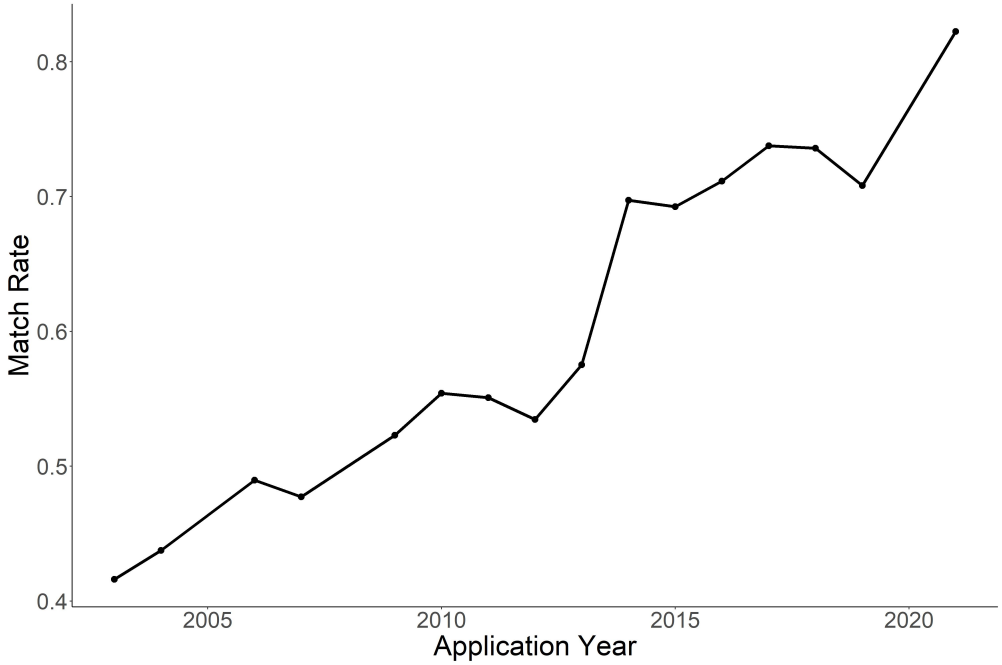
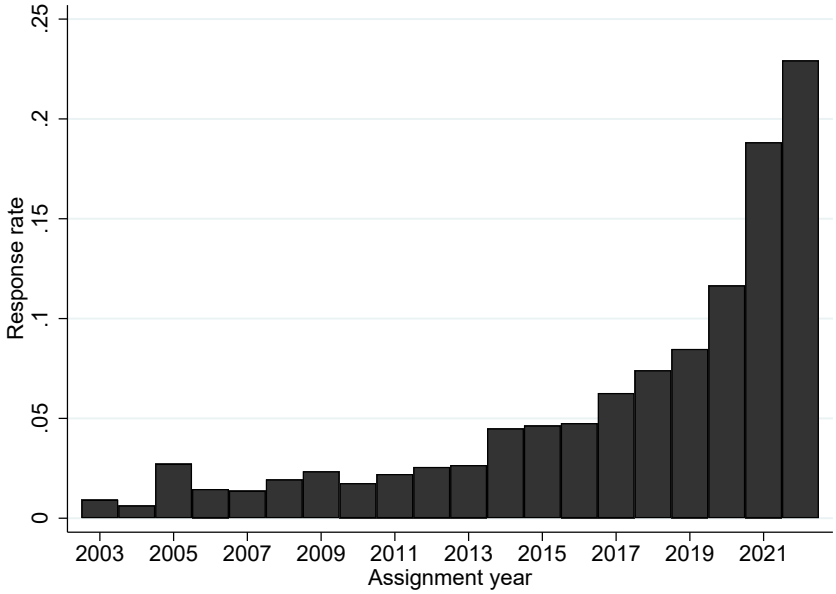
# A Additional Tables and Figures

**Figure A.1: Parental earnings match rate by application cohort**



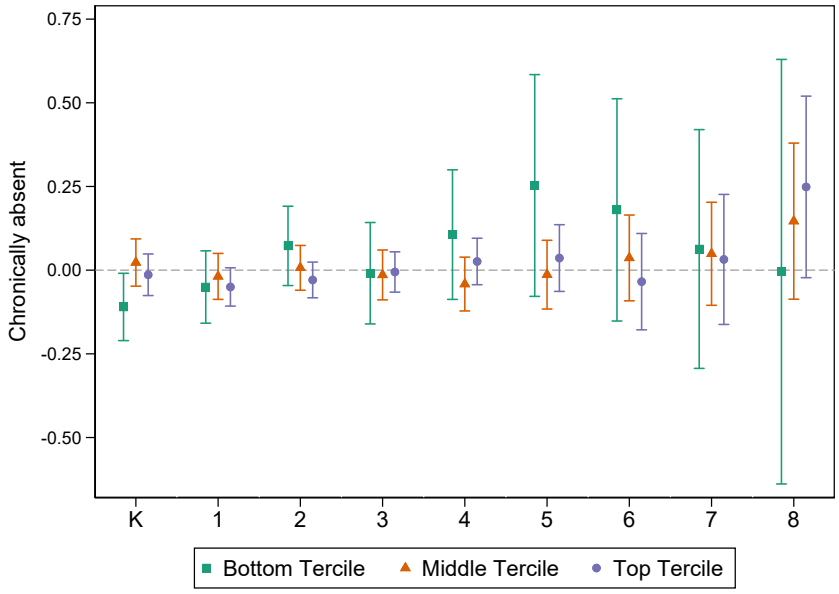

Notes: This figure shows the evolution of the match rate for parental earnings by application cohort. We can observe up to two contacts per applicant, usually one or both of their parents. We consider an applicant record matched if we can match at least one of their provided contacts to the administrative earnings records. We do not consider parental earnings for the 2005, 2008, and 2020 application cohorts. We did not recover historical records of the 2005 and 2008 application processes until after the merge with state records was conducted. As in our other analyses, we drop observations for the 2020 application cohort due to Covid. See Section 3 for details.

**Figure A.2: Survey response rate by application cohort**

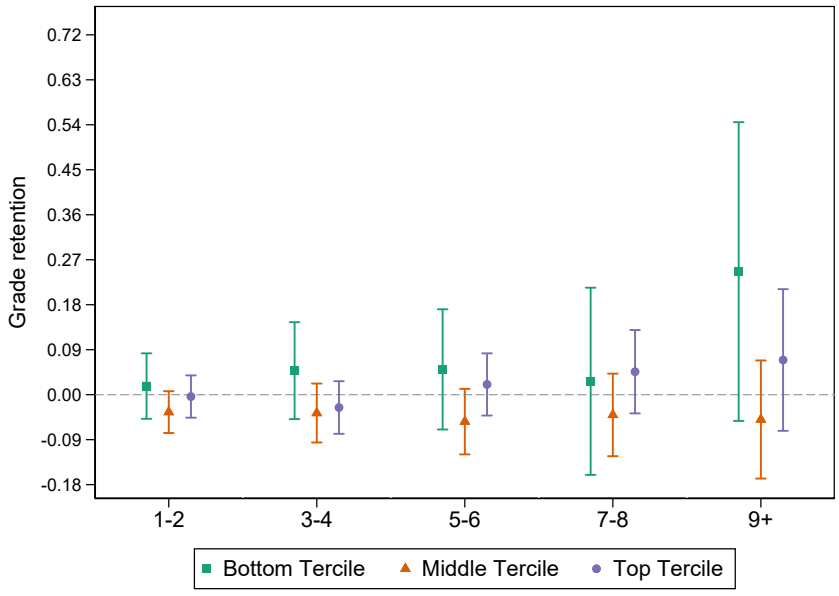



Notes: This figure reports survey response rates by application cohort. See Section 3 for details.

**Figure A.3: Effects of UPK on children's academic outcomes by family income tercile**



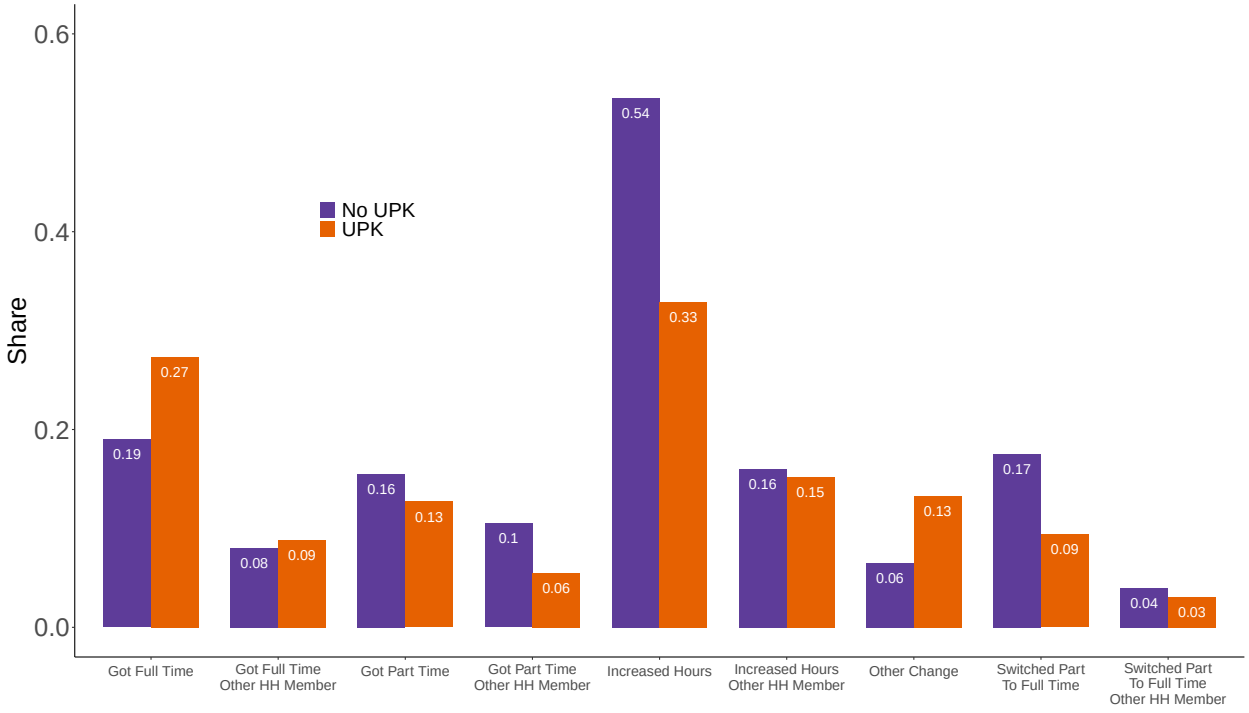

**(a) Chronic absenteeism**




**(b) Grade retention**

Notes: This figure shows IV estimates for the effect of UPK enrollment on chronic absenteeism and a cumulative indicator for ever being retained in a grade by tercile of ACS median block-group household income analogous to those presented in Figure 4. Dots correspond to point estimates with the surrounding error bars indicating the 90% confidence interval.

**Figure A.4: Subjective treatment effects: type of increase in work for those reporting an increase**




Notes: This figure reports the type of increase in work for survey respondents reporting that enrolling in a UPK program either did (if enrolled) or would have (if not enrolled) allowed them to work more. Purple "No UPK" bars in each panel report shares for the group that did not receive UPK and orange "UPK" bars report shares for the group that did. Responses are reported both for the survey respondent and for other household members (labeled with "Other HH Member"). See Section 8 for details.

**Table A.1: Descriptive Statistics - Comparison Set**

| Variable | Comparison Set |
|---|---|
| Asian | 0.04 |
| Black | 0.22 |
| Hispanic | 0.36 |
| White | 0.35 |
| English learners | 0.17 |
| Free or reduced price meals | 0.72 |
| Students with disabilities | 0.34 |
| KEI Score | -0.03 |
| N | 54517 |

Notes: This table shows descriptive statistics for the comparison set of children enrolled in any public pre-kindergarten program in New Haven County during our sample period. See section 3.2 for details.

## Table A.2: Lottery design validation - All Variables

| | Comp Cont. Mean | Control Mean | NHPS sample | NHPS sample | State sample | Earnings sample | Survey sample |
|---|---|---|---|---|---|---|---|
| Black | 0.347 | 0.430 | -0.027 | -0.006 | -0.005 | -0.011 | -0.034 |
| | (0.034) | | (0.009) | (0.013) | (0.014) | (0.017) | (0.053) |
| White | 0.246 | 0.199 | 0.034 | 0.009 | 0.008 | 0.014 | 0.060 |
| | (0.028) | | (0.007) | (0.011) | (0.012) | (0.016) | (0.050) |
| Female | 0.565 | 0.509 | -0.033 | -0.028 | -0.033 | -0.019 | -0.073 |
| | (0.034) | | (0.009) | (0.014) | (0.015) | (0.019) | (0.058) |
| Age at application | 3.490 | 3.727 | -0.010 | 0.002 | 0.008 | -0.004 | 0.039 |
| | (0.034) | | (0.005) | (0.008) | (0.009) | (0.011) | (0.032) |
| ACS median HH income | 63,609 | 58,651 | 1,510 | -500 | -272 | -1,351 | -3,664 |
| | (2,176) | | (575) | (777) | (828) | (1,066) | (3,983) |
| Fraction renters | 48.711 | 55.195 | -2.412 | 0.071 | -0.152 | 0.285 | 2.192 |
| | (2.047) | | (0.520) | (0.708) | (0.754) | (0.944) | (3.447) |
| Fraction HH below poverty | 0.063 | 0.075 | -0.002 | -0.001 | -0.001 | 0.001 | 0.004 |
| | (0.004) | | (0.001) | (0.001) | (0.002) | (0.002) | (0.006) |
| Fraction employed over 16 | 62.046 | 60.424 | -0.254 | 0.098 | 0.228 | -0.091 | 0.791 |
| | (0.737) | | (0.196) | (0.287) | (0.306) | (0.393) | (1.114) |
| Pre-period income (dollars) | 27,443 | 23,769 | | | | 232 | |
| | (2,286) | | | | | (949) | |
| Pre-period log income | 10.022 | 9.775 | | | | 0.027 | |
| | (0.131) | | | | | (0.050) | |
| Any pre-period income | 0.921 | 0.856 | | | | -0.006 | |
| | (0.030) | | | | | (0.012) | |
| Earnings-weighted index | | | 823 | -41 | 25 | -207 | -526 |
| | | | (197) | (260) | (277) | (357) | (1,317) |
| Joint test | | | 0.000 | 0.522 | 0.384 | 0.840 | 0.384 |
| Year and Grade FEs | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Admit prob. indicators | | | | ✓ | ✓ | ✓ | ✓ |
| First stage partial F-stat | | | 5,481.1 | 842.3 | 836.7 | 569.4 | 63.0 |
| N individuals | | | 16037 | 15931 | 13847 | 9078 | 829 |
| N applications | | | 18795 | 18669 | 16389 | 10753 | |

Notes: This table expands the results reported in Table 3 by reporting reduced-form results for all variables used in the joint balance test. The reduced-form regressions are again following Equation 1 and take predetermined student and parent covariates as the dependent variables of interest. The joint test considers the hypothesis that all coefficients in a given column (except for the coefficient on the earnings-weighted index) are zero. Columns 1 and 2 report the control complier and control group means of the dependent variable listed in the row. Columns 3-7 report regression results from a specification where the dependent variable is as listed in the table row and the controls and samples vary across columns. Each cell reports results from a separate regression. The reported estimates are coefficients on an indicator for being offered a UPK spot, with standard errors in parentheses. Column 3 uses all available application data and includes only grade-by-year fixed effects. Column 4 uses all available application data and adds controls for the $P_i$, as described in Section 4.1. Column 5 has the same controls as column 4, but restricts to application data that is successfully matched to state records. Column 6 has the same controls as column 4 but restricts to application data linked to parent earnings records. Column 7 restricts to the survey sample. Standard errors are clustered at the application level (columns 3-5 and 7), or two ways at the application and parent level (column 6). See Section 4.2 for details.

## Table A.3: The effect of UPK enrollment on KEI subscores

| | Comp Cont. Mean | Control Mean | Overall | ACS 1st tercile | ACS 2nd tercile | ACS 3rd tercile |
|---|---|---|---|---|---|---|
| Avg KEI Score | 0.178 | 0.099 | 0.062 | -0.176 | 0.295 | 0.012 |
| | (0.067) | | (0.072) | (0.183) | (0.108) | (0.115) |
| Language Skills | 0.131 | 0.104 | 0.108 | -0.040 | 0.346 | -0.064 |
| | (0.077) | | (0.082) | (0.208) | (0.122) | (0.133) |
| Literacy Skills | 0.255 | 0.124 | 0.040 | -0.182 | 0.295 | -0.010 |
| | (0.079) | | (0.085) | (0.207) | (0.124) | (0.139) |
| Numeracy Skills | 0.237 | 0.072 | -0.018 | -0.411 | 0.206 | 0.060 |
| | (0.081) | | (0.086) | (0.221) | (0.127) | (0.137) |
| Physical/Motor Skills | 0.165 | 0.080 | 0.011 | -0.029 | 0.273 | -0.046 |
| | (0.077) | | (0.085) | (0.218) | (0.128) | (0.135) |
| Creative/Aesthetic Skills | 0.116 | 0.090 | 0.113 | -0.205 | 0.282 | 0.096 |
| | (0.077) | | (0.084) | (0.210) | (0.125) | (0.135) |
| Personal/Social Skills | 0.161 | 0.123 | 0.117 | -0.191 | 0.366 | 0.037 |
| | (0.076) | | (0.081) | (0.203) | (0.120) | (0.133) |
| First-stage partial F-stat | | | 576.3 | 105.3 | 314.2 | 201.8 |
| N | | | 8716 | 2996 | 2909 | 2969 |

Notes: This table reports IV estimates of Equation 1 for the effect of UPK enrollment on the Connecticut Kindergarten Entrance Inventory (KEI). The first row reports results on the overall KEI score and subsequent rows report results for each of the six subscores. Complier control mean and control mean columns report statistics for the full sample. The three rightmost columns report IV estimates within samples defined by tercile of neighborhood median household income, as measured in the 2019 ACS. All scores have been z-scored by year. Clustered standard errors are in parentheses. See Section 4 for details.

## Table A.4: Control complier means for specifications in Table 6

| | Switch main industry | One job over $ 4,000 | Quarters earn. $\leq$ $ 4,000 (Incl. 0s) | Total qts earn. $\leq$ $ 4,000 since PK | N individuals |
|---|---|---|---|---|---|
| *Disaggregated* | | | | | |
| Pre-K years | 0.21 | 2.00 | 1.49 | 2.10 | 9205; 10621; 10727; 10727 |
| | (0.02) | (0.12) | (0.10) | (0.14) | |
| Yrs after PK 1-2 | 0.17 | 2.08 | 1.46 | 4.70 | 9010; 10285; 10391; 10391 |
| | (0.02) | (0.11) | (0.10) | (0.29) | |
| Yrs after PK 3-4 | 0.19 | 2.01 | 1.31 | 7.27 | 8385; 9990; 10096; 10096 |
| | (0.02) | (0.11) | (0.10) | (0.46) | |
| Yrs after PK 5-6 | 0.15 | 2.05 | 0.99 | 9.13 | 6633; 8221; 8327; 8327 |
| | (0.03) | (0.14) | (0.13) | (0.79) | |
| *Pooled post pre-k* | | | | | |
| Yrs after PK 1-6 | 0.17 | 2.05 | 1.29 | 6.73 | 9476; 10285; 10391; 10391 |
| | (0.02) | (0.10) | (0.09) | (0.45) | |
| Yrs after PK 7+ | 0.18 | 1.97 | 1.01 | 13.52 | 4964; 6128; 6234; 6234 |
| | (0.04) | (0.27) | (0.24) | (2.50) | |

Notes: This table reports the complier control means for estimates in Table 6. See the note for that table and Section 4.5.2 for details.

# B Assignment mechanisms

NHPS used a centralized process to assign students to UPK programs over our entire study period, from 2003 to 2022. However, the city's assignment mechanism and other elements of the application process changed several times over the period. This appendix describes changes in the NHPS UPK assignment system over time and how we use the data available under different assignment regimes to construct our school assignment instrument.

## B.1 Assignment mechanisms and procedures

### 2003-2013

NHPS assigned students using an Immediate Acceptance (IA) mechanism with sibling and neighborhood priority, with ties broken using random draws. Students could apply to at most three schools. The mechanism was implemented by an IT consultant hired by the district, who wrote an NHPS-specific software package. Applications were primarily on paper, typically with one contact listed.

### 2014-2015

NHPS assigned students to schools using the "New Haven" mechanism, in which school preferences are lexicographic over 1) priority group (neighborhood, sibling, or both), and then 2) listed rank. Students apply to three schools. The district hired Smartchoice, a provider of school choice software to many districts, to implement the mechanisms. Application is primarily online, and applicants have the opportunity to list multiple contacts and define their relationship to the student.

### 2016-2017

NHPS returned to IA, and raised the maximum number of listed schools to four. The broader system continued to include neighborhood and sibling priority.

### 2018

NHPS continued as in 2016-2017, but added a priority system based on student zip code that comes after neighborhood and sibling preference in the lexicographic ordering.

### 2019

NHPS adopted a deferred acceptance (DA) procedure, keeping other process elements as in the previous year.

#### 2020-2022

NHPS increased the length of the rank list from four to six. Other elements were unchanged.

## B.2 Data on assignment processes and instrumental variable construction

The data we have about the assignment process changes when the district switches from the "old" procedure, a bespoke process run by a district-hired IT consultant, to the "new" procedure, run by a large purveyor of school choice services. This shift takes place after the 2013 assignment process.

#### 2003-2013

Between 2003 and 2013, we observe applications, capacities, priorities, and realizations of the random lottery draws. We do not directly observe initial placement outcomes. Instead, we observe something closer to realized placements, inclusive of declined placements and the aftermarket processes through which NHPS filled declined spots.

To construct our UPK placement instrument, we simulate the school assignment process based on the applications, capacities, priorities, and realized values of the random draws. Using this simulation, we create an indicator equal to one if the student is assigned an offer in the main process. The feature of the data that lets us do this is that we observe the values of the randomized draws used to make assignments.

#### 2014-2022

In 2014 and later, we observe applications, capacities, priorities, and initial placement outcomes. We use the presence of a main-round offer as our UPK placement instrument.

### B.2.1 Simulated probabilities

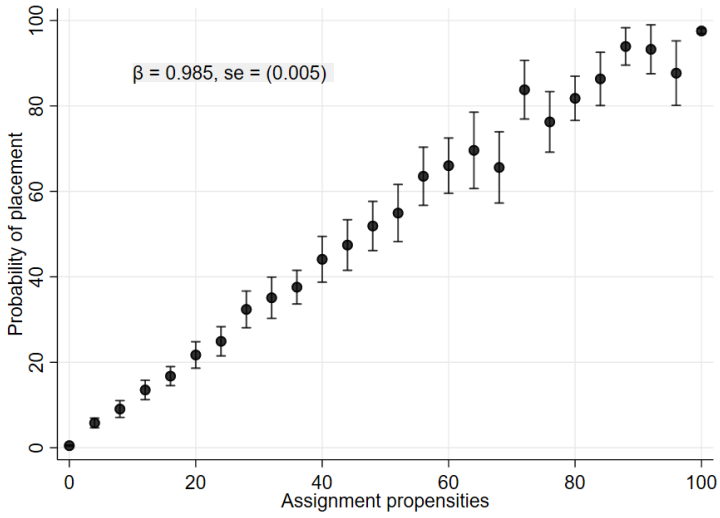
Our approach follows Azevedo and Leshno (2016) and Agarwal and Somaini (2018). We simulate random tiebreaker draws 500 times and run the assignment mechanism under each set of draws. We compute the admissions cutoff score in each simulation (based on the RSP+C representation of the mechanism), then take the average cutoff score across all simulations and use it to compute the assignment probabilities for each application.

### B.2.2 Tests of simulation validity

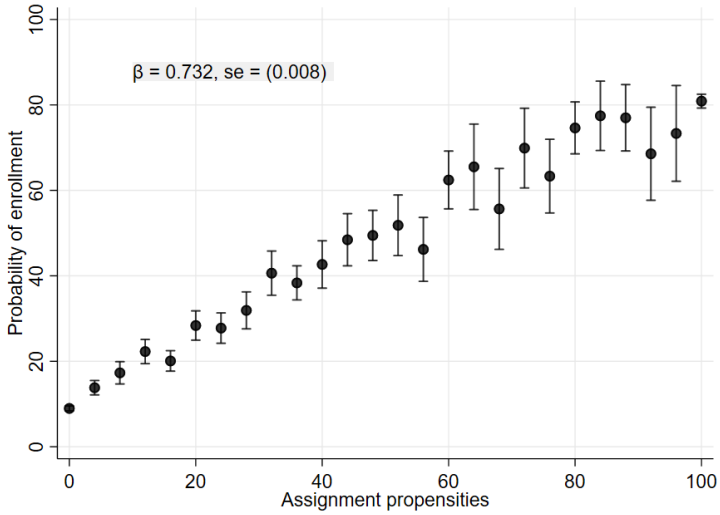
Our process for constructing the placement instruments $Z_i$ and assignment propensities $P_i$ relies on reconstructing the assignment process. To test the accuracy of our reconstruction, we regress an indicator for observed assignment on simulated assignment probability $P_i$. Panel (a) of Figure B.1 reports the results of this exercise. We see that, as predicted, observed assignment probabilities rise one-to-one with the simulated values.

We also see observed *enrollment* probabilities rising steeply with the $P_i$. We report these results in Panel (b) of Figure B.1. The slope here is not one-for-one, and we do not expect it to be due to noncompliance. However, the fact that enrollment rises steeply with simulated assignment probability helps confirm that our approach accurately describes the assignment and enrollment procedures that students encounter.

**Figure B.1: Validating assignment propensities**




**(a) Placement**




**(b) Enrollment**

Notes: Panel (a) plots the share of observed UPK assignments (vertical axis) against simulated assignment probabilities $P_i$ (horizontal axis). Each dot represents a 5pp bin of values of $P_i$. The coefficient from a linear regression of observed placement on $P_i$ is reported in the figure. Panel (b) has the same structure as Panel (a), but the vertical axis variable reflects the probability of enrolling in UPK.

# C Details on other subsidized programs

This appendix describes how we calculate enrollment in various subsidized pre-kindergarten programs in New Haven and provides additional information on those programs. We aim to estimate the number of three- and four-year-old children enrolled in each subsidized pre-kindergarten program in New Haven from 2006 through 2022. We use data

from the Connecticut State Department of Education (SDE), NHPS' Public Schools Information System (PSIS), Connecticut's Office of Early Childhood (OEC), and aggregate data from the federal Office of Head Start (OHS) to categorize five main program types and determine enrollment figures for each. See Section 3 for more details on each data source, and Section 2 for discussion of the counts we obtain from this exercise, which are reported in Figure 1, Panel (c).

## C.1 UPK enrollment

See Section 2 for details on New Haven's UPK program. To calculate UPK enrollment, we use data from the SDE and the PSIS to track enrollment in New Haven UPK programs in each school year.

## C.2 School Readiness

School readiness programs are funded through grants to high-need communities. To be eligible, a school must serve one of the 50 lowest-wealth towns in Connecticut, or be designated as a priority school. School Readiness preschool programs vary in the hours of care they offer (full-time, school-time, part-time, wrap-around) and family fees depend on the type of program, its duration, and family size. For example, for a full-time program, those earning less than 12% of State Median Income (SMI) have a weekly family fee that is equivalent to 4% of family income (if attended for the full year) and slowly increases up to 10% for those making more than 150% of SMI (Connecticut Office of Early Childhood, 2024).

For School Readiness program enrollment, we rely on data from SDE, PSIS and OEC. School Readiness enrollment is recorded in PSIS data (for children enrolled in New Haven), in SDE data (for children enrolled in publicly-run non-NHPS programs), and OEC data (for children enrolled in subsidized programs run by other providers). SDE and PSIS data are available across the full analysis period, but OEC data are available only from 2013-2019 and are most complete from 2016-2018. We keep data from facilities based in New Haven. We erase duplicates in cases where we can identify the same child and school year combination in multiple datasets. Using the deduplicated data, we count the number of unique children across years.

Data on enrollment in OEC files do not include identifiers for children enrolled in subsidized programs who did not match to our record of applicants to the New Haven UPK lottery. The data are identified at the level of the enrollment spell. It is possible one child may account for multiple enrollment spell observations. We estimate the number of unique children from the spell data using the ratio of spells to unique applicants among children that did match our records, then compute total School Readiness

enrollment in each year by adding the scaled number of spells for non-applicant children to the number of unique individuals from our applicant records.

## C.3 Care 4 Kids

Care 4 Kids offers families vouchers that can be used to pay for childcare. The program is primarily funded by the Federal Child Care Development Fund (CCDF) Plan. In addition to income requirements, Care 4 Kids requires the parent to be working or in an approved educational program. To be eligible, new applicants must earn less than 60% of the State Median Income (SMI), must remain below 85% of SMI while enrolled, and must be below 65% of SMI for redetermination (Care4Kids, 2024). Families must additionally pay a fee that is tied to annual gross income. This is 2% annually for those below 20% SMI, 4% for those above 20 but below 30% SMI, 6% for those above 30 but below 40% SMI, 8% for those above 40 but below 50% SMI, and 10% for those above 50 and below 85% SMI.

To estimate Care 4 Kids enrollment, we use data from the OEC to identify children enrolled in Care 4 Kids programs. Information on enrollment in Care 4 Kids is split between two datasets from the OEC, which jointly span the full analysis period. Unlike information used to calculate enrollment in the School Readiness program, here we cannot identify the town where a facility is located for most facilities. We can observe the town of residence for the child. Our approach is to include enrolled children in the program that matched to our record of applicants to the New Haven lottery, and from this set, we keep only those whose facility is in New Haven, if we can identify its location, or those that are New Haven residents in cases where we don't know where their facility is located.

Information on enrollment in Care 4 Kids programs do not include a variable that identifies individuals for those who did not match our record of applicants but are New Haven residents. The data are identified at the level of the enrollment spell. It is possible one child may account for multiple enrollment spell observations. We estimate the number of unique children from the spell data using the ratio of spells to unique applicants among children that did match our records, then compute total Care 4 Kids enrollment in each year by adding the scaled number of spells for non-applicant children to the number of unique individuals from our applicant records.

## C.4 Head Start

Head Start is a nationally funded program for families with household incomes below the federal poverty line. In Connecticut, a child is also eligible if their family receives TANF or if they are homeless or in foster care. Head Start is free to eligible families.

Head Start programs in New Haven provided mostly part-day slots in 2013 and earlier before switching to mostly full-time slots of at least six hours per day thereafter (Source: authors' calculations from Office of Head Start data.). See Friedman-Krauss et al. (2022) for additional details on Head Start and Head Start in Connecticut.

To build estimates of Head Start enrollment in New Haven, we use four data sources. First, we use data from the SDE and PSIS to identify children enrolled in Head Start programs administered by public school systems. We then supplement with OEC data to capture additional enrollees from the New Haven choice process that we might not cover using the SDE source.

The public and state sources of Head Start data have some limitations. In 2019, one of New Haven's largest Head Start providers, LULAC, leaves both district and state datasets despite continuing to operate. This appears to be related to the source of funding for the programs provided by LULAC. To address this issue, we use aggregate records of Head Start enrollment in New Haven from OHS. These data report enrollment counts by year and center, and generate counts close to those we observe in administrative data for years 2018 and earlier. We construct predicted enrollment using the OHS data by regressing our observed enrollment counts on OHS counts using pre-2018 data. We then use predicted values from this regression to estimate Head Start enrollment counts for 2019 through 2022.

## C.5 Other programs

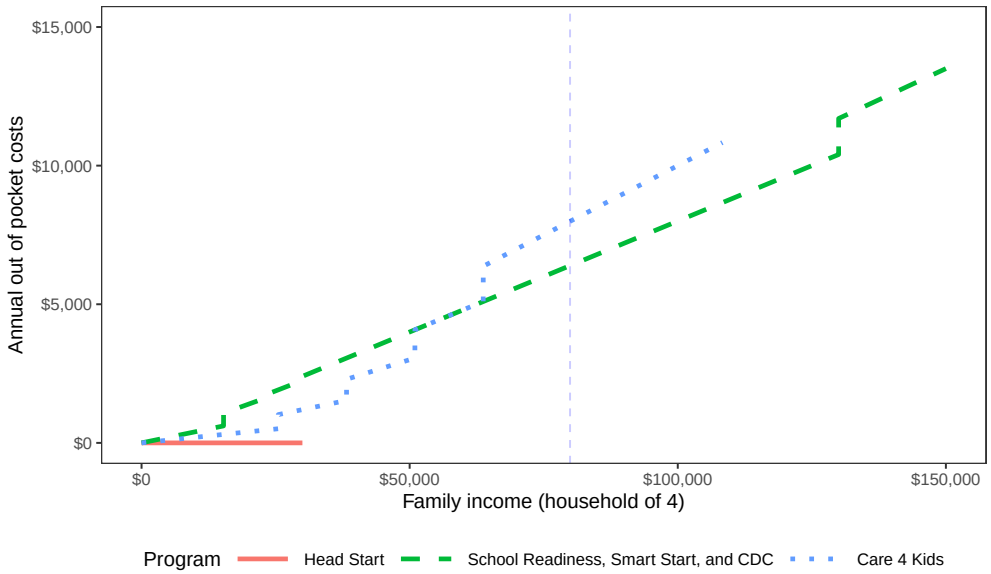
The OEC data includes information on other smaller programs in the state. In the category of "Other programs," we include children enrolled in the rest of subsidized options from the OEC data. This includes children enrolled in Smart Start programs, Child Day Care Contracts (CDCC), and the Preschool Development Grant (PDG) across years that matched to our records of applicants to the New Haven UPK lottery.

We also consider deflected spells to account for children enrolled in these programs that did not match to our records of applicants to the New Haven UPK lottery. We calculate total enrollment in these programs by adding the number of deflected spells and unique individuals that matched to our record of applicants whose facility is based in New Haven.

## C.6 Payment schedules

To compare out-of-pocket costs for School Readiness, Care 4 Kids, and Head Start, Figure C.1 plots the annual out-of-pocket cost to families for enrolling in each of these programs as a function of family income. The figure is for a household of four enrolling their child in a full-time preschool (ages 3 or 4). The dashed vertical line is the eligibility

**Figure C.1: Payment schedules and eligibility**




Notes: This figure plots the annual out-of-pocket cost for families in Head Start, Care 4 Kids, and other OEC programs (School Readiness, Smart Start, and CDC) as a function of household income. Numbers are for a family of four enrolling in a full-time preschool program. All amounts and thresholds are based on 2023 values. The vertical line is the eligibility cutoff for new applicants for Care 4 Kids. Sources: Care4Kids (2024); Connecticut Office of Early Childhood (2024)

threshold for Care 4 Kids for new enrollees.

# D Childcare costs over time

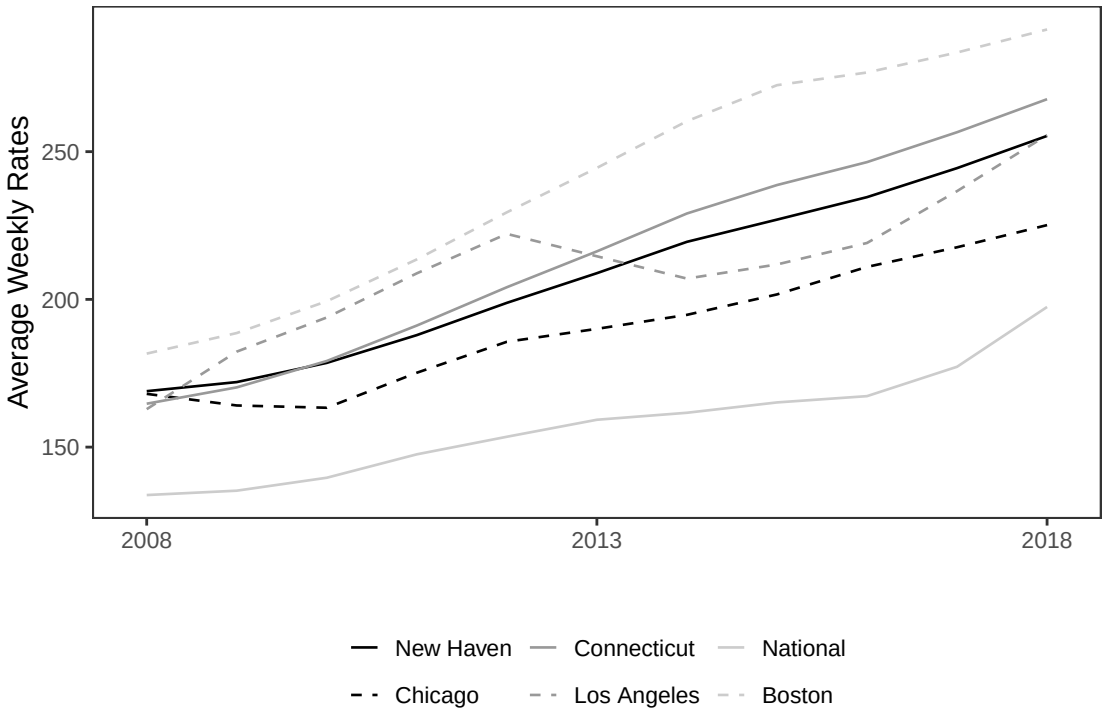
This appendix provides estimates of childcare costs over time from three sources, all of which provide evidence of increasing childcare costs. First, we use the National Database on Childcare Prices to estimate changes in the market rate for center-based preschool care. Figure D.1 plots the market rate for center-based preschool in New Haven County (purple line), Connecticut (dark blue line), and in the US overall (red line) from 2008 to 2018 in 2015 dollars. We additionally include dotted lines for Chicago (Cook County), Los Angeles (Los Angeles County) and Boston (Suffolk County). New Haven County is above the national average, but somewhat below the average for Connecticut. New Haven is somewhat above Chicago, similar to Los Angeles, and somewhat below Boston.

Second, we plot price changes using the seasonally adjusted CPI-U for US cities to plot the Full-basket CPI and the CPI for Daycare/Preschool, Shelter, Transportation, and Food. Specifically, we plot the percent change since 1990 for each basket from 1990 in Figure D.2. We see that the CPI for Daycare/Preschool increased much more rapidly

than the total or any of the other categories we consider, rising by 250% nominally since 1990. The total CPI-U increased by 130% in the same time period.

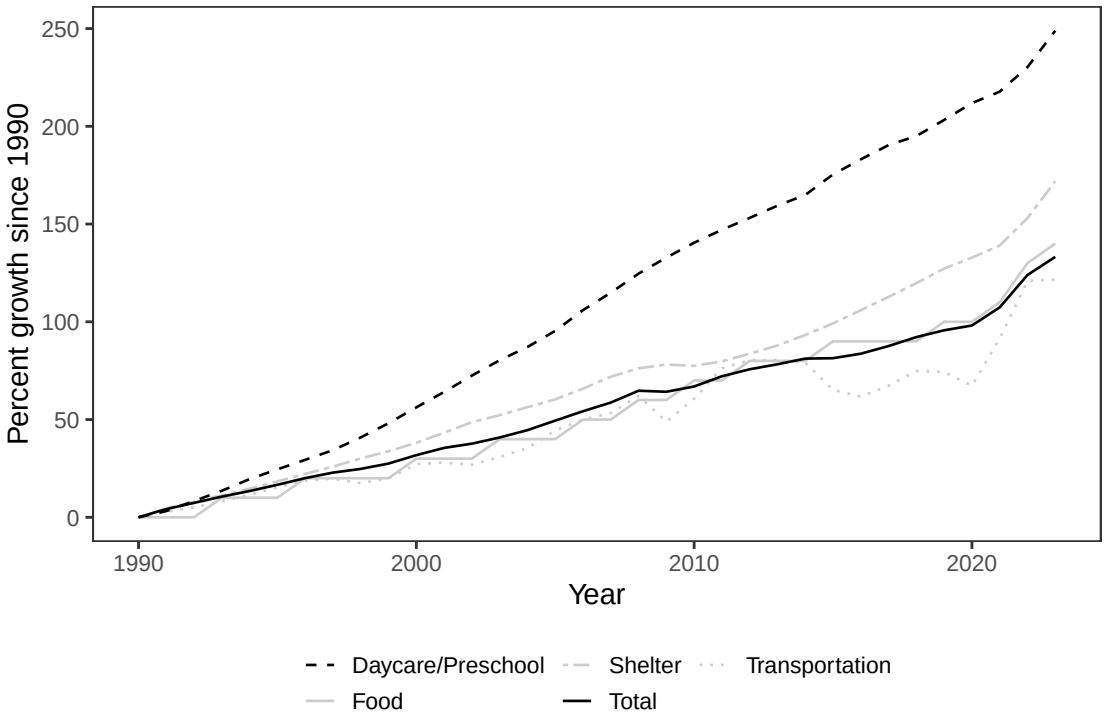
Third, we use the Current Population Survey Annual Social and Economic Supplements (CPS ASEC) to calculate households reported spending on childcare, restricted to households with children under the age of five. Total expenditure on childcare is divided by the number of children to approximate average cost per child. Figure D.3 shows that per-child household expenditure on childcare increased notably since 2005, with a drop in 2020, likely due to the Covid-19 pandemic.

**Figure D.1: Market rates for formal preschool care in from 2008 to 2018**



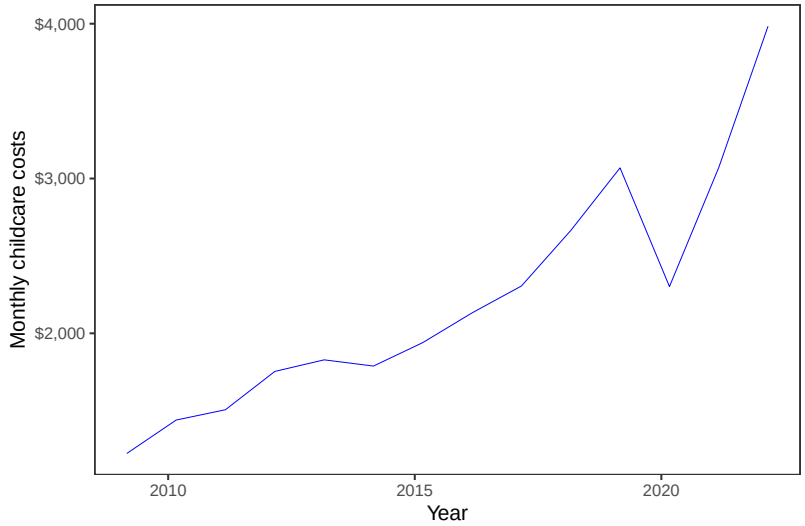

Notes: This figure plots weekly market prices for center-based preschool-aged childcare. The plot contains the following lines: New Haven County (solid black line), Connecticut (dark gray line), and Nationally (light gray line) from 2008 to 2018 in 2015 dollars. We additionally include dashed lines for Chicago (Cook County, black), Los Angeles (Los Angeles County, dark gray) and Boston (Suffolk County, light gray). Source: National Database on Childcare Prices (Landivar et al., 2023)

**Figure D.2: Percent growth in CPI-U for daycare/preschool vs other goods.**




Notes: This figure plots the percent change since 1990 for the seasonally adjusted CPI-U for all goods (Total SA0), Daycare/Preschool (DAYCARE / PRESCHOOL SEEB03), Shelter (SHELTER AH1), Transportation (TRANSPORTATION AT), and food (FOOD AF1). Source: Bureau of Labor Statistics Consumer Price Index (CPI)

**Figure D.3: Average annual household expenditure on childcare per child in households with children under the age of five**




This figure plots the average monthly household spending on childcare per child for households with children under the age of five using data from the Current Population Survey Annual Social and Economic Supplements (CPS ASEC). Amounts are in 2015 dollars.

# E Student achievement data

## E.1 Test score data

This section describes our data on student achievement. We pay particular attention to achievement measures for kindergarteners, because these are the earliest measures we observe and likely also the least familiar to readers.

The earliest assessment we observe is the Connecticut Kindergarten Entrance Inventory (KEI). Kindergarten teachers conduct this assessment in the fall of each academic year. Students receive scores ranging from one to three on six readiness measures: creativity, language proficiency, literacy, numeracy, personal/social readiness, and physical readiness.

The Fall Kindergarten Entrance Inventory (KEI) is an evaluation performed at the beginning of the school year to document the skills students demonstrate upon arriving in kindergarten. The inventory was introduced in 2007 to comply with new state regulations and is administered statewide (Connecticut State Department of Education, 2021, 2024). Scores are based on teachers' evaluations across six domains: Creative/Aesthetics, Language, Literacy, Numeracy, Personal/Social skills, and Physical/Motor skills. Students are rated on a 3-point scale reflecting the degree to which a child demonstrates the skills in a given domain and the amount of instructional support required. To give an example, for Language the teacher is asked the following question: At what level does the student:

- Participate in conversations
- Retell information from a story read to him/her
- Follow simple two-step verbal directions
- Speak using sentences of at least 5 words
- Communicate feelings and needs
- Listen attentively to a speaker.

The teacher then provides a single score of one, two, or three, where a higher score represents a more consistent demonstration of the skills and that the student requires less instructional support for the skills (Connecticut State Department of Education, 2008). Our data covers results for the KEI for the school years 2008/09 through 2018/19, 2020/21, and 2021/22. We standardize test scores by school year and subtest using data from all New Haven pre-kindergarten students. We do not use the 2020/21 years in our analysis because Covid school closures interfered with the administration of the evaluation.

Figure E.1 plots the average of the six raw scores for students in our sample, while Table E.1 reports the min, max, and quartiles of the normalized KEI scores for our

sample. Figure E.2 reports the 25th, 50th, and 75th percentile of raw scores over time, showing that these are largely constant throughout the time window we study.

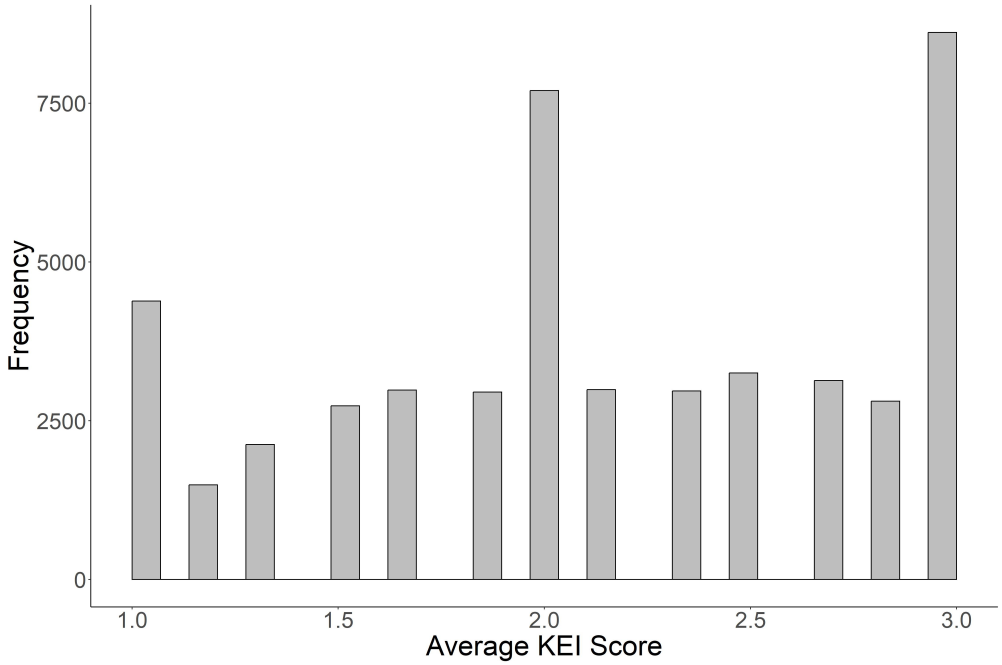
We also observe results from the Connecticut Mastery Test (CMT) and Smarter Balanced Assessment (SBA). These are high-stakes exams administered in grades three through eight that form the basis for Connecticut's school accountability system. We observe these scores from 2007-08 through 2021-22.

All test score data is missing for the 2019-20 school year due to the state Covid response; many Connecticut schools shut down in March 2020 just prior to the scheduled administration of most standardized exams. In addition, school closures in Fall 2020 interfered with the in-person administration of the KEI for the 2020-21 school year.

## E.2 Testing KEI scores

Kindergarten readiness scores are strongly correlated with later achievement measures. Figure E.3 plots the relationship between the average KEI score in kindergarten against average test scores in grade 3, grade 8, and grades 3-8. Each subpanel plots the standardized average KEI score on the x-axis and the standardized other test score on the y-axis. The dots are binned means of the test listed in the title within quantiles of KEI score, while the line from a linear regression of the later test score on the KEI score. On each plot we report the slope of the linear regression (beta). Overall, there is a strong, linear relationship between the KEI score and later test scores, though the slope of line of best fit decreases as more time has passed, with a slope of 0.40 in 3rd grade and 0.27 in eighth grade.

## Figure E.1: Distribution of KEI Scores



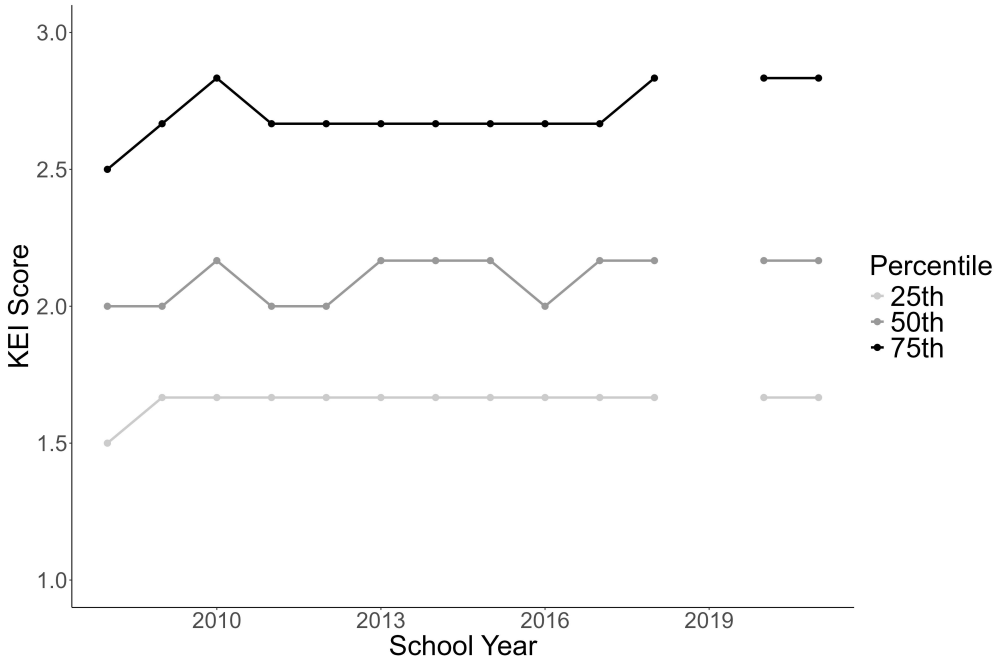

Notes: This figure shows the distribution of raw KEI scores, averaged across all six subtests, among all students in our SDE sample. The maximum attainable score in each subtest is 3, the minimum attainable score is 1. The time period covered is 2008/09-2018/19 and 2020/21-2021/22.

## Table E.1: KEI Subtest Score Distribution

| Subtest | Min | 25th | Median | 75th | Max |
|---|---|---|---|---|---|
| Average | -1.66 | -0.40 | 0.09 | 0.94 | 1.27 |
| Creative | -1.89 | -0.38 | -0.32 | 1.04 | 1.17 |
| Language | -1.45 | -0.18 | -0.02 | 1.23 | 1.35 |
| Literacy | -1.52 | -0.25 | -0.05 | 1.20 | 1.38 |
| Numeracy | -1.56 | -0.19 | -0.07 | 1.19 | 1.33 |
| Personal | -1.62 | -0.23 | -0.13 | 1.16 | 1.28 |
| Physical | -1.96 | -0.42 | -0.29 | 1.02 | 1.13 |

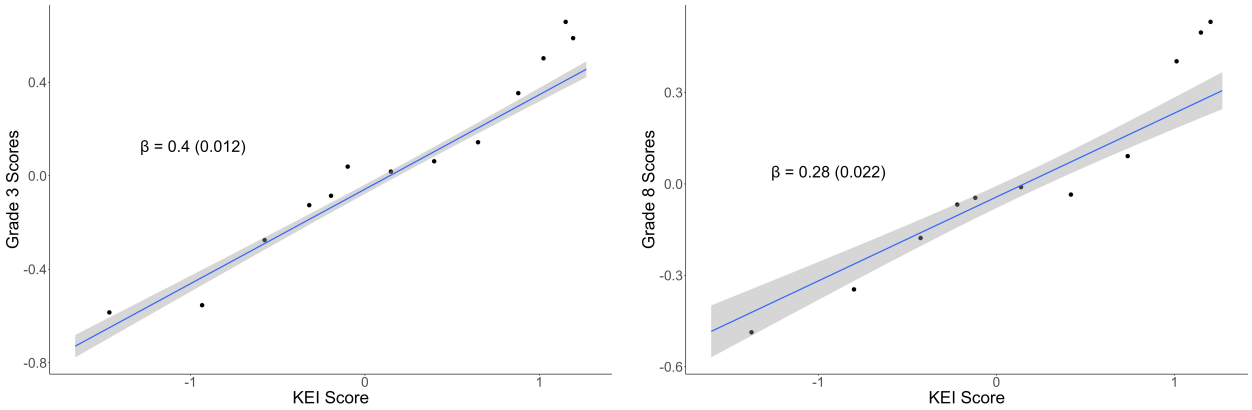
Notes: This table shows the minimum, 25th percentile, median, 75th percentile, and maximum of the standardized KEI score for the overall average across all six subtests and for each subtest. The underlying sample consists of all students contained in our SDE dataset. The time period covered is 2008/09-2018/19 and 2020/21-2021/22. Scores are standardized at the subtest-school year level.

## Figure E.2: KEI Score Percentiles over Time




Notes: This figure shows the evolution of the 25th (light gray), 50th (dark gray), and 75th (black) percentile of the raw, overall KEI score, i.e. the average over all six subtests. The maximum attainable score in each subtest is 3, the minimum attainable score is 1. The underlying sample consists of all students contained in our SDE dataset. The time period covered is 2008/09-2018/19 and 2020/21-2021/22.

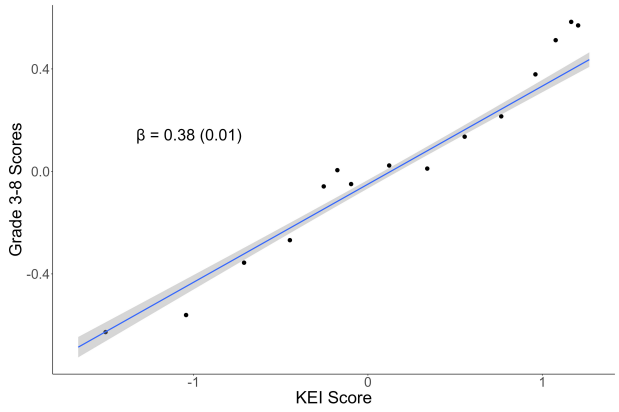
**Figure E.3: KEI Score and Average Upper Grade Score**




**(a) KEI and Grade 3**




**(b) KEI and Grade 8**




**(c) KEI and Grades 3-8**

Notes: This figure shows binscatter plots visualizing the correlation between the overall standardized KEI score, i.e. the average over all six standardized subscores, and a selection of standardized test scores from later grades. The x-axis in each panel reflects the standardized KEI score. For the y-axis, Panel (a) presents the grade 3 test scores, Panel (b) grade 8 test scores, Panel (c) shows the average test score across grades 3 through 8. Each subfigure additionally plots the regression line and reports the slope of the line.

# F Survey procedures and variable construction

## F.1 Survey implementation

We worked with NHPS to survey the parents of past UPK applicants. The survey ran from May to November 2023. Using contact information provided on application forms, survey enumerators at NORC emailed parents of past applicants and followed up by phone with applicants who did not complete the survey or lacked email addresses. We prioritized phone follow-ups for parents whose children had interior placement probabilities to maximize statistical power within budget constraints. Survey respondents were rewarded with a chance to win a prize of $100. We awarded 25 such prizes.

The survey launched in early May with emails to all parents in the survey sam-

ple. Emails highlighted the collaboration between NHPS, Yale, and NORC. The email also emphasized that responses would help improve pre-kindergarten programs in New Haven and that responses were confidential. See Figure F.1 for the email invitation. Upon clicking the email invitation link, respondents were directed to the landing page that reiterated the purpose of the survey, provided contact information for the research team, and asked for consent to continue. Each legal guardian with an available email received up to five reminders. Survey efforts continued until the second week of November.

Survey logic allowed for different questions based on the application status of the child, distinguishing between those children who applied but were not offered a seat, those who were offered a seat but chose not to enroll, and those who enrolled after receiving an offer. Online Appendix K contains the survey questionnaire.

## F.2 Survey variable construction

In most cases our analysis relies on direct reports from survey responses. In some cases we combine responses from multiple questions into summary variables. We describe pertinent data construction choices below.

### F.2.1 Pre-kindergarten outside options

If a survey respondent indicated that their child did not enroll in a UPK program, they were asked about the kind of childcare program their child was enrolled in. The answer options for this question consisted of

1. Head Start/Early Head Start
2. Another childcare center or pre-k (not Head Start)
3. A paid childcare provider operating out of their home (not Head Start)
4. Another town's public pre-k or childcare program
5. Babysitter, nanny, or another private option
6. Other, please specify:

For our analysis, we code these responses into three categories as follows:

- *Head Start*: response option 1
- *Other Public PreK*: response option 4
- *Other Paid PreK*: response options 2, 3, 5

We additionally hand-code all free text responses to answer option 6.

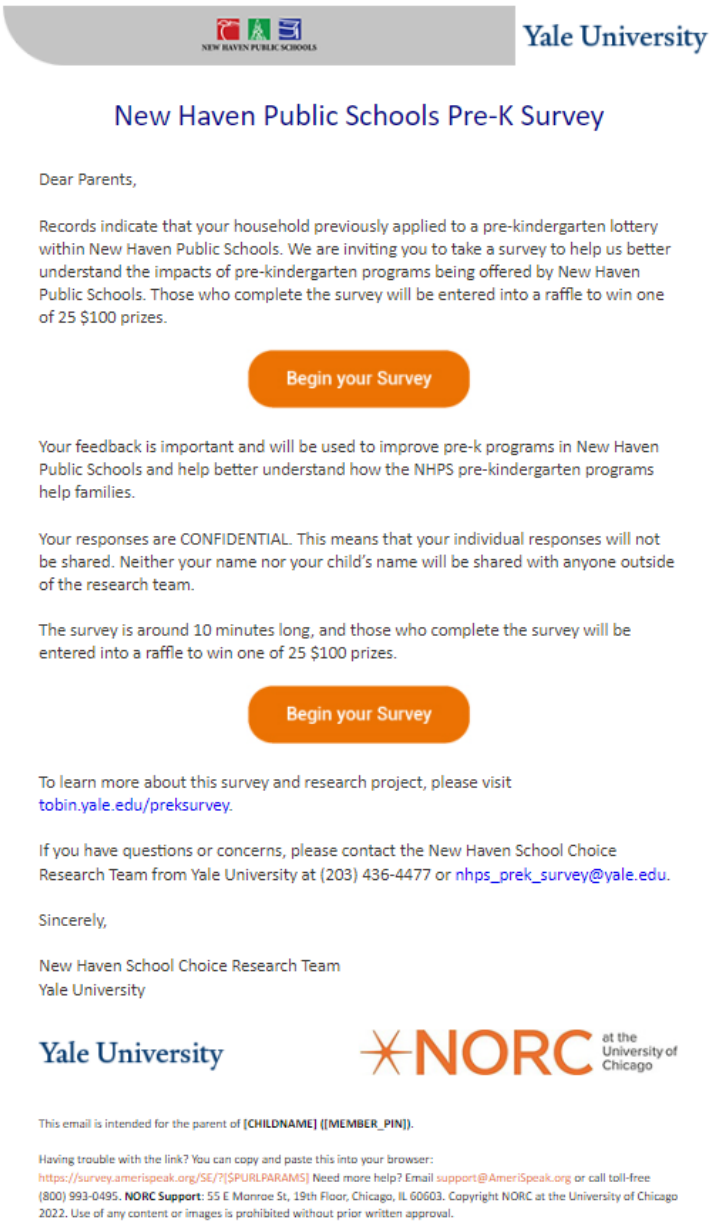
Finally, if a survey respondent indicates that their child did not enroll in any of these childcare options we assign that child to the category *Kid Stays Home*.

### F.2.2 Out-of-pocket costs

Out-of-pocket (OOP) costs for non-UPK pre-kindergarten programs are taken directly from survey responses. Survey respondents could choose between seven bins to describe their monthly OOP costs, with a low value of zero dollars, a high value of $2,000 or more, and five intermediate choices corresponding to ranges of dollar values. In our analysis we assign dollar values based on the midpoint of the selected bin for the middle bins and assign a dollar value of $2,000 for the top bin.

Due to an error in survey logic, we did not collect information on OOP costs for children enrolled in UPK programs. While enrollment in magnet programs is free of charge and includes wraparound before- and after-care prior to 2021 (i.e., for almost all of our sample period), families may nevertheless incur other childcare costs. To address this issue, we impute OOP costs for UPK enrollees as the average OOP costs reported for children enrolling for Head Start programs. We choose Head Start because the programs are also free to participants. The key difference in structure is that Head Start programs do not provide as much extended-hours care as UPKs through most of our sample period. We therefore regard this approach as conservative in the sense that it is likely to overstate the OOP costs for UPK enrollees.

**Figure F.1: UPK survey invitation**



NEW HAVEN PUBLIC SCHOOLS

Yale University

New Haven Public Schools Pre-K Survey

Dear Parents,

Records indicate that your household previously applied to a pre-kindergarten lottery within New Haven Public Schools. We are inviting you to take a survey to help us better understand the impacts of pre-kindergarten programs being offered by New Haven Public Schools. Those who complete the survey will be entered into a raffle to win one of 25 $100 prizes.

Begin your Survey

Your feedback is important and will be used to improve pre-k programs in New Haven Public Schools and help better understand how the NHPS pre-kindergarten programs help families.

Your responses are CONFIDENTIAL. This means that your individual responses will not be shared. Neither your name nor your child's name will be shared with anyone outside of the research team.

The survey is around 10 minutes long, and those who complete the survey will be entered into a raffle to win one of 25 $100 prizes.

Begin your Survey

To learn more about this survey and research project, please visit tobin.yale.edu/preksurvey.

If you have questions or concerns, please contact the New Haven School Choice Research Team from Yale University at (203) 436-4477 or nhps_prek_survey@yale.edu.

Sincerely,

New Haven School Choice Research Team
Yale University

Yale University

NORC at the University of Chicago

This email is intended for the parent of **[CHILDNAME] ([MEMBER_PIN])**.

Having trouble with the link? You can copy and paste this into your browser: https://survey.amerispeak.org/SE/?[$PURLPARAMS] Need more help? Email support@AmeriSpeak.org or call toll-free (800) 993-0495. **NORC Support**: 55 E Monroe St, 19th Floor, Chicago, IL 60603. Copyright NORC at the University of Chicago 2022. Use of any content or images is prohibited without prior written approval.

Notes: This is the email sent to parents or guardians of past UPK applicants inviting them to participate in the survey. Respondents accessed the survey by clicking on any of the buttons displayed, and subsequently were directed to a landing page where they received additional information on the purpose of the survey.

# G Pre-Kindergarten Hours

## G.1 Childcare Hours Construction

### Main Method

We assign each student in our survey dataset a value reflecting the daily hours of care the student has access to at their childcare facility in the year following application to the New Haven choice process (i.e., the first year they might be enrolled in a UPK program). We draw on and/or construct program-year level data from a variety of sources, including NHPS, the Connecticut Office of Early Childhood, and the Office of Head Start. To construct our main measure, we follow the steps outlined below.

1. Students with no reported pre-kindergarten are assigned a value of zero hours.
2. Students reported as enrolled in a UPK program are assigned a value of 10 hours for the school years 2003-04 through 2020-21 and a value of 6.5 hours for 2021-22 and 2022-23. These numbers reflect the official minimum hours offered by UPK programs during those periods. The 6.5-hour figure 2021-22 and later is a lower bound: many programs in practice did offer before- and after-care during this period.
3. For students reporting enrollment in other programs that appear in OEC records, we assign the modal value of hours among all students enrolled in a given program in a given year. If the OEC records don't indicate the number of childcare hours directly, we assign the midpoint on the range of hours that regulations permit.[24]
4. Remaining students without any information on pre-kindergarten hours who report in the survey that they have enrolled in a Head Start program are assigned the modal hours recorded for their respective program taken from the Office of Head Start (OHS).[25]
5. For all remaining students without any information on pre-kindergarten hours, we look up the childcare programs reported in the survey and use the hours currently offered by the program.

**Alternative Methods**

We prepare a variety of alternative childcare hours measures that are used for robustness checks of our main measure:

- *Lower/Upper Bound Hours*: Instead of using the average number of hours observed for a given childcare program, we take the minimum/maximum value.
- *Childcare 211 hours*: We directly collect offered childcare hours, as reported by Connecticut 211 Childcare, for the childcare providers survey respondents re-

[24] See https://www.ctoec.org/wp-content/uploads/2020/02/GP-B-04-Definition-of-Space-Types-Categories-of-Care-and-Eligibility-for-Enrollment_FY25.pdf and https://www.ctcare4kids.com/wp-content/uploads/2021/12/sample-certificate.pdf (retrieved 25.06.2024).

[25] Office of Head Start, Program Information Reports 2008-2022 (https://hses.ohs.acf.hhs.gov).

ported using.[26] For the majority of centers, we use their reported daily hours in this new data source. However, we manually adjust some of the hours for a small number of children based on several criteria.

- For providers missing hours information from the 211 website, we use data collected from the centers' websites.[27]
- For cases where the childcare name indicated no formal childcare (e.g., home-schooling or care by a family member), we assume zero hours.
- We assign 10 hours to children who are flagged as UPK students in the survey if the application year is 2020 or earlier. For application years after 2020, we assign 6.5 hours.
- If children are flagged as Head Start students in the survey and hours are missing, we assign hours based on the main method unless the childcare name is "Reggie Mayo", in which case we assign 6 hours. If both hours measures are missing, we assign 7 hours as a default.
- - For any remaining cases where hours are still missing, we assign hours based on the main method.

Overall, this approach is conservative as CT 211 Childcare typically reports the maximum possible hours offered by the center, likely overstating the hours accessed by those not in UPK.

Finally, we similarly impute missing childcare hours using several different approaches:

- *Zero Hours*: Impute missing childcare hours as 0.
- *Average Non-UPK Hours*: Impute missing childcare hours as the average number of hours observed among all non-UPK childcare enrollees.
- *Median Non-UPK Hours*: Impute missing childcare hours as the median number of hours observed among all non-UPK childcare enrollees.
- *Maximum Non-UPK Hours*: Impute missing childcare hours as the maximum number of hours observed among all non-UPK childcare enrollees.
- *UPK Hours*: Impute missing childcare hours as the number of hours a UPK enrollee would have received in the same year.

[26] Connecticut 211 Childcare is a website administered by The United Way of Connecticut and supported by the Connecticut Office of Early Childhood to facilitate access to childcare (https://www.211childcare.org/). Data retrieved on 07.18.2024.

[27] The centers are Alice Peck Early Learning Center (9 hours - see website), and Overbrook Early Learning Center (10.5 hours - see website).

## G.2 IV Results

We estimate alternate versions of the hours of care IV specification described in Section 4.3 and reported in Table 4 using the approaches to hours imputation described above. We report our findings for daily hours in Tables G.1 and G.2.

**Table G.1: Daily childcare hours IV**

| | Childcare Hours | | | |
|---|---|---|---|---|
| | Main | Lower | Upper | Childcare 211 |
| | (1) | (2) | (3) | (4) |
| UPK Enrollment | 2.27 | 4.61 | 1.77 | 1.52 |
| | (0.640) | (0.537) | (0.637) | (0.596) |
| Grade and Year | ✓ | ✓ | ✓ | ✓ |
| Race | ✓ | ✓ | ✓ | ✓ |
| Gender | ✓ | ✓ | ✓ | ✓ |
| Dependent variable mean | 7.44 | 6.76 | 7.69 | 7.85 |
| Observations | 724 | 724 | 724 | 756 |

Notes: This table reports IV estimates of Equation 1 for UPK enrollment on childcare hours received among the sample of survey respondents. Column 1 presents results using our main measure of childcare hours. Columns 2-4 show results using a series of alternative methods to construct the measure of childcare hours. For details on the different methods, see Appendix G. All specifications control for student sex and race/ethnicity. We account for the probability of winning the lottery using the recentered instrument approach discussed in 4.1. Standard errors are clustered at the student level.

**Table G.2: Daily childcare hours IV - impute missing values**

| | Childcare Hours, Missing Imputed as | | | | |
|---|---|---|---|---|---|
| | Zero | Average | Median | Max | UPK |
| | (1) | (2) | (3) | (4) | (5) |
| UPK Enrollment | 4.46 | 2.49 | 2.09 | 1.08 | 1.20 |
| | (0.648) | (0.504) | (0.519) | (0.618) | (0.557) |
| Grade and Year | ✓ | ✓ | ✓ | ✓ | ✓ |
| Race | ✓ | ✓ | ✓ | ✓ | ✓ |
| Gender | ✓ | ✓ | ✓ | ✓ | ✓ |
| Dependent variable mean | 6.49 | 7.23 | 7.38 | 7.77 | 7.69 |
| Observations | 830 | 830 | 830 | 830 | 830 |

Notes: This table replicates the IV estimation in Table G.1, column 1, but imputes missing values in the measure of childcare hours. For details on the different methods used to impute missing values, see Appendix G. All specifications control for student sex and race/ethnicity. We account for the probability of winning the lottery using the recentered instrument approach discussed in 4.1. Standard errors are clustered at the student level.

# H Poisson specifications

We follow Lin and Wooldridge (2019) and estimate a Poisson specification using a control function approach. We estimate a linear first-stage equation given by

$$D_i = \delta Z_i + X_i'\pi + \sum_p \rho_p 1[P_i = p] + \eta_i. \tag{2}$$

We obtain the estimated residual $\hat{\eta}_i$, and include this residual as a control in the second-stage Poisson specification, given by

$$E[Y_i|D_i, X_i, P_i, \hat{\eta}_i] = \exp\left(\beta D_i + X_i'\Gamma + \sum_p \alpha_p 1[P_i = p] + \phi\hat{\eta}_i\right) \tag{3}$$

We estimate this specification using Poisson pseudo maximum likelihood, as implemented in Correia et al. (2020). We report $e^{\hat{\beta}} - 1$, which is an estimate of the proportional change $(E[Y(1) - Y(0)]/E[Y(0)])$. We compute bootstrapped standard errors clustered at the application level using 500 bootstrap samples. In contrast to our approach to linear specifications, we do not two-way cluster the Poisson specifications. Estimates of one-way clustered linear specifications suggest that clustering on the second dimension (parent identifier potentially spanning multiple applications) has little effect on estimated standard errors.

# I Cost-benefit calculations

This appendix provides details on the construction of the cost-benefit calculations described in Section 5. We focus on the marginal value of public funds (MVPF), though we also consider benefit-cost ratios (BCR) and net social benefit calculations (NSB).

## I.1 Framework for MVPF calculations

This section shows how different models of the market for pre-kindergarten services affect what one should include in the numerator of the MVPF, i.e., the willingness to pay. A conceptual challenge here, and common in MVPF analyses in general, is that the MVPF framework focuses on marginal changes in policy and relies heavily on the logic of the envelope theorem, while the policy effects we measure (access to UPK) reflect large interventions in the lives of specific families. We abstract from this issue by considering marginal shifts in two types of UPK-like policies: price subsidies for childcare and expansions in childcare hours.

### I.1.1 UPK as a price subsidy in an unconstrained market

We first show that if one models UPK as a price subsidy in an otherwise unconstrained market for childcare, WTP a) does not include parents own earnings and b) includes children's earnings if parents do not take children's outcomes fully into consideration when making labor supply choices.

Parents live for periods $t = 0$ through $t = T^p$. Period zero is pre-kindergarten, which differs from other periods because parents must pay for childcare while they work. Assume that in period zero there are perfect markets for childcare at price $p$ and the government can offer some subsidy $s$. Parents' individual utility is given by $U_p = \sum_{t=0}^{T^p} \beta^t u(c_t, l_t)$. Parents may also take into account child utility $U_k$ when they make labor supply choices, so we think of parents as maximizing $\tilde{U}_p = U_p + \theta U_k$, where $\theta \in [0, 1]$ is the weight parents place on child utility, subject to the budget constraint

$$\sum_{t=0}^{T^p} \beta^t c_t + l_0(p - s) \leq (1 - \tau) \left( w_0 l_0 + \sum_{t=1}^{T^p} \beta^t w_t(l_0) l_t \right) = (1 - \tau) Y^p. \tag{4}$$

$w_t$ are wages in period $t$, $\tau$ is the tax rate on income, and $Y^p$ denotes the PDV of pre-tax parent earnings. Wages in periods $t > 0$ can depend on labor supply $l_0$ in period 0. This captures the idea that career investments during pre-kindergarten may have long-run effects.

Children reach adulthood in period $\underline{T}^k$ and live through period $\overline{T}^k$. They have income $Y_t^k(l_0)$ in each period $t \in [\underline{T}^k, \overline{T}^k]$. We allow children's earnings to depend on parents' labor supply/childcare choices in period 0 to reflect the possible impacts of childcare use on children's human capital. Children maximize utility $U_k = \sum_{t=\underline{T}^k}^{\overline{T}^k} \beta^t u(c_t^k)$ subject to the budget constraint

$$\sum_{t=\underline{T}^k}^{\overline{T}^k} \beta^t c_t^k \leq (1 - \tau) \sum_{t=\underline{T}^k}^{\overline{T}^k} \beta^t Y_t^k(l_0) = (1 - \tau) Y^k. \tag{5}$$

$Y^k$ denotes the PDV of pre-tax child earnings. An assumption built into this model is that neither parents nor children can borrow against children's future earnings to fund childcare expenses.

Net government expenditures are given by

$$G = l_0 s - \tau \left( Y^p + Y^k \right) \tag{6}$$

Let $\lambda_p$ denote the multiplier on the budget constraint in the parent's optimization problem and $\lambda_k$ denote the multiplier on the constraint in the children's problem. We can then write the MVPF of the policy as the sum of parent and child WTP divided

by total government costs:

$$MVPF_1 = \frac{\frac{1}{\lambda_p}\frac{dU_p}{ds} + \frac{1}{\lambda_k}\frac{dU_k}{ds}}{\frac{dG}{ds}} = \frac{\frac{1}{\lambda_p}\frac{d\tilde{U}_p}{ds} + \left(\frac{1}{\lambda_k} - \frac{\theta}{\lambda_p}\right)\frac{dU_k}{ds}}{\frac{dG}{ds}}. \tag{7}$$

By the envelope condition, we know that $\frac{d\tilde{U}_p}{ds} = \lambda_p l_0$. The envelope condition does not apply to $\frac{dU_k}{ds}$ since children do not choose $l_0$; we therefore have $\frac{dU_k}{ds} = \lambda_k(1 - \tau)\frac{dY^k}{dl_0}\frac{dl_0}{ds}$. Finally, we have $\frac{dG}{ds} = l_0 + s\frac{dl_0}{ds} - \tau\left(\frac{dY^p}{ds} + \frac{dY^k}{ds}\right)$. We can then rewrite the MVPF using these expressions as

$$MVPF_1 = \frac{l_0 + (1-\tau)\frac{dY^k}{dl_0}\frac{dl_0}{ds}\left(1 - \theta\frac{\lambda_k}{\lambda_p}\right)}{l_0 + s\frac{dl_0}{ds} - \tau\left(\frac{dY^p}{ds} + \frac{dY^k}{ds}\right)}. \tag{8}$$

This expression provides guidance about how to compute the MVPF in this model. The denominator reflects to the total cost of the subsidy to government, net of the fiscal externality from additional earnings for children and parents. The numerator consists of two terms. The first is $l_0$, which corresponds to the cost of the subsidy absent labor supply responses. The second term, $(1-\tau)\frac{dY^k}{dl_0}\frac{dl_0}{ds}\left(1 - \theta\frac{\lambda_k}{\lambda_p}\right)$, describes how much of childrens' earnings should be included in the WTP. If $\theta = 0$ and parents do not weigh children's outcomes at all when making labor supply choices, we should include all of children's after-tax income. If $\theta > 0$, the picture is more complicated. What share of children's after-tax earnings we should include falls with $\theta$ (how much parents take children into account) and with $\lambda_k/\lambda_p$ (the utility value of income for children relative to parents).

### I.1.2 Hours constraints

A different way to think about the UPK subsidy is as a policy that relaxes a binding constraint on childcare hours. Evidence presented in the main text suggests that it may be difficult for people to find alternate programs that offer equal coverage to the UPK program. In this case the MVPF calculation is different.

Suppose individuals face the same problem as above but also face an additional constraint on labor supply based on the hours of childcare availability $h^*$, so that

$$l_0 \leq h^* \tag{9}$$

Clearly if the optimal value of $l_0$ in the baseline problem, $l_0^*$, is less than $h^*$, everything is the same. But if $l_0^* > h^*$, results change, because people would like to work more if they could.

Say the government is considering raising $h^*$, holding $s$ fixed. Note that labor supply

$l_0$ will rise 1-1 with $h^*$ under the assumption that $l_0^* > h^*$. Then

$$\frac{dG}{dh^*} = s - \tau \left( \frac{dY^p}{dl_0} + \frac{dY^k}{dl_0} \right)$$

which is again simply the change in total costs less the fiscal externality from additional earnings for parents and children.

Turning to willingess to pay, we are now in a corner solution with respect to labor supply in period zero. The welfare gains for parents from increased work in period 0 are now positive even as the envelope condition continues to apply to the other optimized variables. In particular,

$$\frac{d\tilde{U_p}}{dl_0} = \lambda_p \left( (1-\tau) \left( w_0 + \sum_{t=1}^{T^p} w_t'(l_0) l_t \right) - (p-s) \right) + \theta \frac{dU_k}{dl_0} + u_l(c_0, l_0) > 0 \qquad (10)$$

i.e. it is the net amount of dollars the parent gets from labor supply this period and wage gains in the future scaled by the utility value of a dollar in income, plus whatever parent-valued benefits kids get from additional work, less the disutility of additional work.

Let $\frac{dE}{dl_0} = \left( (1-\tau) \left( w_0 + \sum_{t=1}^{T^p} w_t'(l_0) l_t \right) - (p-s) \right)$ denote the utility-relevant change in parent earnings from an increase in $l_0$. Also note that $\frac{dU_k}{dl_0} = \lambda_k (1-\tau) \frac{dY^k}{dl_0}$. Then we can write an alternative MVPF formulation given by

$$MVPF_2 = \frac{\frac{dE}{dl_0} + \frac{u_l(c_0,l_0)}{\lambda_p} + (1-\tau)\frac{dY^k}{dl_0} \left( 1 - \theta \frac{\lambda_k}{\lambda_p} \right)}{s - \tau \left( \frac{dY^p}{dl_0} + \frac{dY^k}{dl_0} \right)} \qquad (11)$$

This MVPF formula includes the part of parents' earnings gains attributable to period-0 earnings gains and later wage gains in the numerator, less the utility cost of period zero labor supply. It also includes a term for children's earnings gains that parallels the one included in $MVPF_1$.

What we take away from this analysis is that if access to full-day childcare is constrained, it may make sense to include all or part of parents' earnings gains in the WTP term. An upper bound on the WTP for parents' future earnings gains is given by the effect of UPK on after tax parent earnings. This bound would be tight if 1) changes in earnings after pre-kindergarten are due to wages, not labor supply, and 2) there is no disutility from work, or equivalently, it's just as hard to take care of a kid as it is to work.

### I.1.3 Misunderstanding the returns to career continuity

Another reason it might be reasonable to include a component of parent earnings in the numerator of the MVPF is if parents do not understand the dynamic returns to career continuity.

To explore this, return to the baseline model from Section I.1.1. Assume that when making choices about period 0 labor supply, parents believe that $w_t'(l_0) = 0$ for all $0 < t \leq T^p$. To simplify the analysis, assume that parents learn about the returns to experience after choosing $l_0$ but before choosing $c_0$, so that consumption is still perfectly smoothed given lifetime income.

The analysis then proceeds as in Section I.1.1, except that

$$\frac{d\tilde{U}_p}{ds} = \lambda_p \left( l_0 + (1-\tau) \sum_{t=1}^{T^p} \beta^t w_t'(l_0) \frac{dl_0}{ds} l_t \right).$$

The sum reflects the welfare gains from unanticipated wage effects. Denote this term $\frac{dW}{ds}$. Plugging into the MVPF formula, we have

$$MVPF_3 = \frac{l_0 + (1-\tau)\frac{dW}{ds} + (1-\tau)\frac{dY^k}{dl_0}\frac{dl_0}{ds}\left(1 - \theta\frac{\lambda_k}{\lambda_p}\right)}{l_0 + s\frac{dl_0}{ds} - \tau\left(\frac{dY^p}{ds} + \frac{dY^k}{ds}\right)}. \tag{12}$$

In this setup, we would want to include earnings gains from future wage changes in the WTP term.

### I.1.4 Credit constraints

In the absence of constraints on the availability of full time childcare in the private market, credit constraints do not by themselves motivate the inclusion of parents' earnings the numerator of the MVPF. They do, however, a) suggest that we may want to include larger share of children's earnings in the MVPF, and b) motivate an alternate argument in favor of childcare subsidies not captured by the MVPF: namely, that the value of consumption is high for families of pre-kindergarten age children.

To see this, start with the baseline model from Section I.1.1. Add an additional constraint that rules out borrowing in period 0:

$$c_0 + l_0(p - s) \leq (1-\tau) w_0 l_0. \tag{13}$$

Let $\lambda_{cc}$ denote the multiplier on this constraint. Now consider the MVPF of raising the subsidy $s$. Assuming that the credit constraint in period zero binds, the utility value

of a \$1 cash transfer to parents in period 0 is $\lambda_p + \lambda_{cc}$. We may therefore write

$$MVPF_4 = \frac{\frac{1}{\lambda_p+\lambda_{cc}}\frac{dU_p}{ds} + \frac{1}{\lambda_k}\frac{dU_k}{ds}}{\frac{dG}{ds}} = \frac{\frac{1}{\lambda_p+\lambda_{cc}}\frac{d\tilde{U}_p}{ds} + \left(\frac{1}{\lambda_k} - \frac{\theta}{\lambda_p+\lambda_{cc}}\right)\frac{dU_k}{ds}}{\frac{dG}{ds}}. \tag{14}$$

Applying the envelope theorem, we obtain

$$MVPF_4 = \frac{l_0 + (1-\tau)\frac{dY^k}{dl_0}\frac{dl_0}{ds}\left(1 - \theta\frac{\lambda_k}{\lambda_p+\lambda_{cc}}\right)}{l_0 + s\frac{dl_0}{ds} - \tau\left(\frac{dY^p}{ds} + \frac{dY^k}{ds}\right)}. \tag{15}$$

As in our baseline case, parent earnings do not appear in the numerator. The one difference relative to $MVPF_1$ is that the discount applied to child earnings, $\left(1 - \theta\frac{\lambda_k}{\lambda_p+\lambda_{cc}}\right)$, will tend to be smaller for a given value of $\theta$.

The second difference, of course, is that credit constraints increase the marginal utility of consumption for parents of young children. If one believes transfers should target groups with higher marginal utility, this strengthens the case for transfers aimed at UPK beneficiaries. This does not show up in the numerator of the MVPF formula because WTP scales marginal utility of the subsidy by the value of a distortion-free transfer, and these rise in proportion as credit constraints rise.

## I.2 Inputs to MVPF calculation

Our cost-benefit calculations focus on four components: (1) the net change in per-pupil expenditure (PPE) before kindergarten, (2) the change in out-of-pocket childcare costs for families, (3) the discounted present value of the child's wage gains estimated from changes in kindergarten test scores, and (4) the discounted present value of increased parental wage income. We first discuss how we calculate each of these four components and then discuss how they are used in our various benefit calculations.

### Change in public per-pupil expenditure

As an initial step in calculating the net change in PPE prior to kindergarten, we first calculate the causal impact of UPK enrollment on the number of years in the UPK program, the number of years in Head Start, the number of years in School Readiness programs, the number of years with Care 4 Kids subsidies, and the number of years in other public or subsidized pre-k programs as recorded in administrative data from the State Department of Education and Office of Early Childhood. We estimate these values using our standard 2SLS specification as in Table 4 but taking years of enrollment rather than enrollment indicators as dependent variables. We consider only enrollment at ages 3 and 4; we do not include enrollment at older or younger ages. We also calculate

these values by tercile of median neighborhood income, using the neighborhood when applying to the UPK program.

Next, we use PPE estimates for the various childcare and pre-kindergarten options from the National Institute for Early Education Research (NIEER) (Friedman-Krauss et al., 2022, 2023) and New Haven Public Schools (Connecticut Office of Elementary and Secondary Education, 2020). For childcare and pre-kindergarten options, we use PPE estimates for School Readiness, Care 4 Kids, and Head Start in Connecticut in 2021-2022 (2018-2019 for Head Start), all in real 2015 dollars. For all public programs in the State Department of Education and Office of Early Childhood data that we are not able to classify, we use the average PPE for state programs in Connecticut.

Combining our 2SLS estimates and our PPE estimates, we calculate the gross and net public program costs of UPK enrollment. Gross program costs are the per-year PPE of the UPK program ($PPE_m$) multiplied by the 2SLS estimate of the increase in years of UPK enrollment ($\Delta_{\text{UPK}}$). Net program costs then use the PPE for other programs and the change in years of enrollment in those other programs giving us:

$$\begin{aligned}\text{Net Program Costs} = \Delta_{\text{UPK}} \cdot PPE_m + \Delta_{\text{headstart}} \cdot PPE_{hs} + \Delta_{\text{schoolreadiness}} \cdot PPE_{sr} \\ + \Delta_{\text{care4kids}} \cdot PPE_{c4k} + \Delta_{\text{otherpublic}} \cdot PPE_{op}.\end{aligned}$$

We estimate similar regressions within terciles of neighborhood median household income. For these, we use the same PPE, but estimate the 2SLS estimates of years enrolled in the various programs conditional on each tercile at the time of application.

### Reduction in out-of-pocket costs

We estimate the reduction in parents' out-of-pocket (OOP) costs of childcare using the 2SLS estimates reported in Tables 4 and 8. We assume that the estimated monthly reduction applies to the nine-month school year in each year the child enrolls in UPK. We estimate the effect of enrolling in UPK on total years of UPK enrollment using IV specifications with the count of years enrolled as the outcome. For years of enrollment beyond one, we discount the value using an interest rate of 0.03. We estimate these values in the full sample and within terciles of neighborhood median household income.

### Projected earnings gains for children

We estimate the impacts of UPK enrollment on children's kindergarten test scores, then use these impacts to project future earnings. To do this, we first estimate the impact of UPK on kids' kindergarten test scores (measured in standard deviations) using our 2SLS approach. Next, we use our estimates to predict future earnings, closely following Cascio (2023), which also estimates MVPFs of UPK. First, Cascio (2023) assumes that

the average present discounted value of earnings at age 4 is $291,287 in 2005 dollars, which is the age 10 estimate from Chetty et al. (2011) of $522,000 in 2010 dollars discounted back to age 4 using a 3% discount rate, which is also the discount rate we use in our estimates. Adjusting to 2015 dollars, we have an estimate of the average present discounted value of earnings at age 4 of $353,507. Next, following Cascio (2023) and Kline and Walters (2016), we make the assumption that a one standard deviation increase in test scores increases earnings by 10%. We can then calculate the discounted present value of earnings gains for children as the product of the IV estimate, 0.06, and $353,507. We produce similar estimates by tercile of neighborhood household income, using 2SLS estimates calculated by tercile. Finally, our $353,507 estimate is the average present discounted value of earnings. Kline and Walters (2016), who study children eligible for Head Start, multiply this number by 0.8 to account for the fact that these children are in lower-income families. When producing results by income tercile, we assume 0.8 for the bottom tercile, 1 for the middle tercile, and 1.2 for the top tercile.

While the approach above follows the prior literature closely, it involves many assumptions. We therefore consider two alternative approaches. First, we consider larger test score gains of 0.4, as found in Lipsey et al. (2018). Second, we calculate earnings gains for kids based on the increase in 4-year college enrollment after high school reported by Gray-Lobe et al. (2023), who study a similar UPK program in Boston (a 0.086 increase in the probability of enrollment). Then we use estimates from Zimmerman (2014) to estimate the returns to enrolling in college ($142,757 in 2012 dollars, based on calculations from Hendren and Sprung-Keyser (2020)). We additionally adjust net costs by 0.086 * 2,617, where the latter number is the estimated net cost to the government of an additional enrollee in 4-year college.

### Discounted present value of increased parental wage income

Tables 5 and 8 report the 2SLS estimates of enrolling in the UPK program on earnings in (1) the years when the student is enrolled in the program, (2) one to two years after, (3) three to four years after, and (4) five to six years after. Using these estimates, we construct the discounted present value of wage income gains using an interest rate of 0.03. We assume the effect is constant in each of the four time periods defined above, and then zero afterwards. The assumption of zero gains beyond six years out is based on Figure 5, which shows large and persistent gains through six years after prekindergarten, after which confidence intervals grow large and we cannot rule out null effects. We scale individual earnings effects by 1.56, the average number of adults listed on applications during years when we systematically observe multiple family members. While parents may not have listed all adults when completing the application, we believe

1.56 captures nearly all parents. The figure closely aligns with the average number of adults in households with children under age 6 in New Haven County, which is 1.63 [28].

The gains to parents will differ if the child enrolls in one or two years of UPK. To address this we estimate the discounted present value of parents' wage income both under the assumption of 1 and of 2 years of UPK. We then weight these estimates using the estimated increase in years of UPK enrollment from the 2SLS estimates. For example, in the full sample we estimate that enrolling in UPK results in 1.56 additional years of UPK enrollment. This reflects a mixture of individuals enrolling for one year and individuals enrolling for two years, so 56 percent of applicants enroll for two years.

## I.3 MVPF Calculations

Using the four inputs described above, we calculate the MVPF for the program as a whole and by tercile of neighborhood median household income. Below, we describe the construction of willingness to pay and net costs.

Because UPK is an in-kind transfer, what enters willingness to pay depends on our underlying economic assumptions, as described in Appendix I.1. We consider four potential constructions of willingness to pay. One uses a cost-based approach, and three use hedonic approaches, making different assumptions about the welfare value of program benefits.

1. Our first approach is based on program costs and assumes that families value UPK at the additional childcare subsidy they receive (i.e., the government's cost of providing UPK net of savings from substituting away from other subsidized programs). Estimates using this approach are shown in column one of Tables 7 and I.1 and row one of Table I.2.

2. Our first hedonic approach constructs willingness to pay from estimates of the reduction in out of pocket costs paid by families and the future income gains for children. This specification assumes that the entire effect on parental earnings is driven by behavioral distortions due to changes in childcare pricing, and as such, these earnings effects are excluded from willingness to pay. Estimates are shown in column two of Tables 7 and I.1 and row two of Table I.2.

3. Our second hedonic approach additionally includes parent earnings after pre-k. This would make sense if, for example, parents didn't internalize the later earnings gains associated with increased hours of work and labor force participation during pre-k. These estimates are shown in column three of Tables 7 and I.1 and row three of Table I.2.

[28] Source: Authors' calculation from the ACS 5-year 2019 estimates

4. Our third hedonic approach additionally includes earnings effects during pre-k. As shown in Online Appendix I.1, this is consistent with a model where the UPK program relaxes constraints on the hours of childcare families can access. Estimates are shown in column four of Tables 7 and I.1 and row four of Table I.2. Our baseline version of this specification does not discount earnings for the potential disutility of work, particularly during pre-k, where our survey data shows a notable increase in hours. For robustness, we also consider a specification where we assume the utility cost of work during pre-k is equal to 60% of pay, based on estimates from Mas and Pallais (2019), which is estimated for people on the margin of employment vs unemployment. Results are shown in Table I.1.

For children's wage gains, we use the discounted present value described above net of taxes. We assume an effective tax rate of 0.2. Out of pocket costs come directly from the reduction in out-of-pocket costs described above.

For parents' wage gains, we calculate total wage income from the quarterly earnings records from the CT Department of Labor. Following Cascio (2023), we assume an effective marginal tax rate of 20%. This follows closely from Hendren and Sprung-Keyser (2020) who use effective marginal tax rates from Congressional Budget Office (2016), which are approximately 20% for incomes from 100 to 400 percent of the federal poverty line.

To calculate net costs we use the change in per-pupil public expenditure discussed above, which accounts for substitution from other subsidized programs. We then additionally subtract the discounted present value of tax revenue increases associated with changes in wage income for the parents and children using the tax rates discussed above. The estimates above assume that the other publicly-funded pre-k programs students substitute away from are not rationed. As discussed in Kline and Walters (2016), if the programs children substitute from are also over-subscribed, the MVPF calculation would use the benefits to the child (and their family) who takes up the now vacated slot in the other program (and the costs of what they substitute away from). As we cannot estimate the returns to the other programs, this is beyond the scope of our paper. As a robustness check, we include estimates that assume there are no cost savings from substituting from other programs, and also no benefits for children who gain access to the vacated slots. We view the resulting MVPF estimates as a loose lower bound, since they incorporate the cost side of children's substitution into vacated slots, but not the benefits.

### Benefit Cost Ratio and Net Social Benefit Calculations

An alternative approach to constructing the benefits of a program is the benefit cost ratio (BCR, García et al., 2020; García and Heckman, 2022). This largely uses the same inputs as the MVPF. The numerator includes the numerator from (1) the MVPF (willingness to pay) plus (2) the indirect cost saving (savings from substitution from other publicly-funded pre-k and childcare programs along with tax revenue from increased earnings of parents and children), where (2) is then multiplied by one plus the dead-weight loss associated with raising taxes to fund the program, which we assume to be 0.3. The denominator is the direct cost of the program, calculated as the yearly PPE of the magnet program multiplied by the increase in the number of years of magnet enrollment, multiplied by one plus the dead-weight loss term.

Lastly, we estimate the net social benefit (NSB, García and Heckman, 2022) of the program. This is the willingness to pay from the MVPF calculation minus the net cost term from the MVPF calculation multiplied by one plus the dead-weight loss term. For both of these calculations, we also consider the four potential constructions of willingness to pay described in the MVPF calculations section.

## I.4 Additional cost-benefit analysis results

Figure I.1 reports benefit-cost ratios as described in Section I.3. The first bar within each category of inputs into WTP reports the BCR for the full population, while the second through fourth bars report the BCR by tercile of neighborhood median household income based on the neighborhood of residence when applying for the UPK program. Each group of bars represents a different construction of the willingness to pay. The overall BCR ranges from 1.07 (in our most conservative hedonic approach to constructing willigness to pay) to 2.78 (in our hedonic approach that includes all parent earnings gains. Similar to our MVPF calculations, the BCR is larger for the second and third terciles of neighborhood income (at the time of the application).

Figure I.2 reports the net social benefit as described in Online Appendix I.3. Similar to the prior plot, the first bar within each category of inputs into WTP reports the NSB for the full population, while the second through fourth bars report the BCR by tercile of neighborhood median household income based on the neighborhood of residence when applying for the UPK program. Each group of bars represents a different construction of the willingness to pay. The overall NSB ranges from $4,900 to $58,600, depending on what we include in willingness to pay. The NSB is larger for the second and third terciles of neighborhood income.

Table I.1 reports estimates of the MVPF under four different constructions of willingness to pay:

- No program substitution: Excludes the public cost-saving of individuals substituting away from other publicly funded pre-kindergarten and childcare programs.
- Survey-based program substitution: Uses substitution patterns estimated from survey data rather than state administrative data.
- No out of pocket costs: Excludes the savings in out-of-pocket costs to families.
- 60% opportunity cost of work: Assumes that the WTP for parents are only 40% of their gains in wage income during the pre-k years since during pre-k years much of the wage gains come from increased hours.
- 10% higher tax rates: Scales up all taxes by 10% as a robustness test.
- 25% higher tax rates: Scales up all taxes by 25% as a robustness test.
- 10% lower tax rates: Scales down all taxes by 10% as a robustness test.
- 25% lower tax rates: Scales down all taxes by 25% as a robustness test.
- 25% higher UPK cost: Scales up UPK cost by 25% as a robustness test.
- 25% lower UPK cost: Scales down UPK cost by 25% as a robustness test.
- Alternative PPE Estimate: Uses New Haven School District budget data to estimate pre-k specific per-pupil expenditures of $12,591 based on the method used by Kabay et al. (2020).[29]
- Smaller family size: Uses a smaller family-scaling number of 1.31 for the full sample based on the average number of parents per household in the sample that matched to the earnings data.
- Downstream sibling enrollment: We estimate that winning the lottery leads to an additional 0.18 years in UPK enrollment for a child's siblings and an additional 0.1 siblings enrolled.[30] We adjust the net government costs and changes in out-of-pocket expenses by the additional years of enrollment, and scale the children's earnings effects by the increase in the number of siblings enrolled.
- Partial substitution: Some children are enrolled in multiple programs within a given year. For magnet students, we assume this additional enrollment occurs during the summer months. For non-magnet students, we assume an equal split, with half-time enrollment in each program. We then adjust government costs accordingly: for magnet students, the government funds a full year of UPK plus a quarter year of other subsidized programs, while for non-magnet students enrolled in multiple programs, it covers a half year of each subsidized program.

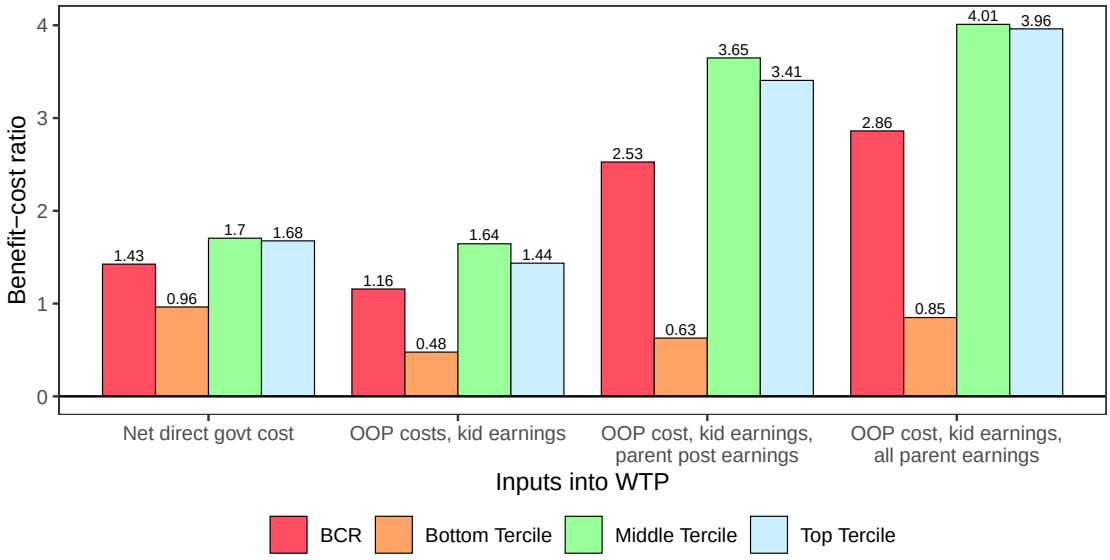
[29]Estimates used the NHPS 2021-2022 budget (New Haven Board of Education, 2022), average CT teacher salaries (Teach Connecticut, 2021) and average CT paraprofessional salaries.

[30]As discussed in Online Appendix B.1, siblings of children already enrolled in magnet schools receive priority in UPK admissions.

For each estimate we report 90% confidence intervals in brackets, which are based on 500 bootstrap samples. Following Hendren and Sprung-Keyser (2020), when net costs are negative and willingness to pay is positive, we report the MVPF to be infinity.

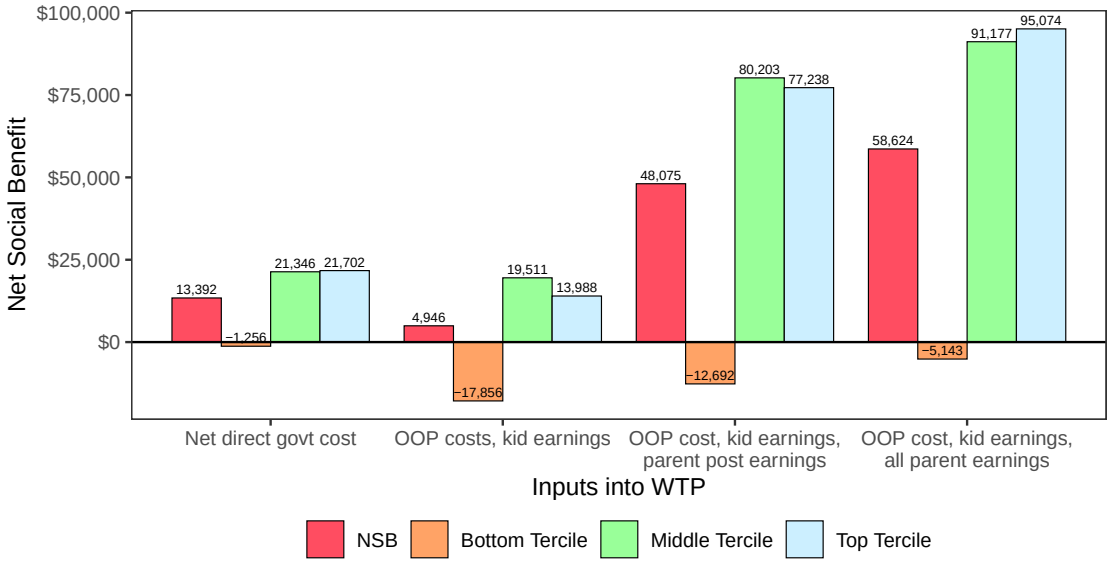
Additionally, Table I.2 reports estimates of MVPF for the full population and by tercile of neighborhood income. The rows represent the four different constructions of willingness to pay. 90% confidence intervals are reported in brackets, which are based on 500 bootstrap samples.

**Figure I.1: BCR: overall and by neighborhood income terciles**



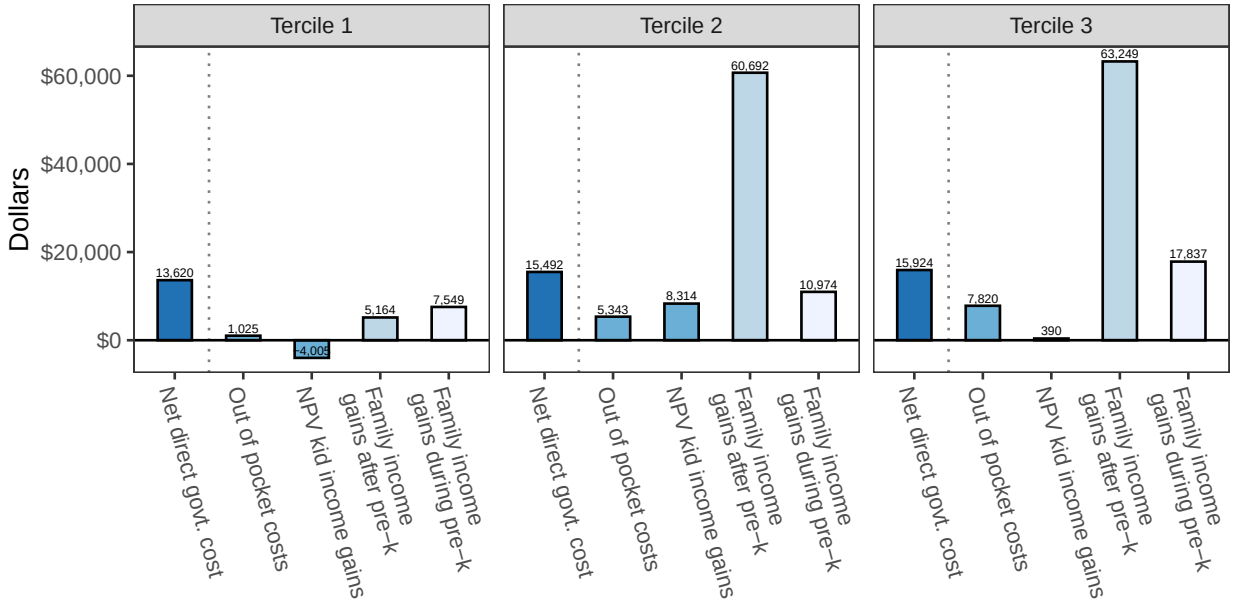

Notes: This figure reports the benefit-cost ratio for the UPK program we study under different constructions of the willingness to pay. The first group of bars assumes parents value the program at net direct government cost (i.e., the average net subsidy). The second assumes willingness to pay is the out-of-pocket savings for the family and the child's discounted present value of future after-tax earnings. The third adds the discounted present value of after-tax earnings gains of parents for the gains after pre-k. The fourth adds all parent earnings, rather than only earnings after pre-k. Each group is comprised of the benefit-cost ratio (BCR) by tercile of ACS median block-group household income. The leftmost bars are for the full sample, while the second through fourth bars report the BCR calculated by terciles. The numerator is the willingness to pay (under the four constructions described above) used in the MVPF calculations plus the change in the discounted present value of tax revenue from parents and kids and the savings from substitution away from other public programs, where the second term is multiplied by one plus the dead weight loss term of 0.3 to capture the DWL associated with raising additional tax revenue. The denominator is the direct cost of adding an additional student to the UPK program times one plus a dead weight loss term. See García et al. (2020) and García and Heckman (2022) for additional details on benefit-cost ratios.

## Figure I.2: NSB: overall and by neighborhood income terciles




Notes: This figure reports the net social benefit (NSB) for the UPK program we study under different constructions of the willingness to pay described above. Each group reports the overal NSB and NSB estimates by tercile of ACS median block-group household income. The leftmost bars are for the full sample, while the second through fourth bars report the NSB calculated by terciles. The NSB is the willingness to pay used in the MVPF calculation minus the net cost from the MVPF calculation times one plus the deadweight loss (assumed to be 0.3) of generating the taxes that fund the program. See García and Heckman (2022) for additional details on net social benefit.

## Figure I.3: Inputs into WTP by neighborhood income terciles




Notes: This figure reports the inputs into the willingness to pay by tercile of ACS median block-group household income, based on the residential address of those who applied for the UPK program. We consider five different potential inputs. (1) Net direct government cost, (2) reduction in out-of-pocket costs, (3) child income gains estimated based on changes in kindergarten test scores, (4) parental income gains after pre-kindergarten, (5) parental income gains during pre-kindergarten.

## Table I.1: Sensitivity of MVPF calculations to underlying assumptions

| Specification | WTP is net direct govt cost | WTP is OOP costs, kid earnings | WTP is OOP costs, kid earnings, parent post earnings | WTP is OOP costs, kid earnings, all parent earnings |
|---|---|---|---|---|
| No program substitution | 2.33 | 0.67 | 4.82 | 5.84 |
| | [1.36, 8.24] | [0.26, 3.00] | [1.47, 26.75] | [1.76, 30.75] |
| Survey-based program subs. | 3.47 | 1.24 | 8.93 | 10.81 |
| | [1.50, Inf] | [0.40, Inf] | [2.04, Inf] | [2.49, Inf] |
| No out of pocket costs | 10.04 | 1.13 | 29.27 | 36.16 |
| | [1.81, Inf] | [-0.35, Inf] | [2.60, Inf] | [3.25, Inf] |
| 60% opportunity cost of work | 10.04 | 4.53 | 32.67 | 35.43 |
| | [1.81, Inf] | [0.60, Inf] | [3.29, Inf] | [3.60, Inf] |
| 10% higher tax rate | 104.48 | 46.83 | 332.42 | 402.28 |
| | [1.97, Inf] | [0.71, Inf] | [3.53, Inf] | [4.22, Inf] |
| 25% higher tax rate | Inf | Inf | Inf | Inf |
| | [2.28, Inf] | [0.80, Inf] | [3.98, Inf] | [4.72, Inf] |
| 10% lower tax rate | 5.27 | 2.39 | 17.54 | 21.25 |
| | [1.68, Inf] | [0.52, Inf] | [3.08, Inf] | [3.74, Inf] |
| 25% lower tax rate | 3.08 | 1.41 | 10.58 | 12.83 |
| | [1.51, Inf] | [0.45, Inf] | [2.83, Inf] | [3.46, Inf] |
| 25% higher UPK cost | 2.82 | 0.91 | 6.60 | 7.99 |
| | [1.45, 301.21] | [0.32, 180.57] | [1.85, 1057.36] | [2.27, 1266.69] |
| 25% lower UPK cost | Inf | Inf | Inf | Inf |
| | [3.66, Inf] | [2.17, Inf] | [10.28, Inf] | [12.71, Inf] |
| Alternative PPE calculation | Inf | Inf | Inf | Inf |
| | [6.38, Inf] | [4.63, Inf] | [17.95, Inf] | [24.57, Inf] |
| Smaller family size | 4.18 | 1.89 | 11.74 | 14.15 |
| | [1.61, Inf] | [0.49, Inf] | [2.53, Inf] | [3.08, Inf] |
| Downstream sibling enrollment | 4.23 | 1.87 | 11.90 | 14.35 |
| | [1.61, Inf] | [0.50, Inf] | [2.53, Inf] | [3.05, Inf] |
| Partial substitution | 8.99 | 4.00 | 28.87 | 34.95 |
| | [1.72, Inf] | [0.61, Inf] | [3.07, Inf] | [3.69, Inf] |

Notes: This table reports estimates of the MVPF under several alternative assumptions. The columns report our four assumptions regarding what enters willingness to pay. The first column assumes parents value the program at its net direct government cost. The second excludes parental earnings from WTP and considers only change in out of pocket expenditures and kids future earnings. The third adds post-pre-k parental earnings, and the fourth considers all parental earnings. "No program substitution" excludes savings from reduced use of other public programs from the net cost calculation. "Survey-based program subs." uses the substitution patterns away from other public programs based on survey responses rather than the administrative data. "No out of pocket costs" excludes reductions in out of pocket costs from the willingness to pay. "60% opportunity cost of work" aims to account for the disutility of work. We assume this applies only while the child is in pre-k as we find the strongest evidence of labor supply effects during during pre-k. We discount after-tax earnings in the pre-k period by 60% based on estimates from Mas and Pallais (2019). The next four rows scale the assumed taxes 10 and 25 percent higher or lower respectively. 25% higher/lower UPK cost scales up/down the per pupil expenditure. "Alternate PPE calculation" is based on New Haven School District budget data. "Smaller family size" uses a smaller family-scaling number based on the sample that matched to earnings data. "Downstream sibling enrollment" incorporates the effect of winning the lottery on sibling enrollment in UPK. "Partial substitution" assumes part time enrollment for children enrolled in multiple programs in a given year. 90% confidence intervals are reported in brackets based on 500 bootstraps.

## Table I.2: MVPF estimates by income tercile

| Specification | Full | Bottom | Middle | Top |
|---|---|---|---|---|
| WTP is net direct govt cost | 10.04 | 1.19 | Inf | Inf |
| | [1.81, Inf] | [0.64, 6.70] | [2.53, Inf] | [1.56, Inf] |
| WTP is OOP costs, kid earnings | 4.53 | -0.26 | Inf | Inf |
| | [0.60, Inf] | [-1.52, 0.68] | [1.77, Inf] | [0.26, Inf] |
| WTP is OOP cost, kid earnings, parent post earnings | 32.67 | 0.19 | Inf | Inf |
| | [3.29, Inf] | [-1.63, 15.57] | [5.99, Inf] | [1.92, Inf] |
| WTP OOP cost, kid earnings, all parent earnings | 39.56 | 0.85 | Inf | Inf |
| | [3.96, Inf] | [-1.40, 24.16] | [6.86, Inf] | [3.03, Inf] |

Notes: This table reports estimates of the MVPF by tercile of ACS median block-group household income using four different constructions of willingness to pay (WTP). The first row assumes parents value the program at its net direct government cost. The second excludes parental earnings from WTP and considers only change in out of pocket expenditures and kids future earnings. The third adds post-pre-k parental earnings, and the fourth considers all parental earnings. The "Full" column reports estimates for the whole sample while the remaining three columns report estimates by tercile of neighborhood median household income, which are based on the block group the family lived in at the time they applied. 90% confidence intervals are reported in brackets based on 500 bootstraps.

## Table I.3: BCR estimates by income tercile

| Specification | Full | Bottom | Middle | Top |
|---|---|---|---|---|
| WTP is net direct govt cost | 1.34 | 0.85 | 1.63 | 1.59 |
| | [1.04, 1.65] | [0.47, 1.20] | [1.17, 2.09] | [1.00, 2.19] |
| WTP is OOP costs, kid earnings | 1.07 | 0.37 | 1.57 | 1.35 |
| | [0.74, 1.41] | [-0.13, 0.77] | [1.00, 2.12] | [0.64, 2.04] |
| WTP is OOP cost, kid earnings, parent post earnings | 2.44 | 0.52 | 3.57 | 3.32 |
| | [1.40, 3.59] | [-0.89, 1.82] | [1.84, 5.32] | [1.12, 5.55] |
| WTP OOP cost, kid earnings, all parent earnings | 2.78 | 0.74 | 3.93 | 3.88 |
| | [1.59, 4.02] | [-0.82, 2.19] | [2.05, 5.85] | [1.46, 6.32] |

Notes: This table reports estimates of the benefit-cost ration (BCR) by tercile of ACS median block-group household income using four different constructions of willingness to pay (WTP). The first row assumes parents value the program at its net direct government cost. The second excludes parental earnings from WTP and considers only change in out of pocket expenditures and kids future earnings. The third adds post-pre-k parental earnings, and the fourth considers all parental earnings. The "Full" column reports estimates for the whole sample while the remaining three columns report estimates by tercile of neighborhood median household income, which are based on the block group the family lived in at the time they applied. 90% confidence intervals are reported in brackets based on 500 bootstraps.

## Table I.4: NSB estimates by income tercile

| Specification | Full | Bottom | Middle | Top |
|---|---|---|---|---|
| WTP is net direct govt cost | 13,392 | -1,256 | 21,346 | 21,702 |
| | [3,941; 23,431] | [-14,516; 10,960] | [7,691; 35,144] | [2,567; 40,457] |
| WTP is OOP costs, kid earnings | 4,946 | -17,856 | 19,511 | 13,988 |
| | [-5,437; 15,779] | [-35,898; -3,022] | [2,152; 37,343] | [-9,236; 35,596] |
| WTP is OOP cost, kid earnings, parent post earnings | 48,075 | -12,692 | 80,203 | 77,238 |
| | [16,037; 84,697] | [-61,510; 32,199] | [28,297; 134,475] | [6,128; 150,923] |
| WTP OOP cost, kid earnings, all parent earnings | 58,624 | -5,143 | 91,177 | 95,074 |
| | [21,523; 99,447] | [-59,409; 45,881] | [34,362; 150,426] | [17,355; 172,331] |

Notes: This table reports estimates of the Net Social Benefit (NSB) by tercile of ACS median block-group household income using four different constructions of willingness to pay (WTP). The first row assumes parents value the program at its net direct government cost. The second excludes parental earnings from WTP and considers only change in out of pocket expenditures and kids future earnings. The third adds post-pre-k parental earnings, and the fourth considers all parental earnings. The "Full" column reports estimates for the whole sample while the remaining three columns report estimates by tercile of neighborhood median household income, which are based on the block group the family lived in at the time they applied. 90% confidence intervals are reported in brackets based on 500 bootstraps.

# J Integration effects

Within New Haven, the UPK programs are perceived as crucial to the success of the magnet program in achieving its legislative goal of school integration. This is because UPK pulls in children from suburban towns where public pre-kindergarten is not available, who may then stay.[31]

The efficacy of subsidized pre-kindergarten as a school integration policy depends on how many children, in particular suburban, White, and Asian-American children, stay in the NHPS system after pre-kindergarten. We quantify these effects by estimating versions of Equation 1 that take NHPS enrollment in grades beyond pre-kindergarten as the dependent variable. We estimate separate specifications for each grade from kindergarten through grade eight and then pool over high school grades. Figure J.1 reports results from this exercise in the full sample and split by geography (New Haven vs. the surrounding suburbs) and race (White/Asian vs. non-White/Asian). Each subfigure reports the control complier mean rate of NHPS attendance in a given grade (solid bars) and the treatment effect of UPK enrollment added to the complier mean (dots and standard error bars) Note that our definition of NHPS enrollment in pre-kindergarten includes means-tested programs run by the district, so the control complier mean in pre-kindergarten is not zero.

UPK enrollment has large and long-lasting crowd-in effects, including for suburban and White/Asian students. Panel (a) of Figure J.1 reports results for the full sample of applicants. UPK enrollment raises NHPS enrollment in each elementary and middle school grade and in high school as well, though the increases are only statistically significant through fifth grade. In total, UPK enrollment generates 2.41 years of K-8 enrollment, 83% of the complier control mean. For suburban applicants, UPK enrollment generates 2.71 additional years of K-8 enrollment, 234% of the complier control mean. For White and Asian applicants, UPK enrollment generates 1.00 years of K-8 enrollment, 56% of the complier control mean (though we note that this pooled effect is noisily estimated).

How big are these effects? One way to quantify them is to assess the share of White/Asian students in NHPS who are there because of the UPK program. We compute average per-cohort counts of White and Asian-American students over the 2014-2018 period and scale this number by the IV estimates of UPK enrollment on enrollment in later grades to obtain the total number White/Asian K-8 students whose

[31] A local newspaper article described the issue as follows: "[Superintendent Reggie] Mayo said suburban enrollment tends to fall off in the higher grades, so the city needs to stack the school with more suburban kids in pre-k. The district aims to keep suburban enrollment at higher than 35 percent, he said, because of the risk that kids will later leave the school. Often suburban parents don't have preschool in their towns. So they grab urban pre-k slots at the magnet schools, then move their kids back to their hometown schools for higher grades, leaving the higher grades at the urban magnet schools underenrolled" (Bailey, 2011).

later NHPS enrollment is attributable to UPK enrollment.[32] We then divide this figure by overall grade-specific enrollment of White or Asian-American students in NHPS.

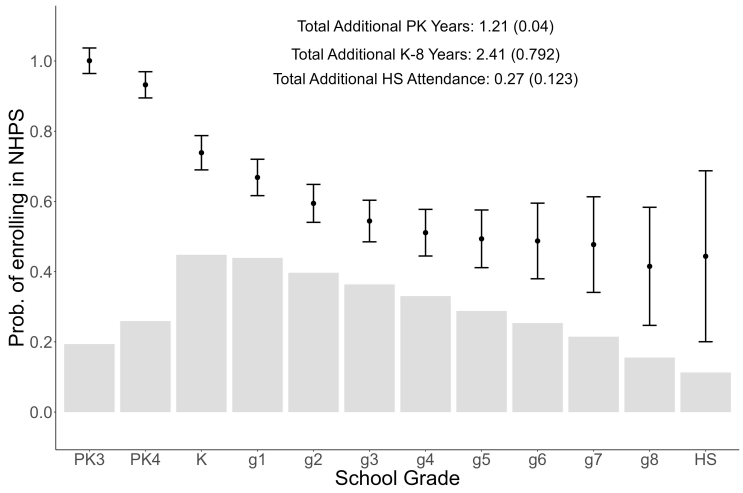
Table J.1 reports results from this exercise. Grade-specific shares start at 16% in kindergarten and decline to 5% by grade 8 as the students induced to enroll in NHPS by the UPK program leave the district. Overall, the causal effect of UPK enrollment accounts for 7% of all White/Asian-American NHPS enrollment in grades K-8, though again we caution that this pooled effect is noisily estimated.

These effects are fairly large in the context of the school integration literature. For example, Lutz (2011) reports that the termination of court-ordered desegregation plans reduced the share of White students at the average Black student's school (i.e., the Black-White exposure index) by 10-15%. Guryan (2004) finds that this same exposure index rose by about 50% (15pp on a base of about 30%) for districts desegregated in the 1970s following the Brown vs. Board decision.

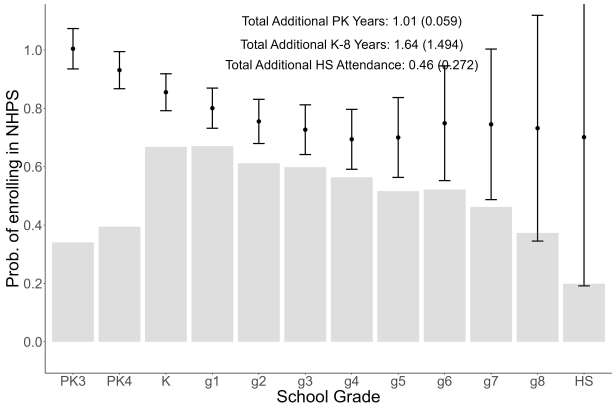
To what extent do the integration benefits of UPK depend on the absence of a means test? To get a back-of-the-envelope sense of this tradeoff, we conduct an exercise where we drop UPK enrollees from the top tercile and replace them with students with a race distribution matching what we observe in the lower two terciles. The rightmost column of Table J.1 reports the share of White or Asian-American NHPS enrollment attributable to UPK in this counterfactual scenario. Compared to what we see in the data, means-testing causes this share to fall by roughly half in each grade. For example, the attributed share of kindergarten students falls from 16% at baseline to 8% under a means test.

[32] We focus on 2014-2018 because this period reflects steady-state UPK program size in the pre-Covid period. See Figure 1.

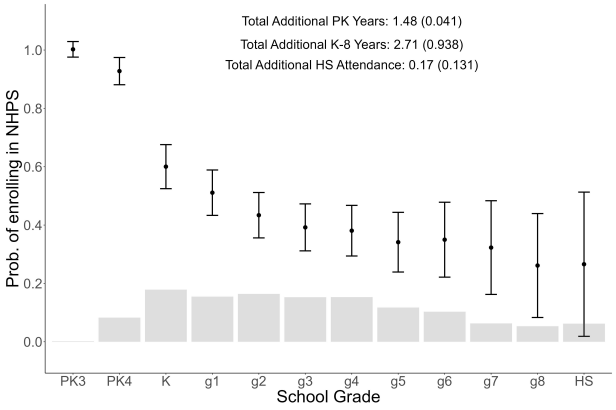
## Figure J.1: UPK enrollment and racial/ethnic integration in NHPS



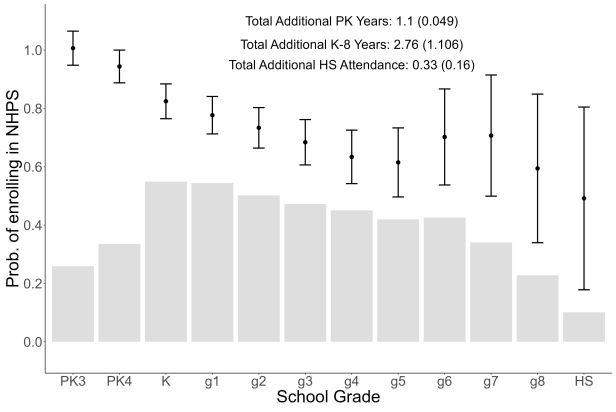

(a) Overall



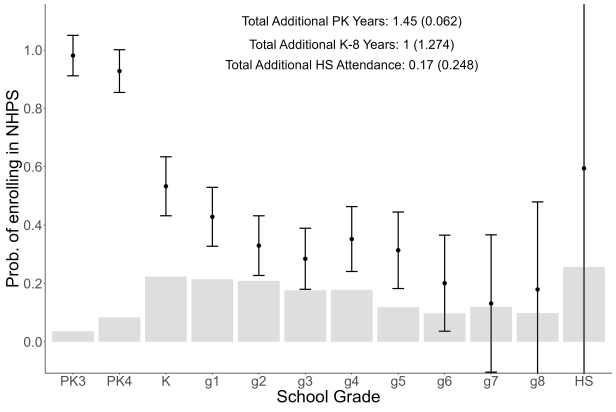

(b) Urban




(c) Suburban




(d) Non-White/Asian




(e) White/Asian

Notes: This figure visualizes the effect of UPK enrollment on the probability of students enrolling in the NHPS school system at different grade levels based on IV estimates and control complier means. Panel (a) shows the overall results across all subpopulations, whereas Panels (b)-(c) split the sample into children from an urban or suburban area and Panels (d)-(e) into Non-White/Asian and White/Asian children. The x-axis for each panel reflects the grade of enrollment from PK3 through grade 8 as well as grades 9-12 grouped together as high school (HS). The y-axis reflects the share of children enrolled in NHPS by grade level. Gray bars represent complier control means by grade level. Black dots are the point estimates of treatment effects from 2SLS estimates added to the complier means (i.e. the vertical distance from the complier mean to the dot is the treatment effect). The bars show 95% confidence intervals for the 2SLS estimates. See Section 9 for details.

**Table J.1: UPK effects on non-URM NHPS Enrollment**

| Grade | IV Estimate | Attr. Students | Total NHPS | Attr. Share | Means-Tested CF |
|---|---|---|---|---|---|
| K | 0.31 | 44 | 270 | 0.16 | 0.08 |
| | (0.06) | (8.66) | | (0.03) | (0.02) |
| Grade 1 | 0.21 | 29 | 264 | 0.11 | 0.05 |
| | (0.06) | (8.63) | | (0.03) | (0.02) |
| Grade 2 | 0.12 | 16 | 262 | 0.06 | 0.03 |
| | (0.06) | (8.67) | | (0.03) | (0.02) |
| Grade 3 | 0.11 | 15 | 256 | 0.06 | 0.03 |
| | (0.06) | (8.87) | | (0.03) | (0.02) |
| Grade 4 | 0.17 | 24 | 236 | 0.1 | 0.05 |
| | (0.07) | (9.41) | | (0.04) | (0.02) |
| Grade 5 | 0.19 | 27 | 238 | 0.11 | 0.05 |
| | (0.08) | (11.11) | | (0.05) | (0.02) |
| Grade 6 | 0.11 | 15 | 256 | 0.06 | 0.03 |
| | (0.1) | (13.95) | | (0.05) | (0.03) |
| Grade 7 | 0.02 | 2 | 242 | 0.01 | 0 |
| | (0.14) | (19.81) | | (0.08) | (0.04) |
| Grade 8 | 0.09 | 12 | 241 | 0.05 | 0.02 |
| | (0.18) | (25.23) | | (0.1) | (0.05) |
| K-8 | 1.14 | 158 | 2264 | 0.07 | 0.03 |
| | (1.24) | (172.50) | | (0.08) | (0.04) |

Notes: This table shows results from an exercise estimating the share of White and Asian students enrolled in the NHPS system due to the UPK program. IV estimates are taken from Figure J.1, Panel (e). We compute the number of attributable students by grade level (column *Attr. Students*) by multiplying the grade-specific IV estimate of the effect of UPK enrollment on later NHPS enrollment by the average number of Asian and White UPK enrollees for 2014-2018. The total number of Asian and White students enrolled in NHPS (column *Total NHPS*) is calculated as the average number of Asian and White students enrolled in NHPS for 2014-2018 in the relevant grade, across all schools. The share of Asian and White enrollment attributable to the UPK program (column *Attr. Share*) is then calculated by dividing the number of attributable students by the total number of students in the NHPS system. The column *Means-Tested CF* reports estimates for the counterfactual attributable share of White and Asian students enrolled in NHPS if a means-tested reform was introduced that bars students from the top tercile of the income distribution from the UPK lottery and replaced them with students drawn from the bottom two terciles. Robust standard errors clustered at the applicant level are shown in parentheses. See Section 9 for details.

# K Survey Questionnaire

Dear Parent,

We are inviting you to take this survey as New Haven Public School records indicate that your child previously participated in the pre-kindergarten choice process for the New Haven Public Schools. If eligible, you will be entered into a sweepstakes for the chance to receive one of 25 $100 rewards for taking our survey.

Your feedback is important and will be used to improve the pre-k programs in the New Haven Public Schools. Thank you very much for taking the survey!

Your responses are CONFIDENTIAL meaning that your individual responses will not be shared. Neither your name nor your child's name will be shared with anyone outside of the research team.

If you have questions or concerns, please contact YaleâĂŹs NHPS pre-k survey team at (203) 432-5820 or nhps_prek_survey@yale.edu.

Sincerely,

New Haven School Choice Research Team Yale University

Do you consent?

(a) Yes

(b) No

1. Please describe your relationship to (child name)
   (a) Mother
   (b) Father
   (c) Stepmother
   (d) Stepfather
   (e) Grandmother
   (f) Other, please specify:
2. Can you confirm that, in [PROCESSYEAR], your child

   [IF STATUS=1: participated in the New Haven Public Schools' School Choice Process and applied to at least one New Haven Public School free magnet pre-k program, but did not get offered a slot]

   [IF STATUS=2: enrolled in a New Haven Public School free magnet pre-k program]

   [IF STATUS=3: was offered a New Haven Public School free magnet pre-k program slot, but did not enroll]?

(a) Yes,

IF STATUS=1: my child applied to an NHPS pre-k program in [PROCESSYEAR], but was not offered a slot

IF STATUS=2: my child enrolled in an NHPS pre-k program in [PROCESSYEAR]

IF STATUS=3: my child applied to an NHPS pre-k program in [PROCESSYEAR] and was offered a slot, but we chose not to enroll

(b) No, to my knowledge, this information is not correct.

If answer to question 2. was (b), then

3. Which best applies:

   (a) My child enrolled in an NHPS magnet pre-k program

   (b) My child applied to an NHPS magnet pre-k program, but was not offered a slot

   (c) My child applied to an NHPS magnet pre-k program and was offered a slot, but I chose not to enroll

   (d) To my knowledge, my child did not apply for a slot at an NHPS magnet pre-k program.

If answer to question 3. was (d), the following message was displayed

*Thank you for your time today. Unfortunately you are not eligible for this study. We appreciate your participation.*

Otherwise, respondents were re-classified in three categories:

1. **Enrolled** if answer to question 3 was (a)
2. **Applied but no offer** if answer to question 3 was (b)
3. **Received offer but chose not to enroll** if answer to question 3 was (c)

If **Enrolled**:

We would now like to ask you about your experiences with NHPS's pre-k program.

4. Thinking back to when your child was enrolled in NHPS's pre-k, how satisfied were you with your child's experience?

   1. Overall

      (a) Very dissatisfied

      (b) Somewhat dissatisfied

      (c) Neither satisfied nor dissatisfied

(d) Somewhat satisfied

(e) Very satisfied

(f) Not applicable

2. The quality of the teachers and instruction

(a) Very dissatisfied

(b) Somewhat dissatisfied

(c) Neither satisfied nor dissatisfied

(d) Somewhat satisfied

(e) Very satisfied

(f) Not applicable

3. The quality of the facilities

(a) Very dissatisfied

(b) Somewhat dissatisfied

(c) Neither satisfied nor dissatisfied

(d) Somewhat satisfied

(e) Very satisfied

(f) Not applicable

4. The quality of communication between the program and your family

(a) Very dissatisfied

(b) Somewhat dissatisfied

(c) Neither satisfied nor dissatisfied

(d) Somewhat satisfied

(e) Very satisfied

(f) Not applicable

5. The other children and families enrolled in the program

(a) Very dissatisfied

(b) Somewhat dissatisfied

(c) Neither satisfied nor dissatisfied

(d) Somewhat satisfied

(e) Very satisfied

(f) Not applicable

The next few questions ask you to think back to when your child was enrolled in New Haven Public Schools' pre-k program, and to think about what options for pre-k or childcare you would have used *if you had not been able to enroll your child in the NHPS pre-k program.*

5. If your child had not enrolled in the NHPS pre-k program, what best describes the childcare or pre-k option that you would have used for the child?

   *Select the best option available. If you are uncertain or donâĂŹt recall, please choose the option you think would have been most likely.*

   (a) I would have ***not enrolled*** my child in any pre-k or daycare program
   (b) I would have ***enrolled*** my child in a pre-k or daycare program or service

   If answer to question 5. was (a), the following question was displayed:

6. If you had not enrolled in the NHPS pre-k program, who would have most likely watched over the child during the day prior to kindergarten?

   *Select the best option available. If you are uncertain or don't recall, please choose the option you think would have been most likely.*

   (a) The mother, father, or other legal guardian would have taken care of the child
   (b) Another family member would have taken care of the child
   (c) A family friend or neighbor would have taken care of the child
   (d) A babysitter or other childcare provider would been paid to take care of the child
   (e) Other, please specify:

   If answer to question 5. was (b), the following question was displayed:

7. If you had not enrolled in the NHPS pre-k program, what best describes the type of pre-k or child-care program you think your child would have likely enrolled in?

   (a) Head Start or Early Head Start programs
   (b) Another childcare center or pre-k (not Head Start)
   (c) A paid childcare provider operating out of their home (not Head Start)
   (d) Another town's public pre-k or childcare program
   (e) Babysitter, nanny, or another private option
   (f) Other, please specify:

   If answer to question 5. was (b), the following question was also displayed:

8. What was the name of the program your children would have likely enrolled in if you had not enrolled in the NHPS pre-k program ?

   (a) Program name:
   (b) I didn't have a specific program in mind
   (c) I don't remember
   (d) I prefer not to say

9. Thinking back to when your child was enrolled in an NHPS pre-k program, do you think enrolling resulted in:

   1. You or other adults in your household being able to work more

      (a) Yes
      (b) No

   2. Less stress about money

      (a) Yes
      (b) No

   3. Better pre-kindergarten education for your child

      (a) Yes
      (b) No

   If answer to question 9.1. is (a), the following question was displayed:

10. In the previous question, you said that enrolling your child in the NHPS pre-k program allowed you or another adult in your household to work more. Which of the options below describes how it changed your situation?
    *Select all that apply*

    (a) I got a part time job
    (b) I got a full-time job
    (c) I switched from working part time to full time
    (d) I increased the number of hours I worked
    (e) Another member of the household got a part time job
    (f) Another member of the household got a full-time job
    (g) Another member of the household switched from working part time to full time

(h) Another member of the household increased the number of hours they worked

(i) Other, please specify:

(j) None of the above

If **Applied but no offer**

NHPS pre-k programs cannot offer a slot to every family that applies. The following questions aim to help us better understand what childcare and daycare options families use when they are not able to enroll their child in the NHPS pre-k program.

11. After your pre-k application in [PROCESSYEAR], was your child ever enrolled in a pre-k or daycare program?

(a) Yes, I enrolled my child in a pre-k or daycare program

(b) No, I did not enroll my child in a pre-k or daycare program

If answer to question 11 was (b), the following question was displayed

12. Who watched over the child during the day prior to kindergarten?

*Select the best option available. If more than one option was used, please select the one used most frequently that year.*

(a) The mother, father, or other legal guardian took care of the child

(b) Another family member took care of the child

(c) A family friend took care of the child

(d) A babysitter or other childcare provider was paid to take care of the child

(e) Other, please specify:

If answer to question 11 was (a), the following questions were displayed

13. What type of pre-k or child-care program was your child enrolled in?

*Select the best option available. If more than one option was used, please select the one your child was enrolled in for the longest time.*

(a) Head Start/Early Head Start

(b) Another childcare center or pre-k (not Head Start)

(c) A paid childcare provider operating out of their home (not Head Start)

(d) Another town's public pre-k or childcare program

(e) Babysitter, nanny, or another private option

(f) Other, please specify:

14. How satisfied were you with your child's experience at their pre-k or childcare program?

    1. Overall
        (a) Extremely dissatisfied
        (b) Somewhat dissatisfied
        (c) Neither satisfied nor dissatisfied
        (d) Somewhat satisfied
        (e) Extremely satisfied

    2. The quality of the teachers and instruction
        (a) Extremely dissatisfied
        (b) Somewhat dissatisfied
        (c) Neither satisfied nor dissatisfied
        (d) Somewhat satisfied
        (e) Extremely satisfied

    3. The quality of the facilities
        (a) Extremely dissatisfied
        (b) Somewhat dissatisfied
        (c) Neither satisfied nor dissatisfied
        (d) Somewhat satisfied
        (e) Extremely satisfied

    4. The quality of communication between the program and your family
        (a) Extremely dissatisfied
        (b) Somewhat dissatisfied
        (c) Neither satisfied nor dissatisfied
        (d) Somewhat satisfied
        (e) Extremely satisfied

    5. The other children and families enrolled in the program
        (a) Extremely dissatisfied
        (b) Somewhat dissatisfied
        (c) Neither satisfied nor dissatisfied
        (d) Somewhat satisfied
        (e) Extremely satisfied

15. What was the name of the program that your child enrolled in?

    (a) Program name:
    (b) I don't remember
    (c) Prefer not to say

16. Do you believe that receiving an NHPS pre-k slot would have resulted in:

    1. You or other adults in your household being able to work more

        (a) Yes
        (b) No

    2. Less stress about money

        (a) Yes
        (b) No

    3. Better pre-f education for the child

        (a) Yes
        (b) No

    If answer to question 16.1 was (a), the following question was displayed

17. In the previous question you said that if your child had received a slot in the NHPS pre-k program, you or another adult in your household would have been able to work more. Which of the options below describes how it would have changed your household's work situation?

    *Select all that apply*

    (a) I would have gotten a part-time job
    (b) I would have gotten a full-time job
    (c) I would have switched from working part-time to full-time
    (d) I would have increased the number of hours I worked
    (e) Another member of the household would have gotten a part-time job
    (f) Another member of the household would have gotten a full-time job
    (g) Another member of the household would have switched from working part-time to full-time
    (h) Another member of the household would have increased the number of hours they worked
    (i) Other, please specify:

If **received offer but chose not to enroll**

We see that your child was offered a slot but did not end up enrolling in a NHPS pre-k program. We would now like to ask you about your decision to not enroll in the NHPS pre-k program and what childcare or daycare options your family chose instead.

18. What best describes your reason for not enrolling?
    (a) I found a better option, such as being moved off a waitlist at another program
    (b) I moved and attending the NHPS pre-k program was no longer feasible
    (c) Upon learning more, I decided that the NHPS pre-k program was not a good fit
    (d) Other, please specify:

19. After your pre-k application in [PROCESSYEAR], was your child ever enrolled in a pre-k or daycare program?
    (a) Yes, I enrolled my child in a pre-k or daycare program
    (b) No, I did not enroll my child in a pre-k or daycare program

    If answer to question 19 was (b), the following question was displayed

20. Who watched over the child during the day prior to kindergarten?

    *Select the best option available. If more than one option was used, please select the one used most frequently that year*
    (a) The mother, father, or other legal guardian took care of the child
    (b) Another family member took care of the child
    (c) A family friend took care of the child
    (d) A babysitter or other childcare provider was paid to take care of the child
    (e) Other, please specify:

    If answer to question 19 was (a), the following three questions were displayed

21. What type of pre-k or child-care program was your child enrolled in?

    *Select the best option available. If more than one option was used, please select the one your child was enrolled in for the longest time.*
    (a) Head start/Early head start
    (b) Another childcare center or pre-k (not Head Start)

(c) A paid childcare provider operating out of their home (not Head Start)

(d) Another town's public pre-k or childcare program

(e) Babysitter, nanny, or another private option

(f) Other, please specify:

22. How satisfied were you with your child's experience at their pre-k or childcare program?

    1. Overall
        (a) Extremely dissatisfied
        (b) Somewhat dissatisfied
        (c) Neither satisfied nor dissatisfied
        (d) Somewhat satisfied
        (e) Extremely satisfied

    2. The quality of the teachers and instruction
        (a) Extremely dissatisfied
        (b) Somewhat dissatisfied
        (c) Neither satisfied nor dissatisfied
        (d) Somewhat satisfied
        (e) Extremely satisfied

    3. The quality of the facilities
        (a) Extremely dissatisfied
        (b) Somewhat dissatisfied
        (c) Neither satisfied nor dissatisfied
        (d) Somewhat satisfied
        (e) Extremely satisfied

    4. The quality of communication between the program and your family
        (a) Extremely dissatisfied
        (b) Somewhat dissatisfied
        (c) Neither satisfied nor dissatisfied
        (d) Somewhat satisfied
        (e) Extremely satisfied

    5. The other children and families enrolled in the program

(a) Extremely dissatisfied

(b) Somewhat dissatisfied

(c) Neither satisfied nor dissatisfied

(d) Somewhat satisfied

(e) Extremely satisfied

23. What was the name of the program your child attended?

    (a) Program name:

    (b) I don't remember

    (c) I prefer not to say

    If respondents were classified as either **applied but no offer** or **received offer but chose not to enroll**, they were asked the following questions:

24. Thinking back to when you applied to the NHPS pre-k program in [PROCESSYEAR], were you aware of any other programs that could have helped pay for alternative childcare options?

    (a) Yes

    (b) No

    If answer to question 24. was (a), the next question was displayed

25. In [PROCESSYEAR], did you or anyone else in your household apply to a program to help pay for childcare or pre-k?

    (a) Yes

    (b) No

    If answer to question 25. was (a), the next question was displayed

26. In [PROCESSYEAR], did you or anyone else in your household get help paying for childcare or pre-k from one of these programs?

    (a) Yes

    (b) No

    If answer to question 25. was (b), the next question was displayed

27. What best describes your reason for not applying?

    *Select all that apply*

(a) I was not interested in enrolling my child in childcare or pre-k

(b) I did not think my household would be eligible

(c) I did not know enough about the programs to know how to apply

(d) I did not have the time to apply

(e) The application process was too complicated or involved too many steps

(f) I did not need the subsidy

If answer to question 11 or 19 was (a), the next question was displayed

28. After your pre-k application in [PROCESSYEAR], approximately how much did your family pay out of pocket each month for pre-k or childcare for your child?

(a) $0

(b) $1-$200

(c) $201-$500

(d) $501-$1,000

(e) $1,001 - $1,500

(f) $1,501 - $2,000

(g) More than $2,000

(h) I don't remember

(i) I prefer not to say

Respondents were asked the following questions regardless their re-classification

29. Thinking back to when you applied to the NHPS pre-k program in [PROCESSYEAR], what was important to you when you were making your childcare or pre-k decisions?

1. Affordability
   (a) Not important
   (b) A little important
   (c) Somewhat important
   (d) Important
   (e) Very important

2. Convenient location (such as close to home or close to work)
   (a) Not important
   (b) A little important
   (c) Somewhat important

(d) Important

(e) Very important

3. Convenient schedule (such as full day program, or flexible drop-off hours)
   (a) Not important
   (b) A little important
   (c) Somewhat important
   (d) Important
   (e) Very important

4. Class size (i.e. how many other children were in the same group as your child)
   (a) Not important
   (b) A little important
   (c) Somewhat important
   (d) Important
   (e) Very important

5. The quality of the teachers or childcare providers
   (a) Not important
   (b) A little important
   (c) Somewhat important
   (d) Important
   (e) Very important

6. The other children and families enrolled in the childcare or pre-k program
   (a) Not important
   (b) A little important
   (c) Somewhat important
   (d) Important
   (e) Very important

**Parent - Family Demographics**

To better understand who applies to the NHPS pre-k program, we would now like to ask you a few questions about your household.

30. What is your highest level of education?

   (a) Some high school, no diploma

(b) High school graduate, diploma or the equivalent (for example: GED)

(c) Some college credit, no degree

(d) Trade/technical/vocational training

(e) Associate degree

(f) Bachelor's degree or more.

(g) Prefer not to say

31. When you applied to the NHPS pre-k program in [PROCESSYEAR], was there another parent or legal guardian for the child in the household?

(a) Yes

(b) No

(c) Prefer not to say

If answer to question 31 was (a), the following question was displayed.

32. What is the highest level of education of the child's other parent or legal guardian?

(a) Some high school, no diploma

(b) High school graduate, diploma or the equivalent (for example: GED)

(c) Some college credit, no degree

(d) Trade/technical/vocational training

(e) Associate degree

(f) Bachelor's degree or more.

(g) Prefer not to say

33. In [PROCESSYEAR], how many adults and children, including you, were in your household?

(a) Range [0 - 20]

(b) Prefer not to say

**Parents' Employment**

We would now like to ask a few questions about your household's work situation in [PROCESSYEAR+1], the year after you applied to the NHPS pre-k program.

34. Thinking back to [PROCESSYEAR+1], what was your total household income?

(a) Less than $5,000

(b) 5,000 to 7,499

(c) 7,500 to 9,999

(d) 10,000 to 12, 499

(e) 12,500 to 14, 999

(f) 15,000 to 19,999

(g) 20,000 to 24,999

(h) 25,000 to 29,999

(i) 30,000 to 34,999

(j) 35,000 to 39,999

(k) 40,000 to 49,999

(l) 50,000 to 59,999

(m) 60,000 to 74,999

(n) 75,000 to 99,999

(o) 100,000 to 149,999

(p) 150,000 or more

(q) Prefer not to say

35. What best describes your employment situation in [PROCESSYEAR+1]?

(a) I was employed full time most of the year

(b) I was employed part time most of the year

(c) I was in and out of work that year

(d) I was not employed and was searching for a job

(e) I was not employed, and I was not looking to be employed

(f) Prefer not to say

36. In [PROCESSYEAR+1], when working, how many hours did you usually work per week?

*RANGE [0 - 120]* hours per week

***You are halfway done!***

If answer to question 35 was (c), the following question was displayed

37. In [PROCESSYEAR+1] approximately how many weeks do you think you worked (for example, working the whole year with two weeks of vacation would be 50 weeks).

*RANGE [0 - 52]* weeks

If answer to question 31 was (a), the following question was displayed

38. What best describes the employment situation of the child's other parent or legal guardian in [PROCESSYEAR+1]?

    (a) They were employed full time most of the year
    (b) They were employed part time most of the year
    (c) They were in and out of work that year
    (d) They were not employed and were searching for a job
    (e) They were not employed, and weren't looking to be employed
    (f) Prefer not to say

If answer to question 35 was (a), (b) or (c) or answer to question 38 was (a), (b) or (c), the following question was displayed

39. When you applied to the NHPS pre-k program, were you or someone in your household working in the city of New Haven?

    (a) Yes
    (b) No
    (c) Prefer not to say

**Financial**

We would now like to ask you some questions regarding your household's current financial situation. These questions will help us better understand who applies to the NHPS pre-k program, and the potential benefits of that program.

40. What best describes your current employment situation?

    (a) I am employed full time (30 hours or more per week on average)
    (b) I am employed part time (less than 30 hours per week on average)
    (c) I am not employed and am searching for a job
    (d) I am not employed, and I am not looking to be employed
    (e) Prefer not to say

If answer to question 40 was (a) or (b)

41. How many hours do you usually work per week?

(a) *RANGE [0 - 120]* hours per weeks

(b) Prefer not to say

42. Thinking back to last year, what was your total household income?

(a) Less than $5,000

(b) 5,000 to 7,499

(c) 7,500 to 9,999

(d) 10,000 to 12, 499

(e) 12,500 to 14, 999

(f) 15,000 to 19,999

(g) 20,000 to 24,999

(h) 25,000 to 29,999

(i) 30,000 to 34,999

(j) 35,000 to 39,999

(k) 40,000 to 49,999

(l) 50,000 to 59,999

(m) 60,000 to 74,999

(n) 75,000 to 99,999

(o) 100,000 to 149,999

(p) 150,000 or more

(q) Prefer not to say

**Educational history**

This section asks a few brief questions about where your child went to elementary school and their experiences since then.

43. What best describes the type of school your child attended for first grade?

(a) Traditional Public School

(b) Magnet Public School

(c) Charter School

(d) Private School

(e) Home School

(f) My child has not attended first grade yet

(g) Other, please specify: [TEXTBOX]

(h) Prefer not to say

If answer to question 43. was (a) or (b)

44. Where did your child attend first grade?

(a) New Haven Public Schools
(b) A district near New Haven Public Schools (for example, East Haven, West Haven, North Haven, Hamden, Woodbridge, or Orange)
(c) A district in Connecticut, but not near New Haven Public Schools
(d) Outside Connecticut
(e) Prefer not to say

If the respondent's child participated in the process in 2010 or before

45. Is your child currently enrolled in 1st through 12th grade?

(a) Yes
(b) No

If answer to question 45 was (b), the following question was displayed

46. Did your child graduate from high school?

(a) Yes
(b) No, they left school without a diploma
(c) Other, please specify: [TEXTBOX]
(d) Prefer not to say

If answer to question 46 was (a), the following question was displayed

47. Is your child currently enrolled in:

*Select all that apply*

(a) A 4-year college degree program
(b) A 2-year college degree program
(c) Trade school or another training program
(d) None of the above
(e) Prefer not to say

**Other questions**

48. Does your child currently live in Connecticut?

    (a) Yes

    (b) No

    If answer to question 48. was (b), the following question was displayed

49. When did your child move out of Connecticut?

    (a) *[Dropdown: 2000 - 2022]*

    (b) *[Text Entry: 2000 - 2022]*

    (c) Prefer not to say

*You will be entered into a sweepstakes for the chance to receive one of 25 $100 rewards for taking our survey*

Those are all of the questions we have. You will be entered into a sweepstakes for the chance to receive one of 25 $100 rewards for completing the survey. If you have any questions at all for us, you can email us at nhps_prek_survey@yale.edu or call us toll-free at (203) 432 5820.

Thank you for participating in this survey!

You can close your browser window now.