Charter Schools and Human Capital Outcomes

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What We Studied

We estimate the impact of charter schools on early-life labor market outcomes using administrative data from Texas. We find that, at the mean, charter schools have no impact on test scores and a negative impact on earnings. No Excuses charter schools increase test scores and four-year college enrollment, but have a small and statistically insignificant impact on earnings, while other types of charter schools decrease test scores, four-year college enrollment, and earnings. Moving to school-level estimates, we find that charter schools that decrease test scores also tend to decrease earnings, while charter schools that increase test scores have no discernible impact on earnings.
In contrast, high school graduation effects are predictive of earnings effects throughout the distribution of school quality.

Texas enacted legislation allowing for the establishment of charter schools in 1995. The Texas charter sector has subsequently grown into one of the largest in the nation. Today, there are more than 600 charter schools in Texas educating approximately 3.5 percent of public school students. In this study, we estimate the impact of charter schools on early-life labor market outcomes using administrative data from the state of Texas. The combination of high-stakes accountability and large and varied charter school sector makes Texas an archetypal laboratory to measure the effect of charter schools on labor market outcomes.

How We Analyzed the Data

In our analysis, we use a combination of matching and regression to adjust for baseline differences between charter and non-charter students. Our primary specification controls for elementary school by race by gender fixed effects and for a rich set of background characteristics including third-order polynomials in baseline math and reading test scores. We identify school-specific effects by comparing the outcomes of students who attended the same non-charter elementary school, but different middle or high schools. This specification yields relatively precise earnings estimates while controlling for any observable differences between charter and non-charter students. The key identifying assumption of our empirical design is that gender-race-cohort-school effects and baseline controls account for all observed and unobserved differences between charter and non-charter students. We begin our analysis by estimating the mean impact of charter schools in our sample on test scores, educational attainment, and earnings.

Throughout the text, we present results for three categories of charter schools: all charter schools, No Excuses charter schools, and regular charter schools. All charters refers to the complete set of charter schools in our estimation sample. No Excuses charters have higher behavioral expectations, stricter disciplinary codes, are more likely to have uniform requirements, and are more likely to have an extended school day and year (e.g. Thernstrom and Thernstrom 2003). Regular charters are defined as all charters in Texas that are not No Excuses schools.

We make six sample restrictions to the student data with the overarching goal of having a valid comparison sample.

Table 1: Students in Estimation Sample

	Full Sample	Trad. Elem	Baseline Covars	Test Scores	In Texas	Cohort Size	Matched Cells
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Non-Charters	1420877	1413231	1319580	1226527	1162148	1162148	188666
No Excuses	1358	1345	1192	1164	1051	1039	1039
Regular Charters	4905	4830	4633	4365	4090	3860	3860

Table 1 provides details on the number of students dropped by each sample restriction. With no restrictions, there are 1,420,877 students in regular public schools, 1,358 students in No Excuses charter schools, and 4,905 students in regular charter schools. Column 2 omits students who did not attend a public elementary school in 4th grade. This decreases the sample by 7,646 students in non-charters, but only by 13 students in No Excuses Charters and 75 in regular charters. Column 3 leaves out students with missing baseline covariates such as gender or race. Column 4 drops students with no middle or high school test score. Column 5 drops students who transferred to an out-of-state primary or secondary school. Column 6 drops charter schools with a cohort size fewer than ten. In our final estimation sample – which includes all students for which there is a match cell on 4th grade school, cohort, gender, and race – there are 188,666 students in non-charters, 1,039 in No Excuses charters, and 3,860 students in regular charters. The majority of the non-charter sample was dropped due to not matching individuals in the charter sample, primarily because these students attend schools in districts without a charter school.

The summary statistics paint a familiar portrait of the characteristics of charter school enrollees. Students in charter schools are more likely to be minority, more likely to be on free lunch (a measure of poverty), and more likely to be labeled at risk of dropping out, and yet those in No Excuses charter schools enroll with higher test scores. Consistent with this, Allen and Consoletti (2007, 2008) state that charter schools attract minority students who are more probable of receiving free lunch and being at risk.

Our empirical analysis has two objectives:
(1) to estimate the effect of attending charter schools on labor market outcomes such as earnings and employment, and
(2) to estimate the correlation between a school's effect on labor market outcomes and its effect on human capital outcomes such as test scores.

What We Discovered

Table 2 reports OLS estimates of the effect of charter attendance on test scores. Odd columns control for the number of years spent at charter schools not in our main sample, the baseline controls, cubic polynomials in grade 4 math and reading scores, and 4th grade school x cohort effects. Even columns add 4th grade school x cohort x race x gender effects. All specifications stack 5th-11th grade test score outcomes and cluster standard errors by student. In our preferred specification with 4th grade school x cohort x race x gender fixed effects, we find that the impact of attending a charter school for one year is -0.009σ (se=0.006) on math scores and 0.022σ

Table 2: Charter School Attendance and Test Scores

	Math Scores		Reading Scores		Pooled Scores	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Pooled Results Any Charter	-0.011*	-0.009	0.021***	0.022***	0.005	0.006
	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Panel B: By Charter Type	0.092***	0.095***	0.098***	0.099***	0.095***	0.097***
	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)
Regular Charter	-0.080***	-0.078***	-0.003***	-0.029***	-0.055***	-0.054***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Matched Cell FE	No	Yes	No	Yes	No	Yes
N Students x Years	903281	903281	900712	900712	1803993	1803993
Dep. Variable Mean	-0.006	-0.006	0.030	0.030	0.012	0.012

*** = significant at 1 percent level, ** = significant at 5 percent level, * = significant at 10 percent level.

(se=0.005) on reading scores. Stacking both math and reading test scores, we find that attending a charter school for one year increases test scores by 0.006σ (se=0.005). None of the estimates suggest economically large impacts of charter attendance on test scores at the mean.

However, the test score estimates differ markedly for No Excuses and non-No Excuses charter schools. In our preferred specification, the impact of attending a No Excuses charter school for one year is 0.095σ (se=0.009) in math, 0.099σ (se=0.008) in reading, and 0.097σ (se=0.008) stacking both math and reading scores.

Table 3: Charter School Attendance and Educational Attainment

	High School Grad.		Two-Year Enrollment		Four-Year Enrollment	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Pooled Results						
Any Charter	0.012***	0.012***	0.015***	0.015***	0.002	0.003
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Panel B: By Charter Type						
No Excuse	0.024***	0.025***	0.012**	0.012**	0.026***	0.028***
	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)
Regular Charter	0.004	0.004	0.016***		-0.013***	-0.013***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Matched Cell FE	No	Yes	No	Yes	No	Yes
N Students x Years	193565	193565	193565	193565	193565	193565
Dep. Variable Mean	0.760	0.760	0.322	0.322	0.289	0.289

*** = significant at 1 percent level, ** = significant at 5 percent level, * = significant at 10 percent level.

In contrast, the impact of attending a regular, or non-No Excuses charter school, is -0.078σ (se=0.007) in math, -0.029σ (se=0.007) in reading, and -0.054σ (se=0.006) stacking scores from both subjects. Overall, the results indicate that charter schools in Texas have little impact on test scores. However, No Excuses charter schools increase test scores and regular charters modestly decrease test scores.

Table 3 reports OLS estimates of the effect of charter attendance on academic attainment. Again, the same controls and specifications as Table 2 above. At the mean, the effect of attending a charter school is 1.2 (se=0.2) percentage points for high school graduation, 1.5 (se=0.3) percentage points for two-year college enrollment, and 0.3 (se=0.3) percentage points for four-year college enrollment. Consistent with the test score results from Table 3, the effects differ by charter type, particularly for four-year college enrollment. No Excuses charters increase four-year college enrollment by 2.8 (se=0.5) percentage points, compared to -1.3 (se=0.3) percentage points for regular charters.

High school graduation effects are also larger for No Excuses and regular charters, while two-year college enrollment effects are similar. These results are consistent with No Excuses charters increasing the number of students attending all types of colleges, while regular charters shift students who otherwise would have attended a four-year school to a two-year school.

The results indicate that charter schools in Texas have little impact on educational attainment. However, No Excuses charter schools increase educational attainment and regular charter schools decrease four-year college enrollment. Finally, high school graduation effects are predictive of earnings effects throughout the distribution of school quality.

Table 5 presents estimates of equation (1) for average earnings and employment for ages 24-26.12 Columns 1-2 present earnings results using our baseline set of controls and with matched cell fixed effects. Again, the same controls and specifications as Table 2 and 3 above. At the mean, the effect of attending a charter school for one year is -$163.65 (se=98.86). Thus, if a student attended a charter school for 5 years, expected annual earnings would be over $800 lower. Consistent with our test score and attainment results, No Excuses charters have better outcomes. The impact of attending a No Excuses charter for one year is a statistically insignificant $101.04 (se=176.12). Regular charters have a surprisingly negative impact on earnings of -$322.28 (se=114.52). Results for employment are less precise and are not statistically distinguishable from zero for either No Excuses or regular charters.

Columns 3-5 of Table 4 explore the robustness of our earnings results to various assumptions about missing earnings observations. Column 3 presents results dropping all zero earnings observations. In this scenario, the effect that is being estimated is the impact of charters on earnings, conditional on employment. Column 4 imputes the missing earnings observations using the baseline characteristics in Table 2, third-order polynomials in 4th grade math and reading state test scores, the number of years spent at charter schools not included in our analysis sample, and 4th grade school x cohort x race x gender fixed effects. Column 5 imputes the missing earnings observations using the same baseline characteristics and the observed test score and academic attainment outcomes from Tables 2-3. Specifically, for both imputation procedures, we regress non-missing earnings on all characteristics. We then take the median predicted earnings in each 4th grade school x cohort x race x gender cell. Results are similar using the 25th or 75th percentile of each 4th grade school x cohort x race x gender cell instead. Our earnings results are broadly similar regardless of how we deal with missing earnings. The estimated effect of No Excuses charters is modestly more positive when dropping missing earnings observations or imputing outcomes, while the estimated effects of regular charters is somewhat more negative. The largest estimates (in absolute value) suggest that No Excuses charters increase earnings by a statistically insignificant $237.44 (se=152.79) and that regular charters decrease earnings by $443.56 (se=138.42). In results available upon request, we find nearly identical results if we impute earnings at different percentiles of the predicted earnings distribution.

Table 4: Charter School Attendance, Average Earnings and Earnings Greater that Zero

	Average earnings					Earnings>0	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Pooled Results Any Charter	-184.184*	-163.653*	-199.477*	-143.209*	-102.408	-0.002	-0.001
	(97.681)	(98.860)	(119.275)	(85.091)	(85.352)	(0.003)	(0.003)
Panel B: By Charter Type No Excuse	56.175	101.043	211.058	167.098	237.441	-0.002	-0.002
	(172.743)	(176.117)	(218.020)	(150.790)	(152.787)	(0.004)	(0.004)
Regular Charter	-	-322.278***	-443.561***	-329.167***	-	-0.001	-0.001
	(113.763) (114.515)		(138.418)	(99.516)	(100.599)	(0.003)	(0.003)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Matched Cell FE	No	Yes	Yes	Yes	Yes	No	Yes
Non-Zero earnings Only	No	No	Yes	No	No	No	No
Baseline Imput.	No	No	No	Yes	No	No	No
Output Imput.	No	No	No	No	Yes	No	No
N Students x Years	193565	193565	141340	193565	193565	193565	193565
Dep. Variable Mean	16514.79	16514.79	22616.99	21097.92	20996.20	0.641	0.641

Note: This table reports OLS estimates of the effect of charter attendance on earnings eight years after high school graduation. We report the coefficient and standard error on the number of years spent at the indicated charter school type. All columns control for the number of years spent at charter schools not in our main sample, the baseline controls listed in Table 2, cubic polynomials in grade 4 math and reading scores, and 4th grade school x cohort effects. Columns 2-5 and 7 add 4th grade school x cohort x race x gender effects. All specifications include one observation per student and cluster standard errors at the 4th grade school by cohort level.

*** = significant at 1 percent level, ** = significant at 5 percent level, * = significant at 10 percent level.

Broadly, any selection correction or imputation method that uses the differential attrition from earnings data between charters and non-charters will lead to qualitatively similar results because, there is little differential attrition on average or across observable characteristics. Importantly, however, any "worse case" type bound that assumes the missing observations from non-charter schools are significantly lower earning earners will substantially alter the results. For example, our estimates will significantly understate the true effect of charter schools if all missing charter observations are due to out-state migration for high paying jobs and all missing non-charter observations are due to incarceration. Our robustness results should be interpreted with this caveat in mind.

Overall, the results indicate that charter schools in Texas have little impact on earnings. No Excuses charter schools have a small and statistically insignificant effect on earnings. Finally, regular charter schools decrease earning.

Policy Recommendations

Based on the portion of our analysis reported in this policy brief, we have established three facts. First, at the mean, charter schools in Texas have little impact on test scores, educational attainment, or earnings. Second, No Excuses charter schools increase test scores and educational attainment, but have a small and statistically insignificant effect on earnings. Third, regular charters modestly increase two-year college enrollment but decrease test scores, four-year college enrollment, and earnings.

Charter schools, in particular No Excuses charter schools, are considered by many to be the most important education reform of the past quarter century. At the very least, however, this paper cautions that charter schools may not have the large effects on earnings many predicted. It is plausible this is due to the growing pains of an early charter sector that was "building the plane as they flew it." This will be better known with the fullness of time. Much more troubling, it seems, is the possibility that what it takes to increase achievement among the poor in charter schools deprives them of other skills that are important for labor markets.

References

Allen, J., and Consoletti, A. (2007). "Annual Survey of America's Charter Schools." Washington, DC: Center for Education Reform.

Allen, J., and Consoletti, A. (2008). "Annual Survey of America's Charter Schools." Washington, DC: Center for Education Reform.

Thernstrom, A, and Thernstrom, S. (2003). No Excuses: Closing the Racial Gap in Learning. New York: Simon and Schuster.