

SUPPLEMENT TO “RESEARCH DESIGN MEETS MARKET DESIGN:
USING CENTRALIZED ASSIGNMENT FOR IMPACT EVALUATION”
(*Econometrica*, Vol. 85, No. 5, September 2017, 1373–1432)

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APPENDIX B: EMPIRICAL APPENDIX

B.1. *Data*

THE DENVER PUBLIC SCHOOLS (DPS) analysis file is constructed using application, school assignment, enrollment, demographic, and outcome data provided by DPS for school years 2012–2013 and 2013–2014. All files are de-identified, but applicants can be matched across years and files. Applicant data are from the 2012–2013 and 2013–2014 SchoolChoice assignment files; test score data are from the CSAP (Colorado Student Assessment Program) and the TCAP (Transitional Colorado Assessment Program) files. The CSAP was discontinued in 2011, and was replaced by the TCAP beginning with the 2012–2013 school year. Enrollment, demographic, and outcome data are available for applicants enrolled in DPS only; enrollment data are for October.

Applications and Assignment: The SchoolChoice File

The 2012–2013 and 2013–2014 SchoolChoice assignment files contain information on applicants’ preferences over schools (school rankings), school priorities over applicants, applicants’ school assignments (offers) and lottery numbers, and a flag for whether the applicant is subject to the family link policy described in the text and, if so, to which sibling the applicant is linked. Each observation in the assignment file corresponds to an applicant applying for a seat in programs within schools known as a bucket.¹ Each applicant receives at most one offer across all buckets at a school. Information on applicant preferences, school priorities, lottery numbers, and offers is used to compute the DA propensity score and the simulated propensity score.

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¹Since applicants’ rankings are at the school level but seats are assigned at the bucket level, the SchoolChoice assignment mechanism translates school-level rankings into bucket-level rankings. For example, if an applicant ranked school A first and school B second, and if all seats at both A and B are split into two categories, one for faculty children (“Faculty”) and one for any type of applicant (“Any”), then the applicant’s ranking of the programs at A and B would be listed as 10 for Faculty at A, 11 for Any at A, 20 for Faculty at B, 21 for Any at B, where numbers code preferences (smaller is more preferred).

TABLE B.I
DPS SCHOOLCHOICE APPLICATION RECORDS^a

	All Applicants		In DPS at Baseline	
	Applicants (1)	Types (2)	Applicants (3)	Types (4)
A. 2013				
All applicants	25,687	15,283	15,487	9,018
Applicants for grades 4 through 10	12,507	6,970	10,898	6,245
Applicants to any charters (for grades 4 through 10)	5,669	4,606	4,964	4,124
B. 2014				
All applicants	27,364	17,169	16,558	10,102
Applicants for grades 4 through 10	12,997	7,243	11,413	6,535
Applicants to any charters (for grades 4 through 10)	5,920	4,842	5,239	4,342

^aApplications are for the 2012–2013 and 2013–2014 academic years. Columns 1 and 2 count all applicants in the SchoolChoice assignment file. Columns 3 and 4 exclude applicants not enrolled in DPS in the relevant baseline grade (the grade prior to application grade) in the baseline year (2011–2012 and 2012–2013). Applicants to grade “EC” (early childhood, or pre-kindergarten) are excluded from columns 3 and 4. Columns 2 and 4 count unique combinations of applicant preferences over school programs and school priorities in those programs.

Table B.I describes the construction of the analysis sample starting from all applicants in the 2012–2013 and 2013–2014 SchoolChoice assignment files. Panel A shows, for example, that of a total of 25,687 applicants seeking a seat in DPS in 2012–2013, 5,669 applied for a charter school seat in grades 4 through 10. We focus on applicants to grades 4 through 10 because baseline grade test scores are available for these grades only. We further limit the sample to applicants who were enrolled in DPS in the baseline grade (the grade prior to the application grade) in the baseline year, for whom baseline enrollment demographic characteristics are available.

Enrollment and Demographic Characteristics

Each observation in the enrollment files describes an enrolled student, and includes information on grade attended, student sex, race, gifted status, bilingual status, special education status, limited English proficiency status, and subsidized lunch eligibility.² Demographic and enrollment information are from the first calendar year a student spent in each grade.

CSAP/TCAP Scores

Test scores and proficiency levels for the CSAP/TCAP math, reading, and writing exams are available for grades 3 through 10. Each observation in the CSAP/TCAP data file contains a student’s test results in a particular subject, grade, and year. For each grade, we use scores from the first attempt at a given subject test, and exclude the lowest obtainable scores as outliers. As a result, 41 observed math scores, 19 observed reading scores, and 1 observed writing score are excluded from the sample of charter applicants that are in DPS in the baseline year. After outlier exclusion, score variables are standardized to have mean zero and unit standard deviation in a subject-grade-year in the DPS district.

²Race is coded as black, white, asian, hispanic, and other. In DPS, these are mutually exclusive categories.

School Classification

We classify schools as charters, traditional public schools, magnet schools, innovation schools, contract schools, or alternative schools (i.e., intensive-pathways and multiple-pathways schools) according to the 2012–2013 and 2013–2014 Denver SchoolChoice Parent Guides for Elementary and Middle Schools and High Schools. School classification is by grade, since some schools run magnet programs for a few grades only. Schools not included in the Parent Guide (e.g., SIMS Fayola International Academy Denver) were classified according to information from the school’s website.

B.2. *Additional Tables*

Table B.II reports effects of charter offers on the availability of follow-up data. Table B.III reports statistics for innovation schools analogous to those reported for charter schools in text Table II, combining 2013 and 2014. Table B.IV reports balance tests for innovation school offers analogous to those reported in text Table V for charter offers, as well as estimates of differential attrition by innovation offer status. Table B.V is a version for text Table II for 2014 charter applicants.

TABLE B.II
ATTRITION BY OFFER STATUS^a

	Non-Offered Mean (1)	No Controls (2)	Simulated Score Controls (Hundredths) (3)	DA Score Controls	
				Frequency (Saturated) (4)	Formula (Saturated) (5)
Enrolled in DPS in follow-up year	0.902	0.034*** (0.005)	0.031** (0.014)	0.033** (0.014)	0.033** (0.014)
Has scores in follow-up year	0.878	0.035*** (0.006)	0.033** (0.015)	0.038** (0.015)	0.035** (0.016)
<i>N</i>	5,674	9,879	2,714	2,445	2,404

^aThis table reports coefficients from regressions of DPS enrollment and test-score availability indicators on charter offers, similar to the balance coefficients reported in Table V. The sample includes applicants for 2013 and 2014 charter seats in grades 4–10 who were enrolled in Denver at baseline. Column 1 reports follow-up rates for charter applicants who did not receive a charter offer. The propensity-score control schemes used to construct the estimates in columns 3, 4, and 5 parallel those used for Table V. Robust standard errors are reported in parentheses. For applicants who applied in both years, we only consider their first-time application. *significant at 10%; **significant at 5%; ***significant at 1%.

TABLE B.III
DPS INNOVATION SCHOOLS^a

School	Total Applicants		Applicants Offered Seats		Simulated Score in (0, 1)			
					Total Applicants		Applicants (First Choice)	
	2013 (1)	2014 (2)	2013 (3)	2014 (4)	2013 (5)	2014 (6)	2013 (7)	2014 (8)
<i>Elementary and middle schools</i>								
Centennial ECE-8 School	0	15	0	8	0	0	0	0
Cole Arts and Science Academy	31	46	15	23	10	5	6	3
DCIS at Fairmont	0	27	0	13	0	8	0	6
DCIS at Ford	16	36	0	15	1	8	0	2
DCIS at Montbello MS	412	463	125	157	170	298	68	125
Denver Green School	153	205	62	80	52	73	18	22
Denver Public Montessori	0	95	0	49	0	27	0	10
Godsman Elementary	10	26	8	10	0	0	0	0
Grant Beacon Middle School	0	483	0	203	0	126	0	24
Green Valley Elementary	53	55	15	23	36	24	2	3
Martin Luther King Jr. Early College	427	430	177	144	122	309	0	71
McAuliffe International School	406	584	165	233	113	180	54	104
McGlone	14	44	2	10	3	14	0	5
Montclair Elementary	15	22	11	5	1	1	0	0
Noel Community Arts School	288	385	108	106	106	291	2	54
Swigert International School	0	25	0	0	0	3	0	0
Trevista ECE-8 at Horace Mann	0	90	0	25	0	2	0	0
Valdez Elementary	6	9	3	2	1	1	0	0
West Generations Academy MS	0	192	0	78	0	65	0	10
West Leadership Academy	0	223	0	107	0	64	0	13
Whittier K-8 School	47	83	8	22	4	29	0	5
<i>High schools</i>								
Collegiate Preparatory Academy	433	312	125	53	165	147	0	17
DCIS at Montbello	506	508	125	131	190	233	76	109
High-Tech Early College	481	524	125	199	226	217	74	10
Manual High School	390	412	130	152	197	104	7	16
Martin Luther King Jr. Early College	515	550	144	183	171	270	29	188
Noel Community Arts School	334	406	78	120	110	197	1	57
West Generations Academy	0	111	0	26	0	40	0	0
West Leadership Academy	0	91	0	22	0	28	0	1

^aThis table describes DPS innovation applications in a format like that used for charters in Table II.

TABLE B.IV
 STATISTICAL TESTS FOR BALANCE AND DIFFERENTIAL ATTRITION FOR DPS INNOVATION SCHOOLS^a

	Non-Offered		Simulated Score Controls		DA Score Controls	
			Rounded	Rounded	Frequency	Formula
	Mean	No Controls	(Hundredths)	(Thousandths)	(Saturated)	(Saturated)
	(1)	(2)	(3)	(4)	(5)	(6)
A. Application variables						
Number of schools ranked	4.573	-0.396*** (0.039)	0.129 (0.085)	0.115 (0.092)	0.114 (0.088)	0.033 (0.083)
Number of charter schools ranked	1.251	0.628*** (0.021)	0.117** (0.052)	0.113* (0.060)	0.043 (0.051)	0.017 (0.051)
First school ranked is charter	0.069	0.611*** (0.009)	-0.008 (0.019)	0.005 (0.020)	-0.005 (0.016)	-0.016 (0.012)
B. Baseline covariates						
Origin school is charter	0.126	0.138*** (0.010)	0.019 (0.025)	0.037 (0.030)	0.045 (0.029)	0.027 (0.029)
Female	0.510	-0.007 (0.013)	0.035 (0.033)	0.028 (0.039)	0.004 (0.038)	0.008 (0.037)
Hispanic	0.537	0.108*** (0.013)	0.033 (0.031)	0.052 (0.035)	-0.024 (0.035)	0.006 (0.034)
Black	0.230	-0.049*** (0.010)	-0.008 (0.027)	-0.016 (0.032)	0.013 (0.031)	0.002 (0.030)
Gifted	0.222	-0.071*** (0.010)	0.026 (0.025)	0.018 (0.030)	-0.014 (0.029)	-0.001 (0.028)
Bilingual	0.028	0.009** (0.005)	-0.027** (0.013)	-0.022 (0.015)	-0.035** (0.014)	-0.031* (0.015)
Subsidized lunch	0.763	0.064*** (0.010)	0.007 (0.024)	0.020 (0.026)	0.012 (0.028)	0.011 (0.026)
Limited English proficient	0.288	0.029** (0.012)	0.009 (0.031)	0.020 (0.035)	0.003 (0.034)	0.010 (0.033)
Special education	0.104	0.012 (0.008)	-0.001 (0.019)	-0.004 (0.022)	0.007 (0.022)	0.006 (0.021)
<i>N</i>	2,890	6,127	2,070	1,416	1,070	1,160
Baseline scores						
Math	-0.009	-0.221*** (0.026)	0.052 (0.060)	0.051 (0.071)	-0.012 (0.067)	0.035 (0.065)
Reading	0.019	-0.211*** (0.025)	0.038 (0.059)	0.022 (0.069)	0.006 (0.066)	0.025 (0.066)
Writing	0.009	-0.192*** (0.025)	0.064 (0.058)	0.057 (0.068)	0.007 (0.064)	0.039 (0.063)
<i>N</i>	2,847	6,011	2,034	1,393	1,053	1,137
C. Differential attrition						
Enrolls in Denver in follow-up year	0.927	-0.026*** (0.007)	-0.025 (0.018)	-0.009 (0.023)	-0.023 (0.022)	-0.025 (0.021)
Has scores in follow-up year	0.902	-0.036*** (0.008)	-0.016 (0.020)	-0.004 (0.025)	-0.025 (0.024)	-0.024 (0.023)
<i>N</i>	2,890	6,127	2,070	1,416	1,070	1,160
Risk set points of support			75	114	63	75
Robust <i>F</i> -test for joint significance		331.8	1.02	0.90	0.80	0.49
<i>p</i> -value		0.000	0.428	0.559	0.681	0.947

^aPanels A and B report covariate balance tests for innovation offers in a manner analogous to that used for charter offer balance in Table V. The sample includes applicants for 2013 and 2014 innovation seats in grades 4–10 who were enrolled in Denver at baseline. Panel C tests for attrition in a manner analogous to Table B.II. Robust standard errors are reported in parentheses. For applicants who applied in both years, we use the first application. *p*-values for joint significance tests are estimated with stata's mvreg command. *significant at 10%; **significant at 5%; ***significant at 1%.

TABLE B.V
DPS CHARTER SCHOOLS (2014 APPLICANTS)^a

School	CMO (1)	Simulated Score in (0, 1)				
		Total Applicants (2)	Capacity (3)	Applicants Offered Seats (4)	Total Applicants (5)	Applicants (First Choice) (6)
<i>Elementary and middle schools</i>						
Cesar Chavez Academy Denver		77	76	24	18	9
Denver Language School		12	100	0	0	0
DSST: Byers	Yes	280	156	152	128	45
DSST: Cole	Yes	508	215	205	188	74
DSST: College View	Yes	311	168	163	151	19
DSST: Green Valley Ranch	Yes	905	181	176	386	347
DSST: Stapleton	Yes	827	187	183	224	128
Girls Athletic Leadership School		155	87	73	72	38
Highline Academy Charter School		191	74	12	65	43
KIPP Montbello College Prep	Yes	253	72	64	161	14
KIPP Sunshine Peak Academy	Yes	476	84	75	1	0
Odyssey Charter Elementary		198	30	4	18	8
Omar D. Blair Charter School		375	185	53	138	42
Pioneer Charter School		65	76	13	17	4
SIMS Fayola International Academy Denver		94	37	33	68	18
SOAR at Green Valley Ranch		121	88	5	74	62
SOAR Oakland		58	149	14	7	1
STRIVE Prep—Federal	Yes	605	126	124	308	113
STRIVE Prep—GVR	Yes	416	130	127	279	76
STRIVE Prep—Highland	Yes	243	130	126	58	12
STRIVE Prep—Lake	Yes	310	129	129	114	108
STRIVE Prep—Montbello	Yes	222	70	63	167	39
STRIVE Prep—Westwood	Yes	563	135	133	304	175
Venture Prep		27	8	7	0	0
Wyatt Edison Charter Elementary		60	57	12	18	3
<i>High schools</i>						
DSST: Green Valley Ranch	Yes	764	76	76	259	238
DSST: Stapleton	Yes	480	23	23	130	76
KIPP Denver Collegiate High School	Yes	291	126	110	112	23
SIMS Fayola International Academy Denver		80	27	21	39	12
Southwest Early College		217	48	42	86	14
STRIVE Prep—Excel	Yes	203	140	133	54	1
STRIVE Prep—SMART	Yes	318	153	148	157	145
Venture Prep		137	44	31	65	14

^aThis table describes DPS charter applications for the academic year 2013–2014. Column 1 lists all CMO schools. CMO stands for Charter Management Organization, covering schools in the DSST, STRIVE, and KIPP networks. Column 2 reports the number of applicants ranking each school. Column 3 reports each school's capacity. Column 4 counts the number of applicants who received an offer. Column 5 counts applicants with simulated score values strictly between zero and 1. The simulated score is rounded to 0.001. Column 6 shows the subset of applicants from column 5 who rank each school as their first choice.

Co-editor Liran Einav handled this manuscript.

Manuscript received 3 November, 2015; final version accepted 7 March, 2017; available online 23 March, 2017.