The Effect of Charter Schools on School Segregation
Tomas Monarrez, Brian Kisida, and Matthew Chingos
Online Appendix

1.   Placebo Tests

Our main identification strategy relies on a generalized differences-in-differences design linking changes in charter share of district-grade enrollment to changes in district-grade segregation. This method identifies the effect of charters using between-grade comparisons within districts that see differing levels of charter penetration at different grade levels over time. However, it is possible that unobserved factors are simultaneously associated with charter school growth in particular grade levels and with corresponding increases in segregation. Though our method inherently addresses many potential confounding explanations, we test the validity of these assumptions with an informative robustness check.

We conduct a placebo test exploiting the structure of our district-by-grade-by-year level dataset. The placebo test is based on the notion that increases in charter percent of enrollment in, say, primary schools should not have a direct contemporaneous impact on the racial segregation of high schools. We conduct this test by restructuring our data wide by grade, resulting in a district-year panel with segregation and charter enrollment measured for different grade levels. We then estimate the following class of models:

$$(1) \qquad Y_{it}^g = \sum_{g=0}^{12} \beta_g E_{it}^g + X_{it}^{'}\Gamma + \tau_i + \delta_{s(i)t} + \epsilon_{it}$$

where E_{it}^g is charter percent of enrollment for groups of school grades $g = 0, 1, 2, ..., 12$, and grade 0 corresponds to kindergarten (KG). The models control for district fixed effects, state-by-year effects, and separately for each grade: number of schools, log total enrollment, and share Black or Hispanic.

When estimating models of segregation in grade g, the test requires estimates of β_g similar to our main estimates (assuming between-grade effect heterogeneity is minimal) and null effects for any $\beta_{g'}$ with $g \neq g'$. However, one could also imagine that off-diagonal coefficients with $g' < g$ (the lower triangle in table A2) could capture "preemptive effects", where student sorting patterns react to the growth of charter schools in higher grades as families choose the educational trajectory of their children. Under this view, significant patterns in the upper-triangle of the placebo test matrix are more worrisome in terms of threats to our research design, as they cannot be explained by preemptive behavior and are more likely to be an indication of endogeneity of the treatment variable.

The results of the placebo test in Table A2 provide strong evidence that the relationships we have identified in our main models are well-identified causal relationships. Across 169 coefficients in 13 separate models, the results are generally significant where one would expect them to be if the effect was strictly contemporaneous, unbiased, and under minimal preemptive effects. For grades 4 through 12, the estimated effect of the own-grade (the diagonal of the matrix) are positive, of similar magnitude to our main estimates, and statistically significant. This is not the case for earlier grades, suggesting that there are smaller effects at the earliest elementary school grades. In contrast, the off-diagonal elements are of smaller magnitude and not statistically different from zero in the vast majority of cases. In the lower-triangle, only 3 coefficients are significant at the 5% level; In the upper-triangle, 4 coefficients are.

We formalize the placebo test by computing an F-statistic for the joint significance of the upper- and

lower-triangle coefficients, separately. We report the p-values for these tests at the bottom of Table A2. Encouragingly, a large majority of these tests come back insignificant at conventional levels of statistical confidence. For about 3 or 4 of these models, we find that the lower triangle is jointly significant, depending on the level of confidence. These are concentrated at the high school level, consistent with preemptive sorting effects for charter high schools. On the other hand, none of the F-tests are significant for the upper triangle.

Altogether, the breadth of the evidence suggests that our models "pass the placebo" test, providing further evidence and confidence that our estimates can be interpreted causally without major reservations.

Figure 1. : The mechanical effect of school additions on segregation
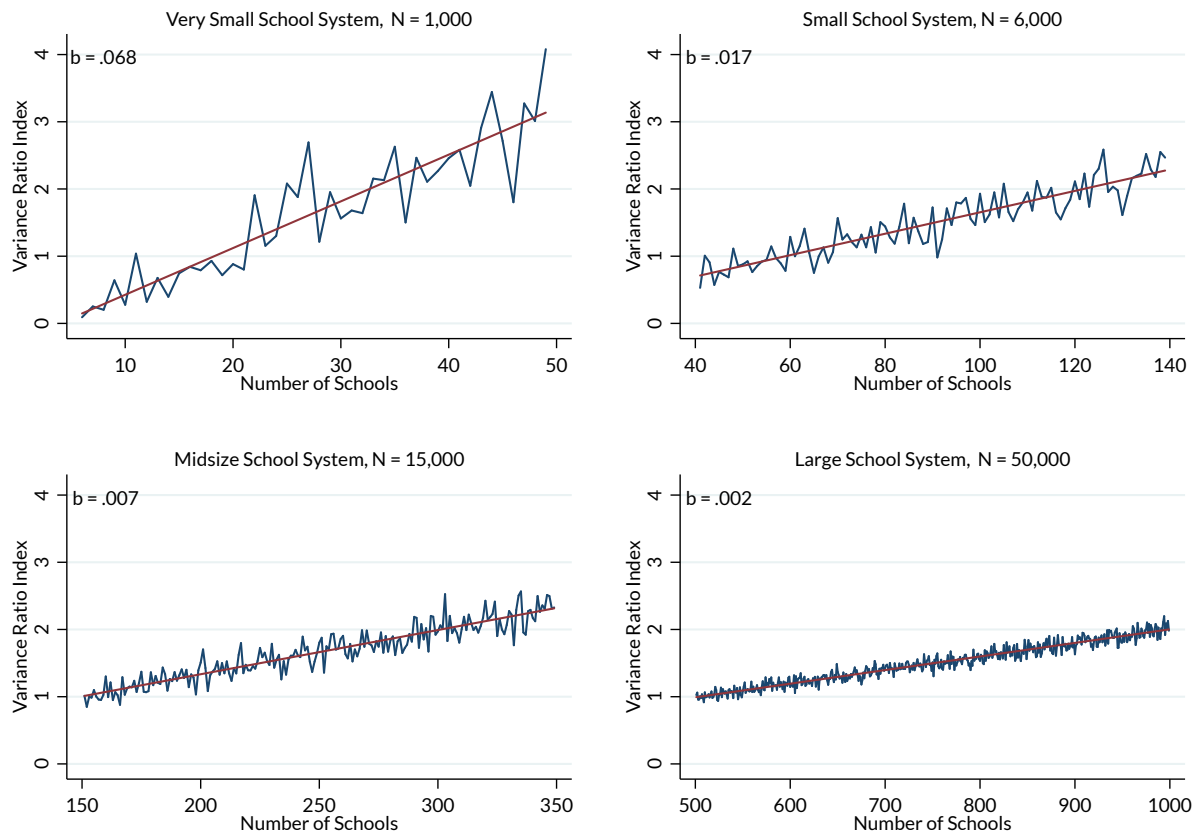
Note: Figure shows simulations of school segregation with random school assignment, for hypothetical school systems of different total population. It is assumed 50% of the population is from the "minority" group. Simulations gradually increase the number of schools in the system. Every time a school is added, random school assignment is conducted.

Figure 2. : Distribution of charter school opening and closing events
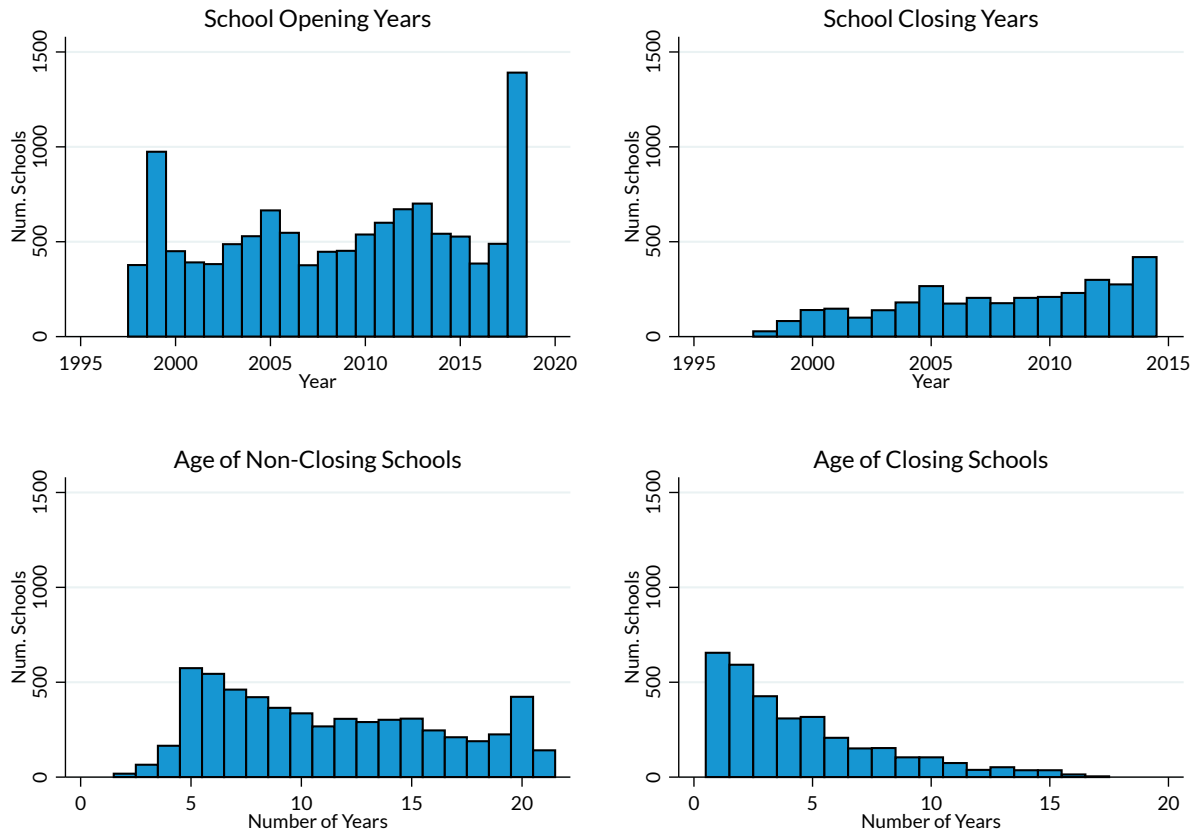
Note: School-level histograms of the cross-section of all charter schools in operation between 1998-2018. The top left panel shows the distribtuion of charter opening years, the first year they report enrollment to the Common Core of Data. The bottom left panel shows the distribution of current age of charter school that have not ceased operations. The right top panel shows the distribution of charter closure years. The bottom right panel shows the age of charter schools that close prior to 2018.

Figure 3. : Distributed lag models of Black and Hispanic segregation and predicted charter percent (reduced form)
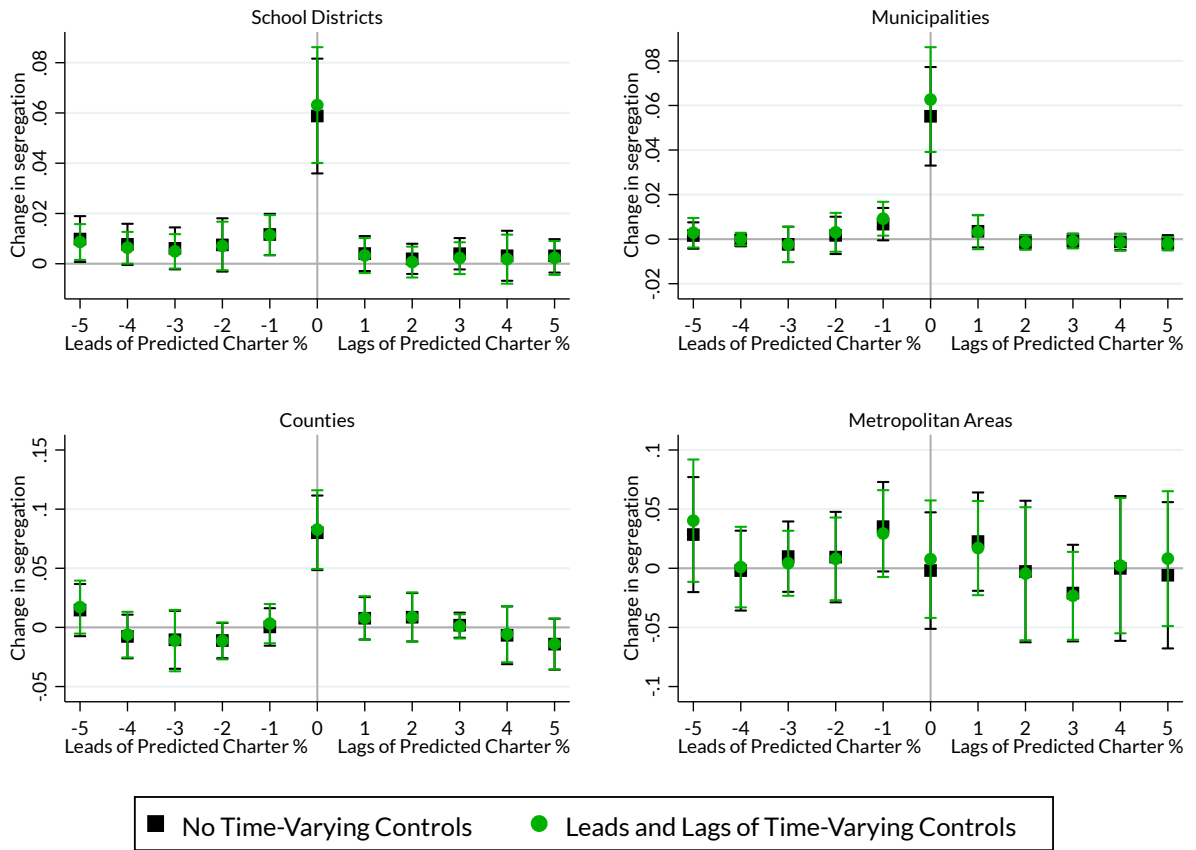
Note: Distributed lag models. The independent variables are leads and lags of school systems' predicted charter percent of enrollment, which is computed using the fitted values from the enrollment growth models shown in Figure 3. Standard errors are clustered at the system level in all specifications.

Table 1—: Randomization-based falsification test - What if charter enrollment was randomly drawn from district schools?

Black or Hispanic	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) IV
Charter percent	-0.0111 (0.0102)	-0.0394 (0.0097)	-0.0365 (0.0084)	-0.0325 (0.0082)	-0.0326 (0.0082)	-0.0326 (0.0082)	-0.0328 (0.0082)	-0.0394 (0.0097)
Black	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) IV
Charter percent	-0.0189 (0.0090)	-0.0347 (0.0087)	-0.0159 (0.0069)	-0.0160 (0.0067)	-0.0160 (0.0067)	-0.0160 (0.0067)	-0.0176 (0.0068)	-0.0125 (0.0084)
Hispanic	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) IV
Charter percent	0.0390 (0.0089)	-0.0224 (0.0052)	-0.0224 (0.0062)	-0.0182 (0.0061)	-0.0178 (0.0062)	-0.0178 (0.0062)	-0.0171 (0.0061)	-0.0307 (0.0073)
Asian	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) IV
Charter percent	0.0037 (0.0042)	-0.0044 (0.0036)	0.0031 (0.0054)	0.0042 (0.0056)	0.0052 (0.0057)	0.0052 (0.0057)	0.0063 (0.0062)	0.0019 (0.0067)
White	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) IV
Charter percent	-0.0338 (0.0090)	-0.0539 (0.0093)	-0.0361 (0.0093)	-0.0318 (0.0094)	-0.0322 (0.0094)	-0.0322 (0.0094)	-0.0334 (0.0089)	-0.0412 (0.0116)
Dep. Var. Mean	11.07							
Year FE		X						
District FE		X						
Grade FE		X						
District-Year FE			X	X	X	X	X	X
District-Grade FE			X	X	X	X	X	X
State-Grade-Year FE				X	X	X	X	X
Population Ctrl.					X	X	X	X
Num. Schools Ctrl.						X	X	X
Composition Ctrl.							X	X
R^2	0.001	0.668	0.884	0.894	0.894	0.894	0.895	0.014
N	834,555	834,527	831,059	831,042	831,042	831,042	831,042	831,042

Note: Standard errors are clustered at the school district level in all models. The dependent variable is a transformed segregation index, estimated assuming a counterfactual in which charter school enrollment is a random draw (with replacement) from the non-charter school student population in a given school system, grade and year.

Table 2—: Placebo tests – effect of charters on segregation across school grade levels

	(1) KG	(2) G1	(3) G2	(4) G3	(5) G4	(6) G5	(7) G6	(8) G7	(9) G8	(10) G9	(11) G10	(12) G11	(13) G12
Charter % KG	-0.05 (0.05)	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)	-0.02 (0.02)	0.01 (0.03)	0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)	-0.04** (0.02)	-0.03 (0.02)	-0.03* (0.02)
Charter % G1	0.02 (0.04)	0.05 (0.03)	-0.04 (0.03)	-0.03 (0.03)	-0.04 (0.03)	-0.04 (0.04)	-0.06* (0.03)	-0.03 (0.03)	0.01 (0.03)	-0.01 (0.03)	0.04 (0.05)	-0.02 (0.03)	0.01 (0.03)
Charter % G2	0.13*** (0.04)	0.06* (0.03)	0.14*** (0.03)	0.01 (0.03)	-0.01 (0.03)	-0.03 (0.03)	0.01 (0.03)	-0.01 (0.03)	-0.04 (0.03)	0.03 (0.03)	0.00 (0.04)	0.04 (0.03)	0.03 (0.04)
Charter % G3	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	0.06 (0.05)	0.05 (0.04)	0.03 (0.04)	0.01 (0.03)	0.02 (0.03)	0.01 (0.04)	-0.00 (0.04)	-0.04 (0.04)	-0.01 (0.04)	-0.02 (0.04)
Charter % G4	-0.02 (0.03)	-0.02 (0.03)	-0.00 (0.02)	0.06** (0.03)	0.08*** (0.02)	0.03 (0.04)	0.02 (0.03)	0.03 (0.03)	0.02 (0.03)	-0.00 (0.03)	0.06* (0.03)	0.01 (0.02)	0.03 (0.02)
Charter % G5	-0.04 (0.03)	-0.02 (0.03)	-0.04 (0.03)	-0.04 (0.03)	-0.01 (0.02)	0.08** (0.03)	0.01 (0.03)	-0.00 (0.03)	0.01 (0.03)	-0.03 (0.03)	-0.04 (0.03)	-0.01 (0.02)	-0.03 (0.03)
Charter % G6	0.04 (0.02)	0.01 (0.03)	0.02 (0.02)	0.01 (0.02)	0.01 (0.02)	-0.03 (0.02)	0.07*** (0.03)	-0.02 (0.03)	-0.04 (0.03)	0.00 (0.03)	-0.02 (0.03)	-0.03 (0.03)	-0.02 (0.02)
Charter % G7	-0.01 (0.02)	0.00 (0.03)	0.03 (0.02)	0.01 (0.02)	0.03 (0.02)	0.03 (0.03)	0.04 (0.03)	0.13*** (0.03)	0.03 (0.03)	-0.02 (0.03)	-0.00 (0.03)	-0.01 (0.03)	0.01 (0.03)
Charter % G8	-0.02 (0.02)	-0.02 (0.03)	-0.04* (0.02)	-0.03 (0.02)	-0.03 (0.02)	-0.01 (0.02)	0.01 (0.03)	0.02 (0.03)	0.13*** (0.03)	0.06** (0.03)	0.05* (0.03)	0.06** (0.03)	0.03 (0.03)
Charter % G9	0.00 (0.02)	-0.00 (0.02)	0.01 (0.02)	0.00 (0.02)	0.01 (0.02)	0.01 (0.02)	0.02 (0.02)	-0.01 (0.02)	0.01 (0.02)	0.13*** (0.02)	0.03* (0.02)	0.04** (0.02)	0.05** (0.02)
Charter % G10	-0.01 (0.02)	0.01 (0.02)	-0.00 (0.02)	0.01 (0.02)	0.00 (0.02)	0.01 (0.02)	0.01 (0.02)	0.02 (0.02)	0.01 (0.02)	-0.02 (0.03)	0.13*** (0.03)	-0.01 (0.03)	-0.00 (0.03)
Charter % G11	-0.02 (0.02)	-0.02 (0.02)	-0.01 (0.02)	-0.01 (0.02)	-0.00 (0.02)	0.00 (0.02)	-0.02 (0.02)	0.03 (0.02)	0.03 (0.02)	0.04* (0.02)	-0.02 (0.03)	0.13*** (0.03)	-0.01 (0.03)
Charter % G12	0.02 (0.01)	0.03* (0.01)	0.01 (0.02)	0.01 (0.02)	0.00 (0.02)	-0.00 (0.02)	0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)	-0.03** (0.01)	-0.03 (0.03)	-0.05** (0.02)	0.07*** (0.03)
State-by-Year FE	X	X	X	X	X	X	X	X	X	X	X	X	X
District FE	X	X	X	X	X	X	X	X	X	X	X	X	X
Covariates	X	X	X	X	X	X	X	X	X	X	X	X	X
Lower-Triangle F (p-value)	.028	.599	.694	.354	.882	.824	.235	.372	.212	.1	.042	.015	.314
Upper-Triangle F (p-value)	.385	.385	.218	.713	.512	.733	.732	.796	.784	.597	.112	.355	.81
R^2	0.86	0.88	0.88	0.86	0.88	0.87	0.85	0.84	0.84	0.82	0.83	0.83	0.81
Total Obs.	35,301	35,450	35,400	35,394	35,405	35,419	35,351	35,347	35,299	35,257	35,182	35,099	34,944

Note: Standard errors are clustered at the district level. Covariates include log population, and the fraction of students that are Black or Hispanic. P-values for F-tests of joint significance of the coefficients in upper and lower triangle of coefficient matrix are reported. These test for significance of strictly lower and higher grades separately, relative to the grade that the model focuses on. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3—: First stage and reduced form estimates

Black or Hispanic	School Districts		Municipalities		Counties		Metro Areas	
	(1) FS	(2) RF	(3) FS	(4) RF	(5) FS	(6) RF	(7) FS	(8) RF
Pred. charter percent	0.585	0.054	0.603	0.053	0.767	0.087	0.886	0.073
	(0.039)	(0.008)	(0.042)	(0.008)	(0.029)	(0.017)	(0.022)	(0.027)
Black	School Districts		Municipalities		Counties		Metro Areas	
	(1) FS	(2) RF	(3) FS	(4) RF	(5) FS	(6) RF	(7) FS	(8) RF
Pred. charter percent	0.584	0.052	0.603	0.042	0.767	0.082	0.885	0.057
	(0.039)	(0.008)	(0.042)	(0.006)	(0.029)	(0.019)	(0.022)	(0.028)
Hispanic	School Districts		Municipalities		Counties		Metro Areas	
	(1) FS	(2) RF	(3) FS	(4) RF	(5) FS	(6) RF	(7) FS	(8) RF
Pred. charter percent	0.585	0.021	0.603	0.029	0.767	0.037	0.885	0.044
	(0.039)	(0.005)	(0.042)	(0.006)	(0.029)	(0.012)	(0.022)	(0.021)
Asian	School Districts		Municipalities		Counties		Metro Areas	
	(1) FS	(2) RF	(3) FS	(4) RF	(5) FS	(6) RF	(7) FS	(8) RF
Pred. charter percent	0.585	0.026	0.603	0.016	0.767	0.012	0.886	0.027
	(0.039)	(0.005)	(0.042)	(0.004)	(0.029)	(0.006)	(0.022)	(0.015)
White	School Districts		Municipalities		Counties		Metro Areas	
	(1) FS	(2) RF	(3) FS	(4) RF	(5) FS	(6) RF	(7) FS	(8) RF
Pred. charter percent	0.585	0.050	0.603	0.050	0.767	0.083	0.885	0.082
	(0.039)	(0.008)	(0.042)	(0.007)	(0.029)	(0.017)	(0.022)	(0.030)
System-Year FE	X	X	X	X	X	X	X	X
System-Grade FE	X	X	X	X	X	X	X	X
State-Grade-Year FE	X	X	X	X	X	X	X	X
Covariates	X	X	X	X	X	X	X	X
N	831,042	831,042	847,078	847,078	554,162	554,162	86,212	86,212

Note: Standard errors are clustered at the school district level in all models. Covariates are log total enrollment and the enrollment share of the group.

Table 4—: The effect of charter schools on the dissimilarity index of segregation, by geography and race/ethnicity

Black or Hispanic	School Districts		Municipalities		Counties		Metro Areas	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.197	0.200	0.173	0.187	0.139	0.158	-0.011	0.017
	(0.015)	(0.020)	(0.015)	(0.018)	(0.026)	(0.031)	(0.034)	(0.038)
Black	School Districts		Municipalities		Counties		Metro Areas	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.235	0.261	0.185	0.201	0.163	0.182	0.118	0.150
	(0.019)	(0.026)	(0.016)	(0.019)	(0.034)	(0.044)	(0.050)	(0.055)
Hispanic	School Districts		Municipalities		Counties		Metro Areas	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.157	0.147	0.141	0.146	0.103	0.111	0.016	0.018
	(0.013)	(0.019)	(0.014)	(0.016)	(0.024)	(0.030)	(0.034)	(0.040)
Asian	School Districts		Municipalities		Counties		Metro Areas	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.230	0.240	0.191	0.213	0.161	0.198	0.119	0.114
	(0.018)	(0.026)	(0.018)	(0.024)	(0.034)	(0.042)	(0.052)	(0.061)
White	School Districts		Municipalities		Counties		Metro Areas	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.190	0.197	0.169	0.185	0.110	0.129	-0.006	0.042
	(0.015)	(0.019)	(0.015)	(0.018)	(0.026)	(0.030)	(0.039)	(0.047)
Dep. Var. Mean	32.69		32.97		43.02		52.35	
System-Year FE	X	X	X	X	X	X	X	X
System-Grade FE	X	X	X	X	X	X	X	X
State-Grade-Year FE	X	X	X	X	X	X	X	X
Covariates	X	X	X	X	X	X	X	X
N	831,042	831,042	847,078	847,078	554,162	554,162	86,212	86,212

Note: Standard errors are clustered at the school system level in all models. Covariates are log total enrollment, number of schools, and the enrollment share of the group. Dissimilarity is defined as $D = \sum_k \frac{p_k |q_k - Q|}{2PQ(1-Q)}$, where k indexes schools, p_k is total school enrollment, q_k is the group share of enrollment at the school, Q is the group share of school system enrollment, and P is total school system population.

Table 5—: Heterogeneity of effect of charters on segregation by district size

Black or Hispanic	Q1		Q2		Q3		Q4	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.053 (0.010)	0.073 (0.021)	0.120 (0.022)	0.123 (0.026)	0.098 (0.018)	0.083 (0.026)	0.106 (0.018)	0.096 (0.019)
Black	Q1		Q2		Q3		Q4	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.034 (0.009)	0.086 (0.022)	0.114 (0.026)	0.131 (0.030)	0.073 (0.016)	0.062 (0.022)	0.067 (0.014)	0.072 (0.018)
Hispanic	Q1		Q2		Q3		Q4	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.023 (0.006)	0.010 (0.013)	0.053 (0.012)	0.051 (0.014)	0.040 (0.008)	0.031 (0.015)	0.055 (0.011)	0.049 (0.012)
Asian	Q1		Q2		Q3		Q4	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.015 (0.008)	0.034 (0.011)	0.023 (0.006)	0.021 (0.008)	0.040 (0.019)	0.039 (0.020)	0.054 (0.009)	0.058 (0.011)
White	Q1		Q2		Q3		Q4	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.058 (0.011)	0.081 (0.018)	0.107 (0.020)	0.112 (0.024)	0.088 (0.017)	0.072 (0.025)	0.087 (0.021)	0.082 (0.022)
Mean LEA Population	2975.38		3953.84		17505.1		119275	
District-Year FE	X	X	X	X	X	X	X	X
District-Grade FE	X	X	X	X	X	X	X	X
State-Grade-Year FE	X	X	X	X	X	X	X	X
Covariates	X	X	X	X	X	X	X	X
R^2	0.866	0.018	0.864	0.021	0.879	0.013	0.944	0.010
N	204,245	204,245	207,615	207,615	208,240	208,240	208,223	208,223

Note: Standard errors are clustered at the school system level in all models. Covariates are log total enrollment, number of schools, and the enrollment share of the group.

Table 6—: Effect of charter schools on district segregation - Gradual addition of fixed effects and other control variables

Black or Hispanic	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) IV
Charter percent	0.1467***	0.1012***	0.0915***	0.0953***	0.0950***	0.0949***	0.0942***	0.0925***
	(0.0160)	(0.0090)	(0.0093)	(0.0093)	(0.0092)	(0.0092)	(0.0091)	(0.0121)
Black	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) IV
Charter percent	0.1202***	0.0715***	0.0753***	0.0768***	0.0766***	0.0766***	0.0733***	0.0882***
	(0.0167)	(0.0078)	(0.0094)	(0.0095)	(0.0094)	(0.0094)	(0.0092)	(0.0122)
Hispanic	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) IV
Charter percent	0.1076***	0.0499***	0.0393***	0.0427***	0.0430***	0.0430***	0.0439***	0.0356***
	(0.0132)	(0.0060)	(0.0049)	(0.0048)	(0.0049)	(0.0049)	(0.0048)	(0.0070)
Asian	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) IV
Charter percent	0.0460***	0.0344***	0.0340***	0.0319***	0.0329***	0.0329***	0.0343***	0.0384***
	(0.0062)	(0.0044)	(0.0058)	(0.0058)	(0.0059)	(0.0059)	(0.0064)	(0.0072)
White	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) IV
Charter percent	0.1348***	0.0932***	0.0817***	0.0868***	0.0864***	0.0863***	0.0853***	0.0851***
	(0.0157)	(0.0087)	(0.0091)	(0.0090)	(0.0090)	(0.0090)	(0.0089)	(0.0116)
Dep. Var. Mean	12.64							
Year FE		X						
District FE		X						
Grade FE		X						
District-Year FE			X	X	X	X	X	X
District-Grade FE			X	X	X	X	X	X
State-Grade-Year FE				X	X	X	X	X
Population Ctrl.					X	X	X	X
Num. Schools Ctrl.						X	X	X
Composition Ctrl.							X	X
R^2	0.017	0.693	0.892	0.901	0.901	0.901	0.902	0.016
N	834,555	834,527	831,059	831,042	831,042	831,042	831,042	831,042

Note: Standard errors are clustered at the school district level in all models.

Table 7—: The effect of charter schools on the Theil's H index of multigroup entropy, by geography

	School Districts		Municipalities		Counties		Metro Areas	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.090	0.092	0.075	0.082	0.083	0.090	0.045	0.059
	(0.007)	(0.009)	(0.007)	(0.009)	(0.018)	(0.022)	(0.022)	(0.028)
Dep. Var. Mean	13.7		13.67		20.46		28.09	
System-Year FE	X	X	X	X	X	X	X	X
System-Grade FE	X	X	X	X	X	X	X	X
State-Grade-Year FE	X	X	X	X	X	X	X	X
Covariates	X	X	X	X	X	X	X	X
N	831,042	831,042	847,078	847,078	554,162	554,162	86,212	86,212

Note: Standard errors are clustered at the school district level in all models. Theil's H index of multi-group entropy index is defined as $H = \sum_k \frac{p_k(E - E_k)}{EP}$ where entropy $E_k = \sum_r \pi_{rk} ln(1/\pi_{rk})$ and π_{rk} is group r's share of enrollment in school k; E is the entropy of the school system; p_k is school enrollment, and P is total system population. See (**?**)

Table 8—: Charter School Effects on Absolute Inter-Group Exposure in Metropolitan Areas

Black	Black		Hispanic		Asian		White	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.040	0.059	-0.043	-0.039	0.016	0.018	0.009	-0.020
	(0.023)	(0.028)	(0.020)	(0.022)	(0.020)	(0.025)	(0.043)	(0.048)
Hispanic	Black		Hispanic		Asian		White	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.029	0.042	0.020	0.018	0.006	0.004	-0.029	-0.050
	(0.018)	(0.018)	(0.016)	(0.019)	(0.007)	(0.008)	(0.029)	(0.032)
Asian	Black		Hispanic		Asian		White	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.009	0.009	-0.029	-0.025	0.031	0.029	0.002	-0.016
	(0.025)	(0.028)	(0.027)	(0.031)	(0.013)	(0.016)	(0.044)	(0.048)
White	Black		Hispanic		Asian		White	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
Charter percent	0.008	0.000	-0.026	-0.036	-0.002	-0.009	0.027	0.046
	(0.008)	(0.009)	(0.012)	(0.016)	(0.006)	(0.006)	(0.012)	(0.017)
Dep. Var. Mean	9.18		16.14		5.22		66.1	
System-Year FE	X	X	X	X	X	X	X	X
System-Grade FE	X	X	X	X	X	X	X	X
State-Grade-Year FE	X	X	X	X	X	X	X	X
Covariates	X	X	X	X	X	X	X	X
N	86,212	86,212	86,212	86,212	86,212	86,212	86,212	86,212

Note: Standard errors are clustered at the metropolitan area level in all models. Covariates are log total enrollment, number of schools, and the enrollment share of the group. Average exposure of group A students to group B in the schools i of a given metro-grade-year is given by $Exp_B^A = \frac{1}{P^A} \sum_i p_i^A * (p_i^B / p_i)$. Where P^A is group A's total population in the metro-grade-year, p_i^A and p_i^B is group A and B total enrollment, and p_i is total enrollment at school i. Reported dependent variable means correspond to white student exposure rates.