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IPR RAPID RESEARCH REPORT || APRIL 2, 2024

THE CHICAGO UNIVERSAL PRE-K STUDY

Does the Impact of Universal Pre-K on Access Vary Based on Neighborhood Poverty Rates?

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by **Terri J. Sabol** and **Diane Whitmore Schanzenbach**

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Introduction

In 2018–19, Chicago began efforts to expand Universal Pre-Kindergarten (UPK) to all children in the city. However, prior to the UPK expansion, targeted efforts had been underway for years to provide free pre-K for children from low-income backgrounds. In addition, during the UPK expansion, Chicago was also experiencing population declines—especially among children under age 5—and was impacted by the COVID-19 pandemic. These combined factors influenced access to and enrollment in early care and education in the city.

In this context, we examine the impact of the UPK expansion on enrollment and capacity, and how they differ by neighborhood poverty rates. More specifically, we examine enrollment and the capacity of free, full-day pre-K in schools in high-poverty versus low-poverty neighborhoods over time, and how UPK expansion affected them. Overall, we seek to characterize the patterns in enrollment and capacity over time to understand the extent of equitable access to free, full-day pre-K across neighborhoods in Chicago.

Overview of Chicago's Universal Prekindergarten (UPK) Expansion

Pre-K Programming at CPS

Before the UPK expansion began in 2018–19, 370 CPS schools offered pre-K. Most of Chicago's pre-K capacity was in the form of free, half-day programming and was funded mainly through state and federal programs such as Title I, Head Start, and Preschool 4 All. In 2013, Chicago began targeted efforts to increase access to school-based pre-K, opening new, free, full-day programming for 4-year-olds in schools serving high proportions of underserved students,

including students from Black, Hispanic or Latino, English language learner, and/or low-income backgrounds (Ehrlich et al., 2020). In 2017–18, the year before the UPK expansion began, 36% of CPS pre-K capacity was in free, full-day programs (Sabol and Schanzenbach, 2023).

The UPK expansion represents a shift from targeted interventions in the public pre-K system to a cohesive, city-wide approach to free, full-day pre-K programming:

- tuition-based pre-K seats in public schools were replaced with free seats,
- schools without pre-K programs began offering free, full-day pre-K; schools with existing pre-K programs expanded the number of available seats, and
- half-day seats were converted to full-day seats.

As our earlier work found, the capacity of free, full-day pre-K seats in CPS for both 3- and 4-year-olds increased substantially due to the UPK expansion. The expansion also led to increased enrollment of 3- and 4-year-olds in free, full-day pre-K at CPS programs. Most of the growth in the number of full-day seats and enrollment was offset by declines in half-day seats and enrollment. The system also had capacity to serve additional children at schools throughout the city (Sabol and Schanzenbach, 2023).

Characterizing Schools' Neighborhoods

In this rapid research report, we analyze enrollment and capacity in free, full-day pre-K in high- and low-poverty areas. To do so, we map schools to their census tracts and characterize schools based on their tract-level characteristics. Most characteristics, including poverty rates and the population's racial and ethnic composition, are drawn from 2018 American Community Survey data. In the appendix, we also include 2015 Child Opportunity Index (COI) scores from diversitydatakids.org at the census tract level. The COI includes 29 indicators across the domains of education, health and environment, and social and economic factors. A higher COI score indicates a more resource-rich environment.

What Neighborhoods Received the Earliest Pre-K Investments?

We define "UPK expansion schools" as schools designated by CPS to be part of the 2018–19 UPK expansion (e.g., by adding new seats or converting half-day seats to full-day seats). We refer to schools that had already implemented free, full-day pre-K programming prior to the UPK expansion as "previously expanded schools." As demonstrated in Table 1, we find that UPK

expansion schools are generally located in more advantaged areas of the city (as measured by lower poverty rates and higher COI scores), and previously expanded schools are generally in less advantaged areas of the city.

In other words, prior to the UPK expansion, CPS's investments in free, full-day pre-k were targeted toward high-poverty neighborhoods. Accordingly, the more recent shift towards universal coverage incorporated many previously untreated areas in Chicago. Thus, schools affected by the UPK expansion had a higher share of White and Hispanic or Latino students and were located in neighborhoods with lower poverty rates than previously expanded schools.

As shown in Table 1, the student population in previously expanded schools consisted of 59% Black students, 32% Hispanic or Latino students, and 5% White students, with 17% of students designated as English-language learners. At UPK expansion schools, the student population was 24% Black, 56% Hispanic or Latino, and 13% White, with 29% of students were designated as English-language learners. The census-tract poverty rates for previously expanded schools averaged over 22%, compared with 14% for UPK expansion schools. COI scores averaged 19.8 among previously expanded schools, and 32.9 among UPK expansion schools.

Table 1: Characteristics of CPS Schools with Pre-K and Their Local Areas Measured Prior to the UPK Expansion

	All CPS Schools	UPK Expansion	Previously Expanded
Individual CPS School Characteristics in 2017–18			
Black (%)	35.7	23.8	58.8
Hispanic or Latino (%)	47.7	55.9	31.9
White (%)	10.5	13.2	5.3
English-Language Learners (%)	25.2	29.0	16.9
Characteristics of School Census Tract Area			
Poverty Rate (%)	17.6	14.6	22.3
Child Opportunity Index (COI) score	27.9	32.9	19.8
Black Population (%)	38.3	27.7	55.3
Hispanic or Latino Population (%)	32.0	37.3	23.6
White Population (%)	44.2	52.7	30.6
Number of Schools	**395**	**220**	**175**

Note: Weighted averages are presented. Individual CPS school characteristics are based on annual demographic data from Chicago Public Schools for the 2017–18 school year. Characteristics of school census tracts are based on

data from the American Community Survey (ACS) in 2018, the year immediately prior to the UPK expansion. Child Opportunity Index (COI) scores are measured in 2015 and come from diversitydatakids.org. School characteristics are weighted by total school enrollment, and census tract characteristics are weighted by total census-tract population.

UPK Expansion and Free, Full-Day Pre-K Enrollment for 4-Year-Olds by Poverty Level

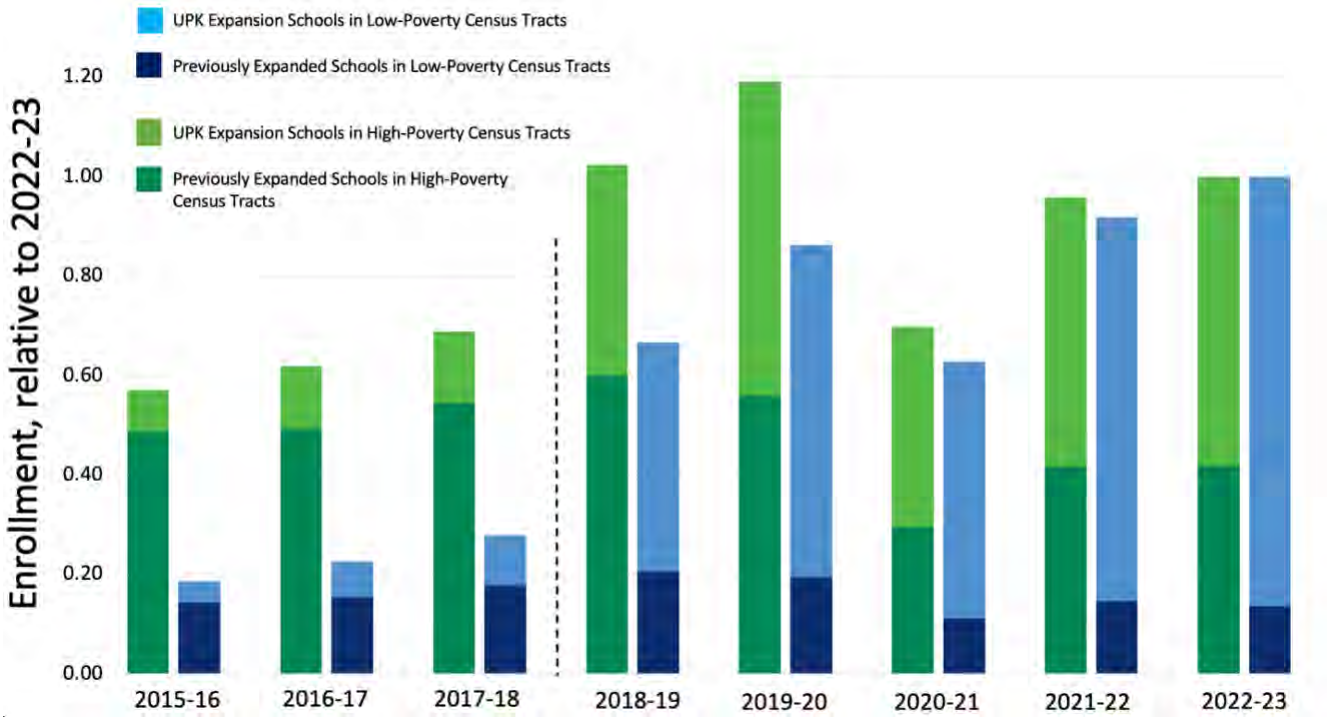
Aggregate Enrollment Patterns in High-Poverty versus Low-Poverty Census Tracts

We are interested in the number of 4-year-olds enrolled in free, full-day pre-K separately in schools in high-poverty and low-poverty neighborhoods over time, and how UPK expansion affects these numbers. Figure 1 presents pre-K enrollment before and after the 2018–19 start of the UPK expansion, separately for schools in high-poverty tracts (green bars) and low-poverty tracts (blue bars). UPK expansion schools are denoted by lighter shades, and previously expanded schools are in darker shades. Because the size of the 4-year-old population is different across high- and low-poverty neighborhoods, we normalize enrollment in both types of neighborhoods relative to their pre-K enrollment in 2022–23.[1]

Prior to the start of the UPK expansion, there was already substantial free, full-day pre-K enrollment in high-poverty census tracts. Relative to its level in 2022–23, in 2015–16 pre-K enrollment was 57% as large in high-poverty neighborhoods. By contrast, in low-poverty neighborhoods in 2015–16, free, full-day pre-K enrollment was only 19% of its 2022–23 level. Prior to the 2018–19 introduction of the UPK expansion, pre-K enrollment was already slowly increasing in both high- and low-poverty neighborhoods, by 2017–18 reaching 69% and 28% of its eventual 2022–23 level, respectively.

[1] In 2022–23, 4-year-old pre-K enrollment was 4,759 in high-poverty schools and 6,343 in low-poverty schools.

Figure 1: Free, Full-Day Pre-K Enrollment of 4-Year-Olds in Schools in High-Poverty (Green) versus Low-Poverty (Blue) Census Tracts, by Previously Expanded and UPK Expansion Schools



Note: Includes enrollment in free, full-day pre-K in UPK expansion schools and previously expanded schools in Chicago's public schools separated by high-poverty and low-poverty census tracts as defined by the tract's poverty rate relative to the sample median on the U.S. Census Bureau's 2018 American Community Survey (ACS). See Appendix Section 1 for more information on the poverty metric. Enrollment is relative to the level in 2022–23. The dotted line denotes the start of the UPK expansion starting in school year 2018–19.

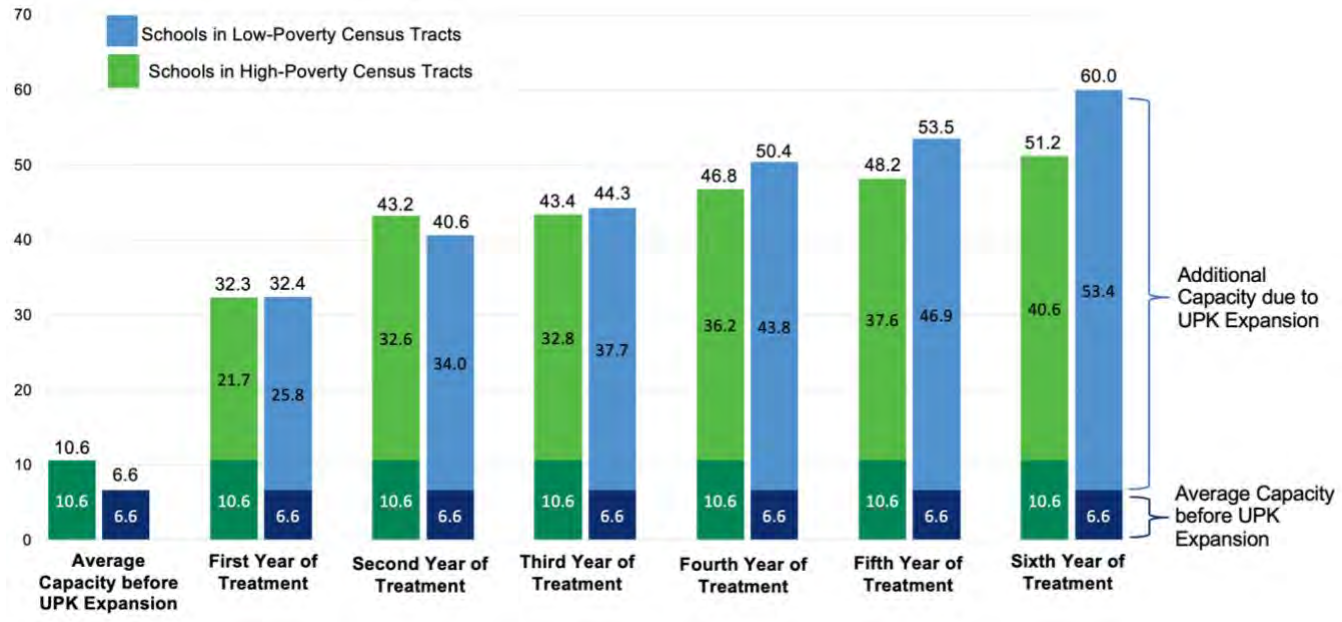
After the UPK expansion began, growth in pre-K enrollment is concentrated in UPK expansion schools (denoted by lighter bars) and not in previously expanded schools (denoted by darker bars). Enrollment in high-poverty neighborhoods grew substantially through 2019–20 before falling during the 2020–21 COVID-19 year, then partially rebounding and leveling off in 2021–22 and 2022–23. Enrollment in low-poverty neighborhoods also grew from a lower relative base prior to the start of the UPK expansion, and it experienced a smaller decline during COVID-19. By 2022–23, most of the enrollment in low-poverty neighborhoods came through UPK expansion schools, while in high-poverty neighborhoods about 40% of enrollment was in previously expanded schools and 60% was in UPK expansion schools.

Capacity and Enrollment in Schools Located in High-Poverty versus Low-Poverty Census Tracts

Next, we estimate the impact of the UPK expansion on school-level pre-K capacity and enrollment, separately for schools in high- and low-poverty census tracts, using a difference-in-differences approach that employs variation in the timing of UPK expansion. The terms capacity and enrollment refer to the number of seats available for 3- and 4-year-olds at a school-based pre-K program and the number of 3- and 4-year-old students enrolled in programming, respectively. We measure the average change in the number of seats and enrolled students for each year after initial expansion. Because the UPK expansion has been introduced at various schools in different years, this approach allows us to evaluate the time pattern of expansion and explore how it may differ by poverty level. See Appendix Section 3 for more details on the analytic model.

Regression findings are presented in Figure 2. We find that the UPK expansion led to an immediate increase in pre-K capacity for treated schools in the first year, and capacity continues to slowly grow across the six years after the UPK expansion began. Furthermore, initial impacts are relatively similar for schools in low-poverty and high-poverty census tracts, but over time capacity grows somewhat more in schools in low-poverty census tracts.

Figure 2: Impact of Chicago Universal Pre-K Expansion on Free, Full-Day Capacity in Schools in High-Poverty (Green) versus Low-Poverty (Blue) Census Tracts

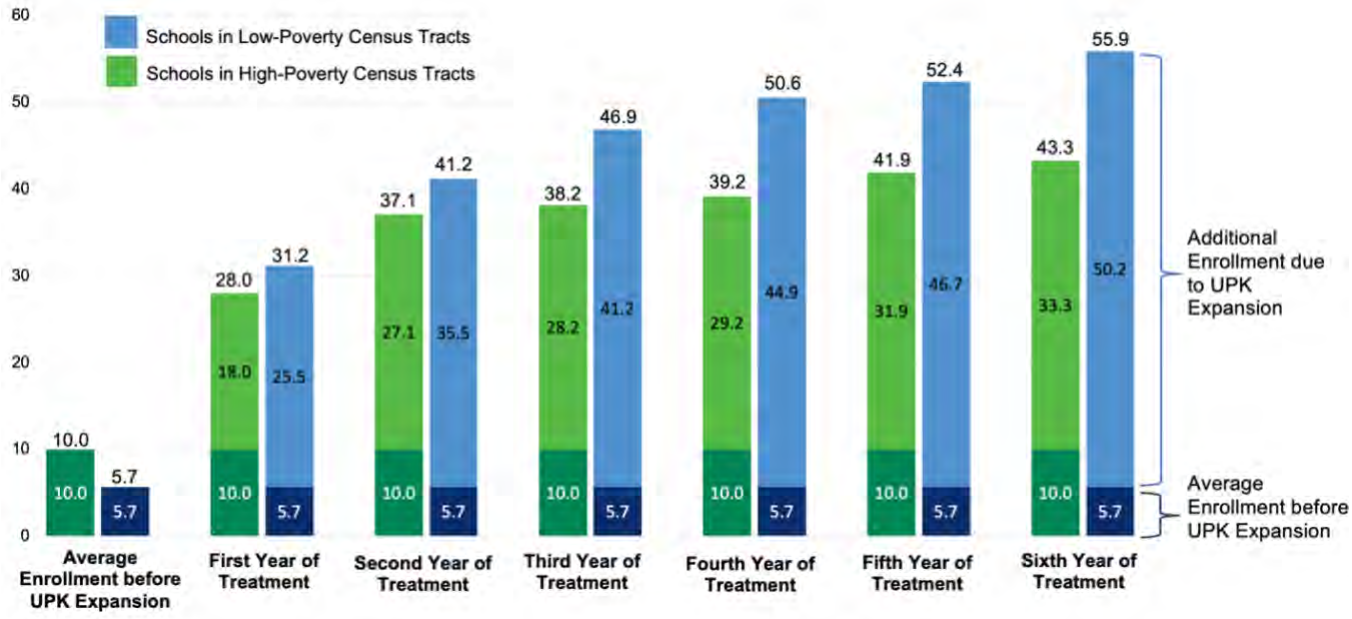


Note: Includes the average number of free, full-day pre-K seats in UPK expansion schools in the year prior to the expansion and the estimated additional capacity due to the UPK expansion, separated by low-poverty and high-poverty census tracts. See Appendix Section 1 for more information on the poverty metric and classifications. See Appendix Table A2 for more detailed results on the impact of the UPK expansion on pre-K capacity.

Prior to the expansion, schools in high-poverty tracts had an average capacity of about 11 seats, and schools in low-poverty tracts had an average capacity of roughly 7 seats. In their first year of program implementation, schools in both tract groups recorded large increases in capacity (an increase of 22 seats in high-poverty tracts and 26 seats in low-poverty tracts). Importantly, treated schools continued to steadily expand their programming in the years following treatment. Six years after initial expansion, schools in high-poverty tracts had added 41 seats, and schools in low-poverty tracts had added 53 seats in addition to the pre-expansion capacities.

Figure 3 repeats the analysis with enrollment. Impacts over time generally mirror those found using capacity. First, there is a large increase in student enrollment in the initial years of expansion as more free, full-day pre-K opportunities became available. In the first year after the expansion, average enrollment increased by 18 students in high-poverty tracts and by 26 students in low-poverty tracts. Enrollment continues to grow over time, albeit more in schools in low-poverty census tracts. We estimate that six years after UPK expansion, in comparison to pre-expansion levels, enrollment at the average UPK expansion school in a high-poverty tract increased by 33 students and by roughly 50 students at the average expansion school in a low-poverty tract.

Figure 3: Impact of Chicago Universal Pre-K Expansion on Free, Full-Day Enrollment in Schools in High-Poverty (Green) versus Low-Poverty (Blue) Census Tracts



Note: Includes the average number of 3-year-olds and 4-year-olds enrolled in free, full-day pre-K in UPK expansion schools in the year prior to the expansion and the estimated additional enrollment due to the UPK expansion, separated by low-poverty and high-poverty census tracts. See Appendix Section 1 for more information on the poverty metric and classifications. See Appendix Table A2 for more detailed results on the impact of the UPK expansion on pre-K enrollment.

UPK Expansion and Community-Level Proportions of Filled, Free, Full-Day Pre-K Seats by Poverty Level

Next, to understand how communities across Chicago took up access to free, full-day UPK, we analyze the relationship between enrollment and capacity at the community level. The heatmaps in Figure 4 below track the share of filled free, full-day pre-K seats for 3- and 4-year-old students over time in CPS schools. Communities shaded in green are high-poverty areas, and those shaded in blue are low-poverty areas. Lighter areas indicate communities closer to or at full capacity, while darker areas denote the availability of open pre-K seats.

Figure 4: Percentages of Filled, Free, Full-Day Seats by 3- and 4-Year-Olds Among CPS Schools in High-Poverty (Green) versus Low-Poverty (Blue) Communities

Note: The percentage of filled, free, full-day seats at UPK expansion schools is denoted by shading. High-poverty communities are colored green, and low-poverty communities are colored blue. See Appendix Section 1 for more information on the poverty metric and classifications.

Over time, substantial additional capacity has been added to high-poverty communities across the city. In other words, while more children have been attending free, full-day pre-K, the schools are not filled to capacity and there are still opportunities to serve additional children in these communities. In low-poverty communities, in general, a higher share of available pre-K seats has been filled in recent years, but in all communities with existing pre-K programs, capacity remains for additional students.

Conclusions

Consistent with its stated goals, the 2018–19 UPK initiative successfully expanded capacity in the Chicago Public Schools to deliver free, full-day pre-K to children across the city. There were sizeable increases in enrollment for free, full-day pre-K programming at CPS schools, and these gains were large in schools in both high-poverty and low-poverty areas. We show in Appendix B

that these same patterns hold up if we divide schools into groups by COI score instead of poverty rates.

Enrollment in pre-K fell in 2020–21 due to COVID-19. While enrollment has subsequently increased, pre-K enrollment in schools in high-poverty areas is still below its pre-COVID peak. Enrollment in schools in low-poverty areas, on the other hand, has surpassed its pre-COVID level.

Importantly, we document the already substantial access to free, full-day pre-K in schools in high-poverty areas prior to the UPK expansion. As a result, enrollment growth in these areas, while still sizeable, was lower than in low-poverty areas because more students were already being served. We also find that remaining capacity exists in all schools in high-poverty neighborhoods that would allow additional students to be served.

Works Cited

Ehrlich, S.B., M. Connors, A. Stein, J. Francis, J. Q. Easton, S. Kabourek, and I. Farrar. 2020. Closer to home: More equitable pre-K access and enrollment in Chicago. Chicago, Ill.: UChicago Consortium on School Research, NORC at the University of Chicago, and Start Early.

Sabol, T., and D.W. Schanzenbach. 2023. The Impact of Chicago's University Prekindergarten Expansion on access to school-based pre-K, 2024 update. Institute for Policy Research Rapid Research Report. https://www.ipr.northwestern.edu/documents/reports/ipr-rapid-research-report-universal-prek-study-impact-update-21-december-2023.pdf

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Appendix A. Poverty, Child Opportunity Index, and Analytic Model

Section 1: Poverty

We use poverty rate information from the U.S. Census Bureau's 2018 American Community Survey (ACS), which was collected immediately prior to the 2018–19 UPK expansion. Poverty rates are assigned to a school based on the poverty rate in the census tract where the school is located. The median value is then determined from the assigned census rates at the school level. Appendix Figure A1 displays the distribution and median of census-tract poverty rates for Chicago schools that offer pre-K. Census tracts with above-median poverty rates are referred to as high-poverty tracts, whereas those with below-median poverty rates are low-poverty tracts.

Section 2: Child Opportunity Index (COI) Child Resource Measure

We match schools to their census tract's Child Opportunity Index (COI) score. The COI is a composite measure of 29 tract-level indicators that have been linked to children's development, including aspects of a census tract area's education, health, and environment. COI scores are calculated by diversitydatakids.org. We use data from 2015, the most recent year available. Census tracts are defined as having high or low resources based on whether their COI score is above or below the median among tracts in our sample of schools that offer pre-K. See Appendix Table A1 for more details on the metrics that make up COI and Appendix Figure A2 for the distribution of COI scores.

Section 3: Analytic Model

We use a difference-in-differences approach that leverages variation in the timing of the expansion of Chicago's school-based pre-K program across schools. Our approach compares changes in pre-K capacity and enrollment over time in schools with and without expanded school-based pre-K to provide an estimate of the causal impact of UPK expansion. This approach accounts for all time-invariant school characteristics, and annual trends or shocks that affect pre-K capacity and enrollment across all CPS schools.

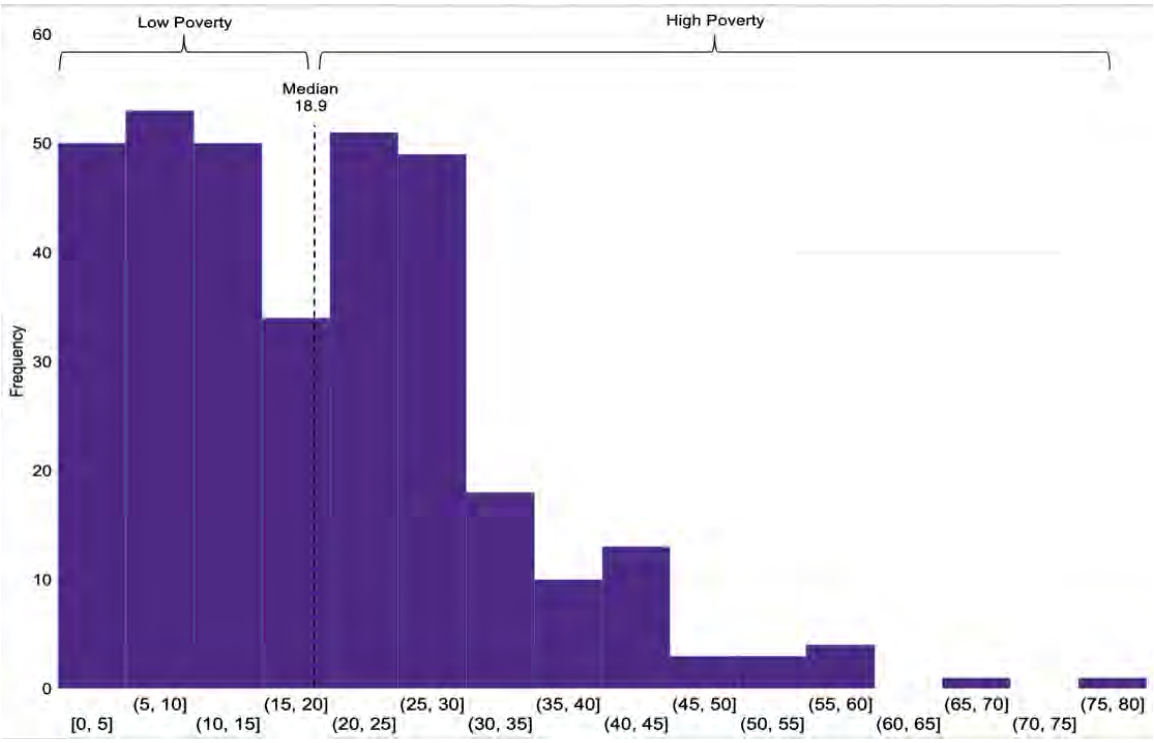
Specifically, we estimate an event-study model of the following form for school *i* in community *j* and year *t:*

$$(2)\ Y_{ijt} = \alpha + \sum_{t=1}^{6} \beta_t PostUPKExpansion_{ijt} + \sum_{t=1}^{6} \delta_T (PostUPKExpansion_{ijt} * Characteristic_{ij}) + \theta Covariates_{ijt} + \lambda_t + \mu_{ij} + \epsilon_{ijt}$$

where Y_{ijt} is pre-K enrollment or capacity for school i in year t, $PostFDExpansion_{ijT}$ is an indicator for whether an observation for school i in year t is T years after the UPK expansion began (for example, $PostFDExpansion_{1jT}$ =1 in the first year of UPK expansion), $Characteristic_{ij}$ is one of the time-invariant school neighborhood-level moderators (percent Black, percent Hispanic or Latino, percent White, poverty rate, and COI score), $Covariates_{ijt}$ is a series of time-varying school-level covariates, λ_t are year fixed effects, and μ_{ij} are school fixed effects. This approach allows us to estimate the impact of UPK expansion in the first six years after the expansion began. We estimate separate models for 3-year-old and 4-year-old capacity and enrollment. For all models, standard errors were clustered at the community level. We ran both unweighted and weighted regressions and chose unweighted for ease of interpretation, but our findings still hold with weighted calculations.

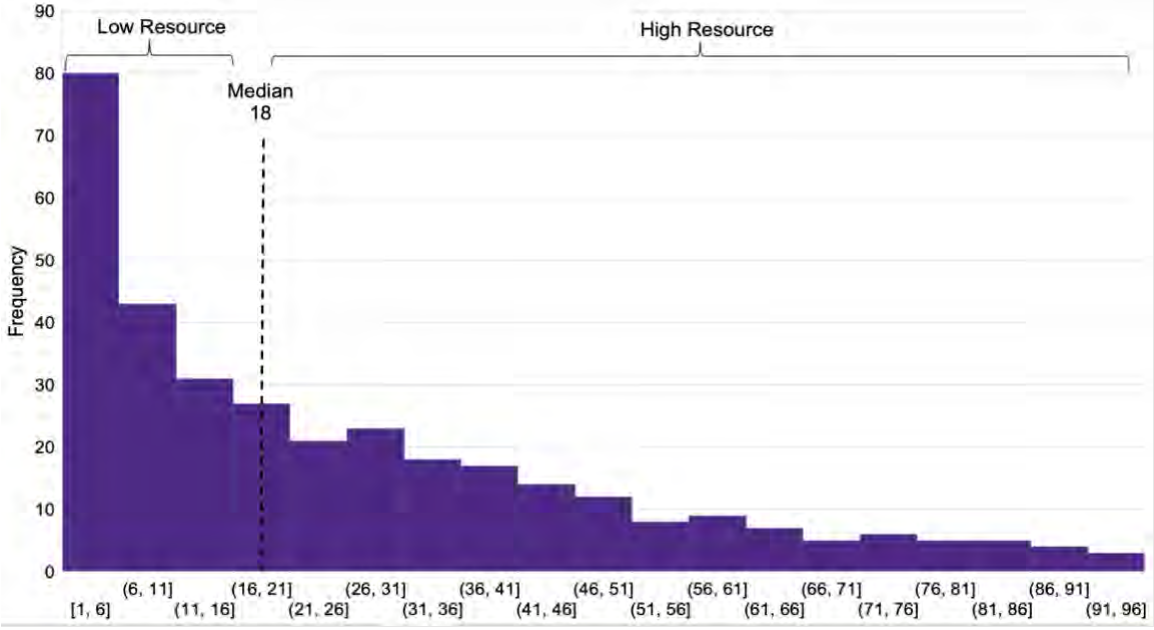
We include all CPS schools that have preschool enrollment in the analysis, including schools that participated in the UPK expansion and schools that did not. We also confirmed that results were similar if we restricted the sample to schools that participated in the UPK expansion.

Figure A1: Distribution of Chicago Census Tract Level Poverty Rates in 2018



Note: School census tract area poverty rates are based on data from the American Community Survey (ACS) in 2018, the year immediately prior to the UPK expansion. The school poverty rate is based on the poverty rate in the school's census tract.

Figure A2: Distribution of Chicago Census Tract Level Resources in 2015 (Using COI Scores)



Note: School resources are based on the Child Opportunity Index (COI) scores from diversitydatakids.org in 2015, the most recent year of data available. The school COI score is determined by the COI score of the school's census tract.

Table A1: Components of Child Opportunity Index (COI) Score

Education	**Early Childhood Education (ECE)**
	ECE Centers
	High-Quality ECE Centers
	ECE Enrollment
	Elementary Education
	Third-Grade Reading Proficiency
	Third-Grade Math Proficiency
	Secondary & Postsecondary Education
	High School Graduation Rate
	Advanced Placement (AP) Course Enrollment
	College Enrollment in Nearby Institutions
	Educational and Social Resources
	School Poverty
	Teacher Experience
	Adult Educational Attainment
=	**Healthy Environments**
	Access to Healthy Food
	Access to Green Space
	Walkability
	Housing Vacancy Rate
Health & Environment	**Toxic Exposures**
	Hazardous Waste Dump Sites
	Industrial Pollutants in Air, Water, or Soil
	Airborne Microparticles
	Ozone Concentration
	Extreme Heat Exposure
	Health Resources
	Health Insurance Coverage

Social & Economic	**Economic Opportunities**
	Employment Rate
	Commute Duration
	Economic and Social Resources
	Poverty Rate
	Public Assistance Rate
	Homeownership Rate
	High-Skill Employment
	Median Household Income
	Single-Headed Households

Table A2: Time-Invariant Moderator (2018 Weighted Standard): Difference-in-Differences Regressions with Poverty Dummy and Continuous Covariates

	Free, Full-Day Pre-K Seats	Free, Full-Day Pre-K Enrollment
First Year of Treatment: School-Level	25.8***	25.5***
	(2.0)	(1.8)
Second Year of Treatment: School-Level	34.0***	35.5***
	(2.4)	(2.4)
Third Year of Treatment: School-Level	37.7***	41.2***
	(2.6)	(2.7)
Fourth Year of Treatment: School-Level	43.8***	44.9***
	(3.1)	(2.8)
Fifth Year of Treatment: School-Level	46.9***	46.7***
	(3.5)	(3.1)
Sixth Year of Treatment: School-Level	53.4***	50.2***
	(4.1)	(3.4)

Interaction Term – Year 1 Treatment and 2018 High Weighted Poverty Indicator	-4.1	-4.1
	(2.3)	(2.1)
Interaction Term – Year 2 Treatment and 2018 High Weighted Poverty Indicator	-1.4	-5.0
	(2.9)	(2.9)
Interaction Term – Year 3 Treatment and 2018 High Weighted Poverty Indicator	-4.9*	-9.6***
	(2.4)	(2.2)
Interaction Term – Year 4 Treatment and 2018 High Weighted Poverty Indicator	-7.6**	-12.3***
	(3.1)	(2.4)
Interaction Term – Year 5 Treatment and 2018 High Weighted Poverty Indicator	-9.3**	-11.4***
	(3.1)	(2.8)
Interaction Term – Year 6 Treatment and 2018 High Weighted Poverty Indicator	-12.8**	-13.5***
	(3.8)	(3.3)
Observations	3,281	3,281
Adjusted R^2	0.753	0.708

Mean in Year Before Expansion, High-Percent Poverty Schools (N = 78)	10.6	10.0
Mean in Year Before Expansion, Low-Percent Poverty Schools (N = 121)	6.6	5.7

Note: The interaction terms are between the treatment indicators and the poverty dummy in 2017–18. The poverty dummy in 2017–18 is broken by the 2018 weighted median (0.189). The following covariates are included: continuous school demographic variables (Poverty, Special Education, Blacks, Hispanics, and Whites). Year fixed effect and school fixed effect are included. Standard errors are in parentheses, clustered by community, * *p < 0.05,* ** *p < 0.01,* *** *p < 0.001*

Table A3: Time-Invariant Moderator (2018 Weighted Standard): Difference-in-Differences Regressions with COI Categorical Variables and Continuous Covariates

	Free, Full-Day Pre-K Seats	Free, Full-Day Pre-K Enrollment
First Year of Treatment: School-Level	20.8***	19.8***
	(2.4)	(2.3)
Second Year of Treatment: School-Level	30.6***	27.6***
	(3.0)	(3.0)
Third Year of Treatment: School-Level	30.4***	29.1***
	(2.7)	(2.6)
Fourth Year of Treatment: School-Level	33.3***	30.4***
	(3.5)	(2.4)
Fifth Year of Treatment: School-Level	34.8***	32.5***
	(3.3)	(2.7)
Sixth Year of Treatment: School-Level	37.4***	33.7***
	(3.7)	(3.1)

Interaction Term – Year 1 Treatment and 2018 High ACS Weighted COI Indicator	5.5*	6.4**
	(2.3)	(2.2)
Interaction Term – Year 2 Treatment and 2018 High ACS Weighted COI Indicator	4.5	9.6**
	(3.1)	(3.0)
Interaction Term – Year 3 Treatment and 2018 High ACS Weighted COI Indicator	8.8**	13.4***
	(2.7)	(2.5)
Interaction term – Year 4 Treatment and 2018 High ACS Weighted COI Indicator	12.2**	15.6***
	(3.7)	(2.4)
Interaction Term – Year 5 Treatment and 2018 High ACS Weighted COI Indicator	13.6***	15.8***
	(3.5)	(2.9)
Interaction Term – Year 6 Treatment and 2018 High ACS Weighted COI Indicator	17.7***	18.1***
	(4.1)	(3.4)
Observations	3,273	3,273

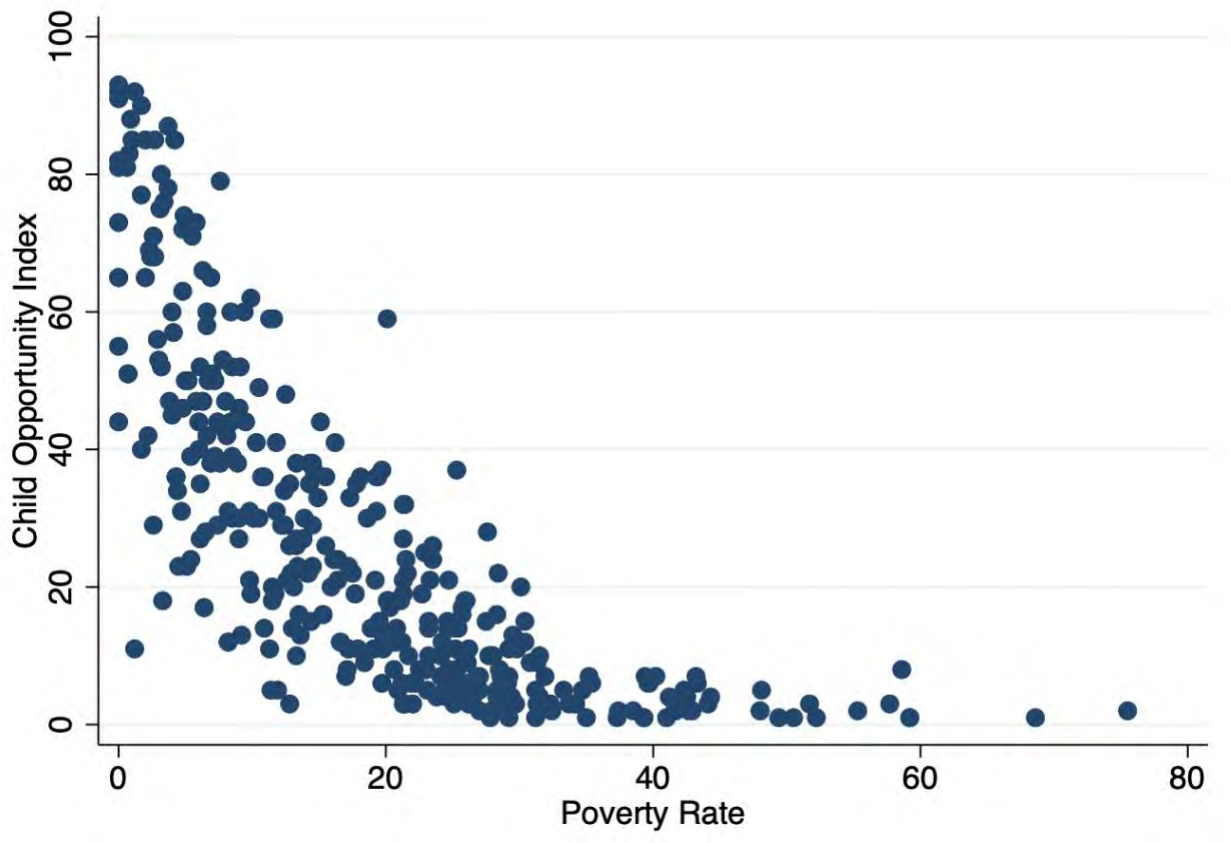
Adjusted R^2	0.756	0.715
Mean in Year Before Expansion, High Percent COI Schools (N = 125)	7.3	6.3
Mean in Year Before Expansion, Low Percent COI Schools (N = 74)	9.7	9.2

Note: The interaction terms are between the treatment indicators and the COI categorical variable in 2017–18. The COI categorical variable in 2017–18 is broken by the 2018 weighted median (18). The following covariates are included: continuous school demographic variables (Poverty, Special Education, Blacks, Hispanics, and Whites). Year fixed effect and school fixed effect are included. Standard errors in parentheses, clustered by community, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Appendix B. UPK Expansion and Free, Full-Day Pre-K Enrollment for 4-Year-Olds by Resource Level

Instead of the poverty rate, the Child Opportunity Index (COI) is a more comprehensive way to characterize the local environment. It includes measures across the domains of education, health, environment, social, and economic factors. Higher COI scores reflect more resource-rich environments for children in the community. (See Appendix Section 2 for more detail.) The relationship between schools' census-tract poverty rates and COI scores is strong but imperfect and is illustrated in Figure B.1 below.

Figure B.1: Schools' Census-Tract Poverty Rates and COI Scores



Notes: Each dot represents a census tract in Chicago. Census tract poverty rates are based on data from the American Community Survey (ACS) in 2018, the year immediately prior to the UPK expansion. School resources are based on the 2015 Child Opportunity Index (COI) scores from diversitydatakids.org.

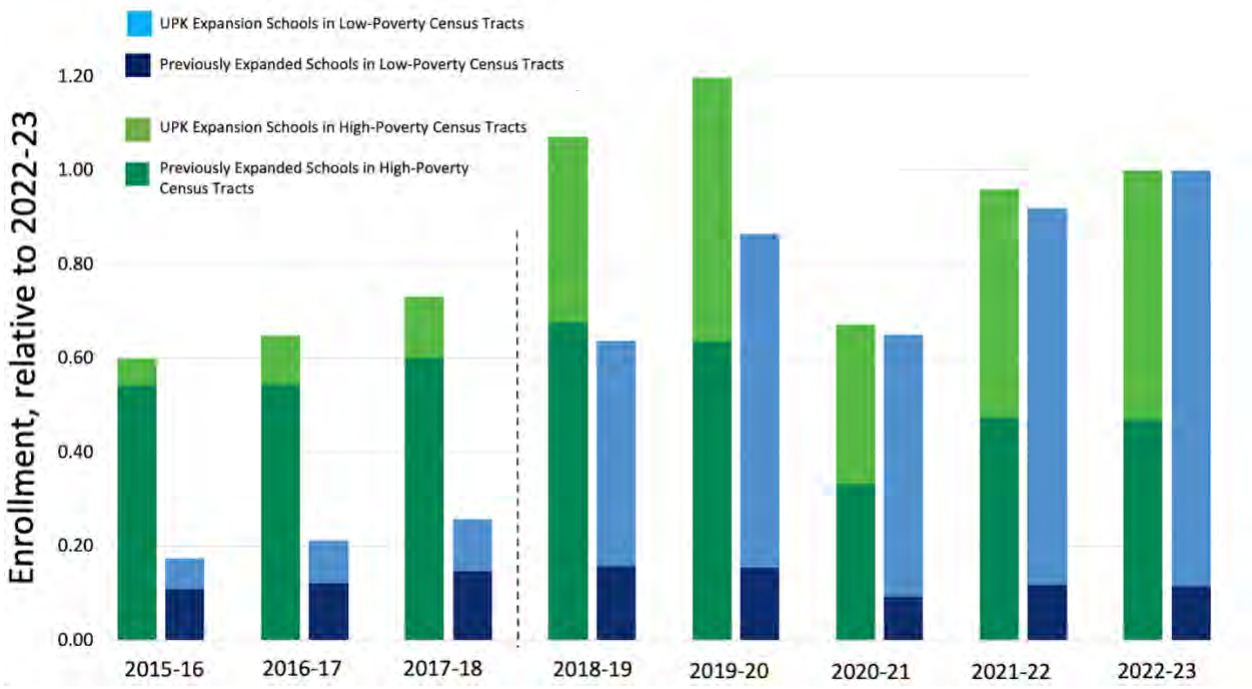
Aggregate Enrollment Patterns in High-Resource versus Low-Resource Census Tracts

Figure B.2 presents pre-K enrollment before and after the 2018–19 start of the UPK expansion, separately for schools in low-resource tracts (green bars) and high-resource tracts (blue bars).

Parallel to Figure 1, UPK expansion schools are denoted by lighter shades, and previously expanded schools are in darker shades, and enrollment in both types of neighborhoods are normalized relative to their pre-K enrollment in 2022–23.

Similar to our findings by poverty level, there was already substantial free, full-day pre-K enrollment in low-resource census tracts prior to UPK's introduction. Relative to its level in 2022–23, in 2015–16 pre-K enrollment was 60% as large in low-resource neighborhoods. By contrast, in high-resource neighborhoods in 2015–16, free, full-day pre-K enrollment was only 17% of its 2022–23 level. Prior to the 2018–19 introduction of the UPK expansion, pre-K enrollment rose slowly in both low- and high-resource neighborhoods, by 2017–18 reaching 73% and 26% of its eventual 2022–23 level, respectively.

Figure B.2: Free, Full-Day Pre-K Enrollment for 4-Year-Olds in Schools in Low-Resource (Green) versus High-Resource (Blue) Census Tracts, by Previously Expanded and UPK Expansion Schools



Notes: Includes enrollment in free, full-day pre-K in UPK expansion schools and previously expanded schools in Chicago Public Schools separated by low-resource and high-resource census tracts as defined by the tract's COI score relative to the sample median. See Appendix Section 2 for more information on the COI resource score. Enrollment is relative to the level in 2022–23. The dotted line denotes the start of the UPK expansion starting in school year 2018–19.

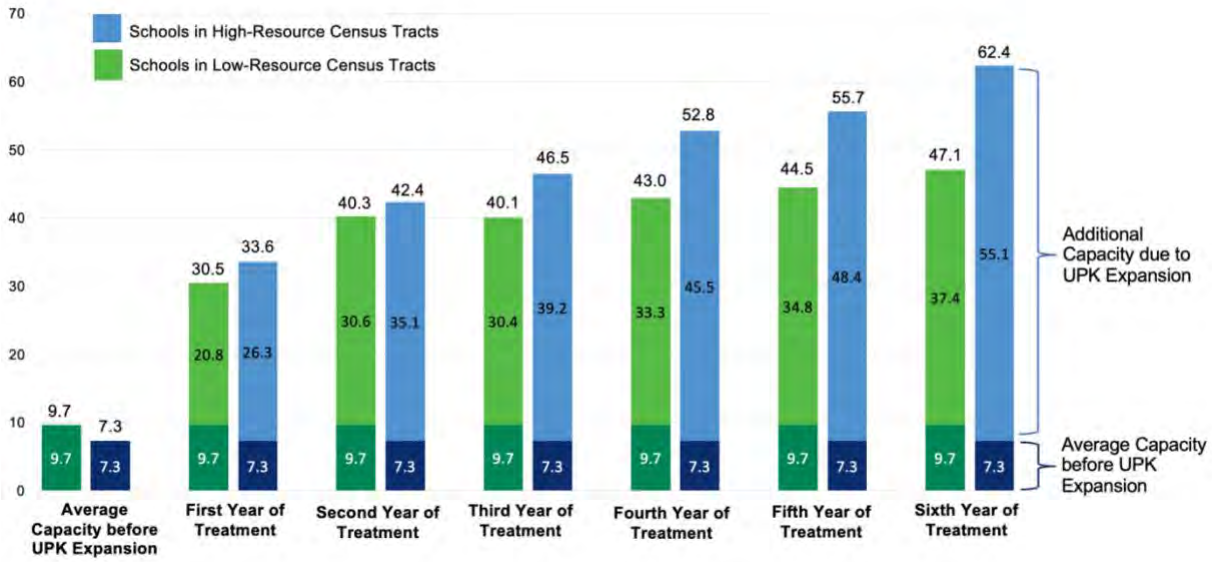
After the UPK expansion began, further growth in pre-K enrollment is concentrated in UPK expansion schools (denoted by lighter bars). Enrollment in low-resource neighborhoods grew substantially through 2019–20 before falling during the 2020–21 COVID year, then partially rebounding and leveling off in 2021–22 and 2022–23. Enrollment in high-resource neighborhoods grew from a lower relative base prior to the start of the UPK expansion and experienced a smaller decline during COVID. By 2022–23, most of the enrollment in high-resource neighborhoods came through UPK expansion schools, while in low-resource neighborhoods almost half of enrollment was in previously expanded schools and half was in UPK expansion schools.

Capacity and Enrollment in Schools Located in Low-Resource versus High-Resource Census Tracts

We next estimate the impact of the UPK expansion on school-level pre-K capacity and enrollment, separately for schools in low- and high-resource census tracts, using a difference-in-differences approach that employs variation in the timing of UPK expansion. We measure the average change in the number of seats and enrolled students for each year after initial expansion. Because the UPK expansion has been introduced at various schools in different years, this approach allows us to evaluate the time pattern of expansion and explore how it may differ by poverty level. See Appendix Section 3 for more details on the analytic model. Because of data limitations, we combine capacity and enrollment for 3- and 4-year-olds.

Regression coefficients for the capacity findings are presented in Figure B.3. The UPK expansion led to an immediate increase in pre-K capacity for treated schools in the first year, and capacity continues to slowly grow through to six years after the UPK expansion began. Furthermore, initial impacts are relatively similar for schools in high-resource and low-resource census tracts, but over time capacity grows somewhat more in schools in high-resource census tracts.

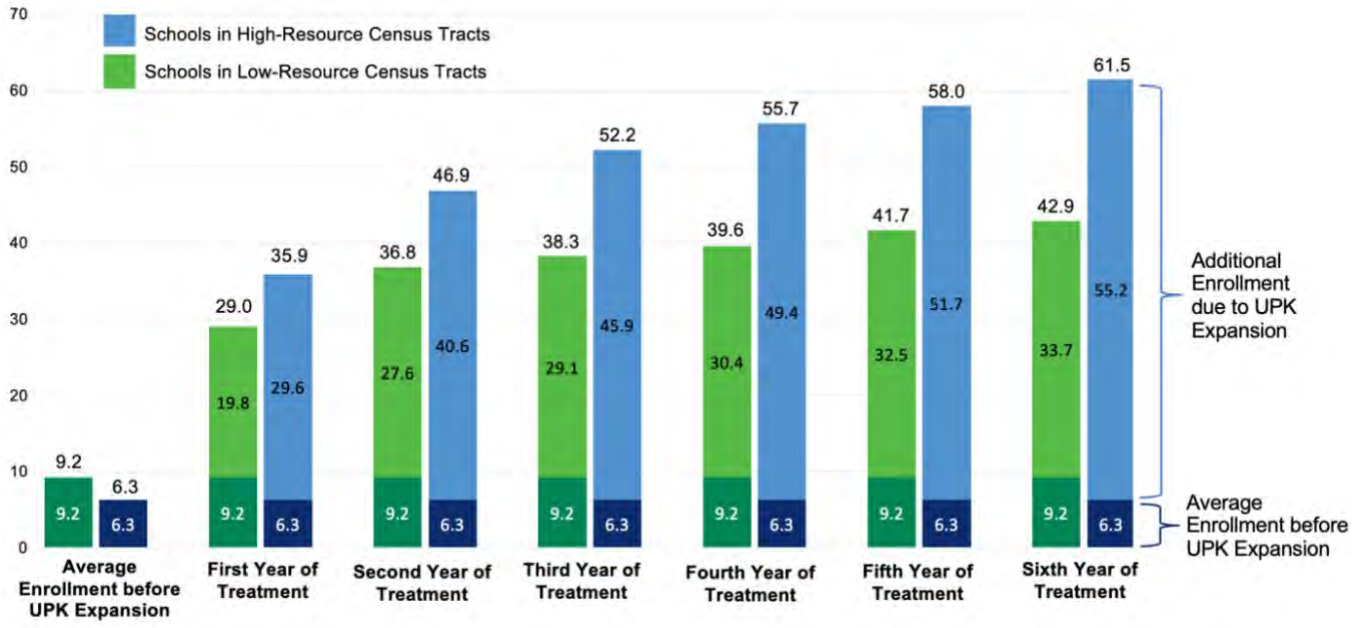
Figure B.3: Impact of Chicago Universal Pre-K Expansion on Free, Full-Day Capacity in Schools in Low-Resource (Green) versus High-Resource (Blue) Census Tracs



Note: Includes the average number of free, full-day pre-K seats in UPK expansion schools in the year prior to the expansion and the estimated additional capacity due to the UPK expansion, separated by low-resource and high-resource census tracts. See Appendix Section 2 for more information on the resource measurement and classifications. See Appendix Table A3 for more detailed results on the impact of the UPK expansion on pre-K capacity.

Figure B.4 repeats the analysis with enrollment. Impacts over time are similar to those found using capacity. In the first year after the expansion, average school-level enrollment increased by 20 students in low-resource tracts and by 30 students in high-resource tracts. Enrollment continues to grow over time. Six years after UPK expansion, the average school in a high-poverty tract enrolled 37 additional students, and the average school in a low-poverty tract enrolled 55 additional students in comparison to pre-expansion enrollment levels.

Figure B.4: Impact of Chicago Universal Pre-K Expansion on Free, Full-Day Enrollment in Schools in Low-Resource (Green) versus High-Resource (Blue) Census Tracts

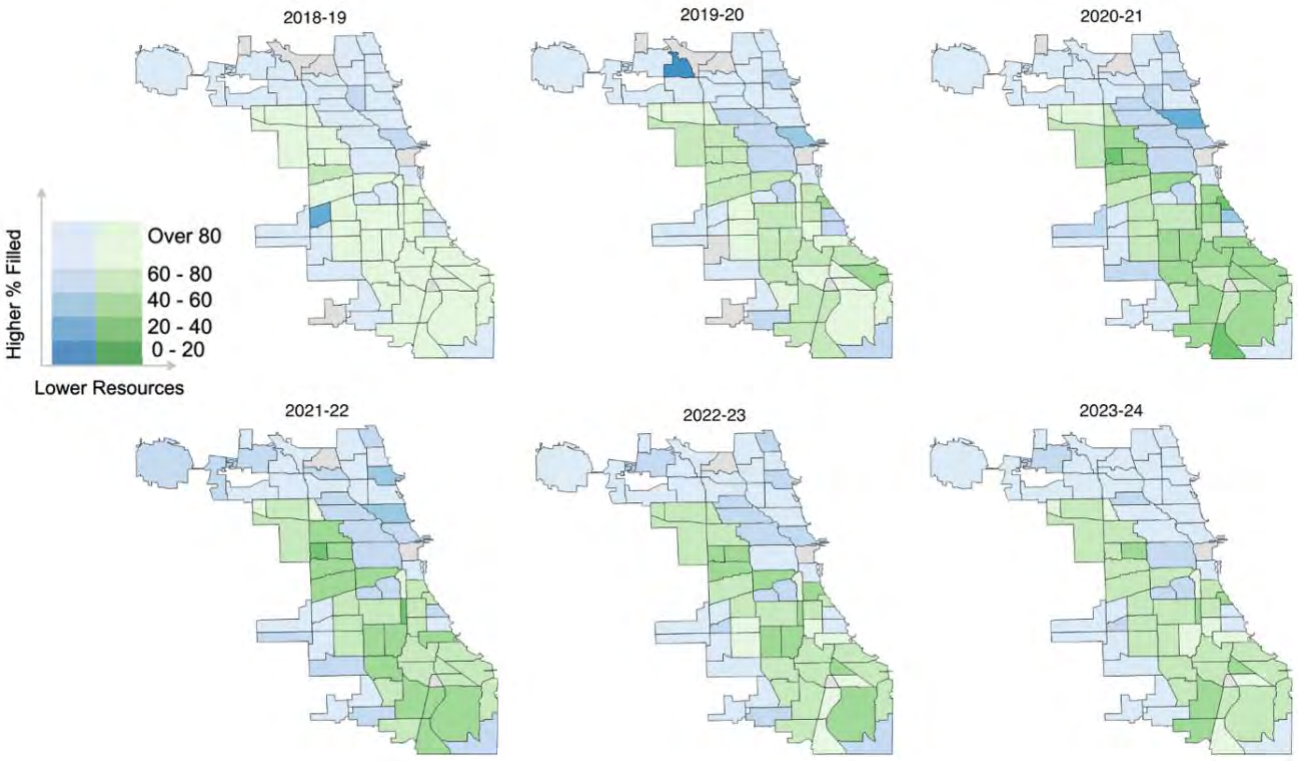


Note: Includes the average number of 3-year-olds and 4-year-olds enrolled in free, full-day pre-K in UPK expansion schools in the year prior to the expansion and the estimated additional enrollment due to the UPK expansion, separated by low-resource and high-resource census tracts. See Appendix Section 2 for more information on the resource measurement and classifications. See Appendix Table A3 for more detailed results on the impact of the UPK expansion on pre-K enrollment.

UPK Expansion and Community-Level Proportions of Filled, Free, Full-Day Pre-K Seats in Low- versus High-Resource Census Tracts

The heatmaps below track the number of filled free, full-day pre-K seats for 3- and 4-year-old students, as a percentage of the total free, full-day pre-K capacity in CPS schools. Figure B.5 shows the percentages of filled seats in low-resource and high-resource communities over time. Lighter areas indicate communities closer to or at full pre-K capacity, while darker areas indicate the availability of open pre-K seats.

Figure B.5: Percentages of Filled, Free, Full-Day Seats by 3- and 4-Year-Olds Among CPS Schools in Low-Resource (Green) versus High-Resource (Blue) Communities



Note: The percentages of filled, free, full-day seats at UPK expansion schools in low-resource communities are shown in green while high-resource communities are blue. See Appendix Section 2 for more information on the resource measurement and classifications.

Alongside increases in pre-K enrollment, we find that the UPK expansion facilitated rapid growth in the free, full-day pre-K capacity of Chicago Public Schools. Figure B.5 demonstrates capacity increases in step with rising enrollment. From 2018–19 to 2023–24, most communities recorded a growth in open seats that was equal to or slightly above the pace of enrollment growth, as demonstrated by a gradual shift toward darker colors in both community types.

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