

Still a Good Investment: **Charter School Productivity in Nine Cities**

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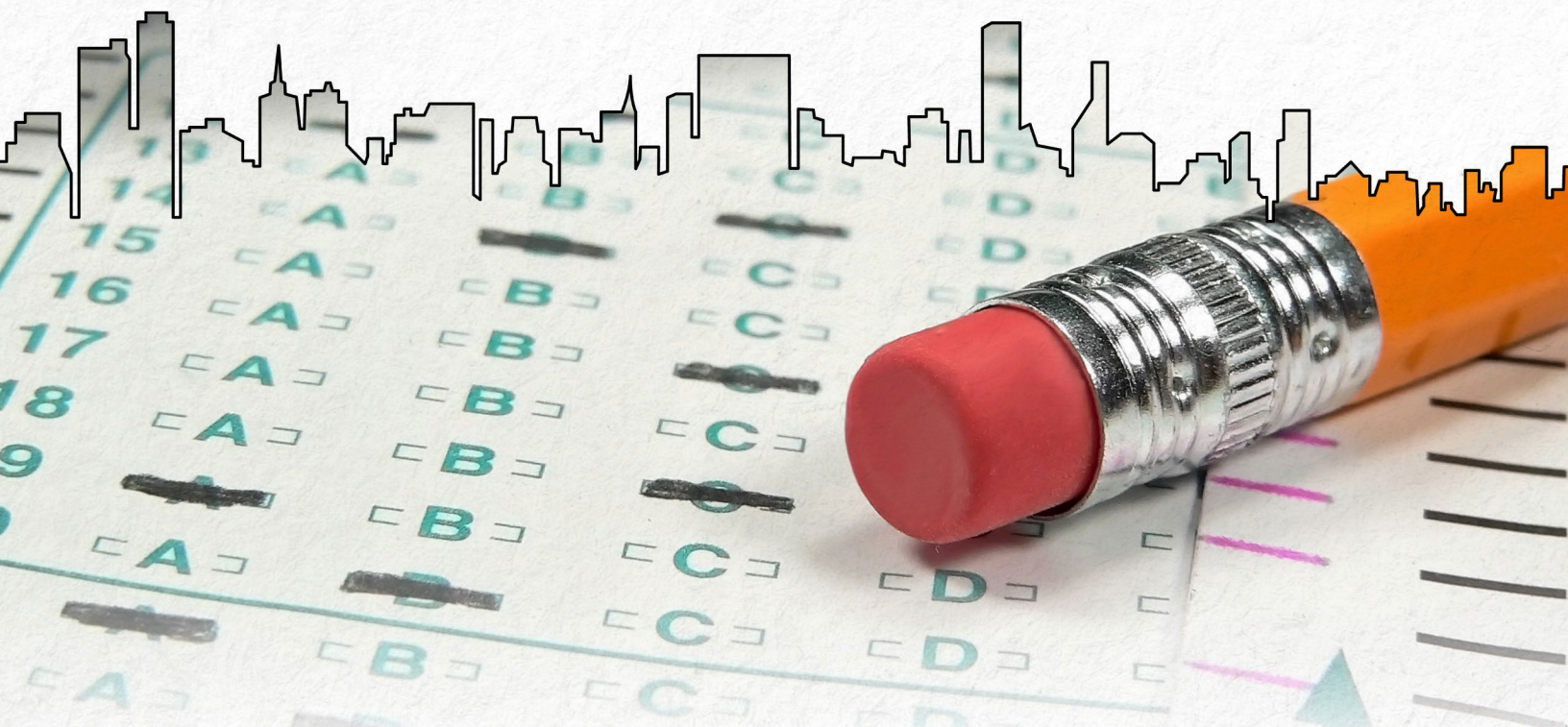
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School Choice Demonstration Project
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The School Choice Demonstration Project (SCDP), based within the Department of Education Reform, is an education research initiative devoted to the non-partisan study of the effects of school choice policy and is staffed by leading school choice researchers and scholars. Led by Dr. Patrick J. Wolf, Distinguished Professor of Education Reform and Endowed 21st Century Chair in School Choice, SCDP's national team of researchers, institutional research partners and staff are devoted to the rigorous evaluation of school choice programs and other school improvement efforts across the country. The SCDP is committed to raising and advancing the public's understanding of the strengths and limitations of school choice policies and programs by conducting comprehensive research on what happens to students, families, schools, and communities when more parents are allowed to choose their child's school.

Executive Summary

Charter schools are public schools that operate free from some government regulations in return for a commitment to achieve a set of student outcomes specified in their charter. Nearly 8,000 public charter schools enrolled 3.7 million students in the U.S. in 2020-21. Our team has studied charter school funding across the United States since 2005, consistently finding that, in major cities, charter schools receive less funding per pupil compared to traditional public schools (TPS). We have also found that charter schools use their funding more efficiently, achieving better short- and long-term outcomes per dollar invested, relative to TPS.

In this study, we reexamine the productivity of publicly funded schools, using funding data from our charter school revenue report “Charter School Funding: Little Progress Towards Equity in the City.” We also use achievement data from the Center for Research on Educational Outcomes’ (CREDO’s) city and national studies, the NAEP Data Explorer, and wage data from the Bureau of Labor Statistics. We have access to complete data for nine cities: Camden, New Jersey; Denver, Colorado; Houston, Texas; Indianapolis, Indiana; Memphis, Tennessee; New Orleans, Louisiana; New York City, New York; San Antonio, Texas; and Washington, DC. In this study, we:

1. Compare the short-term cost-effectiveness of the TPS and charter school sectors, which we define as average NAEP points earned per \$1,000 in funding allocated per pupil, and
2. Compare the expected return on investment (ROI) of the TPS and charter school sectors, which we define as the amount a student will

earn in their lifetime per dollar invested in their education.

Major Findings

- Based on CREDO’s findings, we estimate that charter school students across nine cities perform 2.4 points (0.06 standard deviations, or SD) higher on the eighth grade reading NAEP exam and 1.3 points higher (0.03 SD) on the math exam, compared to matched TPS students.
- We find that charter schools demonstrate an approximately 40 percent higher level of cost-effectiveness than TPS on average across nine cities, earning an additional 4.4 points (0.12 SD or a 41 percent difference) on the eighth grade NAEP reading exam and an additional 4.7 points (0.12 SD or a 40 percent difference) in math per \$1,000 of funding allocated per pupil (see Figure ES1).
- Charter schools demonstrate a higher level of cost-effectiveness than TPS in seven cities; we find the largest gaps in NAEP points per \$1,000 of funding in Indianapolis—an additional 11 points or 0.29 SD in reading (a 76 percent increase in cost-effectiveness) and an additional 12 points or 0.3 SD in math (78

We find that charter schools demonstrate an approximately 40 percent higher level of cost-effectiveness than TPS on average across nine cities.

percent increase). There are also large gaps in Camden, with an additional seven points or 0.18 SD in reading and eight points or 0.19 SD in math (103 percent increase for both), and San Antonio, with an additional four points or 0.11 SD in reading (25 percent) and five points or 0.12 SD in math (23 percent).

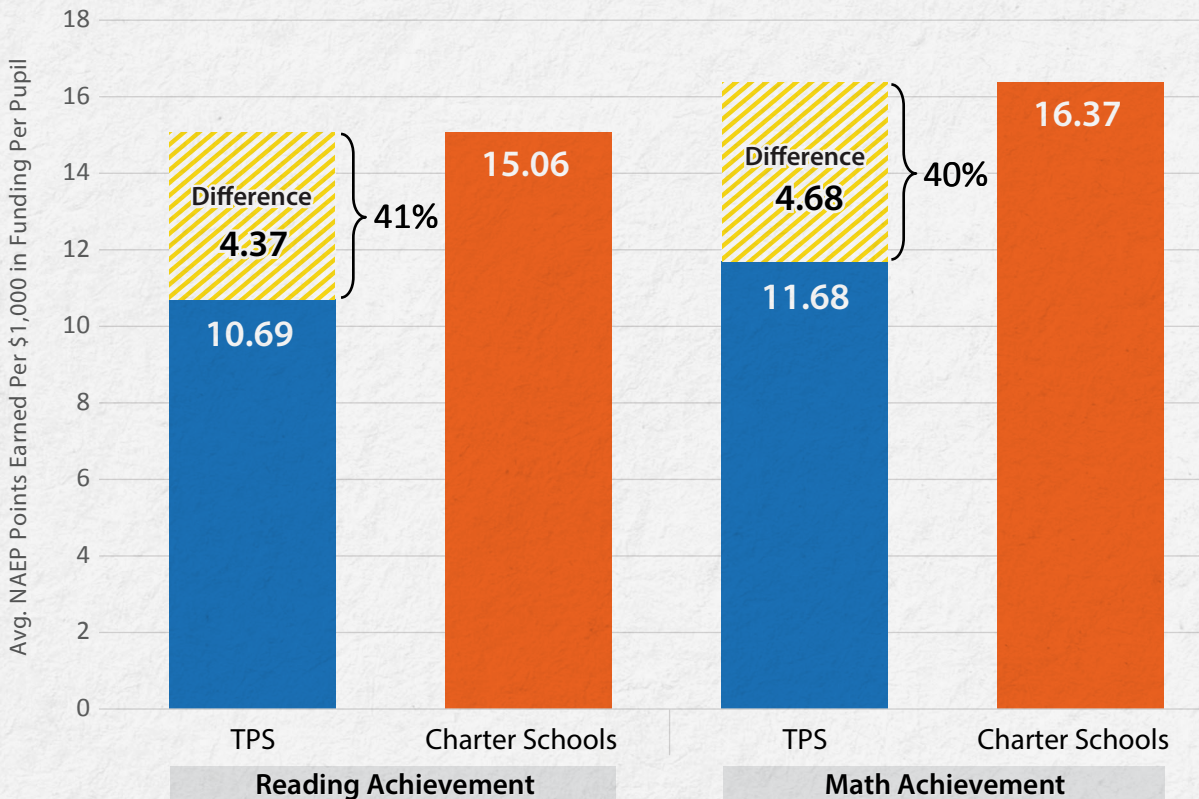
- Across the nine cities, we estimate that attending a TPS for 13 years yields a 294 percent ROI, or \$3.94 per dollar invested (see Figure ES2), whereas attending a charter school for 13 years yields a 525 percent ROI or \$6.25 per dollar invested; therefore, we estimate

that attending a charter school for 13 years, compared to a TPS, increases the ROI by 58.4 percent (about \$2.30 in additional returns per dollar invested).

- The charter schooling ROI advantage varies across the eight cities for which we can make a TPS-charter school ROI comparison; it is largest in terms of dollars in Indianapolis (106 percent higher, or an additional \$4.75 in returns per dollar invested) and largest in terms of percent in Camden (131 percent higher, or an additional \$3.71 in returns per dollar invested).

We estimate that attending a charter school for 13 years, compared to a TPS, increases the ROI by 58.4 percent (\$2.30 in additional returns per dollar invested)

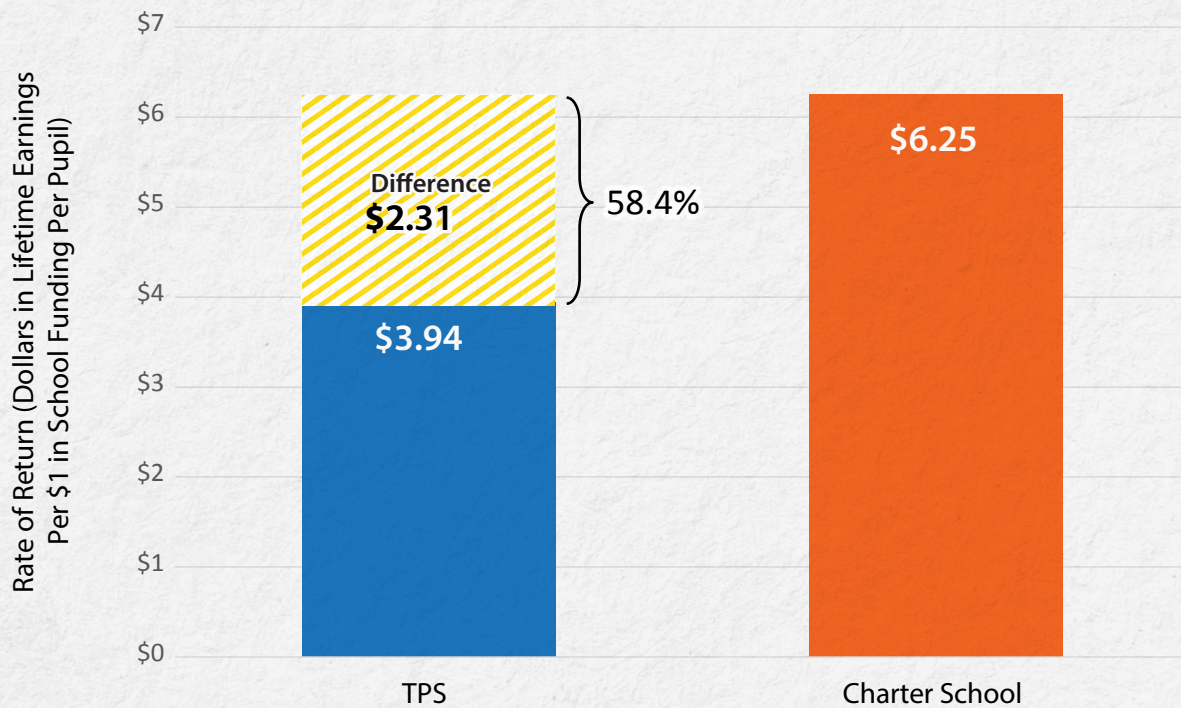
Figure ES1: Cost-Effectiveness of TPS and Charter Schools, 9-City Weighted Average



- Houston maintains near balance in both funding and outcomes between TPS and charter schools. Therefore, the gap in productivity is less than one NAEP point per \$1,000 in funding per pupil (TPS students score 0.7 points higher in reading and 0.5 points higher in math) and the ROI for TPS and charter schools is the same, \$8.65 per dollar of funding per pupil, or 765 percent.
- While we cannot make a TPS-charter school comparison in New Orleans, we find that its schools are very cost-effective compared to

schools in other cities; on average, students in New Orleans earn an additional 6.3 reading points and 6.4 math points on the NAEP per \$1,000 of funding per pupil compared to charter school students in the other eight cities, and an additional 10.7 reading points and 11.1 math points on the NAEP per \$1,000 of funding per pupil, compared to TPS students in those cities.

Figure ES2: TPS and Charter School ROI, 9-City Weighted Average



Introduction

Over the last 100 years in the United States, public education expenditure per student has steadily increased—about 150 percent in real, inflation-adjusted terms since 1970.¹ Policymakers, taxpayers, and families want to know that their increasing investment in education is being spent efficiently and delivering the intended results. With constant change in education policy, the factors influencing public education’s effectiveness are always evolving. One of these changes has been the growth of the public charter school sector since 1992, with nearly 3.7 million students in the US attending a charter school in 2020-21, representing over 7,800 schools in 43 of 50 states and Washington, DC.²

Operating under more autonomy than traditional public schools (TPS), charter schools can be more innovative, tailoring the educational experience to serve their students’ unique needs.³ Relative to similar TPS students, charter school students, on average, perform slightly better on standardized tests, graduate high school at higher rates, enroll in college at higher rates, and have more positive behavioral outcomes.⁴ Charter schools appear to be especially effective in improving outcomes for Black and Hispanic students, students in poverty, and students with special needs.⁵

Policymakers, taxpayers, and families want to know that their increasing investment in education is being spent efficiently and delivering the intended results.

Our team’s past research has found that charter schools in major US cities, on average, receive less funding per pupil⁶ and demonstrate higher productivity⁷ relative to TPS. However, research also indicates that when TPS face additional charter school competition, their students achieve better outcomes.⁸ This “competitive effect” is especially strong in urban areas with large concentrations of Black and Hispanic

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students and students in poverty, where there is some evidence that charter sector growth has helped to narrow historic opportunity gaps.⁹ As the charter school sector grows in the US, the competitive effect

Acknowledgements

We are grateful to those who made this project possible. We appreciate the guidance of Gary Larson, Angela Montagna, Jacob Waters, and the Larson Communications team in making this complicated information accessible to the public. We are thankful for the skill of Marlo Crandall of Remedy Creative in designing and formatting the report. We thank the City Fund and the Walton Family Foundation for their grant support and acknowledge that the content of this report is entirely the responsibility of the authors and does not necessarily reflect the positions of the supporting Foundations, the University of Arkansas, or the University of Arkansas System.

of charter schools may spread, acting as a “rising tide that lifts all boats” and improving TPS outcomes.

In our most recent charter school funding report examining the 2019-20 school year, “Charter School Funding: Little Progress Toward Equity in the City,” we found that charter schools received 30 percent less funding relative to TPS (about \$7,150 per pupil per year). While this represents a slight improvement in contrast to our 2017-18 report, the funding gap has been remarkably consistent over the 18 years we have studied this issue.¹⁰

We released our most recent study just after the Center for Research on Educational Outcomes (CREDO) released new findings on TPS and charter school achievement in their “National Charter School Study III 2023,”¹¹ finding that charter school performance has improved since they began studying charters in 2009, now demonstrating a small advantage over TPS. These results—that charter schools receive less funding and their students perform slightly better relative to TPS—inspired fresh interest in the productivity of publicly-funded schools.¹²

In this study, we reexamine school productivity using data from our school revenue report, “Charter School Funding: Little Progress Towards Equity in the City,” achievement data from the Center for Research on Educational Outcomes’ (CREDO’s) city and national studies, National Assessment of Education Progress (NAEP) data from the National Center for Education Statistics, and wage data from the US Bureau of Labor Statistics (BLS). In our revenue report, we studied nine of the cities CREDO has examined: Camden, New Jersey; Denver, Colorado; Houston, Texas; Indianapolis, Indiana; Memphis, Tennessee; New Orleans, Louisiana; New York City, New York; San

Antonio, Texas; and Washington, DC. In the present study, for those nine cities, we do the following:

- Compare the short-term cost-effectiveness of the TPS and charter school sectors, which we define as average NAEP points earned per \$1,000 in funding allocated per pupil, and
- Compare the expected return on investment (ROI) of the TPS and charter school sectors, which we define as the amount a student will earn in their lifetime per dollar invested in their education.

In the following sections, we explain our data sources and analytical methods, describe our results, and conclude with implications for future research, practice, and policymaking.

Methodology

For the inputs in our analysis, we use 2019-20 per-pupil funding from our 2023 charter school funding report.¹³ For outputs, we first use NAEP scores (eighth grade reading and math), since they allow for comparison between cities across different states. We estimate NAEP scores for each sector in each city, relative to the state averages, using test score differentials from CREDO, which compare each sector in each city to state averages. Second, we estimate average lifetime earnings for each city based on which type of school a student attends using the average salary in each state from the BLS and the average state reading and math test score differences (in standard deviations) from CREDO. For more details regarding our data sources and calculations, see Appendix A.

One challenge in comparing the productivity of TPS and charter schools is that the two sectors may serve slightly different populations in terms of student

needs (see Table 1). For example, in Camden, 90 percent of charter school students are living in poverty while in TPS, only 56 percent are. When one sector serves more disadvantaged students, we might expect to see systematic differences in outcomes. However, CREDO calculates test score differentials using a technique that matches each charter school student to a “virtual twin” from a local TPS with similar prior test scores and demographics.¹⁴ We use these estimates to adjust the NAEP scores to reflect any population differences.

This adjustment is important because in almost every city in our analysis, there is at least a five-percentage point difference between the TPS and charter

populations in one or more of three observable student characteristics: living in poverty (signaled by eligibility for free- or reduced-price lunch), receiving English language learner (ELL) support, or receiving special education services (see Table 1). For example, charter schools serve a higher concentration of students in poverty in Camden, Denver, Houston, Indianapolis, Memphis, and New York City, and more ELLs in Denver. However, TPS serve a higher concentration of students in poverty in San Antonio, a higher concentration of ELLs in Indianapolis, New York City, and Washington, DC, and a higher concentration of students in special education in New York City.

Table 1: Demographic Characteristics by Sector in 9 U.S. Cities, 2019-20 School Year

City	Overall Enrollment		Poverty		ELL		SPED	
	Total Public School Enrollment	Students Attending Charter	TPS	Charter	TPS	Charter	TPS	Charter
Camden	16,954	59.2%	56.4%	90.3%	12.5%	10.0%	17.8%	13.7%
Denver	92,772	23.4%	61.0%	71.6%	29.1%	37.3%	19.6%	16.9%
Houston	249,771	15.9%	79.1%	89.6%	33.9%	32.3%	8.1%	7.1%
Indianapolis	51,118	49.9%	66.0%	73.5%	21.9%	10.8%	17.1%	14.6%
Memphis	116,238	23.6%	55.0%	60.1%	12.0%	9.5%	11.7%	9.4%
New Orleans	50,766	100.0%	n/a	81.5%	n/a	6.9%	n/a	12.6%
New York City	1,054,562	11.8%	74.4%	80.1%	14.6%	6.8%	24.8%	18.7%
San Antonio	60,341	19.6%	89.3%	82.3%	20.7%	19.0%	12.3%	8.8%
Washington, DC	93,963	46.0%	42.7%	40.7%	15.7%	7.9%	15.5%	14.5%
9-City Weighted Average	1,786,485	19.9%	72.4%	74.4%	18.3%	12.7%	20.3%	14.4%

Note: The data above is from our 2023 report, “Charter School Funding: Little Progress Toward Equity in the City.” Red text indicates a between-sector difference greater than five percentage points for that city. We consider New Orleans as a charter school-only city, thus “n/a” = “not applicable” (see the appendices for more information).

Results

Trends in Funding and Achievement

First, we examine trends in per-pupil funding (in 2020 USD; see Figure 1) and NAEP scores (reading and math combined; see Figure 2) at four points from FY14 to FY20. Overall, we observe that TPS funding is significantly higher than charter school funding for all four years (by about \$6,000 to \$9,000 per pupil)¹⁵ and that estimated NAEP scores, adjusted for differences in student population, are slightly higher for charter schools (by 1.8 points or 0.05 SD to 2.6 points or 0.07 SD) across those years. However, it is important to note that the composition of the cities in our sample changed over time. We included New York City in each analysis except FY18.¹⁶ This omission likely explains the change in funding observed in FY18 relative to FY16 and FY20.

Figure 1: Average Per-Pupil Revenue Over Time

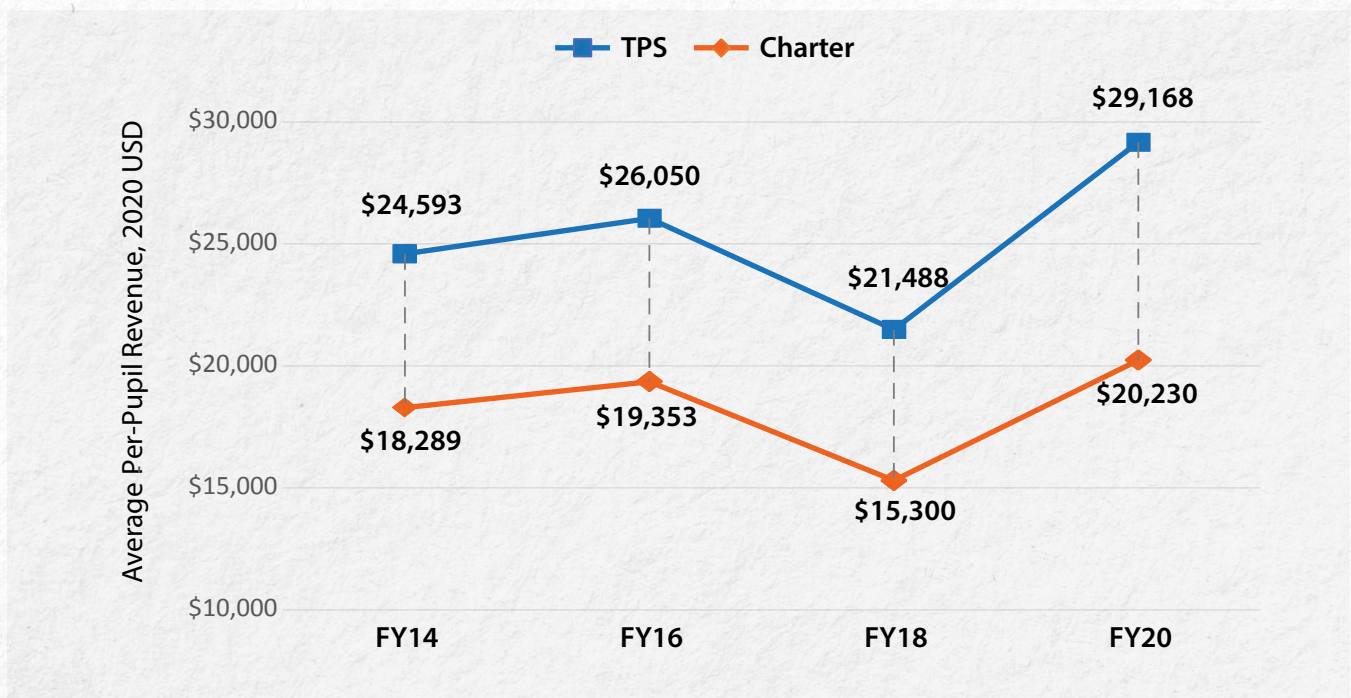
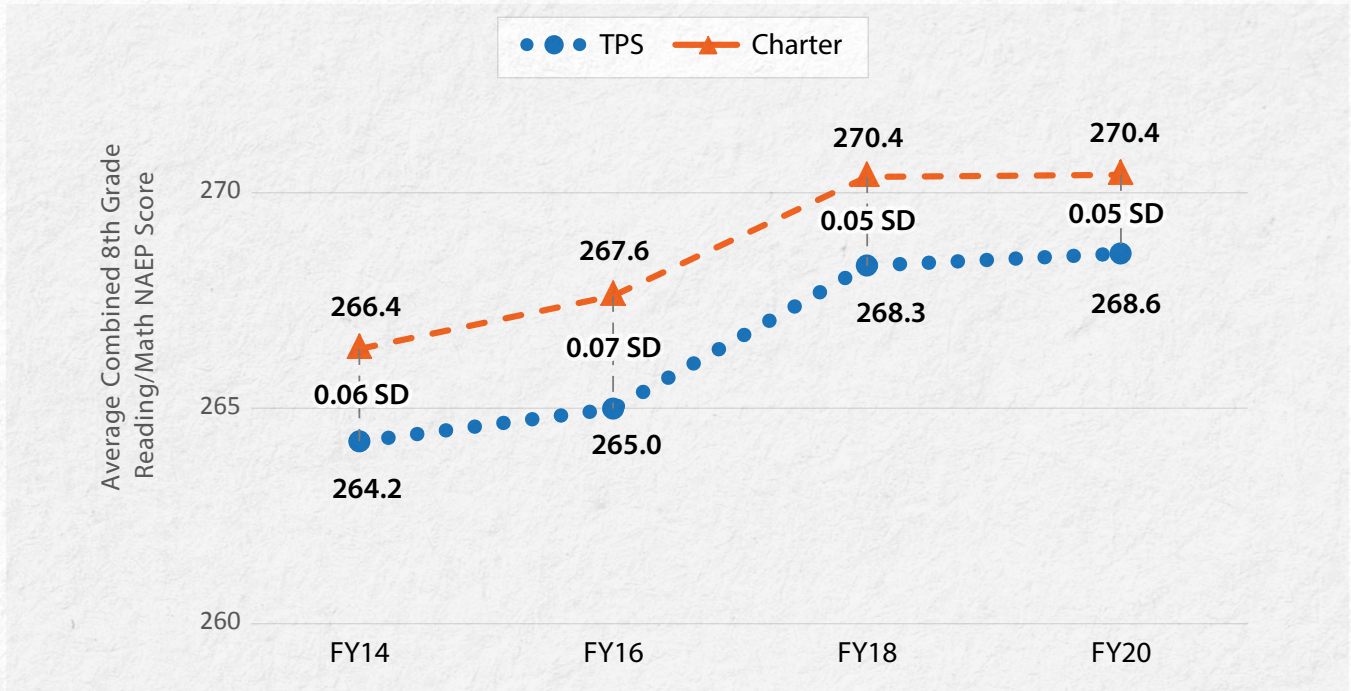


Figure 2: Average Eighth Grade NAEP Scores Over Time

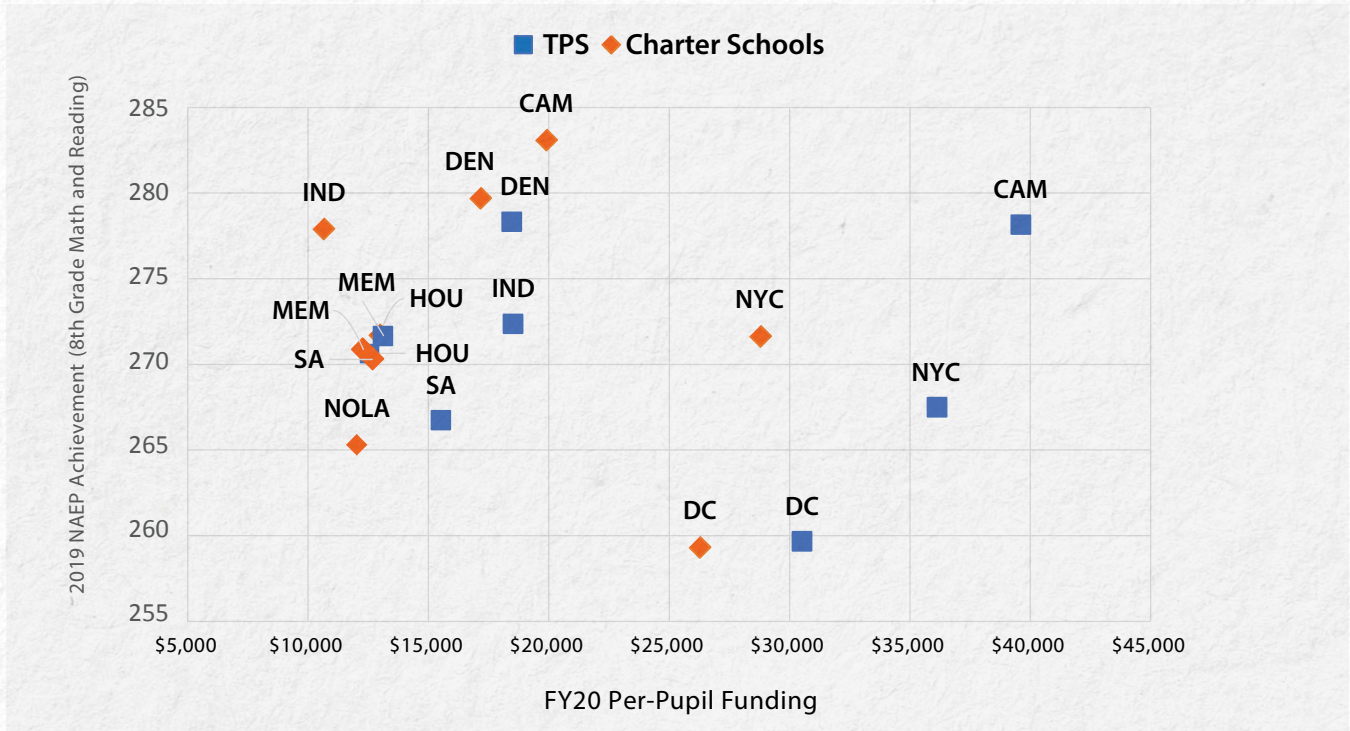


Note: estimates adjusted for observable differences between student populations.

Cost-Effectiveness Analysis

Next, we present the results of our cost-effectiveness analysis, where we estimate for each city the average number of NAEP points earned by each sector per \$1,000 of funding allocated per pupil to each sector. We first plot the average NAEP score (eighth grade reading and math combined) on the y-axis and average per-pupil funding on the x-axis for each sector within each city (see Figure 3). The upper left-hand quadrant of the graph shows the overlap between high achievement and low funding, or where schools are most efficient.

Figure 3: NAEP Achievement by Funding Per Pupil

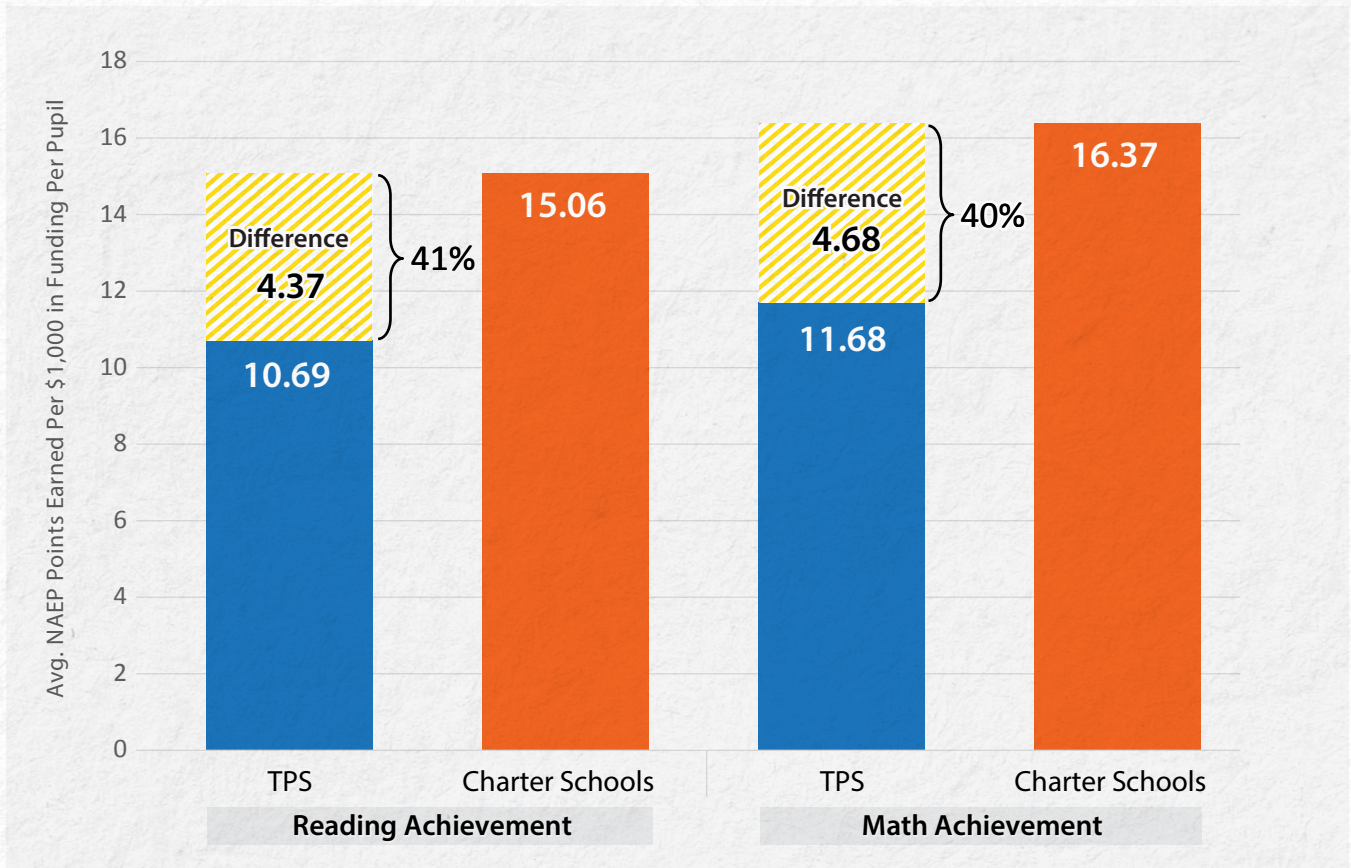


When we estimate overall cost-effectiveness, we find that the student-weighted average NAEP points per \$1,000 in per pupil funding is 10.7 for reading and 11.7 for math in TPS and 15.1 for reading and 16.4 for math in charter schools (see Figure 4). On average, a charter school student earns an additional

4.4 points (0.12 SD or 41 percent) on the eighth grade NAEP reading exam and an additional 4.7 points (0.12 SD or 40 percent) on the eighth grade NAEP math exam compared to a matched TPS student, per \$1,000 received by their school for their education each year.

On average, a charter school student earns an additional 4.4 points ...on the eighth grade NAEP reading exam and an additional 4.7 points ...on the eighth grade NAEP math exam compared to a matched TPS student, per \$1,000 received by their school for their education each year.

Figure 4: Cost-Effectiveness of TPS and Charter Schools, 9-City Weighted Average



However, there is variation in both funding and estimated NAEP scores across the nine cities. The difference between TPS and charter schools in terms of NAEP points per \$1,000 of per-pupil funding is shown in Figures 5 and 6 and the rightmost columns of Tables 2 and 3. While charter schools' advantage in terms of productivity is slightly higher for math than reading, we find that charter students earn more NAEP points per \$1,000 in funding for their

education for both math and reading in every city except Houston, where TPS students' additional points per \$1,000 is less than one point (less than a tenth of a percent difference). Houston's TPS and charter school sectors are nearly identical in terms of funding, achievement, and productivity. The largest charter school advantages for both reading and math are in Indianapolis (10.8 points or 0.29 SD in reading, a 76 percent increase in cost-effectiveness, and 11.9

We find that charter students earn more NAEP points per \$1,000 in funding for their education for both math and reading in every city except Houston, where TPS students' additional points per \$1,000 is less than one point.

points or 0.3 SD in math, a 78 percent increase). There are also large differences in Camden (6.9 points or 0.18 SD in reading, a 103 percent increase, and 7.5 points or 0.19 SD in math, a 102 percent increase) and San Antonio (4 points or 0.11 SD in reading, a 25 percent increase, and 4.2 points or 0.11 SD in math, a 23 percent increase). Charter schools in these cities both receive significantly less funding and have higher average test scores relative to TPS.

The largest charter school advantages for both reading and math are in Indianapolis, Camden, and San Antonio.

Figure 5: Charter School Advantage in Terms of NAEP Reading Points Per \$1,000 of Funding Per Pupil

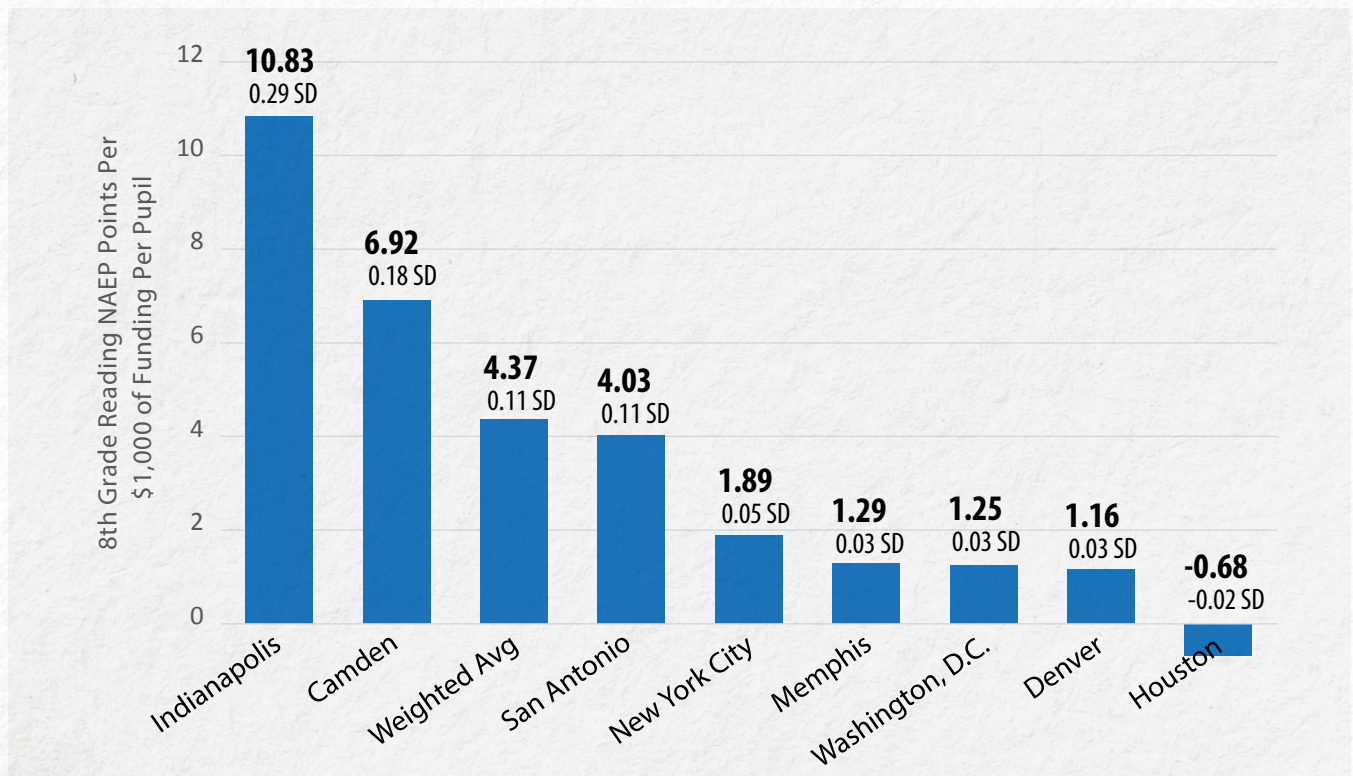


Table 2: Average NAEP Reading Scores Per Thousand Dollars Funded Per Pupil

Location	TPS			Charter Schools			Difference
	FY20 Per-Pupil Revenue	FY19 NAEP Score	NAEP Points per \$1,000 Funded	FY20 Per-Pupil Revenue	FY19 NAEP Score	NAEP Points per \$1,000 Funded	NAEP Points per \$1,000 Funded
Camden	\$39,611	266.54	6.73	\$19,900	271.56	13.65	6.92
Denver	\$18,459	269.46	14.60	\$17,161	270.42	15.76	1.16
Houston	\$12,552	258.84	20.62	\$12,969	258.66	19.94	-0.68
Indianapolis	\$18,511	263.01	14.21	\$10,648	266.63	25.04	10.83
Memphis	\$13,111	262.43	20.02	\$12,265	261.37	21.31	1.29
New Orleans	n/a	n/a	n/a	\$12,026	257.26	21.39	n/a
New York City	\$36,126	254.00	7.03	\$28,792	256.76	8.92	1.89
San Antonio	\$15,514	254.05	16.38	\$12,678	258.66	20.40	4.03
Washington, D.C.	\$30,517	250.87	8.22	\$26,272	248.86	9.47	1.25
9-City Avg.	\$23,050	259.90	13.47	\$16,968	261.13	17.32	3.85
9-City Student-Weighted Avg.	\$29,168	256.11	10.69	\$20,230	258.47	15.06	4.37

Note: differences between state and city/sector NAEP averages adjusted for observable differences between student populations.

Figure 6: Charter School Advantage in Terms of NAEP Math Points Per \$1,000 of Funding Per Pupil

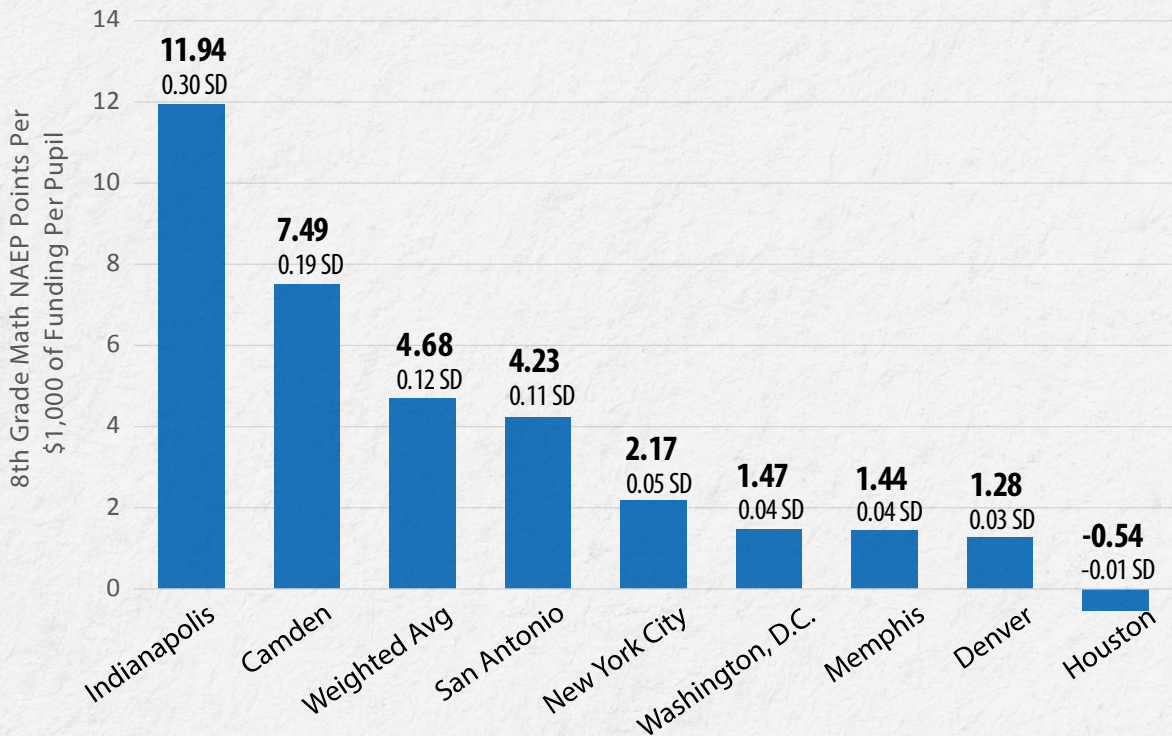


Table 3: Average NAEP Math Scores Per Thousand Dollars Funded Per Pupil

Location	TPS			Charter Schools			Difference
	FY20 Per-Pupil Revenue	FY19 NAEP Score	NAEP Points per \$1,000 Funded	FY20 Per-Pupil Revenue	FY19 NAEP Score	NAEP Points per \$1,000 Funded	NAEP Points per \$1,000 Funded
Camden	\$39,611	289.77	7.32	\$19,900	294.64	14.81	7.49
Denver	\$18,459	287.19	15.56	\$17,161	289.00	16.84	1.28
Houston	\$12,552	282.40	22.50	\$12,969	284.80	21.96	-0.54
Indianapolis	\$18,511	281.72	15.22	\$10,648	289.20	27.16	11.94
Memphis	\$13,111	280.88	21.42	\$12,265	280.40	22.86	1.44
New Orleans	n/a			\$12,026	273.35	22.73	n/a
New York City	\$36,126	281.00	7.78	\$28,792	286.54	9.95	2.17
San Antonio	\$15,514	279.44	18.01	\$12,678	282.00	22.24	4.23
Washington, D.C.	\$30,517	268.49	8.80	\$26,272	269.80	10.27	1.47
9-City Avg.	\$23,050	281.36	14.58	\$16,968	283.30	18.76	4.18
9-City Student-Weighted Avg.	\$29,168	281.06	11.68	\$20,230	282.36	16.37	4.68

Note: differences between state and city/sector NAEP averages adjusted for observable differences between student populations.

We exclude New Orleans from the TPS-charter productivity comparison because it is an all-charter city.¹⁷ Instead, we compare the charter results in the Crescent City to those from the charter and TPS sectors in our other eight cities. On average, students in New Orleans earn an additional 6.3 reading points (0.17 SD or a 42 percent increase in cost-effectiveness) and 6.4 math points (0.16 SD or a 39 percent increase) on the NAEP per \$1,000 of funding per pupil, compared to charter school students in the other eight cities. Students in New Orleans also earn an additional 10.7 reading points (0.28 SD or a 100 percent increase) and 11.1 math points (0.28 SD or a 95 percent increase) on the NAEP per \$1,000 of funding per pupil, compared to TPS students in those cities (see Appendix B).

ROI Analysis

Finally, we turn to our ROI analysis, where we calculate the return (average lifetime earnings) on the investment (average per-pupil funding for 13 years in K-12 education) in each school sector in each city. We estimate that, for every dollar of funding received by their school for their education, TPS students earn \$3.94 in average lifetime earnings while charter school students earn \$6.25 in average lifetime earnings, representing a 58 percent charter school advantage in rates of return (see Figure 7). These estimates are based on students' combined average reading and math scores on state exams.

However, some students switch from a TPS to a charter school or vice versa during their K-12

schooling. We compare the rate of return on attending a TPS for 13 years, for attending a charter school for 13 years, and for a hybrid experience with 6.5 years in each sector (see Figure 8) and find that even attending a charter school for half of a student's K-12 schooling experience increases the ROI by \$0.81 per \$1 invested (a 21 percent increase in ROI).

We also examine ROI over time by comparing our current findings to those from our past productivity studies (see Figure 9).¹⁸ This charter ROI advantage ranged from \$1.99 to \$2.54 from FY14 to FY20.

We estimate that, for every dollar of funding received by their school for their education, TPS students earn \$3.94 in average lifetime earnings while charter school students earn \$6.25 in average lifetime earnings, representing a 58 percent charter school advantage in rates of return

[We] find that even attending a charter school for half of a student's K-12 schooling experience increases the ROI by \$0.81 per \$1 invested (a 21 percent increase in ROI).

Figure 7: TPS and Charter School ROI, 9-City Weighted Average

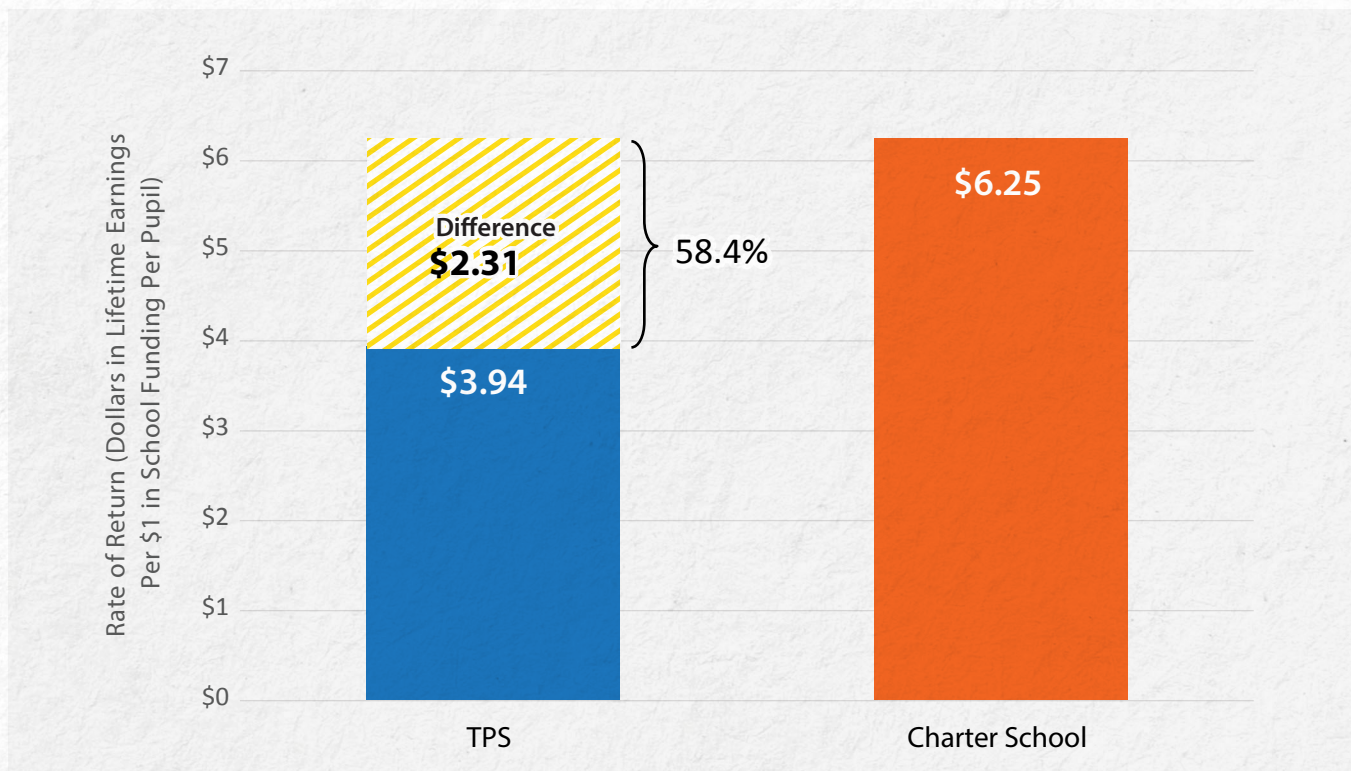


Figure 8: ROI by Schooling Experience, 9-City Weighted Average

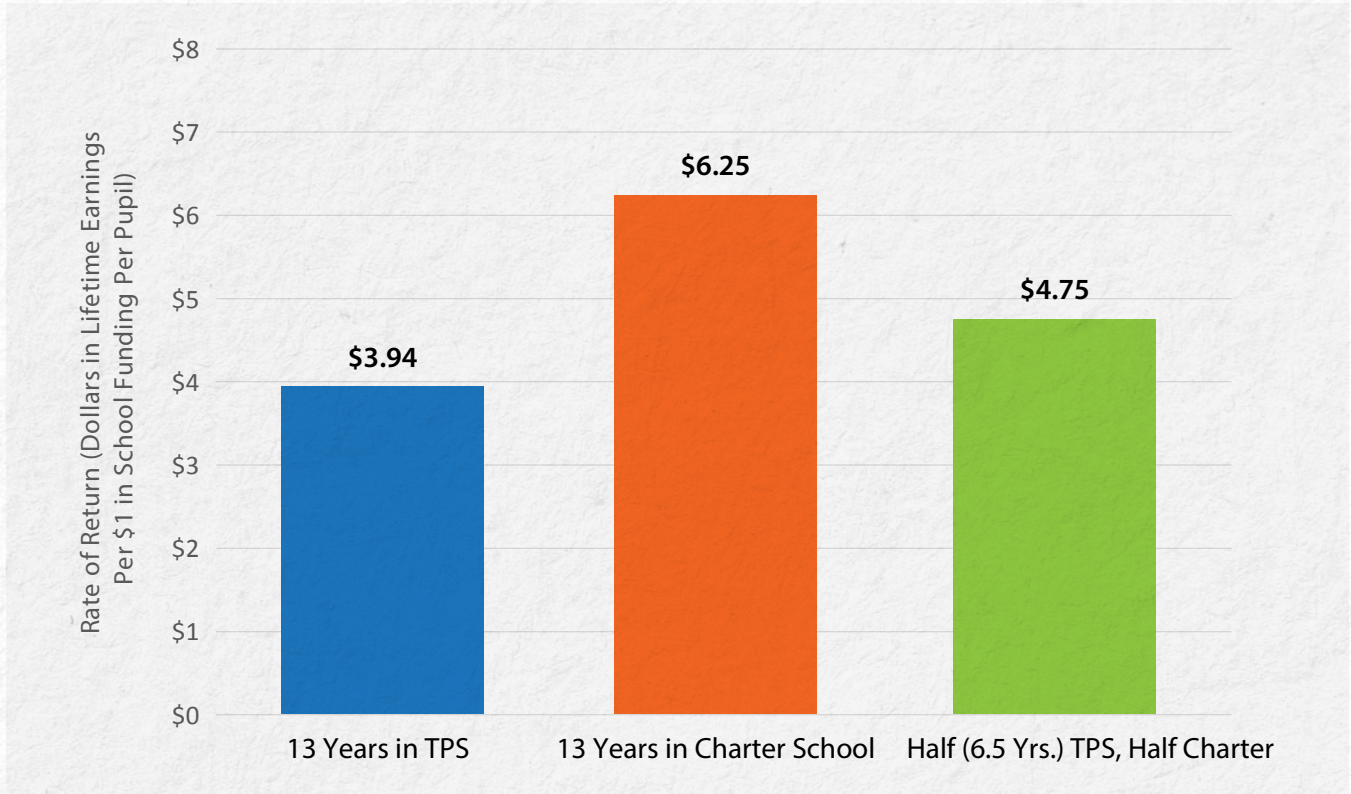


Figure 9: TPS-Charter School ROI Difference Over Time



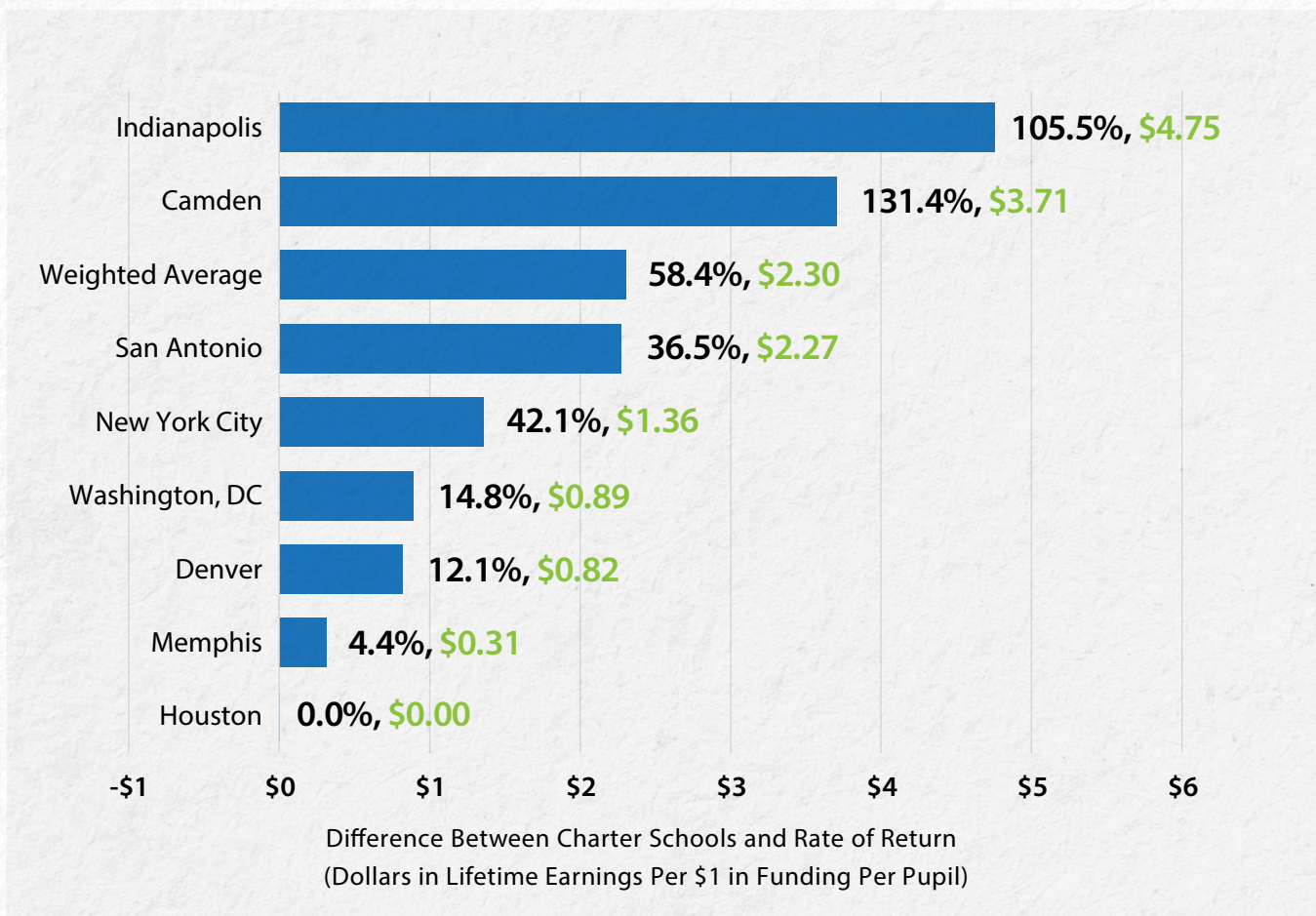
Estimated rates of return also vary across the nine cities (see Figure 10). Charter schools have the largest ROI advantage in terms of dollars in Indianapolis, where we estimate that the rate of return for charter schooling is \$4.75 or 106 percent higher than that of TPS. In terms of percent difference, the largest charter school ROI advantage in terms of percent is in Camden, where we estimate that the rate of return for charter schooling is \$3.71 or 131 percent higher than that of TPS. The rate of return in Houston is the same for both sectors—\$8.65 or 765 percent.

We also find the ROI for New Orleans schools to be much higher than the eight-city averages for TPS and

Charter schools have the largest ROI advantage in terms of dollars in Indianapolis (\$4.75 or 106 percent higher than TPS) and in terms of percent in Camden (\$3.71 or 131 percent higher than TPS).

charter schools (see Appendix B). While the ROI for TPS in the other eight cities is \$3.94 (294 percent) and is \$6.25 (525 percent) for charter schools, the ROI for schools in New Orleans is \$7.57 (657

Figure 10: Charter ROI Advantage in 8 Cities



percent). New Orleans' all-charter public schools, on average, appear to be significantly more productive than both charter schools and TPS in our eight other cities.

New Orleans' all-charter public schools, on average, appear to be significantly more productive than both charter schools and TPS in our eight other cities.

Conclusion

In this report, we find that charter schools tend to demonstrate greater efficiency on both metrics of cost-effectiveness and return on investment, using fewer dollars to achieve better outcomes, relative to TPS. Because our estimates of productivity are adjusted for observable differences in the student populations served by each sector, we can assume that we do not find these differences in efficiency because TPS disproportionately serve students who need additional resources to succeed. Furthermore, our descriptive statistics suggest it is not consistently the case that TPS disproportionately serve such students.

While our report suggests that charter schools operate more efficiently, we do not examine why this might be the case. This differential could be due in

part to the fact that charter schools do not have the same kind of structural inefficiencies as TPS. Charter schools may be nimbler in responding to enrollment changes, while TPS face higher fixed costs. However, part of the mechanism that allows charter schools to produce better outcomes with less funding could be related to the fact that charter schools are released from some restrictions placed on public schools, which may allow them to customize the way they spend their dollars to be more efficient and achieve better outcomes for students. Further research should explore the ways that charter schools achieve greater efficiency than TPS.

Our findings also raise the question whether charter schools would achieve even better outcomes with more funding or whether there is a ceiling effect in terms of charter school productivity. Currently, a student in one of the nine cities in our sample forgoes, on average, \$8,938 in per-pupil funding per year if they decide to attend a charter school

We find that charter schools tend to demonstrate greater efficiency on both metrics of cost-effectiveness and return on investment, using fewer dollars to achieve better outcomes, relative to TPS.

rather than a TPS. Even still, on average, they score 2.2 points higher on the eighth grade NAEP reading exam and 0.6 points higher on the math exam. Perhaps these charter schooling gains would be even larger if charter school funding was equitably matched to TPS funding. Since our analysis of

longitudinal and cross-city trends in funding and test scores is merely descriptive, we cannot conclusively determine whether increased charter school funding is causally linked to higher test scores. Further research should examine whether, as charter school funding rises, charter school test scores also rise and charter school productivity remains the same or increases.

Many TPS leaders soon will face more restricted budgets as unfunded teacher pension liabilities place a greater financial strain on TPS.

Our report suggests that TPS leaders could learn lessons from charter school operators who have already been operating on much tighter budgets without sacrificing academic quality. Reconfirming the results of our team's past charter school productivity reports, we conclude that charter schools are still a good investment.

Our report suggests that TPS leaders could learn lessons from charter school operators who have already been operating on much tighter budgets without sacrificing academic quality.

Authors



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Appendix A: Further Information on Data and Methods

Sample Selection

Our team’s past reports on TPS and charter school productivity, which we update in this report, have included a sample of seven or eight cities from the larger samples we include in our revenue reports. For our revenue reports, we identify cities for inclusion based on whether they have seen significant charter school sector growth or have the potential for significant growth. However, for the productivity studies, we select cities from our revenue studies for inclusion based on the availability of achievement data from CREDO. We did not have access to both revenue and achievement data for the same sample of cities for every report, therefore causing the sample composition to vary; however, we did include Denver, Indianapolis, San Antonio, and Washington, DC in each of the four reports (including this one). In Figure 1 in the main text of the report, there is a dramatic decrease in funding per pupil from FY16 to FY18 and a dramatic increase from FY18 to FY20. This may be because of the exclusion of New York City in our 2021 report, which used data from FY18.

Table A.1: Cities Included in Longitudinal Analyse

Report Year	Revenue Data Year	Achievement Data Year(s)	Selected Cities
2018	2013-14	2006-12	Atlanta, Boston, Denver, Houston, Indianapolis, New York City, San Antonio, Washington, DC
2019	2015-16	2016-17	Atlanta, Boston, Denver, Houston, Indianapolis, New York City, San Antonio, Washington, DC
2021	2017-18	2018-19	Camden, Denver, Indianapolis, Memphis, New Orleans, San Antonio, Washington, DC
2023	2019-20	2018-19	Camden, Denver, Houston, Indianapolis, Memphis, New Orleans, New York City, San Antonio, Washington, DC

Though we include New Orleans in the analysis, we do not make a TPS-charter school comparison because, in the 2019-20 school year, TPS served less than one percent of the public school student population in New Orleans. Of the three remaining public school entities, one was in the process of transitioning to a charter school, another was located in a correctional center, and the third was the New Orleans Public Schools central office, representing 185 students unassigned to a school location. Therefore, for the purposes of this analysis, although our data points represent revenue and test scores for every student in the city of New Orleans, we consider New Orleans to be an all-charter city. All funds and all students are assigned to the charter sector. Rather than a within-city TPS-charter school comparison in terms of productivity, we compare New Orleans schools’ productivity to the average productivity of TPS and charters in the other eight cities.

Data Sources

As the input in our analysis, we use 2019-20 revenue per pupil which we calculated in our 2023 report, “Charter School Funding: Little Progress Towards Equity in the City.” For this revenue analysis, we included every dollar flowing to TPS and charter schools as reported in official sources (preferably from the state, but from the district when state sources were unavailable). We included in-kind services such as special education services or use of facilities as a credit to charter schools and a debit to TPS, and we ensured pass-through funds to charter schools were excluded from TPS revenue calculations. Because loans must be repaid, we did not include bond revenue or any other borrowed revenue streams for either TPS or charter schools. Further information regarding these calculations can be found in the body and appendices of the report.

As in past reports, we use achievement data from the CREDO City Study project¹⁹ to examine the productivity of TPS and charter schools. The city studies estimate the difference, in standard deviations, between the average test scores of charter schools in a city as well as TPS in a city, compared to the state average. In other words, the Camden city study provides estimates of the difference between the average Camden charter school student’s state test score and the average New Jersey student’s state test score, as well as the average Camden TPS student’s state test score and the average New Jersey student’s state test score, both in standard deviation units. Because CREDO uses a virtual control record method, these estimates compare charter school students with TPS students who are alike in terms of past achievement and demographics, reducing concerns that the differences between the average city-sector test scores and the state test scores are a function of differences in student populations.

However, CREDO did not include New York City in its 2018-19 City Study cohorts. Instead, New York City data can be found in the 2023 CREDO national study. While the city studies estimate the differences between the state average and city-sector averages, the national study estimates the TPS-charter difference in each state, including New York City as a state so as not to skew the New York state results. Therefore, we can use the New York City TPS-charter school difference estimate in this analysis. Table A.2 specifically notes where the estimates we use can be found in the city studies.

Table A.2: TPS and Charter School Achievement Estimate Sources

City	Report Year	Page of Estimates
Camden ²⁰	2022	City study p. 36 (combine Charter and Renaissance Schools, Magnet Schools and Other TPS)
Denver ²¹	2022	City study p. 37 (combine Innovation Schools and Other TPS)
Houston ²²	2022	City study p. 36 (combine Magnet Schools and Other TPS)
Indianapolis ²³	2022	City study p. 36 (combine Innovation Schools and Other TPS)
Memphis ²⁴	2022	City study p. 36 (combine Optional Schools, Achievement School District Schools, and Other TPS)
New Orleans ²⁵	2022	City study p. 36 (combine Charter Schools, Selective Schools, and Other TPS)
New York City ²⁶	2023	National study p. 49-50 (use NYC TPS-charter difference estimates from the maps, listed in days of learning; convert to SD [5.78 days = 0.01 SD]) ²⁷
San Antonio ²⁸	2022	City study p. 36 (combine Innovation Schools and Other TPS)
Washington, DC ²⁹	2022	City study p. 27 (combine Magnet Schools and Other TPS)

While we classify every publicly funded school as either a TPS or charter school, CREDO classifies schools on a more disaggregated level—for example, classifying publicly funded schools in Camden as one of the following: charter school, Renaissance school, magnet school, or other TPS. As we did in our 2023 revenue study, we classify Renaissance schools as charter schools, because they functionally operate as charter schools. We also do not make distinctions regarding type of TPS, classifying magnet schools as simply TPS. Therefore, we use 2018-19 school enrollment from the Common Core of Data (CCD) to produce weighted averages of the CREDO estimates when their estimates are disaggregated at a level beyond our revenue estimates. For some cities, CCD did not include indicators for the types of schools that CREDO differentiates. For example, there is no indicator for Optional Schools or Achievement Schools in Memphis. In the case that we could not identify enrollment for a subset of TPS in CCD, we used state or district sources to identify the schools in that subset and retrieve 2018-19 enrollment from CCD for those schools. We show the CREDO estimates used, the weights we calculated based on enrollments, and the weighted averages we estimated in Table A.3.

We estimate lifetime earnings by using the average worker’s yearly salary in the state as reported by the BLS in May 2020 as the base amount; we assume that an individual works full time from age 25 to 70 and therefore multiply the average salary by 46 years.³⁰ We also assume a one percent salary increase each year and use a three percent discount rate to calculate the net present value of lifetime earnings. Relying upon findings from economist Eric Hanushek, we assume that a one standard deviation increase in academic achievement is associated with a 13 percent increase in lifetime earnings, and that only 70 percent of these gains persist from year to year.³¹

Table A.3: Sector-Weighted CREDO Achievement Estimates

City/Sector	Reading	Math	Weight
<i>Camden</i>			
Charter ³²	-0.02	0.01	0.49
Renaissance ³³	0.1	0.12	0.51
Magnet ³⁴	0.07	-0.02	0.11
Other TPS ³⁵	-0.11	-0.06	0.89
Weighted Charter Estimate	0.04	0.07	1
Weighted TPS Estimate	-0.09	-0.06	1
<i>Denver</i>			
Charter	0.09	0.10	1
Innovation ³⁶	0.11	0.1	0.35
Other TPS ³⁷	0.04	0.03	0.65
Weighted TPS Estimate	0.06	0.05	1
<i>Houston</i>			
Charter	0.07	0.12	1
Magnet ³⁸	0.16	0.07	0.50
Other TPS ³⁹	-0.01	0.05	0.50
Weighted TPS Estimate	0.07	0.06	1
<i>Indianapolis</i>			
Charter	0.02	0.08	1
Innovation ⁴⁰	-0.02	-0.04	0.16
Other TPS ⁴¹	-0.09	-0.12	0.84
Weighted TPS Estimate	-0.08	-0.11	1
<i>Memphis</i>			
Charter	-0.02	0.01	1
Optional ⁴²	0.12	0.11	0.30
ASD ⁴³	-0.11	-0.1	0.04
Other TPS ⁴⁴	-0.03	-0.01	0.66
Weighted TPS Estimate	0.01	0.02	1
<i>New Orleans</i>			
Charter ⁴⁵	-0.02	0.01	0.91
Selective ⁴⁶	0.31	0.3	0.08
Other TPS ⁴⁷	-0.01	0.04	0.01
Weighted City Estimate	0.01	0.03	1

<i>San Antonio</i>			
Charter	0.06	0.04	1
Innovation ⁴⁸	-0.01	-0.02	0.41
Other TPS ⁴⁹	-0.08	-0.01	0.59
Weighted TPS Estimate	-0.05	-0.01	1
<i>Washington, DC</i>			
Charter	-0.03	0.02	1
Magnet ⁵⁰	0.16	0.17	0.09
Other TPS ⁵¹	0.01	-0.03	0.91
Weighted TPS Estimate	0.02	-0.01	1

Calculating Cost-Effectiveness

First, we estimate the short-term benefits of attending either a TPS or charter school in terms of academic achievement (NAEP points). We could simply compare the average NAEP scores for TPS and charter school students in each city, but this method poses a few challenges. First, these raw comparisons would not take differences in student populations between the two sectors into account. Second, for many of the cities for which we have revenue data, NAEP score data is not available publicly in the NAEP Data Explorer—much less disaggregated by TPS and charter schools. What we do consistently have is the NAEP state averages. This aligns well with the data we have from CREDO, which for every city in our analysis except New York City, estimates the difference between the state average and the average for students in either TPS or charter schools in each city. By adjusting the state average NAEP score by the standard deviation difference from CREDO, we can estimate the average NAEP score of each TPS or charter school sector within each city. The only exception is New York City, where we do not have estimates that compare each sector within each city to the state average but rather, the sectors within the city to each other. In this case, we can use the New York City TPS average NAEP score from the NAEP Data Explorer and adjust it by the TPS-charter school differential from CREDO to estimate the average charter school student’s NAEP score in comparison to TPS. Our NAEP score estimates should not be considered the actual average NAEP scores for TPS or charter school students in each city (except for TPS in New York City) because they are adjusted using CREDO’s state test score difference estimates, which account for differences in student populations. The value of this analysis is not understanding at what level TPS and charter school students are achieving on the NAEP or on state test scores, but rather how they fare in comparison to one another.

To estimate NAEP scores for each sector and subject in the eight cities other than New York City, we use the formula below (with example computation for Indianapolis TPS):

$$\begin{aligned}
 (1) \quad & \textit{City TPS NAEP Reading Score} \\
 & = \textit{State Average NAEP Reading Score} \\
 & + (\textit{SD difference between City TPS and State Average NAEP Reading Score} \\
 & * 1 \textit{ SD on NAEP Reading Exam}) = 266 + (-0.08 * 38) = 263.01
 \end{aligned}$$

However, for New York City, we do not have an estimate comparing TPS in New York City to the state average. Instead, the comparison is between TPS and charter schools in New York City, expressed in days of learning. For New York City for both reading and math, we use the formula below, using the New York City TPS reading and math NAEP scores from the NAEP Data Explorer:

$$\begin{aligned}
 (2) \quad & \textit{NYC Charter NAEP Reading Score} = \\
 & \textit{NYC TPS NAEP Reading Score} + \left(\frac{\textit{Days of Learning difference between TPS and Charters}}{5.78} \right) * \\
 & \left(\frac{1 \textit{ SD on NAEP Reading Exam}}{100} \right) = 254 + \left(\frac{42}{5.78} * \frac{38}{100} \right) = 256.76
 \end{aligned}$$

Calculating Return on Investment

We then turn to the long-term benefits of attending either a TPS or charter school—the ROI. We calculate the costs of educating a child for 13 years in either a TPS or charter school, using FY20 funding from our 2023 revenue study. We then estimate the lifetime earnings of graduates of both types of schooling, based on test score differences from CREDO and Hanushek’s (2010) finding that a one standard deviation increase in test scores is associated with a 13 percent increase in lifetime earnings.⁵² However, some children may experience some combination of both types of schooling; therefore, we also estimate the costs and benefits of attending a TPS for 6.5 years and a charter school for 6.5 years. We divide the lifetime earnings by the cost of investment for each schooling experience to find the ROI of each, expressed both as dollars earned for every dollar spent or percent ROI, where the percent ROI is equal to the dollars earned per dollar spent minus one and multiplied by 100.⁵³

While we could estimate lifetime earnings based on both reading and math test scores, Hanushek’s estimate is for overall test scores; therefore, our preferred ROI estimates for each type of schooling are the overall

estimates, which are based upon the averages of the reading and math test score differences.

To estimate ROI, we use the following formulae for both TPS and charter schools (with example computation for Indianapolis), where NPV is Net Present Value calculated using a three percent discount rate and assuming one percent annual salary growth:

(3)

13 Yrs. TPS ROI

$$= \frac{(NPV \text{ State Average Lifetime Earnings}) * (1 + (TPS \text{ Test Score Difference} * 0.13 * 0.03)^{13})}{\text{Annual TPS Revenue Per Pupil} * 13}$$

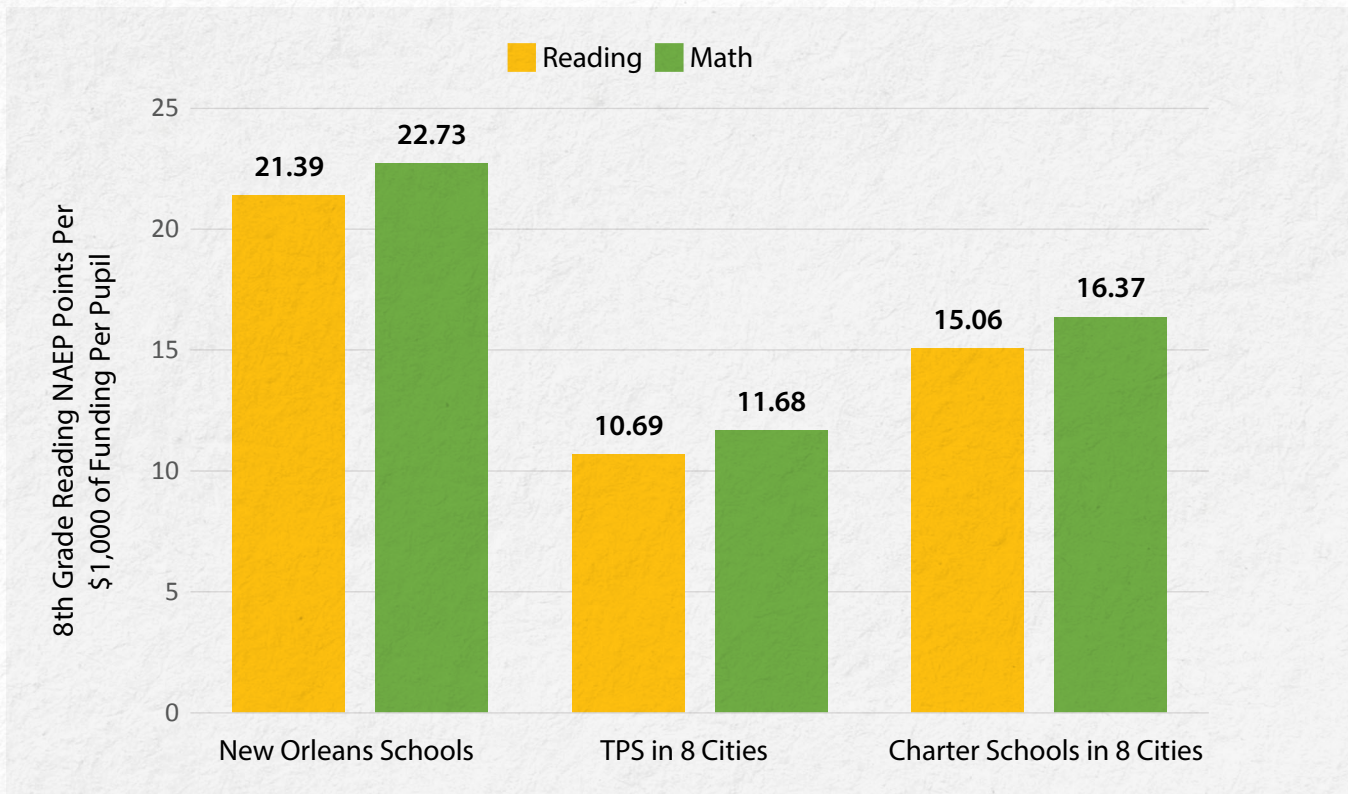
$$= \frac{(\$1,156,077) * (1 + (-0.09 * 0.13 * 0.70)^{13})}{\$18,511 * 13} = \frac{\$1,210,571}{\$240,639} = \$4.51 \text{ or } 351\%$$

For New York City, because we have the TPS-charter school difference within New York City but not estimates comparing the state average on test scores with the TPS and charter school averages in the city, we estimate the difference by finding the difference between the TPS NAEP score and the state average and our estimated charter NAEP score and the state average. In New York City, the eighth grade 2018-19 TPS NAEP scores were 254 for reading and 281 for math. For charter schools in New York City, we estimated a score of 256.8 for reading and 286.5 for math. The 2018-19 average eighth grade NAEP scores for the state of New York were 262 for reading and 280 for math. Therefore, the differences between the New York City TPS NAEP scores and the state NAEP scores are -8 points for reading and +1 point for math, and the differences between the New York City charter school NAEP scores and the state NAEP scores are -5.2 for reading and 6.5 for math. When we combine reading and math and translate these point differences into standard deviations, where one standard deviation is equal to 39 points on the NAEP, the New York City TPS-state difference is -0.09 standard deviations (favoring the state average) and the New York City charter school-state difference is 0.02 standard deviations (favoring New York City charter schools). We then use these estimates in the ROI formulae above.

Appendix B: Results for New Orleans

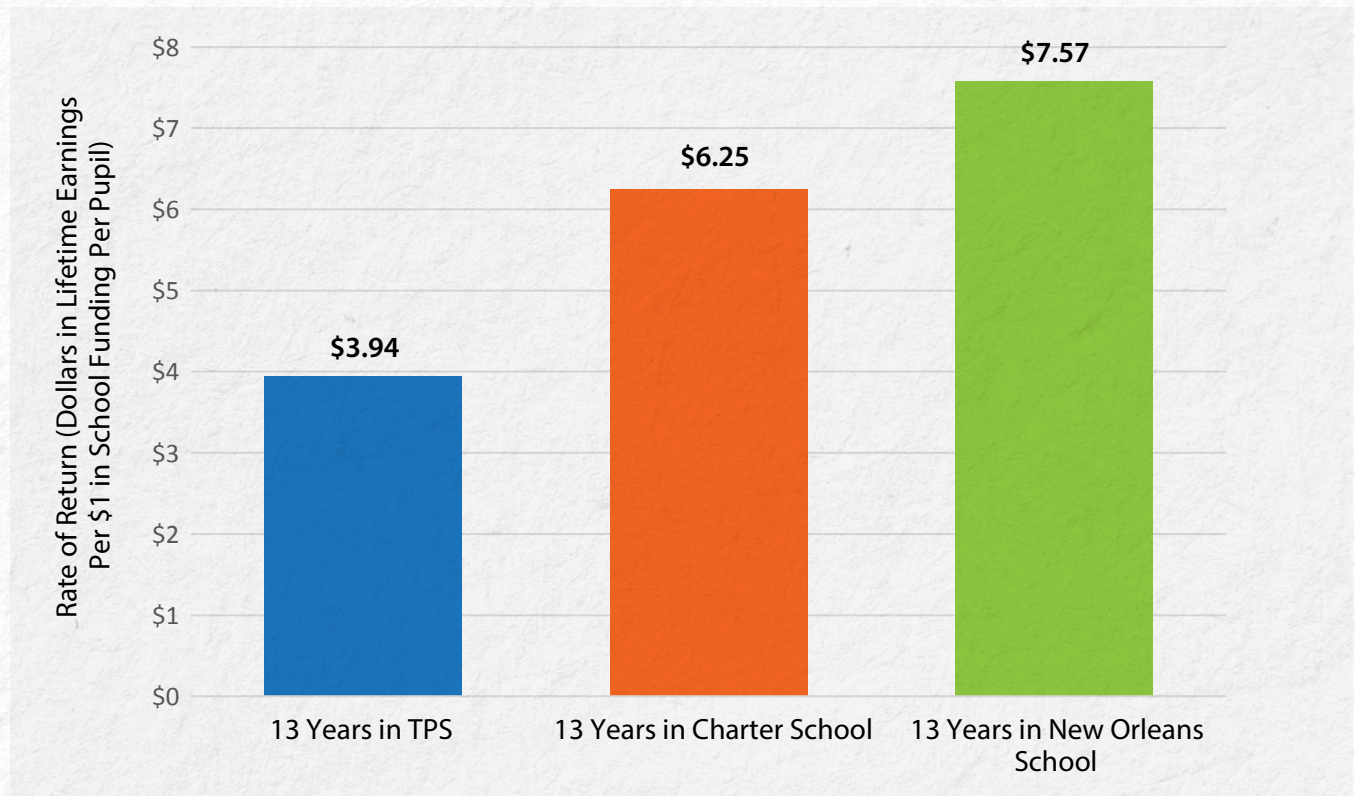
Because we cannot make a TPS-charter school comparison in New Orleans, we compare New Orleans schools to the TPS and charter school sectors in the eight other cities. We find that, on average, students in New Orleans earn an additional 6.3 reading points and 6.4 math points on the NAEP per \$1,000 of funding per pupil, compared to charter school students in the other eight cities, and an additional 10.7 reading points and 11.1 math points on the NAEP per \$1,000 of funding per pupil, compared to TPS students in those cities (see Figure B.1).

Figure B.1: Cost-Effectiveness Comparison for New Orleans



We also find the ROI for New Orleans schools to be much higher than the eight-city averages for TPS and charter schools (see Figure B.2). New Orleans schools, on average, appear to be significantly more productive than both charter schools and TPS in eight other cities.⁵⁴ While the ROI for TPS in the other eight cities is \$3.94 (294 percent) and is \$6.25 (525 percent) for charter schools, the ROI for schools in New Orleans is \$7.57 (657 percent).

Figure B.2: ROI Comparison for New Orleans



Endnotes

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- 15 These per-pupil revenue figures reflect the average of the subset of cities included in our productivity analyses and are therefore different from the cross-city averages in our revenue studies, where we find that, in 2020 dollars, the gap over the same period of time ranged from \$6,259 to \$8,084.
- 16 The FY14 and FY16 reports included New York City because estimates of academic achievement for New York City were available in CREDO's Urban Charter School Study (2015). However, for our FY18 analysis, no updated achievement data was available for New York City from CREDO. In the present analysis, we use the results for New York City from the 2023 CREDO National Study, which focuses on states but treats New York City as a state because of its size.
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- 24 https://credo.stanford.edu/wp-content/uploads/2022/05/memphis_slide_deck_FINAL_20220429.pdf
- 25 https://credo.stanford.edu/wp-content/uploads/2022/06/New_Orleans_slide_deck_FINAL_20220628-1.pdf
- 26 <https://ncss3.stanford.edu/wp-content/uploads/2023/06/Credo-NCSS3-Report.pdf>
- 27 Raymond, M. E., Woodworth, J. L., Lee, W. F., Bachofer, S., Cotter Mazzola, M. E., Snow, W. D., and Sabkova, T. (2023). [*As a matter of fact: The national charter school study III 2023*](#). Center for Research on Education Outcomes. p. 34.
- 28 https://credo.stanford.edu/wp-content/uploads/2022/11/sanantonio_slide_deck_20221111.pdf
- 29 https://credo.stanford.edu/wp-content/uploads/2022/04/DC_slide_deck_FINAL-1.pdf
- 30 <https://www.bls.gov/oes/2020/may/oessrcst.htm>
- 31 Hanushek, E. A. (2011). [*The economic value of higher teacher quality*](#). *Economics of Education Review*, 30(3), 466-479.
- 32 <https://www.nj.gov/education/doedata/enr/index.shtml>
- 33 KIPP Cooper Norcross, Camden Prep Inc., and Mastery Schools of Camden Inc. <https://www.nj.gov/education/doedata/enr/index.shtml>
- 34 [https://camdencityschools.org/community/long-term-school-planning/faqs/#:~:text=The%20Camden%20City%20School%20District%20has%20three%20\(3\)%20magnet%20high,and%20Big%20Picture%20Learning%20Academy](https://camdencityschools.org/community/long-term-school-planning/faqs/#:~:text=The%20Camden%20City%20School%20District%20has%20three%20(3)%20magnet%20high,and%20Big%20Picture%20Learning%20Academy)
- 35 All remaining non-magnet, non-Renaissance TPS in Camden City School District in CCD.

- 36 <https://www.cde.state.co.us/choice/innovationschoolslist>
- 37 All remaining non-Innovation TPS in Denver 1 School District in CCD.
- 38 All schools identified as magnet schools in CCD.
- 39 All TPS not identified as magnet schools in CCD.
- 40 <https://inview.doe.in.gov/networks/2000000057/school-list>. Some Innovation schools are classified as charter schools; if current IPS school classifications differed from FY19 CCD, we deferred to CCD.
- 41 All non-charter, non-Innovation schools in Indianapolis Public Schools.
- 42 <https://www.scsk12.org/schools/?LP=schools#/optional>
- 43 <https://www.tn.gov/achievementschooldistrict/asd-operators/member-schools.html>; only included schools with Memphis addresses.
- 44 All non-charter, non-Optional, non-Achievement TPS in Memphis-Shelby County School District in CCD.
- 45 Calculated as overall New Orleans enrollment from our 2023 revenue study, minus enrollment of schools operated by Orleans Parish School Board from CCD.
- 46 Schools operated by Orleans Parish School Board that are indicated as charter schools in CCD.
- 47 All schools operated by Orleans Parish School Board that are not indicated as charter schools in CCD.
- 48 Innovation school = "choice school"; <https://saisdchoice.com/schools/all-choice-schools-magnet-programs/>
- 49 All non-choice schools in San Antonio Independent School District in CCD.
- 50 All magnet schools in DC Public Schools in CCD.
- 51 All non-magnet schools in DC Public Schools in CCD.
- 52 Hanushek, E. A. (2011). [The economic value of higher teacher quality](#). *Economics of Education Review*, 30(3), 466-479.
- 53 We use revenues, not expenditures; revenue should be viewed as estimated expenditures or investment.
- 54 Harris, D. N. (2020). *Charter school city: What the end of traditional public schools in New Orleans means for American education*. University of Chicago Press.