Data Appendix excerpted from: https://www.nber.org/papers/w5888

So the results presented here may be showing evidence of a marginal return for reductions in class size over a range of sizes that are not characteristic of most American schools. On the other hand, while classes as large as those in Israel are not typical in the United States, in 1991 the average eighth grade class size in California was 29 pupils, not dramatically lower than the corresponding Israeli average of 32.[23]

Finally, our study serves to highlight an important methodological point. Hanushek's [1995] widely cited survey of research on school inputs in developing countries shows the same pattern of weak effects reported in his surveys of results for the United States. Like Hanushek, an education survey in *The Economist* [1997] magazine recently interpreted the lack of an association between education inputs and test scores as evidence that school resources have no causal effect on learning. The findings presented here suggest that such conclusions are premature. Observational studies are often confounded by a failure to isolate a credible source of exogenous variation in school inputs. The regression-discontinuity research design overcomes problems of confounding by exploiting exogenous variation that originates in administrative rules. As in randomized trials like the STAR experiment, when this sort of exogenous variation is used to study class size, smaller classes appear beneficial.

DATA APPENDIX

A. 1991 Data (Fifth and Fourth Graders)

A computerized data file from the Central Bureau of Statistics [1991] survey of schools includes 1027 Jewish public (secular and religious) schools with fifth grade pupils, in 2073 (nonspecial education) classes.[24] These data, containing information collected in September, were given to us by the Central Bureau of Statistics. Data on class size collected between March and June, provided by the Ministry of Education, contained records for 2052 of these classes, with information on class size for 2029 of them.

Data on average test scores came in two forms. Ministry of Education programmers provided one file with information on average test scores and numbers of test takers for 1733 of the

23. These figures are from United States Department of Education [1996, p. 107]. Utah, with an average size of 30, had the largest classes in the United States.

24. The relevant Central Bureau of Statistics [1991, p. 67] report indicates that there were 1081 Jewish public elementary schools in 1990–1991, although not all of these have regular (nonspecial education) classes and not all have enrollment in all grades.

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classes (about 85 percent). We also obtained a file that contained average test scores and numbers of test takers for each grade in each school for 1978 of the classes. Among the 296 classes missing class-level average scores, school-level averages were available for all but 5. Since there was never more than one class missing a class-level score, and we know the number of test takers in each school and in each class with nonmissing scores, we were able to impute the missing class-level average for all but the five classes missing both class-level and school-level averages. Finally, the PD index and town ID were added to the linked and imputed class/school data set from a separate Ministry of Education file on schools. The PD index was available for every school in the database.

The construction of the fourth graders' data set follows that of the fifth graders. A computerized file from the Central Bureau of Statistics [1993] survey of schools includes 1039 Jewish public schools with fourth grade pupils, in 2106 (nonspecial education) classes. Data on class size, provided by the Ministry of Education, contained records for 2082 of these classes, with information on class size for 2059 classes.

We were provided with class-level average scores in 1769 of the 2059 fourth grade classes and school-level averages in 2025 of the 2059 classes. Among the 290 classes missing class-level average scores, school-level averages were available for all but 4. Since there was never more than one class missing a class-level score, and we know the number of test takers in each school and in each class with nonmissing scores, we were able to impute the missing class-level average for all but four of the classes missing both class-level and school-level averages. The PD index and town ID were then added as with the fifth graders.

We checked the imputation of class-level averages from school averages by comparing the school and class averages in schools with one class and by comparing the imputed and nonimputed data. School and class-level averages matched almost perfectly in schools with one class. We were unable to detect any systematic differences between schools that were missing some class-level data and the schools that were not. The empirical findings are not sensitive to the exclusion of the imputed class-level averages.

B. 1992 Data (Third Graders)

Construction of the third graders data set differs from the construction of the fourth and fifth graders data sets because we

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were provided with micro data on the test scores of third grade pupils. As with the fourth and fifth graders, we began with the Central Bureau of Statistics [1993] survey of schools. This includes 1042 Jewish public schools with third grade pupils in 2193 (nonspecial education) classes. Data on class size, provided by the Ministry of Education, contained records with information on class size for 2162 of these classes.

We used micro data on the test scores of third graders to compute average math and reading scores for each class. Score data were available for 2144 of the 2162 classes with class size information in the CBS survey of schools. Finally, we added information on the PD index and town identities from a Ministry of Education file containing information on schools. There was no information on the PD index for 34 of the 2144 classes with data on size and test scores, so that the third grade sample size is 2111. This is probably because new schools would not have had a PD index assigned at the time data in our school-level file were entered into the record-keeping system.

APPENDIX 1: DESCRIPTIVE STATISTICS WEIGHTED BY CLASS SIZE

			Quantiles				
Variable	Mean	S.D.	0.10	0.25	0.50	0.75	0.90
A. Full sample							
5th grade (2019 classes, 1002 schools, tested in 1991)							
Class size	31.4	6.0	23	27	32	36	39
Enrollment	83.0	38.8	37	55	78	107	134
Percent disadvantaged	13.1	12.6	2	4	9	17	32
Reading size	28.6	6.2	20	25	29	33	36
Math size	29.0	6.3	21	25	29	34	37
Average verbal	74.7	7.4	64.7	70.5	75.6	79.9	83.3
Average math	67.7	9.4	55.6	61.9	68.1	74.4	79.6
4th grade (2049 classes, 1013 schools, tested in 1991)							
Class size	31.6	5.8	23	28	32	36	39
Enrollment	82.9	37.5	36	56	78	106	131
Percent disadvantaged	13.1	12.6	2	4	9	17	32
Reading size	28.8	6.2	20	25	29	33	36
Math size	29.2	6.2	21	25	30	34	37
Average verbal	72.7	7.7	62.4	67.9	73.6	78.2	81.9
Average math	69.2	8.5	58.4	64.0	70.0	75.1	79.4

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DESCRIPTIVE STATISTICS WEIGHTED BY CLASS SIZE

Variable	Mean	S.D.	Quantiles 0.10	0.25	0.50	0.75	0.90
3rd grade (2111 classes, 1011 schools, tested in 1992)							
Class size	31.8	5.7	24	28	33	36	39
Enrollment	83.6	36.9	40	57	78	108	131
Percent disadvantaged	13.1	12.7	2	4	9	17	33
Reading size	25.4	5.1	18	22	26	29	32
Math size	25.6	5.1	19	22	26	30	32
Average verbal	86.4	5.9	78.8	83.2	87.3	90.7	93.0
Average math	84.2	6.7	75.3	80.4	84.8	89.0	91.9

B. +/− 5 Discontinuity sample (enrollment 36–45, 76–85, 116–124)

	5th grade		4th grade		3rd grade	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
	(471 classes, 224 schools)		(415 classes, 195 schools)		(441 classes, 206 schools)	
Class size	32.6	7.0	32.8	6.8	32.3	6.9
Enrollment	80.4	29.3	82.2	29.7	78.8	27.5
Percent disadvantaged	12.4	12.2	12.4	12.0	13.6	13.8
Reading size	29.7	7.0	29.9	7.4	25.8	6.1
Math size	30.2	7.1	30.3	7.3	26.0	6.2
Average verbal	74.9	7.8	72.7	7.7	86.4	6.0
Average math	67.7	9.9	69.0	8.8	84.4	6.7

Variable definitions are as follows: Class size = number of students in class in the spring, Enrollment = September grade enrollment, Percent disadvantaged = percent of students in the school from "disadvantaged backgrounds," Reading size = number of students who took the reading test, Math size = number of students who took the math test, Average verbal = average composite reading score in the class, Average math = average composite math score in the class.

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