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Evaluating the Impact of Charter Schools on Student Achievement:
A Longitudinal Look at the Great Lakes States

Appendix E

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Appendix E
Student Achievement in Minnesota Charter Schools

Minnesota is renowned for passing the nation's first charter school law in 1991. This state has also been the focus of a number of charter school studies, although few of them have addressed the relative performance of the charter schools on standardized tests. A state evaluation of the charter school reform in 1998 contained some findings on student performance in charter schools. Unfortunately, data was only available for only a small number of schools and no comparison groups were considered. Essentially, the evaluators found that most charter schools were scoring below the 50th percentile on norm-referenced tests.[1] Loveless' (2003) study of charter performance across 10 states found that in Minnesota 33 percent of charter schools were failing as compared with 13 percent failure of all traditional public schools using the state's criteria for failure.[2]

Minnesota currently has close to 140 charter schools serving more than 22,000 students. Charter schools account for 2.6 percent of all public school enrollments in Minnesota. Minnesota's charter school reform has exhibited a relatively even pace of growth over the years.

Minnesota is generally seen to have a relatively permissive charter school law. The Center for Education[3] has consistently rated Minnesota's law as one of the least restrictive laws in the nation because multiple authorizers are permitted (e.g., local and intermediate school boards, public and private postsecondary institutions, and the state board of education, upon appeal). Also, there are no caps on the number of schools or students allowed in charter schools. Finally, conversions are permitted for both public and private schools.

Minnesota does not forbid for-profit education management organizations (EMOs), although they are not permitted to hold the charter contract. Relatively few EMOs are operating in the state.

Chi and Welner (in press)[4] suggested an alternative framework for rating and ranking charter school laws that places more emphasis on rigor of oversight, accountability, and measures to promote/ensure equity in access. According to their review, Minnesota's law was deemed to be rather strong and positive and was therefore ranked fifth among the 41 state charter school laws they reviewed.

Data Sources, Outcome Measures, and Methods for Analysis

We obtained demographic variables from the Common Core of Data at the National Center for Education Statistics (NCES).[5] These include variables covering school enrollment, ethnicity, free and reduced lunch, and urbanicity or locale. A variable designating whether or not a school was a charter school or traditional public school was used from this data set to distinguish the charter schools in the state. Student achievement

test results, special education enrollment, and limited English proficiency enrollment data were obtained from the Minnesota Department of Education Web site.[6]

The outcome measure we used for our analyses was the percentage of students who met or exceeded state standards on the Minnesota Comprehensive Assessments (MCA). Scale scores were available, but several schools did not have average scale scores reported. Had we used the scale score instead of cut score, close to 20 percent of the charter schools would have been dropped from the analysis. For this reason, we used the cut scores. The cut scores are divided across four categories: (1) does not meet standards, (2) partially meets standards, (3) meets standards, and (4) exceeds standards.

The MCA was administered to students in grades 3, 5, 7, 10, and 11. Data on these grades are available from 1998 until 2005. Starting in the 2005-06 academic year, a new version of the MCA (i.e., MCA-II) was rolled out for grades 3-8 and 11. Our analyses focused on math and reading from 2001-02 to 2005-06. This provided five-year trends for the test data for the elementary grades and three-year trends for grades 7, 10, and 11 where data were available only for 2003-04 through 2005-06.[7] Table 1 illustrates the range of grades, years, and subjects included in our analyses.

Table 1. Test Data Used in Analyses, by Year, Grade, and Subject

	2001-02	*2002-03*	*2003-04*	*2004-05*	*2005-06*
Grade 5	Reading Math	Reading Math	Reading Math	Reading Math	Reading Math
Grade 7			Reading Math	Reading Math	Reading Math
Grade 10			Reading	Reading	Reading
Grade 11			Math	Math	Math

Variables Used to Create the Predicted Values for Each School

In terms of the demographic variables required for the regression analyses, the data set we created for Minnesota was relatively complete compared to the other states in the study. No imputation of missing values was conducted, although in a number of instances schools were dropped from specific analyses because they had too few test takers (test results in Minnesota are not reported if there are fewer than 10 test takers in a specific group). For example, in the 2005-06 analyses, only 38 out of 55 schools had test data for grade 5; 32 of 47 schools had test data for grade 7; and 48 of 60 schools had test data for grade 11. This meant that between 20 and 30 percent of the schools had to be excluded because their test results were not reported.   This may represent a bias in the data, since many of the small schools were excluded. In a very few cases, a school was dropped from specific analyses because it did not have complete demographic data available. Table 2 displays the variables used in developing the residual gain score analysis for Minnesota.

Table 2. Variables Included in Residual Gain Score Analysis for Minnesota

Variable	*Description*
Percentage passing (dependent variable)	Percentage of students meeting or exceeding state standards on the Minnesota Comprehensive Assessments
Percentage minority	Percentage of nonwhite and non-Asian American students enrolled at the school i
Percentage low income	Percentage of students in school i receiving free or reduced lunch
Percentage special education	Percentage of students in school i with disabilities
Percentage limited English proficient	Percentage of students in school i classified as limited English proficient
Urbanicity (Locale)	Rating from 1-8 indicating population density

Table 3 and Figure 1 illustrate our findings across all schools. "Actual" scores are simply the observed school-level score (i.e., the percentage of students meeting or exceeding state standards) for each grade and subject specific test. The predicted values were created using an ordinary least squares (OLS) multiple regression procedure, in the form of this linear equation included below:

$$Y_i = a + b_1\,MINORITY_i + b_2 LOWINCOME_i + b_3 SPED_i + b_4 LEP_i + b_5 URBANICITY_i + \varepsilon_i$$

The variables included in the regression analysis are described in Table 2. Essentially, the predicted values indicate how the school is expected to score based on how other schools in the state with similar demographics have performed on the same test.

The residual is the difference between the actual score and the predicted score. If the residual score is negative, then the school is doing worse than expected. If the residual score is positive, the school is performing better than expected.

The rows in the tables contain the average annual change scores, which indicate the relative direction in which the school's performance is moving. For example, a school may have all negative residual scores; but if it is becoming less negative over time, the average annual change score will be a positive number. The average annual change score is computed for patterns of actual, predicted, and residual scores across time by subtracting the first score from the most recent and dividing by the number of observations (e.g., years) minus 1.

It is important to note that the results in Table 3 and Figure 1 are aggregate results across all charter schools with available data. When calculating the aggregate results, we weighted the data by the relative number of test takers per school. For example, if a large school has extremely positive results, it will carry more weight than a small school with less positive results.

Table 3. Minnesota Aggregate Results by Grade, Subject, and Year

| School Name	Year	Math					Reading				
		Schools	Students	Actual	Predicted	Residual	Schools	Students	Actual	Predicted	Residual
Grade 5	2002	26	615	38.37	52.13	-13.76	26	619	46.69	56.34	-9.66
	2003	30	744	47.18	58.85	-11.68	31	756	51.46	61.81	-10.35
	2004	34	875	50.86	58.56	-7.70	34	876	53.65	58.92	-5.27
	2005	41	1068	56.27	65.54	-9.27	40	1036	59.65	66.65	-7.00
	2006	43	1123	35.17	42.53	-7.36	38	870	59.08	64.61	-5.53
Average annual change				-0.80	-2.40	1.60			3.10	2.07	1.03
Grade 7	2002										
	2003										
	2004	25	712	48.59	53.19	-4.60	25	707	54.93	56.45	-1.52
	2005	30	947	63.78	66.14	-2.36	30	936	63.99	65.13	-1.13
	2006	32	1023	47.21	48.65	-1.44	32	894	59.17	60.91	-1.73
Average annual change				-0.69	-2.27	1.58			2.12	2.23	-0.10
Grade 10 Reading **Grade 11 Math**	2002										
	2003										
	2004	37	966	38.51	44.52	-6.01	35	929	55.44	55.20	0.24
	2005	40	1026	44.74	48.76	-4.02	45	1280	59.22	60.16	-0.94
	2006	48	1290	10.54	14.73	-4.19	45	1138	47.10	45.67	1.43
Average annual change				-13.98	-14.89	0.91			-4.17	-4.76	0.60
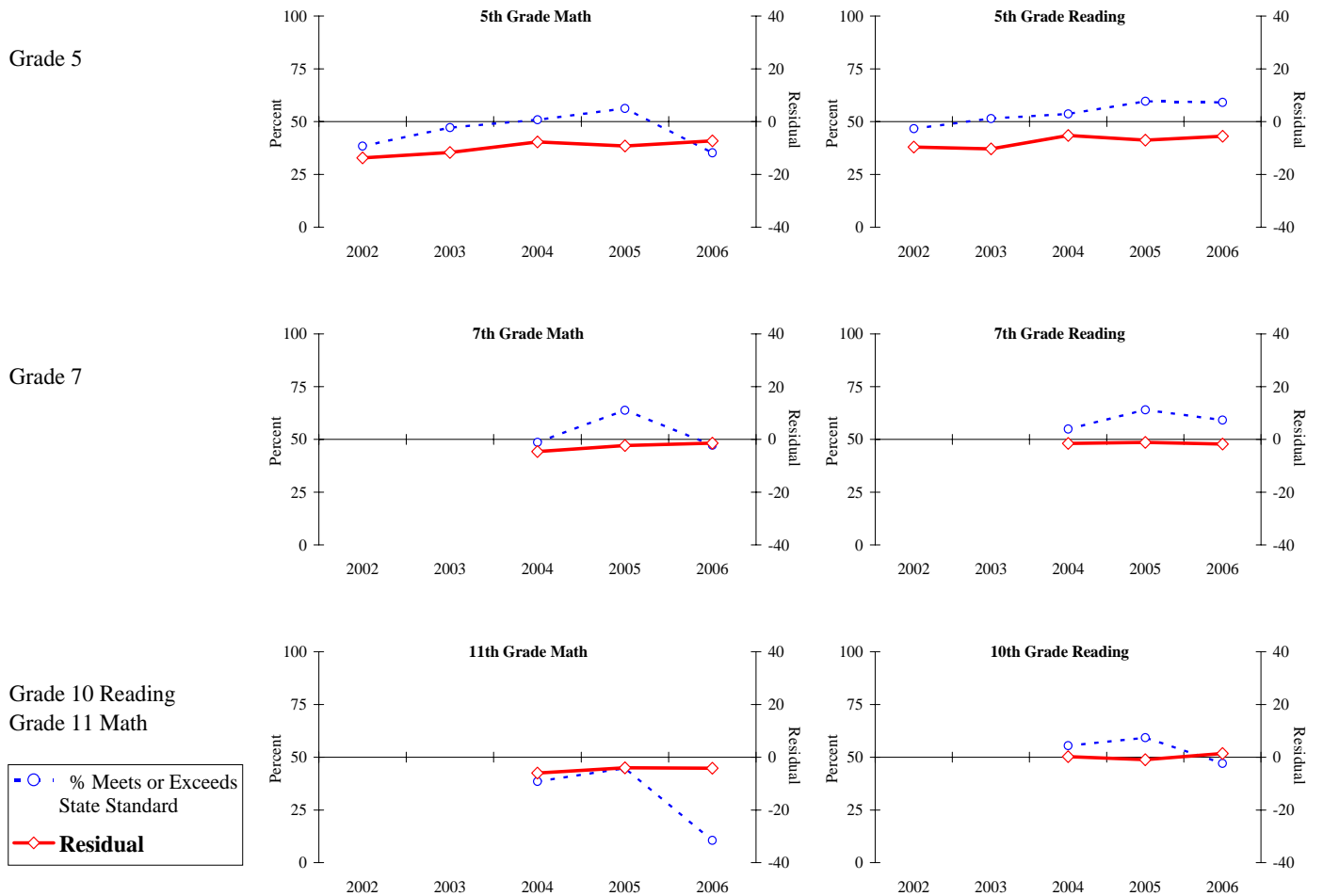
Figure 1. Minnesota Aggregate Results: Residual Scores and Percent Meeting State Standards

Actual Performance and Residual Gains for All Charter Schools

The data and charts in Table 3 and Figure 1 illustrate the overall results aggregated for all Minnesota charter schools from 2001-02 to 2005-06 for grade 5. The results for grades 7, 10, and 11 are limited to three years, since these are the only years in which consistent and comparable test data could be gathered for these grades and subjects.

The dashed line in the charts in Figure 1 indicates the proportion of students that meet or exceed state standards. Based on these trend lines, we see that typically between 44 and 60 percent of the students in charter schools are meeting state standards. This is noticeably lower than the state average, which is typically near or above 70 percent. Figure 2 illustrates the statewide trend in terms of percentage of students meeting or exceeding state standards in math and reading. Nevertheless, one should be cautious in comparing charter schools to the state average since the state results include a large portion of schools that are not similar in terms of student demographics to charter schools. Our residual gains analyses, however, create demographically similar comparison groups.
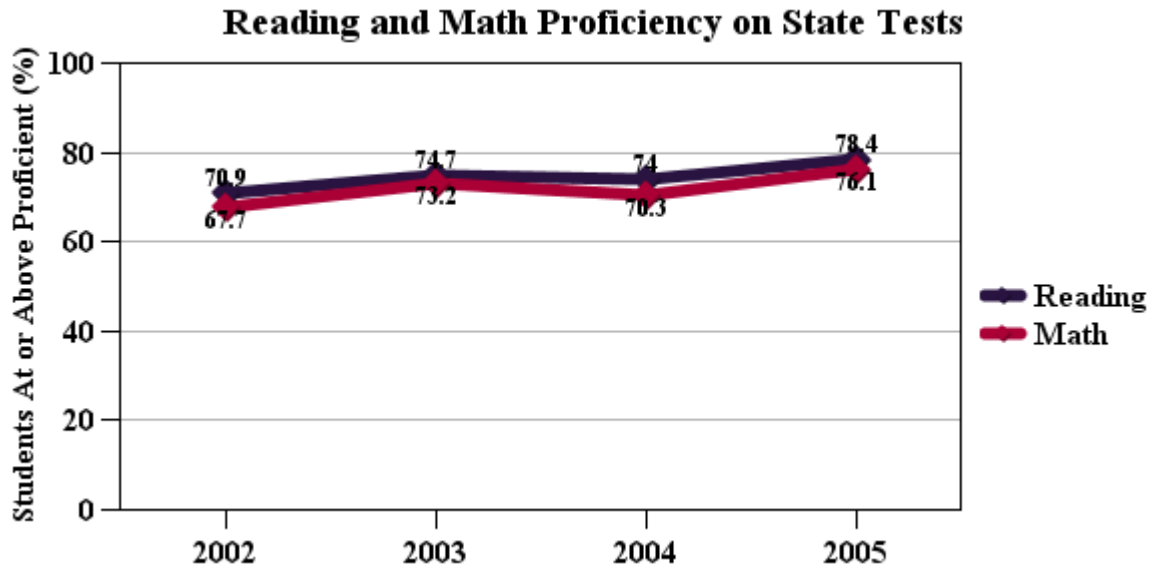

Figure 2.   Performance on MCA from 2002-2005[8]

Actual Performance and Residual Gains for Same Cohort of Schools

As indicated in Table 3, from 7 to 19 charter schools were added to the aggregate results between 2002 and 2006. Therefore, changes in aggregate results may be due to the inclusion of new schools. To control for this, we tracked a subset of the same charter schools that had test data available for all years. The results from these aggregate results for cohorts of the same schools are illustrated in Table 4 and Figure 3.

Table 4. Minnesota Results from Cohorts of Same Schools Tracked Over Time

| School Name	Year	Math					Reading				
		Schools	Students	Actual	Predicted	Residual	Schools	Students	Actual	Predicted	Residual
Grade 5	2002	19	468	39.53	51.29	-11.76	19	468	47.65	55.10	-7.45
	2003	19	484	47.11	57.18	-10.08	19	484	50.62	60.30	-9.68
	2004	19	535	50.28	56.84	-6.56	19	538	52.79	57.25	-4.46
	2005	19	573	53.40	61.27	-7.87	19	565	57.35	62.65	-5.31
	2006	19	613	28.87	38.23	-9.36	19	490	55.71	59.53	-3.82
Average annual change				-2.66	-3.26	0.60			2.02	1.11	0.91
Grade 7	2002										
	2003										
	2004	17	587	54.17	55.78	-1.61	17	582	61.22	58.73	2.50
	2005	17	664	62.95	63.88	-0.93	17	660	63.48	63.03	0.45
	2006	17	647	48.38	46.63	1.74	17	556	60.43	59.95	0.48
Average annual change				-2.90	-4.57	1.68			-0.40	0.61	-1.01
Grade 10 Reading Grade 11 Math	2002										
	2003										
	2004	28	61	58.22	2.42	-6.01	28	929	55.44	55.20	0.24
	2005	28	67	64.18	2.37	-4.02	28	1280	59.22	60.16	-0.94
	2006	28	48	44.87	2.95	-4.19	28	1138	47.10	45.67	1.43
Average annual change				-6.68	0.27	0.91			-4.17	-4.76	0.60
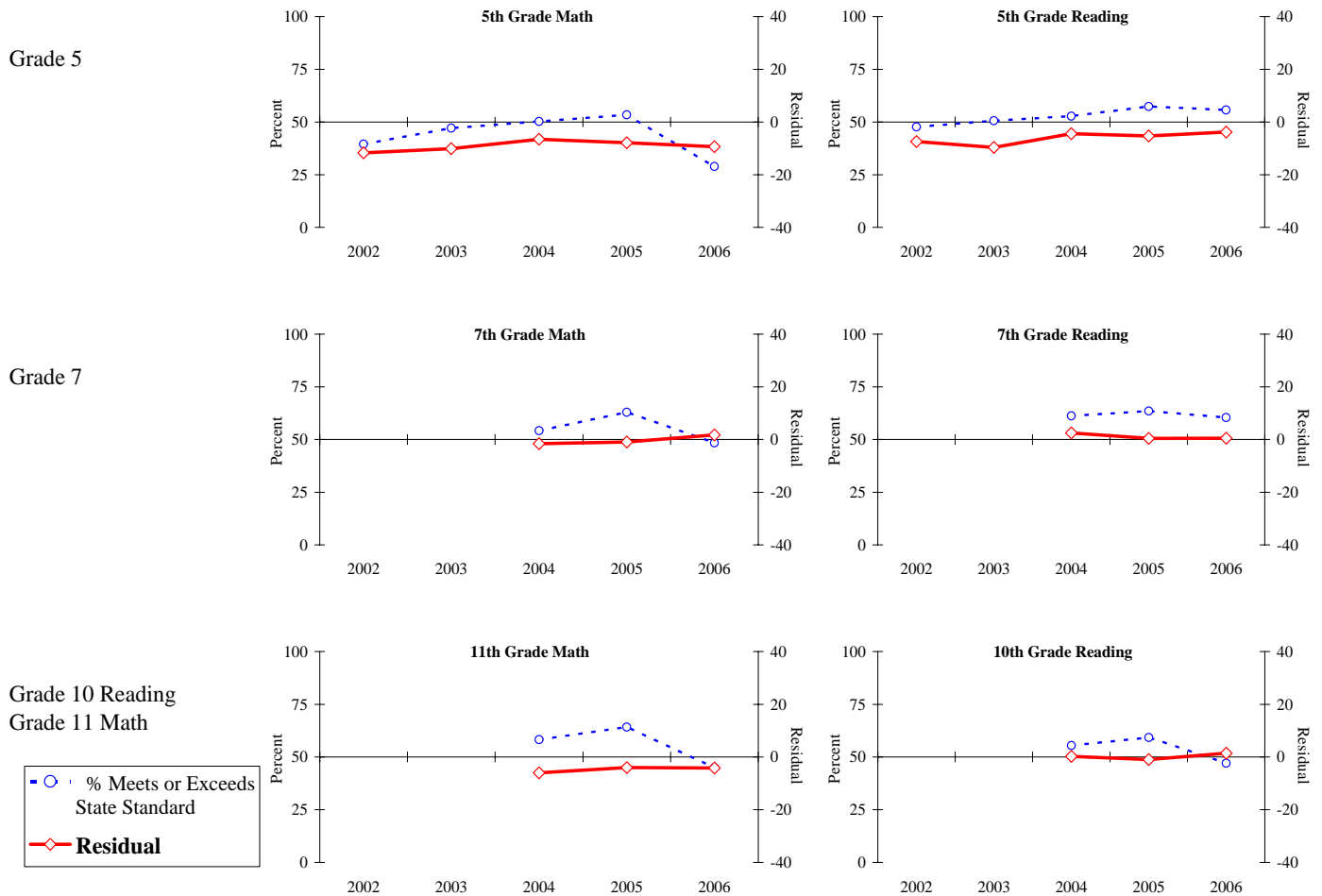
Figure 3. Minnesota School Cohort Results: Residual Scores and Percent Meeting State Standards

We were able to track between 17 and 28 schools in each of the cohorts. The results in Table 4 and Figure 3 are "flatter" and show less change over time. The actual performance levels illustrate that the schools consistently have between 30 and 60 percent of their students meeting or exceeding state standards. Overall results for grade 5 were consistently lower than for the other grades. The solid red line indicates the residuals, which are consistently negative at grade 5 but are close to "0" for grades 7 and 10. The math results at grade 11 are consistently lower than predicted, but show incremental improvements over time.

Summary of Findings from Minnesota

The evaluation questions in this study were (1) How does student achievement in charter schools compare to demographically similar public schools? (2) Are charter schools an effective strategy for improving student achievement over time? Results for these two questions are summarized in Tables 5 and 6, respectively. Table 5 presents a cross-sectional comparison of six mean test residuals (one for each grade and subject specific test included in the analyses) for Minnesota charter schools using the most recent year of available data. Results revealed 93 instances in which charter school residuals are positive (i.e., student achievement is higher than expected) and 145 instances in which they are negative (i.e., student achievement is lower than expected). In total, that means that only 39 percent of the comparisons favored charter schools.

Table 5. Cross-Sectional Comparison Test Residuals by Grade for Charter Schools Using the Most Recent Year of Available Data

	Grade 5 Math	*Grade 5 Reading*	*Grade 7 Math*	*Grade 7 Reading*	*Grade 11 Math*	*Grade 10 Reading*	Totals
# Schools with Positive Residuals	13	15	13	13	19	20	93
# Schools with Negative Residuals	30	23	19	19	29	25	145

Table 6 presents a comparison of the average annual change in test residuals by grade for Minnesota charter and cohort charter schools over five years. Results revealed that the residuals for charter schools overall increased by 0.94 and residuals for charter school cohorts increased by 0.61. This means that over a five-year period, the trend in student achievement is indicates a very small and incremental improvement.

Table 6. Comparison of Average Annual Change in Test Residuals by Grade for All Charter Schools and a Cohort of Same Charter Schools Over Five Years

	Grade 5 Math	*Grade 5 Reading*	*Grade 7 Math*	*Grade 7 Reading*	*Grade 11 Math*	*Grade 10 Reading*	*Mean AAC across all tests*
Average Annual Change in Residual Scores for All Schools with Available Data	1.60	1.03	1.58	-0.10	0.91	0.60	0.94
Average Annual Change in Residual Scores for Cohort of Same Schools	0.60	0.91	1.68	-1.01	0.91	0.60	0.61

As the results in this section reveal, Minnesota's charter schools are not performing better than demographically similar schools. Rather, the charter schools in Minnesota are performing at levels that are similar to or slightly worse than demographically similar noncharter public schools. Although the charter schools in Minnesota do not trail by much, when we looked at a cohort of the same schools over time, we found the charter schools results were largely flat over time, although there was an average annual improvement of 0.6 residual points.

Compared with the other states in the study, the current performance of Minnesota charter schools on state assessments is similar to the other Great Lakes states, although it has showed less growth over time.

Notes and References

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