

Different Paths to College Success: The Impact of Massachusetts'  
Charter Schools on College Trajectories

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Supplemental Appendix

## Appendix A: Lottery Details

Table A.1: Massachusetts Charter Schools Eligible for Lottery Study

School (1)	Town (2)	Urban (3)	CMO/ Affiliation (4)	Grades Served (5)	Lottery Entry Grade(s) (6)	Available Lottery Years (7)
<b>(A) Participating Schools</b>						
Academy of the Pacific Rim Charter School	Boston	Yes		5-12	5,6	2005-2010
Boston Collegiate Charter School	Boston	Yes		5-12	5	2002-2010
Boston Green Academy	Boston	Yes		6-12	9	2011-2014
Boston Preparatory Charter Public School	Boston	Yes		6-12	6	2005-2011, 2014
Cape Cod Lighthouse Charter School	Orleans	No		6-8	6	2007-2010
City on a Hill Charter Public School (Circuit Street)	Boston	Yes		9-12	9	2002, 2004-2014
City on a Hill Charter Public School (Dudley Square)	Boston	Yes		9-12	9	2013-2014
Codman Academy Charter Public School	Boston	Yes	Expeditionary Learning	K-12	9	2004, 2008-2014
Edward Brooke Charter School	Boston	Yes		K-12	5	2006-2009
Excel Academy Charter School	Boston	Yes		5-8	5	2008-2010
Four Rivers Charter Public School	Greenfield	No	Expeditionary Learning	7-12	7	2003-2012
Francis W Parker Charter Essential School	Devins	No	Coalition of Essential Schools	7-12	7	2006-2011
Global Learning Charter Public School	New Bedford	Yes		5-12	5	2006-2007, 2009
Innovation Academy Charter School	Tyngsboro	No		5-12	5	2007-2010
KIPP Academy Lynn	Lynn	Yes	KIPP	K-12	5	2005-2009
Marblehead Community Charter Public School	Marblehead	No		4-8	4	2005-2007, 2009
MATCH Charter Public School	Boston	Yes		K-12	6,9	2002-2011
Pioneer Valley Performing Arts Charter Public School	South Hadley	No		7-12	7	2009-2010
Rising Tide Charter Public School	Plymouth	No		5-8	5	2009-2010
Roxbury Preparatory Charter School	Boston	Yes	Uncommon Schools	6-12	6	2002-2011
Salem Academy Charter School	Salem	No		6-12	6	2010-2011
Sturgis Charter Public School	Hyannis	No	IB	9-12	9	2004, 2006, 2008-2011
UP Academy Boston	Boston	Yes		K-8	6	2011
<b>(B) Eligible but Nonparticipating Schools</b>						
Advanced Math and Science Academy Charter School	Marlborough	No		6-12		
Berkshire Arts and Technology Charter Public School	Adams	No		6-12		
Christa McAuliffe Regional Charter Public School	Frammingham	Yes		6-8		
Community Charter School of Cambridge	Cambridge	Yes	Expeditionary Learning	7-12		
Hampden Charter School of Science	Chicopee	Yes		6-12		
Health Careers Academy Charter School	Boston	Yes		9-12		
New Leadership Charter School	Springfield	Yes		6-12		
Phoenix Charter Academy	Chelsea	Yes		9-12		
Pioneer Charter School of Science	Everett	Yes		7-12		
Sizer School, A North Central Charter Essential School	Fitchburg	Yes	Coalition of Essential Schools	7-12		

Notes: This table includes charter schools that meet the following criteria: 1) admitted students for middle- or high-school grades (4-7, 9); 2) has students in the projected high-school classes of 2006-2018; 3) does not serve special populations (such as students at risk of dropping out), and 4) are not closed charter schools. Schools that indicate grade ranges that do not begin at the lottery entry grade expanded grades served after lottery data was collected. Schools in Panel B that are eligible for the lottery study either had fewer applicants than seats available or did not retain usable lottery records. There were 12 closed schools at appropriate grade levels. Urban towns include those which participate in the Massachusetts Urban Superintendents Network: Boston, Brockton, Cambridge, Chelsea, Chicopee, Everett, Fall River, Fitchburg, Frammingham, Haverhill, Holyoke, Lawrence, Leominster, Lowell, Lynn, Malden, New Bedford, Pittsfield, Quincy, Revere, Somerville, Springfield, Taunton, and Worcester (Salem joined the network at a later date and thus is categorized as nonurban in this study). Match is included in the study as both a middle and a high school.

Table A.2: The Impact of Charter School Offers on Charter Attendance

	Non-offered Mean (1)	Initial Offer (2)	Waitlist Offer (3)
<hr/> (A) Ever attended charter <hr/>			
Urban	0.101	0.483*** (0.010)	0.343*** (0.009)
<i>F</i> -statistic		1198.3	
<i>p</i> -value		0.000	
Nonurban	0.226	0.603*** (0.018)	0.421*** (0.023)
<i>F</i> -statistic		489.5	
<i>p</i> -value		0.000	
<hr/> (B) Years attended charter <hr/>			
Urban	0.729	1.739*** (0.051)	1.333*** (0.049)
<i>F</i> -statistic		1198.3	
<i>p</i> -value		0.000	
Nonurban	0.920	2.765*** (0.094)	2.089*** (0.116)
<i>F</i> -statistic		489.5	
<i>p</i> -value		0.000	

Notes: This table shows the impact of a charter school offer on charter school attendance for the urban and nonurban samples. The sample is restricted to students enrolled in Massachusetts schools at the time of application in the projected high-school classes of 2006–2018. Column 1 shows the proportion of non-offered students attending a charter school. Columns 2 and 3 report coefficients from regressions of charter attendance on initial and waitlist offer dummies, including controls for demographic characteristics and risk sets. Robust standard errors in parentheses (+  $p < 0.10$  \*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\* $p < 0.001$ ). The Sanderson-Windmeijer *F*-statistic and its associated *p*-value are reported under the offer coefficients. N (urban) = 14,191, N (nonurban) = 3,583.

Table A.3: Covariate Balance

	Urban			Nonurban		
	Fraction of Non-Offered With Outcome (1)	Initial Offer Differential (2)	Waitlist Offer Differential (3)	Fraction of Non-Offered With Outcome (4)	Initial Offer Differential (5)	Waitlist Offer Differential (6)
Female	0.515	-0.003 (0.010)	0.009 (0.011)	0.526	-0.000 (0.019)	0.013 (0.022)
Asian	0.028	0.004 (0.003)	-0.001 (0.003)	0.025	-0.007 (0.007)	0.015+ (0.008)
Black	0.519	0.001 (0.010)	-0.000 (0.010)	0.032	-0.002 (0.006)	-0.004 (0.006)
Latinx	0.280	-0.006 (0.009)	0.009 (0.009)	0.033	0.006 (0.007)	0.000 (0.008)
Other race	0.042	0.002 (0.004)	-0.008+ (0.004)	0.039	-0.001 (0.006)	-0.014* (0.006)
White	0.131	-0.002 (0.006)	-0.000 (0.006)	0.870	0.003 (0.012)	0.002 (0.013)
Special education	0.196	-0.002 (0.008)	-0.012 (0.008)	0.164	0.004 (0.014)	-0.009 (0.015)
English learner	0.107	0.000 (0.006)	0.008 (0.007)	0.014	-0.008* (0.004)	0.004 (0.005)
Subsidized lunch	0.723	0.008 (0.009)	0.001 (0.009)	0.120	-0.007 (0.012)	0.019 (0.014)
Baseline MCAS ELA	-0.408	-0.013 (0.021)	0.023 (0.022)	0.436	0.018 (0.032)	-0.049 (0.037)
Baseline MCAS Math	-0.375	-0.010 (0.020)	0.015 (0.021)	0.322	0.022 (0.036)	-0.015 (0.041)
<i>p</i> -value		0.951	0.718		0.454	0.364

Notes: This table shows student characteristics and test scores, and differentials between offered and nonoffered charter applicants. The sample is restricted to students enrolled in Massachusetts schools at the time of application in the projected high-school classes of 2006–2018. Columns 1 and 4 show the proportion of non-offered students with a given characteristic. Columns 2, 3, 5, and 6 report coefficients from regressions of the student characteristic on initial and waitlist offer dummies, including controls for risk sets (+  $p < 0.10$  \*  $p < 0.05$ ). N (urban) = 13947, N (nonurban) = 3583.

Table A.4: Match Rate to SIMS

Projected HS Class	Non-offered Mean (1)	Initial Offer Differential (2)	Waitlist Offer Differential (3)	Number of Applications (4)
2006	0.986	-0.008 (0.012)	0.008 (0.009)	515
2007	0.997	-0.011 (0.017)	-0.033 (0.038)	422
2008	0.996	-0.014 (0.011)	0.007 (0.009)	937
2009	0.992	0.003 (0.009)	-0.007 (0.009)	1,010
2010	0.994	0.000 (0.009)	-0.003 (0.010)	1,332
2011	0.996	-0.000 (0.006)	-0.002 (0.008)	1,597
2012	0.985	-0.002 (0.006)	0.001 (0.005)	2,142
2013	0.991	-0.004 (0.006)	0.001 (0.005)	2,456
2014	0.993	0.001 (0.005)	-0.005 (0.005)	2,949
2015	0.993	0.000 (0.005)	-0.002 (0.004)	3,746
2016	0.992	-0.001 (0.005)	0.001 (0.004)	3,698
2017	0.993	-0.000 (0.004)	-0.001 (0.003)	5,226
2018	0.995	-0.002 (0.003)	0.001 (0.003)	5,581
All cohorts	0.993	-0.002+ (0.001)	-0.000 (0.001)	31,611

Notes: This table shows the match between lottery records and the SIMS data by projected high school class. The sample excludes disqualified, late, out-of-area, and sibling applications. Individuals can be in the sample multiple times if they apply to multiple schools. Columns 2 and 3 report coefficients from regressions of the student characteristic on initial and waitlist offer dummies, including controls for risk sets (+ p<0.10 \* p<0.05 \*\* p<0.01 \*\*\*p<0.001).

## A.1 Details on Attrition and Lee Bounds

The main text mentions that there is some differential attrition in our sample. Here, we detail the differential attrition and how we address the concern. Students offered seats in the lottery are slightly more likely to have test score outcomes than those not offered seats in the lottery by 1.4–1.8 percentage points in the urban lotteries and 3.5 percentage points in nonurban ones (Appendix Table A.5). This is not surprising, since winning the lottery makes it more likely a student enrolls in a charter school (and thus not a private or out-of-state school). Nonurban offered students are also more likely to be present in the data in 9th and 12th grade by 4 and 2 percentage points respectively on the initial offer indicator.

Given the differential attrition, we report Lee (2009) bounds for the MCAS and high-school outcomes in Table 2. By locality, we calculate the lower bound by dropping the fraction of the highest-scoring lottery winners until the response rates among lottery winners and losers are equal. To estimate the upper bound, we drop the fraction of lowest-scoring lottery winners. To avoid commingling noncompliance and attrition, we estimate these bounds on the reduced form. The reduced form is estimated by substituting  $y_i$  for the outcome in Equation 2, though to reduce the number of reported coefficients, we use a single ever-offer instrument, which is the sum of  $Z_{i1}^k + Z_{i2}^k$ . For binary outcomes we conduct a similar procedure but randomly select cases to drop among those with a value of one (lower bound) or zero (upper bound). This bounding exercise shows little scope for the modest differential attrition to explain the MCAS or high-school results.

Table A.5: Attrition

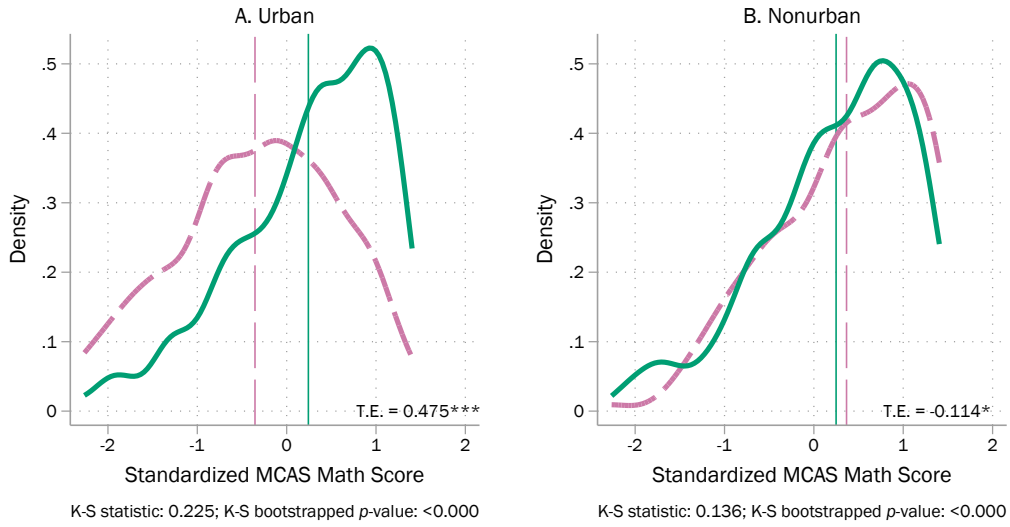
	Urban			Nonurban		
	Fraction of Non-Offered With Outcome (1)	Initial Offer Differential (2)	Waitlist Offer Differential (3)	Fraction of Non-Offered With Outcome (4)	Initial Offer Differential (5)	Waitlist Offer Differential (6)
Has ELA score	0.812	0.014+ (0.008)	0.017* (0.008)	0.855	0.033** (0.011)	0.007 (0.013)
Has math score	0.800	0.015+ (0.008)	0.013 (0.008)	0.866	0.031** (0.012)	0.006 (0.013)
Present in 9th grade in MA	0.860	0.010 (0.007)	-0.002 (0.007)	0.858	0.038*** (0.012)	0.003 (0.014)
Present in 12th grade in MA	0.751	-0.002 (0.009)	-0.002 (0.009)	0.807	0.018 (0.014)	0.005 (0.016)
Sent to NSC	0.945	0.006 (0.004)	0.006 (0.004)	0.941	0.003 (0.008)	0.013 (0.009)

Notes: This table shows follow-up rates for MCAS scores two years after charter application, presence in the Massachusetts data in 9th or 12th grade, and an indicator for being sent to the NSC to be matched to college outcome and data for Massachusetts charter school applicants. The sample is restricted to students enrolled in Massachusetts schools at the time of application in the projected high-school classes of 2006-2018. Columns 1 and 4 show the proportion of non-offered students with a given outcome. Columns 2, 3, 5, and 6 report coefficients from regressions of indicators for follow-up data on initial and waitlist offer dummies, including controls for risk sets (+ p<0.10 \* p<0.05 \*\* p<0.01 \*\*\*p<0.001). N (urban) = 13,947, N (nonurban) = 3,583.

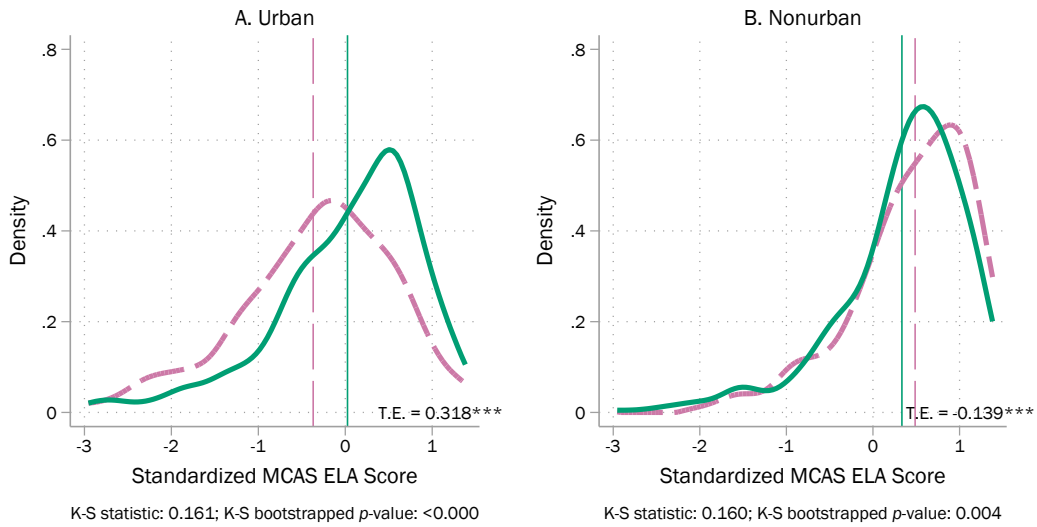
## Appendix B: Additional Results

Figure B.1: Test Score Distributions for Treated and Untreated Compliers

I. Math



II. ELA



— Untreated Compliers      — Treated Compliers

Notes: This figure shows the distribution of test scores for treated and untreated compliers, for MCAS Math and ELA two years after the lottery.

Table B.1: Sample Characteristics and Outcomes

	Urban				Nonurban			
	Noncharter Public Schools (1)	Lottery Applicants (2)	Offered Charter (3)	Not Offered Charter (4)	Noncharter Public Schools (5)	Lottery Applicants (6)	Offered Charter (7)	Not Offered Charter (8)
<b>(A) Baseline characteristics</b>								
Female	0.483	0.518	0.519	0.517	0.491	0.519	0.516	0.526
Asian	0.076	0.030	0.029	0.030	0.039	0.030	0.033	0.025
Black	0.199	0.526	0.538	0.504	0.046	0.026	0.023	0.032
Latinx	0.316	0.284	0.287	0.278	0.062	0.036	0.037	0.033
Other race	0.028	0.041	0.038	0.047	0.017	0.028	0.023	0.039
White	0.380	0.119	0.107	0.142	0.836	0.880	0.884	0.870
Special education	0.187	0.194	0.194	0.195	0.177	0.159	0.156	0.164
English learner	0.179	0.114	0.117	0.109	0.028	0.011	0.010	0.014
Free/reduced price lunch	0.644	0.740	0.752	0.717	0.198	0.128	0.132	0.120
Baseline MCAS ELA	-0.432	-0.418	-0.433	-0.389	0.155	0.417	0.407	0.436
Baseline MCAS Math	-0.426	-0.364	-0.368	-0.356	0.153	0.331	0.336	0.322
<b>(B) Charter school enrollment</b>								
Attend any charter in grades 5-12	0.058	0.427	0.513	0.262	0.052	0.568	0.708	0.284
<b>(C) Academic outcomes</b>								
MCAS Math	-0.359	-0.202	-0.141	-0.311	0.174	0.296	0.297	0.295
MCAS ELA	-0.391	-0.287	-0.248	-0.355	0.189	0.357	0.340	0.394
Took any AP	0.278	0.364	0.378	0.340	0.345	0.313	0.271	0.403
Score 3+ on any AP	0.127	0.102	0.102	0.102	0.244	0.214	0.189	0.266
Took SAT	0.546	0.642	0.638	0.647	0.679	0.771	0.770	0.773
SAT score (1600) (for takers)	94.864	898.188	895.774	902.551	107.148	1125.715	1130.180	1116.332
Graduate high school (4 years)	0.609	0.624	0.608	0.654	0.827	0.821	0.827	0.809
Graduate high school (5 years)	0.656	0.711	0.701	0.731	0.850	0.883	0.880	0.889
Enroll in any college	0.501	0.601	0.604	0.595	0.700	0.799	0.803	0.791
Enroll in 4-year college	0.315	0.446	0.452	0.436	0.563	0.669	0.678	0.651
Enroll in 2-year college	0.217	0.200	0.199	0.201	0.176	0.182	0.176	0.195
Complete any degree	0.257	0.249	0.248	0.251	0.492	0.558	0.566	0.543
Complete BA	0.214	0.214	0.212	0.219	0.449	0.512	0.524	0.490
Complete AA	0.059	0.050	0.052	0.047	0.066	0.070	0.062	0.085
<i>N</i>	275,245	14,191	9,303	4,888	642,470	3,583	2,403	1,180

Notes: This table shows demographic characteristics and outcome means for various samples. Charter attendance includes attendance at non-lottery charters and thus will not match first stage estimates. The sample in Column 1 is restricted to students who attended schools in the state of Massachusetts in 9th grade in the projected high-school classes of 2006–2018. The sample in Column 2 is restricted to charter school applicants enrolled in schools in the state of Massachusetts at the time of application in the projected high-school classes of 2006–2018. The samples in Columns 3 and 4 are further restricted to those offered and not offered a seat at a charter in the lottery, respectively.

Table B.2: The Impact of Charter School Attendance on Advanced Placement

	Urban			Nonurban		
	2SLS (1)	CCM (2)	N (3)	2SLS (4)	CCM (5)	N (6)
<b>(A) Advanced Placement</b>						
Offered AP	0.080*** (0.021)	0.743	13,623	-0.539*** (0.032)	0.786	3,583
Number of APs offered	-1.131*** (0.269)	5.727	13,623	-5.659*** (0.411)	8.172	3,583
<b>(B) AP by subject</b>						
Offered AP Calculus	0.103*** (0.023)	0.542	13,623	-0.483*** (0.034)	0.702	3,583
Offered AP English	-0.136*** (0.023)	0.623	13,623	-0.531*** (0.032)	0.756	3,583
Offered AP History	0.021 (0.023)	0.459	13,623	-0.517*** (0.033)	0.730	3,583
Offered AP Science	-0.072** (0.023)	0.511	13,623	-0.490*** (0.032)	0.674	3,583
<b>(C) AP scores</b>						
Score 2+ on any AP	0.099*** (0.018)	0.170	13,623	-0.239*** (0.031)	0.411	3,583
Score 3+ on any AP	0.045** (0.014)	0.108	13,623	-0.188*** (0.029)	0.333	3,583
Score 4+ on any AP	0.008 (0.011)	0.063	13,623	-0.137*** (0.027)	0.240	3,583
Score 5 on any AP	-0.000 (0.007)	0.026	13,623	-0.100*** (0.022)	0.157	3,583
<b>(D) Conditional AP scores</b>						
Score 2+ on any AP	0.058+ (0.034)	0.608	3,936	-0.065 (0.044)	0.947	965
Score 3+ on any AP	0.008 (0.034)	0.381	3,936	0.014 (0.064)	0.738	965
Score 4+ on any AP	-0.038 (0.028)	0.221	3,936	0.002 (0.077)	0.541	965
Score 5 on any AP	-0.023 (0.018)	0.089	3,936	-0.071 (0.074)	0.366	965

Notes: Each coefficient labeled 2SLS is the instrumental variables estimate of the effect of attending an urban or nonurban charter at any period of time before the outcome listed in the column heading occurred as described in Equation 1. Indicator variables for a lottery offer on the day of the lottery (initial offer) and lottery offer from the waitlist (waitlist offer), separately for urban and nonurban charters, are the instruments for charter attendance. The control complier mean is labeled CCM. All regressions control for lottery risk sets and a vector of demographic characteristics including indicators for race, gender, birth year, calendar year, and baseline special education, English learner, and free or reduced price lunch status. The sample is restricted to students enrolled in Massachusetts schools at the time of application in the projected high-school classes of 2006–2018. Robust standard errors in parentheses (+  $p < 0.10$  \*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$ ). AP outcomes are available for the class of 2007 and later. In the second panel, AP offers are defined based on whether the high school that the student attended offered an AP class. In the third panel, AP scores are conditional on having taken at least one AP.

Table B.3: The Impact of Charter School Attendance on High School Progression

	Urban			Nonurban		
	2SLS (1)	CCM (2)	N (3)	2SLS (4)	CCM (5)	N (6)
<b>(A) On-time grade progression</b>						
10th grade	-0.021 (0.014)	0.914	11,209	-0.002 (0.008)	0.995	3,097
11th grade	-0.045** (0.015)	0.920	10,411	0.006 (0.009)	0.992	3,007
12th grade	-0.036* (0.015)	0.912	10,426	-0.014 (0.011)	0.989	2,966
Repeat 9th or 10th	0.041* (0.019)	0.161	12,001	-0.005 (0.013)	0.027	3,175
<b>(B) High school graduation</b>						
Graduate high school (4 years)	-0.066** (0.023)	0.655	11,983	-0.016 (0.026)	0.815	3,175
Graduate high school (5 years)	-0.018 (0.022)	0.733	11,983	-0.012 (0.024)	0.903	3,175
Graduate high school (6 years)	-0.012 (0.021)	0.787	11,983	-0.017 (0.023)	0.915	3,175
<b>(C) Days attended</b>						
9th grade	0.624 (1.789)	162.716	11,967	1.026 (1.816)	169.753	3,175
10th grade	1.274 (1.597)	161.866	11,199	2.743+ (1.639)	167.366	3,097
11th grade	2.201 (1.769)	156.651	10,401	1.007 (1.709)	167.441	3,007
12th grade	3.722* (1.658)	153.191	10,417	-2.305 (1.618)	160.852	2,966

Notes: Each coefficient labeled 2SLS is the instrumental variables estimate of the effect of attending an urban or nonurban charter at any period of time before the outcome listed in the column heading occurred as described in Equation 1. Indicator variables for a lottery offer on the day of the lottery (initial offer) and lottery offer from the waitlist (waitlist offer), separately for urban and nonurban charters, are the instruments for charter attendance. The control complier mean is labeled CCM. All regressions control for lottery risk sets and a vector of demographic characteristics including indicators for race, gender, birth year, calendar year, and baseline special education, English learner, and free or reduced price lunch status. The sample is restricted to students enrolled in Massachusetts schools at the time of application in the projected high-school classes of 2006–2018. Robust standard errors in parentheses (+  $p < 0.10$  \*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$ ).

Table B.4: The Impact of Charter School Attendance on College Enrollment

Year after Projected High School Graduation	Any College		4 Year College		2 Year College		N (7)
	2SLS (1)	CCM (2)	2SLS (3)	CCM (4)	2SLS (5)	CCM (6)	
<b>(A) 1st year</b>							
Urban	0.024 (0.023)	0.518	0.063** (0.023)	0.390	-0.039** (0.015)	0.127	13,281
Nonurban	0.022 (0.031)	0.665	0.094** (0.033)	0.529	-0.072** (0.022)	0.135	3,414
<b>(B) 2nd year</b>							
Urban	0.077*** (0.023)	0.495	0.079*** (0.022)	0.367	-0.002 (0.016)	0.127	13,281
Nonurban	0.063+ (0.032)	0.684	0.098** (0.034)	0.557	-0.035 (0.023)	0.127	3,414
<b>(C) 3rd year</b>							
Urban	0.073** (0.023)	0.439	0.064** (0.022)	0.335	0.010 (0.015)	0.103	13,281
Nonurban	0.095** (0.034)	0.631	0.099** (0.035)	0.545	-0.004 (0.020)	0.086	3,414
<b>(D) 4th year</b>							
Urban	0.068** (0.023)	0.396	0.053* (0.021)	0.310	0.015 (0.014)	0.085	13,281
Nonurban	0.121*** (0.035)	0.572	0.125*** (0.035)	0.510	-0.004 (0.017)	0.062	3,414
<b>(E) 5th year</b>							
Urban	0.015 (0.020)	0.245	0.023 (0.018)	0.179	-0.010 (0.012)	0.066	13,281
Nonurban	0.029 (0.034)	0.299	0.041 (0.033)	0.257	-0.013 (0.013)	0.043	3,414
<b>(F) 6th year</b>							
Urban	0.049** (0.019)	0.132	0.043** (0.016)	0.087	0.006 (0.011)	0.044	11,608
Nonurban	0.040 (0.028)	0.151	0.048+ (0.027)	0.130	-0.009 (0.011)	0.023	3,158

Notes: Each coefficient labeled 2SLS is the instrumental variables estimate of the effect of attending an urban or nonurban charter at any period of time before the outcome listed in the column heading occurred as described in Equation 1. Indicator variables for a lottery offer on the day of the lottery (initial offer) and lottery offer from the waitlist (waitlist offer), separately for urban and nonurban charters, are the instruments for charter attendance. The control complier mean is labeled CCM. All regressions control for lottery risk sets and a vector of demographic characteristics including indicators for race, gender, birth year, calendar year, and baseline special education, English learner, and free or reduced price lunch status. The sample is restricted to students enrolled in Massachusetts schools at the time of application in the projected high-school classes of 2006–2018. Robust standard errors in parentheses (+ p<0.10 \* p<0.05 \*\* p<0.01 \*\*\*p<0.001).

Table B.5: The Impact of Charter School Attendance on College Degrees

Year after Projected High School Graduation	Any Degree		B.A.		A.A.		N (7)
	2SLS (1)	CCM (2)	2SLS (3)	CCM (4)	2SLS (5)	CCM (6)	
<b>(A) 4th year</b>							
Urban	0.037* (0.016)	0.133	0.031* (0.015)	0.116	0.008 (0.008)	0.022	13,281
Nonurban	0.061+ (0.035)	0.364	0.074* (0.034)	0.308	-0.027 (0.017)	0.074	3,414
<b>(B) 5th year</b>							
Urban	0.038* (0.019)	0.211	0.033+ (0.018)	0.188	0.003 (0.009)	0.037	13,281
Nonurban	0.105** (0.036)	0.483	0.115** (0.036)	0.432	-0.031+ (0.018)	0.085	3,414
<b>(C) 6th year</b>							
Urban	0.046* (0.022)	0.240	0.042* (0.021)	0.216	0.009 (0.011)	0.041	11,608
Nonurban	0.112** (0.037)	0.519	0.119** (0.037)	0.472	-0.030 (0.020)	0.093	3,158

Notes: Each coefficient labeled 2SLS is the instrumental variables estimate of the effect of attending an urban or nonurban charter at any period of time before the outcome listed in the column heading occurred as described in Equation 1. Indicator variables for a lottery offer on the day of the lottery (initial offer) and lottery offer from the waitlist (waitlist offer), separately for urban and nonurban charters, are the instruments for charter attendance. The control complier mean is labeled CCM. All regressions control for lottery risk sets and a vector of demographic characteristics including indicators for race, gender, birth year, calendar year, and baseline special education, English learner, and free or reduced price lunch status. The sample is restricted to students enrolled in Massachusetts schools at the time of application in the projected high-school classes of 2006–2018. Robust standard errors in parentheses (+  $p < 0.10$  \*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$ ). Students can obtain both a BA and an AA, so the coefficient for any degree will not be the sum of the BA and AA coefficients.

Table B.6: The Impact of Charter School Attendance on Key Variables, Alternative Specifications

	Urban			Nonurban		
	Math MCAS (1)	4-Year College Enrollment (2)	4-Year College Graduation (3)	Math MCAS (4)	4-year College Enrollment (5)	4-year College Graduation (6)
Main Specification	0.475*** (0.040)	0.079*** (0.022)	0.042* (0.021)	-0.114+ (0.059)	0.098** (0.034)	0.119** (0.037)
N	10,706	13,281	11,608	3,198	3,414	3,158
Initial offer only	0.424*** (0.052)	0.062* (0.031)	0.036 (0.029)	-0.086 (0.075)	0.103* (0.044)	0.111* (0.046)
N	10,706	13,281	11,608	3,198	3,414	3,158
Baseline test scores	0.483*** (0.041)	0.076** (0.023)	0.039+ (0.022)	-0.091 (0.062)	0.104** (0.036)	0.127*** (0.039)
N	9,923	11,996	10,456	2,714	2,869	2,665
No covariates	0.500*** (0.044)	0.085*** (0.023)	0.044* (0.021)	-0.100 (0.064)	0.097** (0.035)	0.121** (0.038)
N	10,706	13,281	11,608	3,198	3,414	3,158

Notes: The first row of the table repeats the main specification reported in the other tables, see Tables 2 and 3 for details. Four-year college enrollment is enrollment within 2 years of projected high school graduation. Each subsequent row shows an alternative specification. The row labeled Initial offer only uses only admissions offers on the day of the charter school lottery as an instrument for charter attendance (excluding the waitlist offer). The row labeled Baseline test scores uses only students for which baseline math MCAS scores are available. The row labeled No covariates excludes all demographic variables from the regression. Robust standard errors in parentheses (+ p<0.10 \* p<0.05 \*\* p<0.01 \*\*\*p<0.001).