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

Appendix F

June 2007

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Appendix F
Student Achievement in Ohio Charter Schools

The Ohio charter school law was approved in 1997.[1] Although Ohio's charter school reform grew rather slowly in the late 1990s, it has experienced rapid growth over the last six years. This growth has occurred at a time when there was relatively lax and confusing oversight, due to lack of funding for oversight[2] followed by legislative changes regarding authorizers. Currently, just over 300 charter schools are operating in Ohio, which makes this the largest charter school reform in the Great Lakes' region in terms of the number of schools.   Charter schools in Ohio enroll close to 65,000 students, which account for 3.5 percent of all public school enrollments in the state.

Ohio is perceived to have a rather permissive charter school law. The Center for Education Reform gives Ohio a "B" grade.[3] Although some restrictions appear in the letter of the law, in practice, Ohio's charter schools have extensive flexibility, and experience relatively little oversight (Sullins & Miron, 2003).[4] Chi and Welner (in press)[5] suggested an alternative framework for rating charter school laws that places more emphasis on rigor of oversight, accountability, and measures to promote/ensure equity in access. According to their review, Ohio was given a rather strong and positive rating.

Ohio has become a popular site for education management organizations; major EMOs that operate schools in the state include White Hat Management, Constellation Schools, and National Heritage Academies. Ohio's charter school reform also has provided opportunities for large cyber-based schools to operate.

Plenty has been written about the Ohio charter school reform, although most of this has been rhetorical—rather than empirical—in nature. One noteworthy study that examined student achievement in Ohio charter schools was conducted by the Legislative Office of Education Oversight (2003).[6] This evaluation examined the proficiency test results in Ohio's 15 "first generation" community schools and compares each charter school to a matched traditional public school. The results were mixed. Of 155 possible comparisons across subject and grade level tests, 101 of 155 were not statistically significant. For the remaining 54 statistically significant comparisons, 34 favored traditional schools and 20 favored community schools.

Other studies that were less comprehensive in nature largely have found mixed or negative results for charter schools. Porch et al. (2005) examines charter school achievement in Ohio's inner cites, comparing them with their host school districts. The results were mixed, with charter schools outperforming their districts in some subjects and grades; in others, the district schools did better.[7] Similar results were found by Ryan (2004) when comparing Dayton charter schools to Dayton public schools, though both groups lagged behind state average results.[8] Carr (2005) used findings from the Ohio Proficiency test to compare charter and traditional public schools and found charter schools had greater year-to-year gains in the percentage of their students passing the Ohio Proficiency Test in several subjects while controlling for demographics including 4th grade citizenship, math, reading and writing and 6th grade writing. There were no

statistically significant differences between traditional and charter schools on five other tests: 4th grade science and 6th grade citizenship, math, reading and science.[9]

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).[10] 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 Ohio Department of Education Web site. Because only a small portion (i.e., 15 percent) of the schools had data on limited English proficiency, we decided not to include this in the regression analysis.

The outcome measure used for our analyses was the percentage of students who met or exceeded state standards on the state assessments. Grades 4 and 6 were used to track trends over time because we could link data from the Ohio Proficiency Test to the new Ohio Assessment Test. At the high school level, it was not possible to build longer trends at any particular grade level. The best trend we were able to build was for the grade 10 proficiency test. This instrument contained data we could extract from the local report cards for 2000-01 until 2003-04. After building these datasets, it turned out that the data for 2000-01 and 2001-02 were not viable. Therefore, we were left with only 2 years of usable results at grade 10.

Our analyses focused on math and reading from 2001-02 to 2005-06. With the available test data, we could build five-year trends in the elementary grades and a two-year trend for grade 10.[11] 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 4	Reading Math	Reading Math	Reading Math	Reading Math	Reading Math
Grade 6	Reading Math	Reading Math	Reading Math	Reading Math	Reading Math
Grade 10		Reading Math	Reading Math		

Variables Used to Create the Predicted Values for Each School

The data sets we created for Ohio contained the highest proportion of missing data of all the Great Lakes states. For this reason, when schools were missing a demographic indicator we sought to use mean substitution to impute the missing value so that the school would not be dropped from the analysis.[12] Unfortunately, a large portion of the missing data for Ohio charter schools was performance data. Test results in Ohio are not reported if there are fewer than seven test takers in a specific group. Also, Ohio also does

not report data on schools that have been operating for less than three years. Although we did impute missing demographic data, we did not impute performance data, and thus, a large portion of the charter schools were still excluded from the analyses. This severely limited the amount of test data available, particularly in 2001 and 2002. Table 2 displays the variables to be used in developing the residual gain score analysis for Ohio.

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

Variable	*Description*
Percentage passing (dependent variable)	Percentage of students meeting or exceeding state standards on the Ohio Proficiency Tests
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
Urbanicity (locale)	Rating from 1-8 indicating population density

Table 3 and Figure 1 contain the aggregate findings across all schools. Actual scores are simply the observe 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:

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

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. Ohio Aggregate Results by Grade, Subject, and Year

School Name	Year	Math					Reading				
		Schools	Students	Actual	Predicted	Residual	Schools	Students	Actual	Predicted	Residual
Grade 4	2002	27	992	17.94	32.32	-14.39	28	1191	18.47	38.53	-20.07
	2003	43	1730	17.80	41.14	-23.35	43	1730	27.22	51.46	-24.23
	2004	60	2568	33.65	50.39	-16.74	59	2531	39.83	56.78	-16.96
	2005	84	3696	32.90	51.57	-18.67	84	3616	50.44	61.62	-11.18
	2006	118	4789	48.26	60.93	-12.67	117	4772	54.74	62.77	-8.03
Average annual change				7.58	7.15	0.43			9.07	6.06	3.01
Grade 6	2002	21	1039	11.64	30.09	-18.45	22	1160	15.48	30.79	-15.31
	2003	38	1597	12.44	35.80	-23.36	38	1597	30.41	48.49	-18.08
	2004	59	2777	30.54	49.82	-19.28	57	2773	40.73	51.79	-11.07
	2005	77	3565	27.99	48.01	-20.01	76	3556	43.86	58.19	-14.33
	2006	115	4915	39.54	51.57	-12.03	116	4929	67.55	72.22	-4.67
Average annual change				6.97	5.37	1.60			13.02	10.36	2.66
Grades 10	2002										
	2003	16	1105	33.93	71.73	-37.80	15	1063	62.34	90.16	-27.82
	2004	29	2451	29.27	69.94	-40.66	22	1774	64.32	89.29	-24.98
	2005										
	2006										
Average annual change				-4.66	-1.80	-2.86			1.98	-0.87	2.85

Grade 4

Grade 6

Grades 10
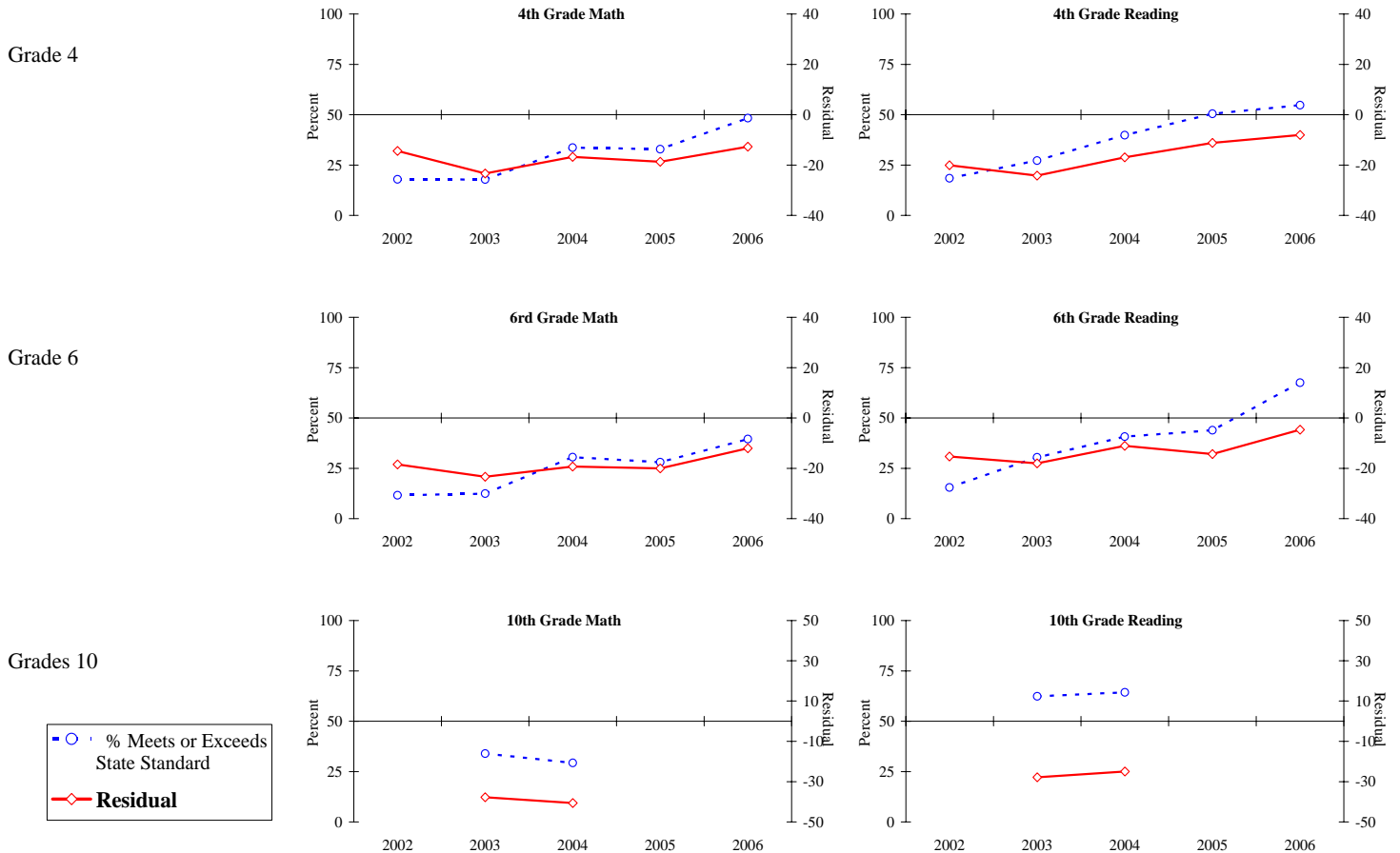
Figure 1. Ohio Aggregate Results: Residual Scores and Percent Meeting State Standards

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 Ohio charter schools. The dashed line in the charts in associate with this table indicates the proportion of students that meet or exceed state standards. Based on these trend lines, we see that typically between 25 and 60 percent of the students in charter schools are meeting state standards. This is noticeably lower than the state average.

Overall the charter school results are substantially 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.
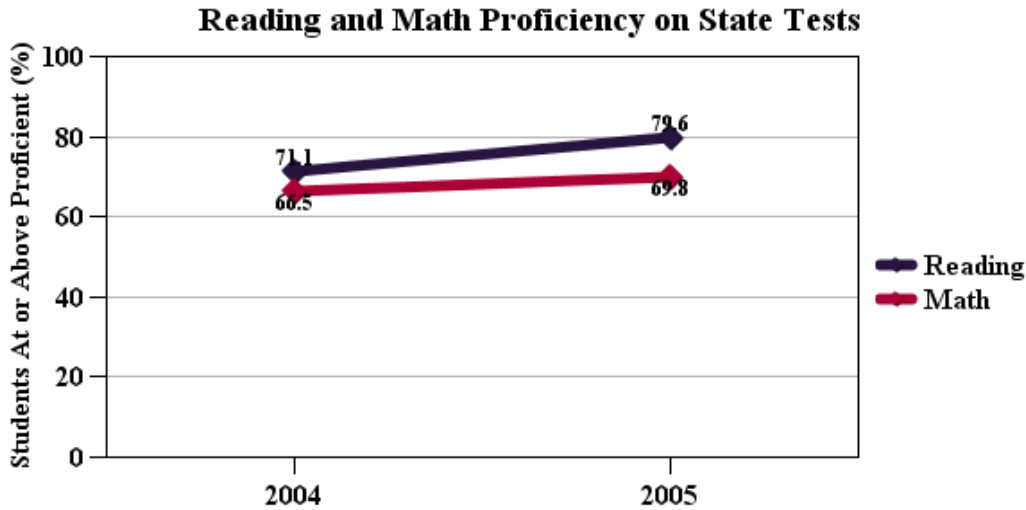

Figure 2.   Performance on Ohio Proficiency Test from 2004-2005[13]

Actual Performance and Residual Gains for Same Cohort of Schools

The changes over time depicted in the results from Figure 1 are likely to be heavily influenced by the addition of new charter schools. The number of schools and the number of students included in each set of results are indicated within Table 3. Note that in 2002, only a handful of schools had viable data. One of the reasons for the lack of data was a regulation that data would not be reported on new schools until they had completed their third year of operation. Between the first and last test dates, more than 100 schools were added to the grades 4 and 6 trends. 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 3 or more years.   Because so few schools had data in2001-02, we created the cohort for the schools that had data for the subsequent 4 years.

Appendix F: Student Achievement in Ohio Charter Schools

Table 4. Ohio 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	2002										
	2003	31	1381	18.18	42.93	-24.75	30	1344	27.99	53.33	-25.34
	2004	31	1669	35.25	50.42	-15.17	30	1637	39.17	56.57	-17.40
	2005	31	1873	33.06	49.60	-16.54	30	1846	50.56	59.97	-9.40
	2006	31	1648	53.81	57.95	-4.14	30	1631	57.21	60.09	-2.88
Average annual change				11.88	5.01	6.87			9.74	2.25	7.48
Grade 6	2002										
	2003	24	1255	11.68	38.13	-26.45	24	1255	32.02	50.78	-18.77
	2004	24	1621	33.28	49.55	-16.27	24	1621	45.15	51.44	-6.28
	2005	24	1816	27.87	45.84	-17.98	24	1816	44.59	56.49	-11.90
	2006	24	1552	41.13	49.34	-8.21	24	1552	67.35	70.88	-3.53
Average annual change				9.82	3.74	6.08			11.78	6.70	5.08
Grades 10	2002										
	2003	15	1099	33.70	71.68	-37.98	11	798	65.10	90.60	-25.50
	2004	15	1485	29.50	71.41	-41.91	11	1162	65.06	90.81	-25.75
	2005										
	2006										
Average annual change				-4.20	-0.27	-3.93			-0.04	0.22	-0.25

Grade 4

Grade 6

Grades 10
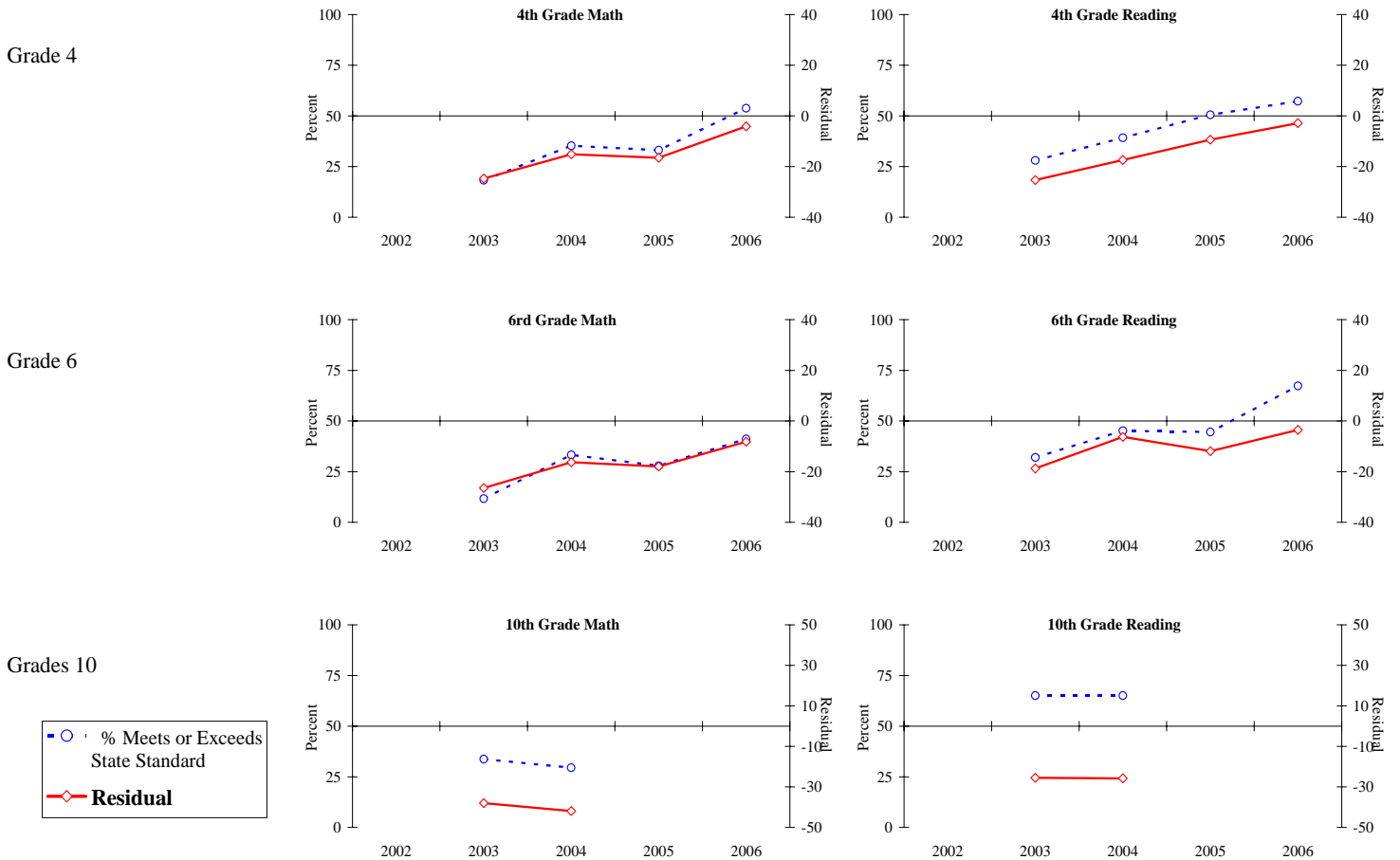
Figure 3. Ohio School Cohort Results: Residual Scores and Percent Meeting State Standards

At grade 4, this cohort included 31 schools; and at grade 6, 24 schools were included. At grade 10, only 15 schools could be tracked for the two years from which data was available in math. The results from these aggregate results for cohorts of the same schools over time are illustrated Figure 3.

The results in Table 4 and Figure 3 are rather similar to the results for all schools, although at grade 10 a noticeable change occurred as the trend in residuals became negative when we looked at only the same schools over time. Overall results at grade 4 and 6 were consistently lower than their demographically matched peers. The solid red line indicates the residuals, which are consistently negative at grade 4 and 6, and became progressively less negative over time. At grade 10 the results are much more negative and show no improvement over time.

Summary of Findings from Ohio

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 Ohio charter schools using the most recent year of available data.

There are large differences in performance at the school level. We found 33 percent of the schools with positive residuals, indicating that the school was performing better than predicted on specific grade and subject level tests. Unfortunately, in 66 percent of the comparisons made, the charter schools had negative residuals, indicating that they are performing at levels lower than predicted and lower than demographically similar schools. Of the Great Lakes states, only Indiana has a higher proportion of negative residuals.

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

	Grade 4 Math	Grade 4 Reading	Grade 6 Math	Grade 6 Reading	Grade 10 Math	Grade 10 Reading	Totals
Positive Residuals	36	39	34	51	4	7	171
Negative Residuals	82	78	81	65	25	15	346
Percent Positive	30.5%	33.3%	29.6%	44.0%	13.8%	31.8%	33.1%

Table 6 presents a comparison of the average annual change in test residuals by grade for the aggregate of all Ohio 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 1.28 points per year, on average, and residuals for the cohorts of same charter schools are increasing by an average 3.56 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 (2002 to 2006)

	Grade 4 Math	Grade 4 Reading	Grade 6 Math	Grade 6 Reading	Grade 10 Math	Grade 10 Reading	Totals
Average Annual Change in Residuals	+0.43	+3.01	+1.60	+2.66	-2.86	+2.85	+1.28
Average Annual Change in Residual Scores for Cohort	+6.87	+7.48	+6.08	+5.08	-3.93	-0.25	+3.56

As the results in this appendix reveal, Ohio's charter schools are not performing better than demographically similar schools. Instead, they are consistently performing at levels that are lower than their demographically matched peers. Over time, however, the Ohio charter schools are closing the gap. For the cohort of schools we could track, relatively large annual gains were being made by charter schools relative to demographically similar traditional public schools. Although this finding shows hope for the future, one should be cautious in interpreting the Ohio results because of the very high proportion of schools that did not have valid test data and had to be excluded from the analyses.[14]

Notes and References

[1] Note that charter schools are referred to as community schools in the state of Ohio. We use the term *charter school* instead of *community* school in this report to reduce confusion regarding terms.

[2] See Petro, J. (2002). Ohio Department of Education community schools operational review. Columbus, OH: Office of the Auditor.

[3] Retrieved [February 27, 2007] http://www.edreform.com/_upload/charter_school_laws.pdf

[4] Sullins, C., & Miron, G. (2005) *Challenges of starting and operating charter schools: A multicase study.* Kalamazoo, The Evaluation Center, Western Michigan University.

[5] Chi, W. C., & Welner, K. G. (in press). Charter ranking roulette: An analysis of reports that grade states' charter school laws. *American Journal of Education.*

[6] Legislative Office of Education Oversight. (2003). *Community schools in Ohio: Final report on student performance, parent satisfaction, and accountability.* Columbus, OH: Author.

[7] Porch, A., Phillips-Schwartz, K., Ryan, T. (2005). *School performance in Ohio's inner cities: Comparing charter and district school results in 2005.* Dayton, OH: Thomas B. Fordham Foundation.

[8] Ryan, T. (2004) *A wide angle look at the charter school movement in Ohio/Dayton, circa September 2004.* Dayton, H: Thomas B. Fordham Foundation.

[9] Carr, M., & Staley, S. (2005). *Using the Ohio proficiency test to analyze the academic achievement of charter school students: 2002-2004.* Columbus, OH: Buckeye Institution.

[10] Retrieved [February 27, 2007] from the Web site for the Common Core of Data: http://nces.ed.gov/ccd/.

[11] Retrieved [March 3, 2007] from http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODE Primary.aspx?page=2&TopicID=263&TopicRelationID=263 l

[12] For example, if a school reported that it had 70 percent minority students in 2003, no data in 2004 and 90 percent minority students in 2005, we would insert a value of 80 percent for the missing data point. There was insufficient data among charter schools to conduct more sophisticated approaches for imputing missing values.

[13] Retrieved [February 25, 2007] from <http://www.schoolmatters.com/pdf/state_reports/SMN.pdf >

[14] Although Ohio has the most charter schools in the region, this state had the highest proportion of schools dropped from the analysis due to incomplete data.