in the classroom (e.g. banner with name of teacher's college, past students' graduation years and college outcomes), teacher autonomy.

School Day and Policies

Survey respondents were asked to answer the following questions about other school practices [possible responses in brackets when provided]:

- What time do instructional activities begin each day for the typical student?
- When do instructional activities end each day for the typical student?
- Do certain students have longer or shorter school days (i.e. extended days for struggling students)? [Yes, No]. If Yes, please explain.
- How many days are in your school year for a typical student (excluding optional Saturdays)?
- Are students required to wear uniforms or follow a dress code? [Yes, No]
- Do parents sign a commitment contract? [Yes, No]
- Do students sign a commitment contract? [Yes, No]
- Which of the following disciplinary actions are used at your school? Please check all that apply. [Detention, Positive behavior support, In school suspension, Counseling session, Behavior improvement plan, Saturday school, Merit/demerit System, Timeout/quiet room, Other]
- Are your students eligible for rewards for achievement or good behavior (e.g. small payments or redeemable points)? [Yes, No] If yes, please describe briefly.
- Who attends Saturday school? Check all that apply. [All students, Students in certain grades, Students who need academic help, Students being disciplined, None]
- How often does the typical Saturday school student have school on Saturday? [Monthly or less, Bi-weekly, Weekly]
- What is the average length of a period of math instruction, and the number of periods per week?

- What is the average length of a period of reading instruction, and the number of periods per week?
- Is reading instruction based on an RTI (Response to Intervention) model? [Yes, No]
- Is math instruction based on an RTI (Response to Intervention) model? [Yes, No]
- To what extent is MCAS preparation a part of your curriculum (check all that apply) [Special classes before exams, Regular weekly classes/study sessions, After-school instruction for all students, After-school instruction for struggling students, Classes or meetings for parents on nights/weekends]
- Which students receive tutoring *during the school day*? Check all that apply. [All students, Students who struggle with class work, Students who struggle with MCAS, None, Other]
- Which students receive *after school* tutoring? Check all that apply. [All students, Students who struggle with class work, Students who struggle with MCAS, None, Other]
- If your school offers tutoring, which of the following describe the tutors? Check all that apply. [Recruited from Teach for America or AmeriCorps, Community members, Parents, Teachers/staff, Local college students]
- (High Schools only) Does your school offer extra preparation for the SAT and AP exams? [Yes, No, Not applicable]
- Please estimate the hours per week teachers typically spend on (in classroom) instructional activities.
- Please estimate the hours per week teachers typically spend on instructional activities outside of the classroom (preparing lesson plans, tracking student performance).

Teacher Profile

Survey respondents were asked to rate the frequency with which their schools hire various types of teachers. Possible responses were “frequently,” “occasionally,” and “rarely or never.” The teacher types were as follows: Teach for America novices, Teach for America alumni, MATCH Teacher Residency, recent college graduates.

Survey respondents were also asked to answer the following questions about their schools’ teachers [possible responses in brackets when provided]:

- How are teachers hired? Check all that apply (please respond for full-time, year-round teachers). [On a contract of specific length, At-will]
- Please estimate your hiring acceptance rate (i.e. 50 accepted/200 applicants).
- Has there ever been a teacher’s union active at your school? [Yes, No]
- Please indicate the performance incentives available at your school (check all that apply). [Merit pay, Higher salaries for hard-to-fill subjects, Yearly bonus, Within-school promotion, Recognition/non-monetary rewards, Other]

- How often do administrators and supervisors observe *new* teachers in the classroom to review their performance (periods/month)?
- How often do administrators and supervisors observe *veteran* teachers in the classroom to review their performance (periods/month)?
- Are lessons ever videotaped and filmed as part of the teacher feedback process? [Yes, No]

Table A1: Massachusetts Charter Schools Eligible for the Lottery Study

School (1)	Town (2)	Urban (3)	Grades (4)	Eligible middle (5)	Eligible high (6)	Years in lottery study (7)
Academy of the Pacific Rim Charter School	Boston	Yes	5-12	Yes		2005-2010
Advanced Math and Science Academy Charter School	Marlborough		6-12	Yes		
Barnstable Horace Mann Charter School	Marstons Mills		4-5	Yes		
Berkshire Arts and Technology Charter Public School	Adams		6-12	Yes		
Boston Collegiate Charter School	Boston	Yes	5-12	Yes	Yes	2002-2010
Boston Preparatory Charter Public School	Boston	Yes	6-11	Yes		2005-2010
Cape Cod Lighthouse Charter School	Orleans		6-8	Yes		2007-2010
Christa McAuliffe Regional Charter Public School	Framingham	Yes	6-8	Yes		
City on a Hill Charter Public School	Boston	Yes	9-12		Yes	2002, 2004-2009
Codman Academy Charter Public School	Boston	Yes	9-12		Yes	2004, 2008-2009
Community Charter School of Cambridge	Cambridge	Yes	7-12	Yes		
Dorchester Collegiate Academy Charter School	Boston	Yes	4-5	Yes		
Edward Brooke Charter School	Boston	Yes	K-8	Yes		2006-2009
Excel Academy Charter School	Boston	Yes	5-8	Yes		2008-2010
Four Rivers Charter Public School	Greenfield		7-12	Yes	Yes	2003-2010
Francis W Parker Charter Essential School	Devins		7-12	Yes		2006-2010
Global Learning Charter Public School	New Bedford	Yes	5-12	Yes		2006-2007, 2009
Hampden Charter School of Science	Chicopee	Yes	6-10	Yes		
Health Careers Academy Charter School	Boston	Yes	9-12		Yes	
Innovation Academy Charter School	Tyngsboro		5-11	Yes		2007-2010
KIPP Academy Lynn	Lynn	Yes	5-8	Yes		2005-2009
Marblehead Community Charter Public School	Marblehead		4-8	Yes		2005-2007, 2010
MATCH Charter Public School	Boston	Yes	6-12	Yes	Yes	2002-2010
New Leadership Charter School	Springfield	Yes	6-12	Yes		
North Central Charter Essential School	Fitchburg	Yes	7-12	Yes		
Phoenix Charter Academy	Chelsea	Yes	9-12		Yes	
Pioneer Charter School of Science	Everett	Yes	7-11	Yes		
Pioneer Valley Performing Arts Charter Public School	South Hadley		7-12	Yes		2006-2010
Rising Tide Charter Public School	Plymouth		5-8	Yes		2009
Roxbury Preparatory Charter School	Boston	Yes	6-8	Yes		2002-2010
Salem Academy Charter School	Salem		6-12	Yes		2010
Smith Leadership Academy	Boston	Yes	6-8	Yes		
Sturgis Charter Public School	Hyannis		9-12		Yes	2004, 2006, 2008-2009

Notes: This table lists all charter schools in Massachusetts eligible for the lottery study. To be counted as eligible, a school must be open in the relevant years and meet the entry grade and student population restrictions required for inclusion in column (3) of Table 1.

Table A2: Covariate Balance

	Middle school			High school		
	All charters	Urban charters	Non-urban charters	All charters	Urban charters	Non-urban charters
	(1)	(2)	(3)	(4)	(5)	(6)
Hispanic	0.023** (0.010)	0.031** (0.014)	0.007 (0.009)	0.000 (0.015)	-0.001 (0.017)	0.003 (0.011)
Black	-0.011 (0.011)	-0.020 (0.016)	0.009 (0.008)	0.010 (0.017)	0.012 (0.019)	-0.016 (0.016)
White	-0.005 (0.010)	-0.005 (0.013)	-0.005 (0.015)	-0.004 (0.010)	-0.004 (0.011)	-0.001 (0.032)
Asian	0.003 (0.004)	0.002 (0.005)	0.007 (0.008)	-0.002 (0.006)	-0.003 (0.007)	0.006 (0.017)
Female	0.010 (0.014)	0.003 (0.017)	0.024 (0.025)	0.010 (0.018)	0.015 (0.019)	-0.038 (0.062)
Subsidized Lunch	0.007 (0.012)	0.013 (0.015)	-0.007 (0.016)	0.023 (0.016)	0.021 (0.017)	0.043 (0.040)
Special Education	-0.004 (0.011)	-0.003 (0.013)	-0.006 (0.019)	-0.002 (0.014)	0.006 (0.015)	-0.080* (0.047)
Limited English Proficiency	0.001 (0.008)	0.005 (0.011)	-0.007 (0.006)	0.009 (0.006)	0.009 (0.006)	0.000 (0.000)
Baseline math score	-0.015 (0.026)	-0.023 (0.033)	0.003 (0.043)	-0.012 (0.034)	-0.023 (0.035)	0.107 (0.101)
Baseline ELA score	-0.006 (0.027)	0.001 (0.035)	-0.020 (0.039)	-0.041 (0.032)	-0.038 (0.034)	-0.077 (0.081)
p-value, from F-test	0.452	0.694	0.386	0.741	0.824	0.275
N	7060	4852	2208	4671	4104	567

Notes: This table reports coefficients from regressions of the variable in each row on an indicator variable equal to one if the student won the lottery. Regressions include risk set dummies and baseline grade dummies and exclude students with sibling priority and late applicants. Samples are restricted to students who have baseline demographics and test scores. F-tests are for the null hypothesis that the coefficients on winning the lottery in all regressions are all equal to zero.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A3: Attrition

School level	Subject	All charters		Urban charters		Non-urban charters	
		Proportion of non-offered with MCAS (1)	Differential (2)	Proportion of non-offered with MCAS (3)	Differential (4)	Proportion of non-offered with MCAS (5)	Differential (6)
Middle	Math	0.907	0.019*** (0.007)	0.925	0.012 (0.008)	0.866	0.032*** (0.011)
		N	2933	7530	2055	5169	878
	ELA	0.903	0.024*** (0.007)	0.918	0.018** (0.008)	0.868	0.033*** (0.011)
		N	2933	7530	2055	5169	878
High	Math	0.753	0.009 (0.015)	0.750	0.004 (0.016)	0.800	0.059 (0.046)
		N	1829	5261	1704	4631	125
	ELA	0.766	0.004 (0.015)	0.762	0.000 (0.016)	0.816	0.038 (0.046)
		N	1829	5261	1704	4631	125

Notes: This table reports coefficients from regressions of an indicator variable equal to one if a student has a follow-up test score on an indicator variable equal to one if the student won the lottery. Column (1) shows the fraction of non-offered students with follow-up scores, while column (2) shows the differential by offer status. Columns (3) and (4) show corresponding results for urban applicants, while columns (5) and (6) show results for non-urban applicants. Regressions include risk set dummies as well as demographic variables, year of birth dummies, year of baseline dummies, and baseline grade dummies. The sample is restricted to students who participated in an effective lottery from cohorts where we should observe follow-up scores.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A4: Lottery Results for High School Graduation

Subject	All charter schools			Urban charter schools			Non-urban charter schools		
	Mean (1)	First Stage (2)	2SLS (3)	Mean (4)	First Stage (5)	2SLS (6)	Mean (7)	First Stage (8)	2SLS (9)
Graduate on-time	0.673	0.300*** (0.050)	-0.098 (0.072)	0.663	0.289*** (0.051)	-0.031 (0.023)	0.790	0.933*** (0.047)	0.053 (0.094)
N		2863			2649			214	
Graduate within two years	0.751	0.304*** (0.060)	-0.024 (0.081)	0.747	0.288*** (0.062)	-0.025 (0.087)	0.801	0.970*** (0.033)	-0.006 (0.087)
N		2118			1937			181	

Notes: This table reports 2SLS estimates of the effects of charter school attendance on high school graduation. The endogenous variable is a dummy for attending a charter school in the year after the lottery, and the instrument is a lottery offer dummy. Columns (1)-(2) show estimates for all charter high schools, columns (3)-(4) show estimates for urban charter high schools, and columns (5)-(6) show estimates for non-urban high schools. The "graduate on-time" outcome is a dummy for graduating in or before a student's projected graduation year assuming normal academic progress from baseline. The "graduate within two years" outcome is a dummy for graduating in or before the year after a student's projected graduation year. The urban and non-urban estimates for a given subject come from a single regression with two endogenous variables, using urban and non-urban offers as instruments. All models control for race, sex, special education, limited English proficiency, subsidized lunch status, and a female by minority dummy. Year of birth and risk set dummies are also included. Standard errors are robust to heteroskedasticity. *significant at 10%; **significant at 5%; ***significant at 1%

Table A5: Comparison of Lottery and Observational Estimates for Eligible Charters

School level	Subject	Urban			Non-urban		
		Lottery estimate	Observational estimates		Lottery estimate	Observational estimates	
			Lottery sample	Non-lottery sample		Lottery sample	Non-lottery sample
(1)	(2)	(3)	(4)	(5)	(6)		
Middle	Math	0.321***	0.249***	-0.024*	-0.123***	-0.015**	-0.008
		(0.031)	(0.013)	(0.014)	(0.047)	(0.007)	(0.012)
	N	11941	136046	4602	248711		
	ELA	0.146***	0.158***	-0.035***	-0.144***	-0.009	-0.013
		(0.028)	(0.010)	(0.012)	(0.039)	(0.007)	(0.011)
	N	11649	131136	4636	239288		
High	Math	0.339***	0.322***	-0.009	-0.020	0.047***	-
		(0.077)	(0.034)	(0.018)	(0.071)	(0.017)	
	N	3519	8018	531	14881		
	ELA	0.264***	0.260***	0.100***	-0.046	0.081***	-
		(0.067)	(0.018)	(0.019)	(0.059)	(0.017)	
	N	3567	8208	536	14967		

Notes: This table reports estimates of the effects of years in charter schools on test scores. Eligible charters are schools with entry grades 4-7 (middle) or 9 (high), and that meet the other restrictions from Table 1. The sample is produced by matching charter students to students in traditional public schools on cells defined by sending school, baseline year, and baseline demographics (race, sex, limited English proficiency, special education status, and free lunch status). All models control for cell fixed effects, year effects, grade effects, and baseline test scores. Middle school regressions pool outcomes from 5th through 8th grade and cluster by student identifier as well

*significant at 10%; **significant at 5%; ***significant at 1%

Table A6: Effects on Discipline and Attendance

School level	Outcome	Urban		Non-urban	
		Mean (1)	2SLS (2)	Mean (3)	2SLS (4)
Middle	Total days suspended	0.537	0.710*** (0.080)	0.080	-0.016 (0.040)
	N		5123		2641
	Days of in-school suspension	0.073	0.172*** (0.034)	0.020	-0.002 (0.016)
	N		5123		2641
	Days of out-of-school suspension	0.464	0.538*** (0.067)	0.060	-0.014 (0.032)
	N		5123		2641
High	Days truant	0.594	0.128 (0.208)	0.235	-0.111 (0.214)
	N		5123		2641
	Total days attended	173	7.28*** (1.19)	171	5.52*** (1.59)
	N		5175		2605
	Total days suspended	0.465	1.27*** (0.194)	0.126	-0.100 (0.080)
	N		3582		533
High	Days of in-school suspension	0.086	0.277*** (0.076)	0.036	-0.024 (0.023)
	N		3582		533
	Days of out-of-school suspension	0.379	0.993*** (0.162)	0.090	-0.075 (0.073)
	N		3582		533
	Days truant	5.69	-11.5 (7.58)	0.305	-0.370 (1.36)
	N		3582		533
High	Total days attended	163	15.9*** (4.22)	168	9.41* (5.47)
	N		3647		530

Notes: This table reports 2SLS estimates of the effects of charter school attendance on disciplinary outcomes and attendance in the year after the lottery. Standard errors are clustered by school-grade-year.

*significant at 10%; **significant at 5%; ***significant at 1%

Table A7: Sample Restrictions for the Lottery Analysis

	Lottery cohort									All lotteries
	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Panel A. Middle School</i>										
Total number of entry grade records	313	394	391	990	1578	2124	2132	2877	2239	13038
Excluding disqualified applicants	313	394	391	990	1577	2106	2115	2873	2225	12984
Excluding late applicants	313	391	390	972	1551	2046	2054	2829	2222	12768
Excluding applicants from outside of area	313	387	388	963	1540	2028	2041	2741	2202	12603
Excluding siblings	295	358	343	890	1378	1787	1801	2395	1973	11220
Excluding records not matched to the SIMS	267	311	305	838	1311	1710	1669	2095	1825	10331
Reshaping to one record per student	267	311	304	741	1115	1505	1424	1757	1568	8992
Excluding repeat applications	267	308	302	728	1093	1470	1360	1705	1497	8730
In Massachusetts public schools at baseline	201	228	223	603	924	1291	1195	1578	1287	7530
Excluding students without a test score	187	208	210	569	883	1219	1129	1475	1080	6960
<i>Panel B. High School</i>										
Total number of entry grade records	775	717	1313	1219	1148	1411	1392	1531	-	9506
Excluding disqualified applicants	775	717	1309	1218	1146	1408	1391	1520	-	9484
Excluding late applicants	765	710	1280	1215	1138	1408	1372	1517	-	9405
Excluding applicants from outside of area	765	706	1278	1206	1134	1403	1372	1504	-	9368
Excluding siblings	732	677	1218	1165	1120	1362	1334	1401	-	9009
Excluding students not matched to the SIMS	645	614	1121	1074	1091	1306	1255	1321	-	8427
Reshaping to one record per student	573	614	895	852	834	936	863	937	-	6504
Excluding repeat applications	573	612	891	846	812	919	830	895	-	6378
In Massachusetts public schools at baseline	406	462	732	690	692	821	715	742	-	5260
Excluding students without a test score	328	358	583	519	567	659	574	537	-	4125

Notes: This table summarizes the sample restrictions imposed for the lottery analysis. Disqualified applications are defined as duplicate records and applications to the wrong grade.

Table A8: Match from Lottery Records to SIMS

Lottery cohort	Number of records (1)	Fraction with SIMS match		
		Total (2)	Offered (3)	Not offered (4)
<i>Panel A. Middle School</i>				
2002-2003	295	0.908	0.934	0.859
2003-2004	358	0.869	0.882	0.817
2004-2005	343	0.889	0.924	0.849
2005-2006	890	0.942	0.967	0.886
2006-2007	1378	0.951	0.962	0.933
2007-2008	1787	0.957	0.978	0.917
2008-2009	1801	0.927	0.958	0.881
2009-2010	2395	0.875	0.865	0.884
2010-2011	1973	0.925	0.950	0.901
All	11220	0.950	0.940	0.894
<i>Panel B. High School</i>				
2002-2003	732	0.898	0.911	0.831
2003-2004	677	0.907	0.879	0.932
2004-2005	1218	0.922	0.934	0.893
2005-2006	1165	0.922	0.937	0.901
2006-2007	1120	0.974	0.977	0.971
2007-2008	1362	0.959	0.965	0.955
2008-2009	1334	0.941	0.939	0.951
2009-2010	1401	0.939	0.956	0.932
All	9009	0.937	0.940	0.933

Notes: This table summarizes the match from the lottery records to the SIMS data. The sample excludes disqualified applicants, late applicants, out-of-area applicants, and siblings.

Table A9: Outcome Data for the Lottery Analysis

Lottery cohort	Application grades (1)	Outcome grades (2)	Number of applicants (3)	Number with a test score (4)	Number of math scores expected (5)	Number of ELA scores expected (6)	Number of math scores observed (7)	Number of ELA scores observed (8)
<i>Panel A. Middle School</i>								
2002-2003	5-6	6-8	201	187	402	290	351	253
2003-2004	5-7	6-8	228	208	510	418	433	356
2004-2005	5-7	6-8	223	210	619	547	542	472
2005-2006	4-7	4-8	603	569	2115	2115	1894	1894
2006-2007	4-7	4-8	924	883	3037	3037	2693	2700
2007-2008	4-7	4-8	1291	1219	4287	4280	3724	3701
2008-2009	5-7	5-8	1195	1129	3385	3385	2950	2956
2009-2010	5-7	5-8	1578	1475	3156	3156	2856	2850
2010-2011	4-7	4-8	1287	1427	1287	1287	1100	1103
All	4-7	4-8	7530	7307	18798	18515	16543	16285
<i>Panel B. High School</i>								
2002-2003	5,9	10	406	328	406	406	327	328
2003-2004	5,7,9	10	462	258	462	462	352	356
2004-2005	7,9	10	732	583	732	732	569	579
2005-2006	7,9	10	690	519	690	690	507	514
2006-2007	9	10	692	567	692	692	561	562
2007-2008	9	10	821	659	821	821	637	657
2008-2009	9	10	715	574	715	715	564	570
2009-2010	9	10	742	537	742	742	530	534
All	5,7,9	10	5260	4025	5260	5260	4047	4100

Notes: This table summarizes observed test score outcomes for charter school lottery applicants. The sample is restricted to randomized applicants matched to baseline SIMS demographics. Expected test scores are post-lottery scores in grades 4-8 for middle school and grade 10 for high school that would be taken in Spring 2010 or earlier given normal academic progress after the lottery. Table A1 lists the schools participating in each cohort and their entry grades. Table A7 lists the availability of math and ELA tests by year.

Table A10: Availability of MCAS Math and ELA Tests by Year

Subject	School year	4th grade (1)	5th grade (2)	6th grade (3)	7th grade (4)	8th grade (5)	10th grade (6)
Math	2001-2002	Yes		Yes		Yes	Yes
	2002-2003	Yes		Yes		Yes	Yes
	2003-2004	Yes		Yes		Yes	Yes
	2004-2005	Yes		Yes		Yes	Yes
	2005-2006 through 2010-2011	Yes	Yes	Yes	Yes	Yes	Yes
ELA	2001-2002	Yes			Yes		Yes
	2002-2003	Yes			Yes		Yes
	2003-2004	Yes			Yes		Yes
	2004-2005	Yes			Yes		Yes
	2005-2006 through 2010-2011	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the years and grades in which MCAS math and ELA tests were administered between 2002 and 2011.

References

- [1] Abdulkadirođlu, A., Angrist, J., Dynarski, S., Kane, T., and Pathak, P. (2011). “Accountability and flexibility in public schools: Evidence from Boston’s charters and pilots.” *The Quarterly Journal of Economics*, forthcoming.
- [2] Angrist, J., Dynarski, S., Kane, T., Pathak, P., and Walters, C. (2010). “Inputs and impacts in charter schools: KIPP Lynn.” *American Economic Review* 100(2), 239-243.