

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

Appendix D

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Appendix D

Student Achievement in Michigan Charter Schools

The Michigan charter school law was approved in 1993. Given that there were multiple authorizers and given pressure applied—and incentives provided—by the governor,¹ the number of charter schools increased rapidly until 1999 when the state cap on university-sponsored charter schools was met. Since 2000, the growth in the number of charter schools has slowed considerably. Currently, around 220 charter schools are reportedly operating. These schools enroll more than 82,000 students which accounts for approximately 4.6 percent of all public school students in the state.

Aside from the cap on university-sponsored charter schools, the Michigan charter school law is generally seen to be among the least restrictive. The Center for Education Reform consistently rates Michigan's charter school law among the most permissive.² Chi and Welner (in press)³ rated Michigan as one of the weakest charter school laws, because of issues related to equity of access, accountability, and proliferation of private interests. Michigan's charter school reform is unique in that three-quarters of its charter schools are operated by for-profit education management organizations. Michigan is also somewhat unique in that the average size of charter schools is approaching the average size of traditional public schools.

Because of the large number of charter schools operating in the state in the 1990s, Michigan became the focus of a number of studies that examined student achievement in charter schools. All of the independent studies found charter schools to be performing at levels that were lower than comparison groups. Eberts and Hollenbeck (2002), for instance, found that Michigan charter schools scored between 2 and 4 percent lower than comparable host districts on the state assessment tests.⁴ Miron and Nelson (2002) found that charter school trends in performance were either indistinguishable from or lower than those of their host districts in all grades and areas except fifth grade science.⁵ Similarly, Bettinger (1999) reported generally negative findings; however, he found some evidence that charter schools had moved some students out of the "low" category on the state examination.⁶ In a more recent Michigan Department of Education (2006) report to the legislature, an analysis of 2005 test results indicated that charter schools has scores that were lower overall than non-charter public schools in both English Language Arts and Mathematics, however, the charter schools had slightly higher proficiency rates than 18 urban host districts.⁷

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).⁸ 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 and special education enrollment data were obtained from the Michigan Department of Education Web site.⁹ Since special education was only reported at the district level, we assigned each district value to all schools within the district. Since charter schools are their own districts, the special education data reported for them were actually building or school level data. Unfortunately, it was not possible to obtain school level data regarding limited English proficiency. Therefore, we were not able to include this variable in the regression analyses.

The outcome measure we used for our analyses was the percentage of students who met or exceeded state standards on the state assessment (Michigan Educational Assessment Program—MEAP). Although the state now tests students at grades 3-8, and 11, we selected grades 4 and 7, 8, and 11 for our analyses since these were the only grades in which we could track trends on the math and reading assessment for 5 or more years.¹⁰ We were fortunate to have access to the most recent results from the state test administered in the autumn of 2006. Working backwards from there we selected the 2002-03 to 2006-07 academic years in order to establish 5 years trends. 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

	<i>2002-03</i>	<i>2003-04</i>	<i>2004-05</i>	<i>2005-06</i>	<i>2006-07</i>
Grade 4	Reading Math	Reading Math	Reading Math	Reading Math	Reading Math
Grade 7	Reading	Reading	Reading	Reading	Reading
Grade 8	Math	Math	Math	Math	Math
Grade 11	Reading Math	Reading Math	Reading Math	Reading Math	Reading Math

Variables Used to Create the Predicted Values for Each School

The data sets we created for Michigan were rather complete in terms of student achievement data but not as complete in terms of demographic variables. However, given that we had relatively large numbers of schools to track over time, we did not seek to impute missing demographic values. This means that a number of schools that have not reported data, such as the proportion of students qualified for free or reduced lunch, are dropped from the analyses. One exception to this was the 2006-07 demographic data.

Although we were able to obtain very recent test data from the autumn of 2006, the corresponding demographic variables will not be available until the summer of 2007. Our preference was to establish the 5 year trend of data including 2006-07, since the alternative was to start the trend in 2001-02 which was a year with noticeably more missing data on ethnicity and free and reduced lunch status. Rather than impute values on demographic variables for the 2006-07 school year, we simply used the 2005-06 variables on percent minority and percent low-income in the regression models for 2006-07. As noted earlier in the report, the quality and completeness of data on both student achievement and demographics has been improving dramatically with each passing year.

This trade-off allowed us to include the most recent year of test data and exclude an earlier year when the data was less complete. However, this represents a compromise in the methodology and a potential limitation, especially if the demographic composition of the charter schools has shifted between 2005-06 and 2006-07. Table 2 displays the variables used in developing the residual gain score analysis for Michigan.

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

<i>Variable</i>	<i>Description</i>
Percentage passing (dependent variable)	Percentage of students meeting or exceeding state standards on the Michigan Educational Assessment Program (MEAP) tests
Percentage minority	Percentage of nonwhite and non-Asian American students enrolled at the school <i>i</i>
Percentage low income	Percentage of students in school <i>i</i> receiving free or reduced lunch
Percentage special education	Percentage of students in school <i>i</i> with disabilities
Urbanicity (Locale)	Rating from 1-8 indicating population density

Actual Performance and Residual Gains for All Charter Schools

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 level test. The predicted values were created using an ordinary least squares (OLS) multiple regression procedure, in the form of this linear equation included below:

$$Y_i = a + b_1 MINORITY_i + b_2 LOWINCOME_i + b_3 SPED_i + b_4 URBANICITY_i + \epsilon_i$$

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.

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

School Name	Year	Math					Reading				
		Schools	Students	Actual	Predicted	Residual	Schools	Students	Actual	Predicted	Residual
Grade 4	2003	136	6,409	44.81	56.48	-11.67	135	6,380	56.07	65.46	-9.39
	2004	144	6,668	55.44	64.78	-9.34	145	6,634	65.54	72.45	-6.91
	2005	160	7,131	56.44	63.61	-7.17	159	7,018	70.75	73.52	-2.78
	2006	161	7,800	68.51	72.40	-3.89	158	7,601	72.86	76.91	-4.05
	2007	164	8,201	74.25	75.90	-1.65	162	8,004	76.92	78.80	-1.87
Average annual change				7.36	4.85	2.51			5.21	3.33	1.88
Grade 7 Reading Grade 8 Math	2003	104	4,189	31.44	39.10	-7.66	113	5,197	44.88	48.78	-3.91
	2004	116	4,895	47.23	46.96	0.27	120	5,643	48.02	50.35	-2.34
	2005	121	5,122	46.73	48.63	-1.90	127	6,089	62.06	63.62	-1.56
	2006	126	5,961	46.09	48.68	-2.59	131	6,789	65.85	66.72	-0.87
	2007	129	6,535	52.45	53.98	-1.53	140	7,438	70.42	70.61	-0.19
Average annual change				5.25	3.72	1.53			6.38	5.46	0.93
Grade 11	2002	39	1,103	38.53	45.75	-7.22	37	1,056	52.18	58.17	-5.99
	2003	37	1,218	38.75	43.29	-4.54	35	1,183	56.33	54.71	1.62
	2004	38	1,347	40.24	32.79	7.45	39	1,357	65.67	55.76	9.91
	2005	42	1,703	31.29	36.06	-4.77	43	1,696	66.22	66.52	-0.29
	2006	50	2,237	27.76	36.23	-8.47	53	2,266	56.09	60.49	-4.40
Average annual change				-2.69	-2.38	-0.31			0.98	0.58	0.40

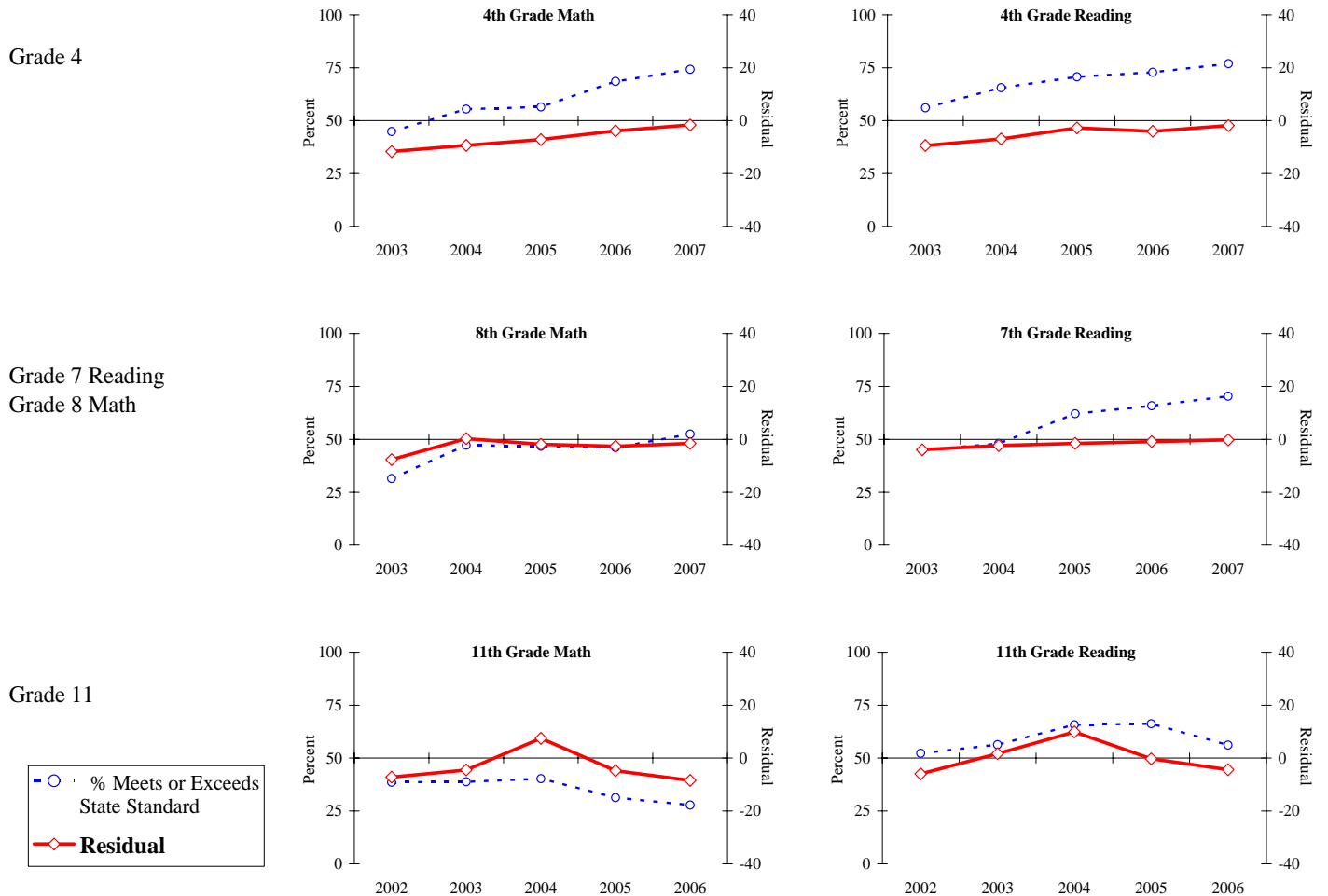


Figure 1. Michigan Aggregate Results: Residual Scores and Percent Meeting State Standards

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 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.

The findings illustrated in the charts contained in Figure 1 are for the aggregate of all Michigan charter schools. The dashed line in the charts indicates the actual proportion of students that meet or exceed state standards. Based on these trend lines, we see that typically between 35 and 75 percent of the students in charter schools are meeting state standards. The results are much more positive at the elementary school level, and progressively less positive at grades 7, 8, and 11.

Overall the charter school results are still noticeably lower than state averages. Figure 2 illustrates the statewide trend in terms of percentage of students meeting or exceeding state standards in math and reading. Nevertheless, state figures should not be used to evaluate charter schools, since the state results include a large portion of schools that are not similar to charter schools in term of student demographics. Our residual gains analyses, however, create demographically similar comparison groups for each and every charter school.

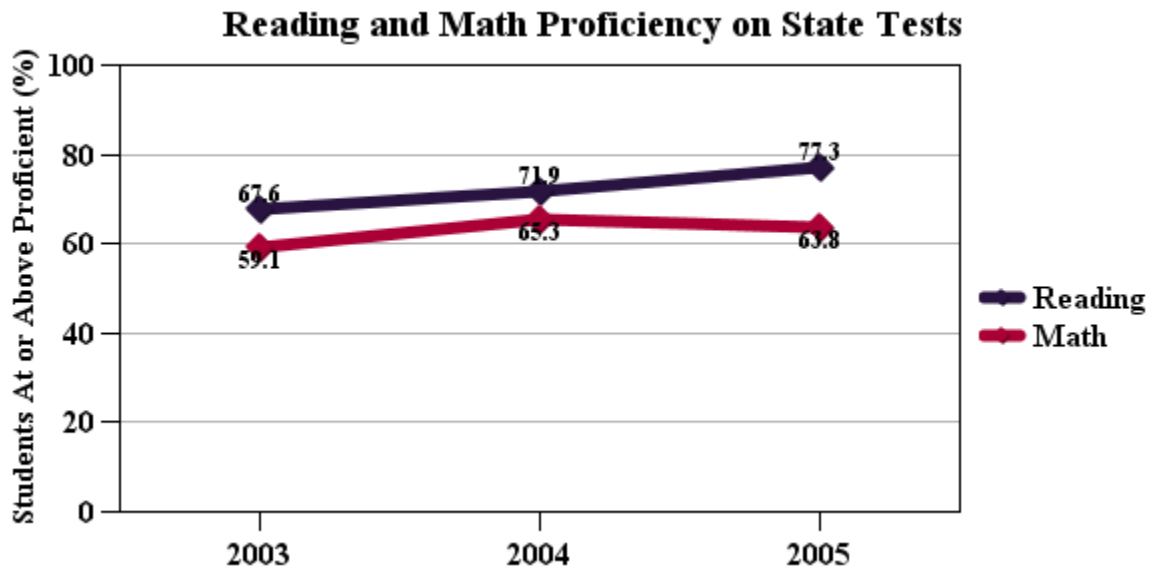


Figure 2. Performance on MEAP Tests from 2003-2005¹¹

Actual Performance and Residual Gains for Same Cohort of Schools

The number of schools and the number of students included in each set of results are clearly indicated in Table 3. Note that the number of schools in the analyses fluctuates considerably from year to year. The reason for this is because of the differences in the completeness of available data for the charter schools. In some years, as many as 164 schools have complete data and a sufficient number of test takers at grade 4 required to have the data publicly reported. In other years, the number of schools with valid test data at grade 4 was as low as 125. Another reason for the change in the number of schools included is the addition of new schools, or the exclusion of schools when they are closed. Even with the cap on state university sponsors in place, Michigan continues to add new charter schools; most are chartered by Bay Mills Community College. An increasing number of charter schools are also opening additional buildings under the same charter which has also promoted growth in the number of charter schools. Sometimes, these new buildings (that receive a unique state school code) are at the same site as the original charter school, and sometimes they are miles apart.

To control for the possibility that differences in results over time are due to changes in the schools included in the analyses, we tracked a subset of the same charter schools that had test data available over five years. At grade 4, this cohort included 121 schools, at grade seven 87 schools were included, and at grade eight 94 schools were included. At grade 11, only 27 schools could be tracked over the 5 year trend. The results from these aggregate results for cohorts of the same schools over time are included in Table 4 and Figure 3.

The results in Table 4 and Figure 3 are rather similar to the results for all schools, although on the whole the trend lines are slightly “flatter” for the cohorts. Overall results at grades 4 and 6 were consistently lower than their demographically matched peers. The solid red line indicates the residuals, which are consistently negative but become progressively less negative over time. By 2007, most of the trends are leveled out as the charter schools reached performance levels similar to their demographically matched peers.

Compared to the other Great Lakes states, we see far fewer differences between the aggregate results for all charter schools and the cohort of same schools in Michigan. This is likely to be due to the fact that Michigan has clearly the most charter schools with valid data available. Also this is likely to be due to the fact that the composition of charter schools is changing less over time in Michigan than in the other states. Finally, this is also likely to be due to a more homogeneous population of charter schools in Michigan than we find in the other Great Lakes’ states.

Although the results in illustrated in Figure 3 are gradually improving at grades 4, 7, and 8, this is not the case with grade 11 where results have dropped sharply over the past 3 years.

Table 4. Michigan 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 4	2003	121	6,000	45.84	57.05	-11.21	119	5,847	57.40	65.98	-8.58
	2004	121	6,049	56.83	65.07	-8.24	119	5,932	66.69	72.90	-6.21
	2005	121	6,027	58.95	63.28	-4.33	119	5,822	72.91	73.34	-0.43
	2006	121	6,216	71.15	72.56	-1.41	119	6,027	74.67	77.15	-2.48
	2007	121	6,365	76.56	76.08	0.48	119	6,178	78.78	79.01	-0.22
Average annual change				7.68	4.76	2.92			5.35	3.26	2.09
Grade 7 Reading Grade 8 Math	2003	87	3,596	33.14	40.59	-7.45	94	4,414	47.13	50.73	-3.61
	2004	87	3,874	50.53	48.20	2.33	94	4,627	50.20	51.68	-1.48
	2005	87	4,097	49.03	49.24	-0.21	94	4,786	63.89	64.75	-0.86
	2006	87	4,422	48.85	49.52	-0.68	94	5,106	68.00	67.90	0.10
	2007	87	4,629	56.52	54.71	1.81	94	5,224	72.65	71.75	0.90
Average annual change				5.84	3.53	2.31			6.38	5.25	1.13
Grade 11	2002	27	844	41.71	44.72	-3.01	27	824	54.98	57.71	-2.73
	2003	27	1,046	38.62	42.10	-3.48	27	1,020	56.96	54.59	2.37
	2004	27	1,160	39.22	31.06	8.16	27	1,140	67.47	54.13	13.34
	2005	27	1,190	32.68	36.68	-3.99	27	1,183	67.80	66.83	0.97
	2006	27	1,323	30.69	37.37	-6.68	27	1,312	59.08	61.75	-2.67
Average annual change				-2.75	-1.84	-0.92			1.03	1.01	0.02

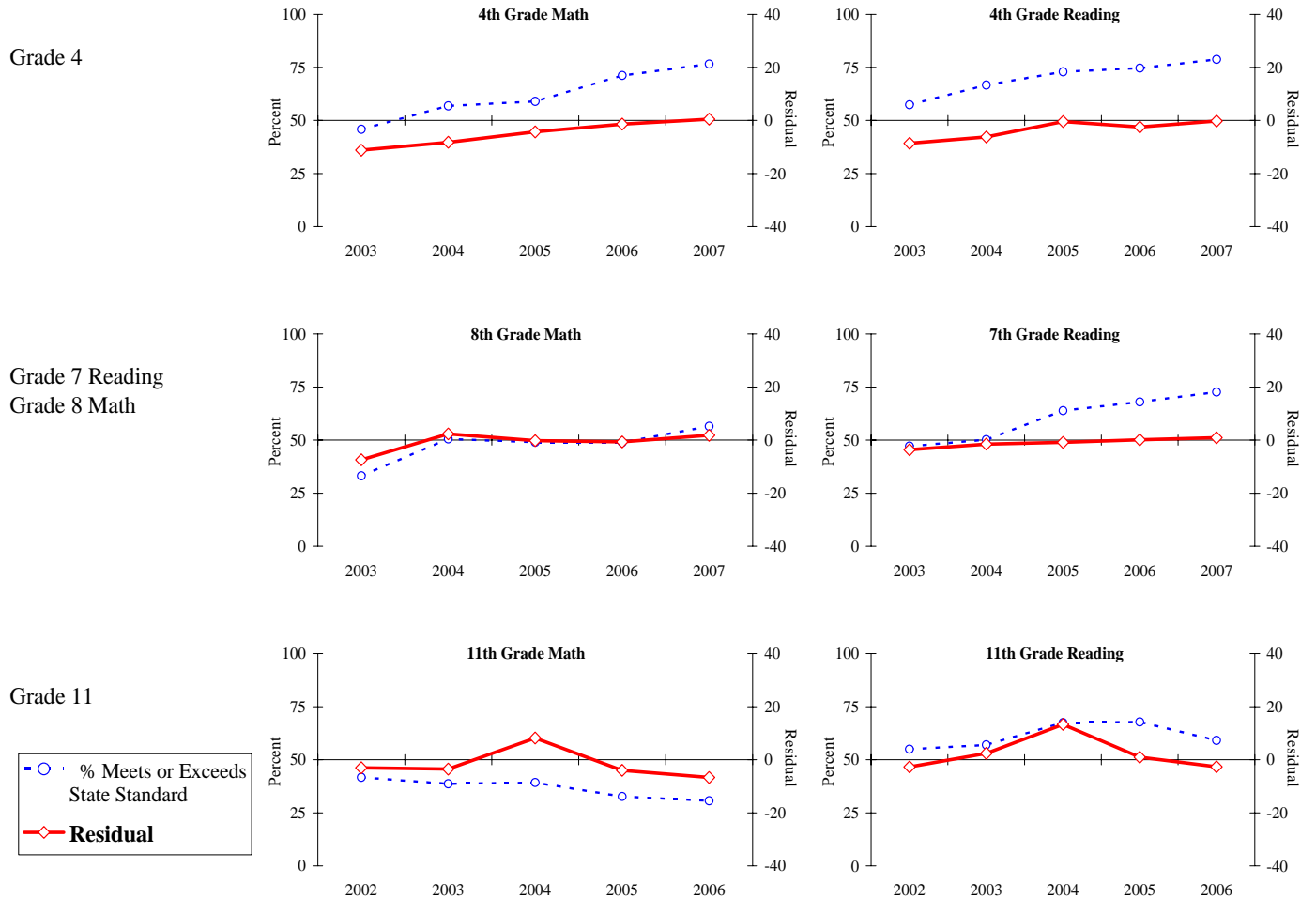


Figure 3. Michigan School Cohort Results: Residual Scores and Percent Meeting State Standards

Summary of Findings from Michigan

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 Michigan charter schools using the most recent year of available data. Results revealed 298 instances in which charter school residuals are positive (i.e., student achievement is higher than expected) and 400 instances in which they are negative (i.e., student achievement is lower than expected). Across all school comparisons, only 42.7 percent of the comparisons favored charter schools. These findings represent some improvement over earlier studies, but still the majority of charter schools are still trailing behind demographically similar traditional public schools.

Table 5. Comparison of Schools with Positive or Negative Residuals in Most Recent Year of Available Data

	<i>Grade 4 Math</i>	<i>Grade 4 Reading</i>	<i>Grade 8 Math</i>	<i>Grade 7 Reading</i>	<i>Grade 11 Math</i>	<i>Grade 11 Reading</i>	<i>Totals</i>
Positive Residuals	66	66	57	67	19	23	298
Negative Residuals	98	96	72	72	32	30	400
Percent Positive	40.2%	40.7%	44.2%	48.2%	37.3%	43.4%	42.7%

Table 6 presents a comparison of the average annual change in test residuals by grade for the aggregate of all Michigan charter schools and for the cohort of same charter schools over five years. Results revealed that the residuals for charter schools overall are increasing by 1.16 points per year, on average, and residuals for the cohorts of same charter schools are increasing by an average 1.26 points per year. This means that over a five-year period, the trend in student achievement is increasing for the charter schools.

Table 6. Comparison of Average Annual Change (AAC) in Test Residuals by Grade for Charter Schools and Charter School Cohorts Over Five Years (2003 to 2007)

	<i>Grade 4 Math</i>	<i>Grade 4 Reading</i>	<i>Grade 8 Math</i>	<i>Grade 7 Reading</i>	<i>Grade 11 Math</i>	<i>Grade 11 Reading</i>	<i>Totals</i>
Average Annual Change in Residuals	+2.51	+1.88	+1.53	+0.93	-0.31	+0.40	+1.16
Average Annual Change in Residual Scores for Cohort	+2.92	+2.09	+2.31	+1.13	-0.92	+0.02	+1.26

In summary, Michigan's charter schools—on the whole—are not performing better than demographically similar traditional public schools. However, except at grade 11,

there are incremental improvements being made each year. While the gap is closing, we can see in the trend lines for Michigan and the other Great Lakes States, that as charter school performance levels approach the performance levels of their demographically matched peers, they tend to flatten out rather than continue on the same growth trajectory.

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