

Child Care and Early Childhood Skills (Nearly done...)

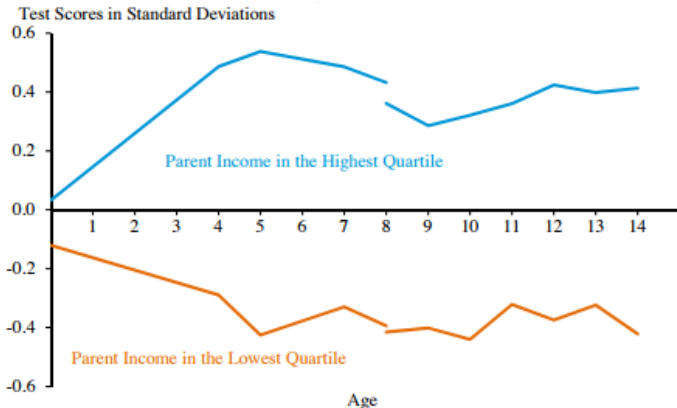
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Overview

- **Research Question:** how would early-childhood care subsidy policies impact the distributions of child cognitive development & parental resource allocation?
- **Contributions/Approach:**
 - Model of maternal choices of child care mix (quantity and quality), maternal labor supply & parenting effort
 - Represent offer of subsidized care as (max. hours, quality, price)
 - Lens to interpret *ex post* evidence from an RCT, Infant Health & Development Program (IHDP)
 - Predict effects of counterfactual policies *ex ante* beyond full-day, high-quality care (extrapolation to both non-takers of current program but also other programs)

Motivation 1: gaps in development by family income open early



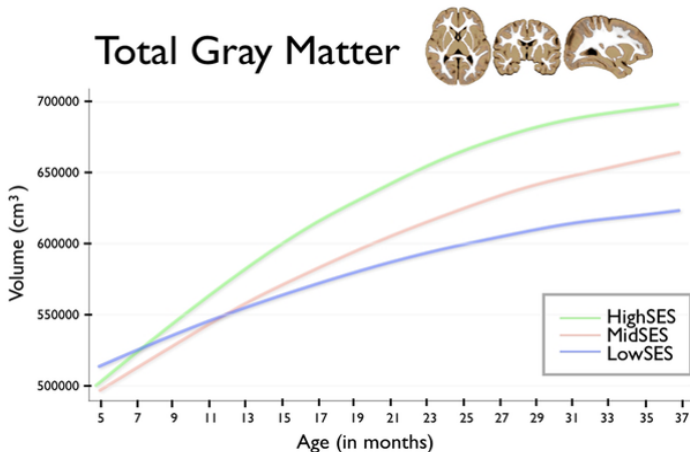
Note: IQ scores are available through age 8. After age 8, math test scores are shown. A three year moving average is used for math scores.

Source: U.S. Collaborative Perinatal Project from Fryer and Levitt (2013) (through age 8);

NLSY79 Child and Young Adult Supplement from Cunha et al. (2006) (after age 8);

CEA calculations.

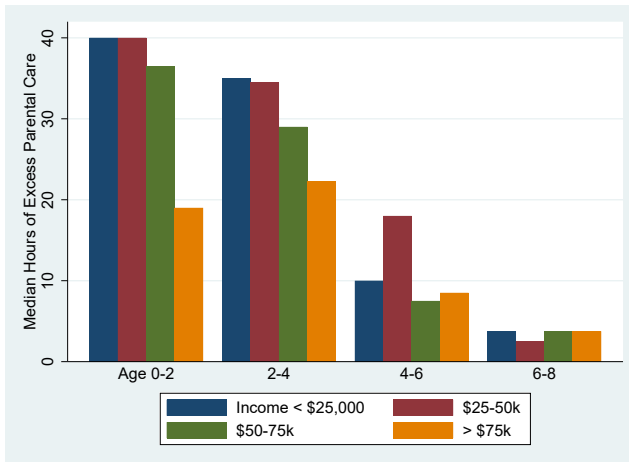
Motivation 1: gaps in development by family income open early



Hanson JL, Hair N, Shen DG, Shi F, et al. (2013) Family Poverty Affects the Rate of Human Infant Brain Growth. PLoS ONE 8(12): e80954. doi:10.1371/journal.pone.0080954

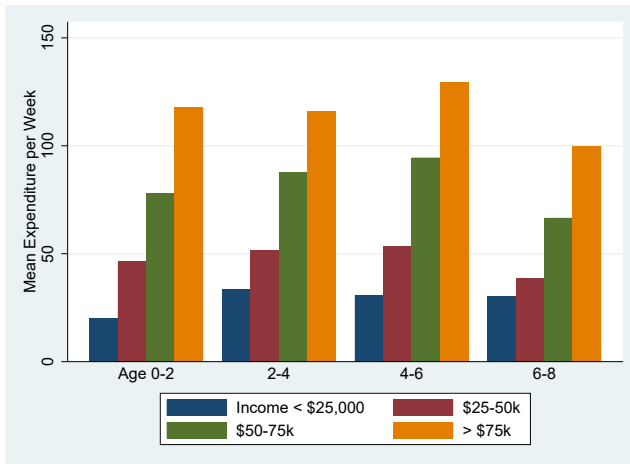
Motivation 2: differences in care usage

Median Weekly Hours of Parental Care by Family Income (-128 hours)



Motivation 2: differences in care usage

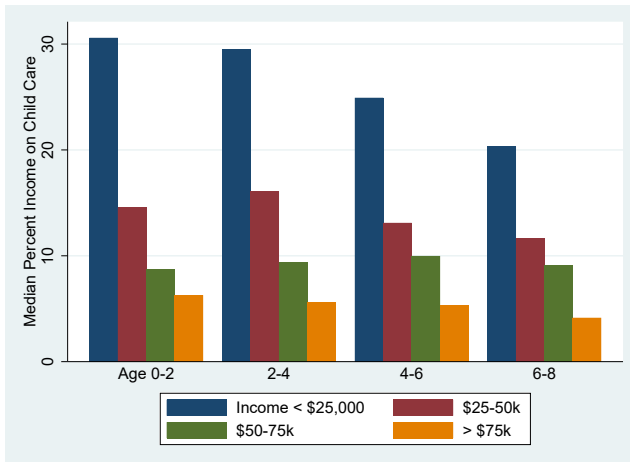
Mean Weekly Expenditures on Child Care



National Survey of Early Care and Education (NSECE), 2012.

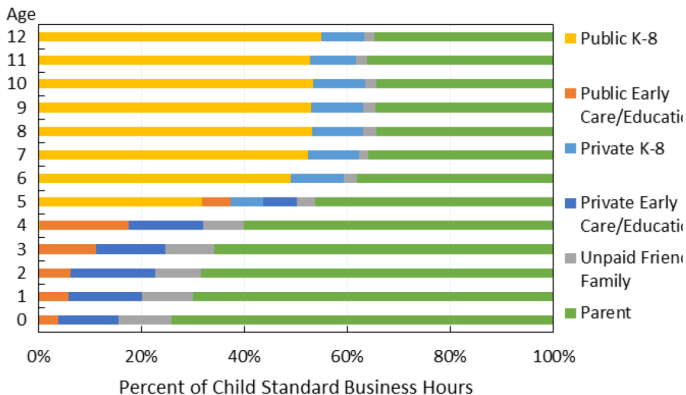
Motivation 2: differences in care usage

Median Percent of Household Income Spent on Child Care (if positive expenditure)



Motivation 3: Fewer Government Resources to Early Child Care than Later K-12 Education

Figure 5: Child Time Coverage by Age



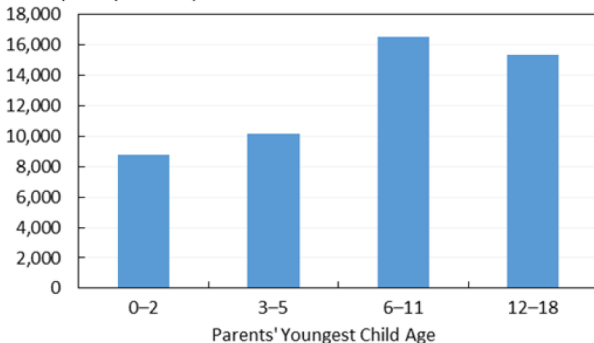
Note: We define standard business hours to be Monday to Friday, 8am to 6pm. Unpaid friends and family include all individuals who receive no payment for caretaking. Public time refers to time spent with K-8, Pre-K, Head Start organizational, and home-based individual providers where the overall cost to parents is \$0, even if there is a co-pay covered by the government. Private time refers to all other time spent with organizational or individual caregivers.

Source: NSECE: CEA calculations

Motivation 3: Fewer Government Resources to Early Child Care than Later K-12 Education

Figure 2: Per Child Public Expenditure by Child Age

Per Capita Expenditure, 2015



Note: Federal funding includes refundable portions of tax credits but not reductions in taxes.

State funding includes state earned income tax credits but no other tax provisions.

Source: Edelstein et al. (2016); Edelstein et al. (2012); CEA calculations.

Council of Economic Advisers (2016)

Motivation 4: Open Policy Questions

Emerging consensus in favor of more investment in young children, but several policy questions remain open:

- What form should the intervention take?
 - In-kind: Full-time vs. Part-time; high vs. low quality; price?
 - Voucher: let parents choose quality/quantity
 - Cash transfer
- Target criteria? Universal or targeted (based on family income or children's baseline status)
- How would program features (quality, quantity, price) affect take-up, effects on children, effects on maternal labor supply?
- How do we make sense of prior evidence on child care expansions (e.g. Quebec), and apply to the US?

Background: Infant Health & Development Program (IHDP)

- 985 families giving birth in 8 research hospitals in 1985. We use singletons.
 - Eligible: low birth-weight ($\leq 2,500$ grams, 5.5 pounds) & premature (≤ 37 weeks gestation)
 - Diverse on other margins: not restricted by family income, race/ethnicity

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 - Diverse on other margins: not restricted by family income, race/ethnicity
- Randomly-assigned package of services including offer of:
 - 0-12 months: weekly home visits by staff
 - 12-36 months: free, full-day care in Child Development Centers with Abecedarian curriculum. Free transportation.

Experiment Results

| | Treatment | Control | Difference | P-Value |
|--|-----------|---------|------------|---------|
| Child cognitive skill at 36 months (h_1) | 96.10 | 86.59 | 9.51 | 0.00 |
| Hours per week of program care (τ_p) | 18.18 | 0.00 | 18.18 | 0.00 |
| Hours per week of maternal care (τ_m) | 52.40 | 62.07 | -9.67 | 0.00 |
| Hours per week other caretakers (τ_n) | 16.92 | 25.43 | -8.52 | 0.00 |
| Earning hours (L) | 17.97 | 16.68 | 1.29 | 0.35 |
| Maternal-care quality (q_m) | 0.32 | 0.09 | 0.23 | 0.00 |
| Quality non-maternal care (q_n) | 3.08 | 3.10 | -0.02 | 0.88 |

Experimental Effects by Maternal Education (ATE)

| | Maternal Education | | | |
|--|--------------------|--------|------------|--------|
| | HS grad. | | Bachelors+ | |
| Child cognitive skill at 36 months (h_1) | 16.43 | (0.00) | 2.58 | (0.48) |
| Hours per week of program care (τ_p) | 19.69 | (0.00) | 16.16 | (0.00) |
| Hours per week of maternal care (τ_m) | -10.08 | (0.00) | -1.86 | (0.53) |
| Hours per week other caretakers (τ_n) | -9.61 | (0.00) | -14.30 | (0.00) |
| Earning hours (L) | 3.93 | (0.12) | 2.01 | (0.61) |
| Maternal-care quality (q_m) | 0.35 | (0.02) | -0.11 | (0.32) |
| Quality non-maternal care (q_n) | 0.18 | (0.25) | -0.50 | (0.56) |
| Number of observations | 240 | | 108 | |

Model: setting

- 1-child, unitary household decision maker (“mother”), 1-period

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Discussion: determinants of child care portfolio

- *Technology*: productivity of mother's time relative to non-maternal time
- *Maternal characteristics*: human capital, age, marital status, family composition
- *Prices*: prices of non-maternal care and wage offer
- *Resources*: non-labor income (spousal income or other sources)
- *Preferences*: leisure, maternal time, child skills, program take-up
- *Policy*: resources and programs available

Model: time constraints for mother & child

Rare to measure & exploit

Mom divides her hours each week (T_p) between 3 activities:

$$\underbrace{T_m}_{\text{maternal care hours}} + \underbrace{L}_{\text{earning hours}} + \underbrace{I}_{\text{all else}} = T_p$$

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Rare to measure & exploit

Mom divides her hours each week (T_p) between 3 activities:

$$\underbrace{\tau_m}_{\text{maternal care hours}} + \underbrace{L}_{\text{earning hours}} + \underbrace{I}_{\text{all else}} = T_p$$

Child must have care for T_c hours from 3 types:

$$\underbrace{\tau_m}_{\text{maternal care hours}} + \underbrace{\tau_p}_{\text{program hours}} + \underbrace{\tau_n}_{\text{other nonmaternal care}} = T_c$$

Model: care quantities & non-program qualities chosen

- Maternal care (m):
 - given price: preferences & wage offer determine shadow price
 - choose hours: τ_m
 - choose quality: q_m , depends on mother's human capital, parenting experience & effort choice

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- Non-maternal, non-program care (n):
 - given price: exogenous π per quality unit
 - choose hours: τ_n
 - choose quality: q_n in terms of hourly price

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- Program care (p): IHDP care
 - given price: 0, also potential (dis)taste in preferences.
 - given quality: q_p , *program care as nonmaternal care*

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- Program care (p): IHDP care
 - given price: 0, also potential (dis)taste in preferences.
 - given quality: q_p , *program care as nonmaternal care*
 - given max. hours: $\bar{\tau}_p = 45$ if treated, 0 otherwise
 - choose hours: $\tau_p \leq \bar{\tau}_p$

Model: child-skill “production” function

Age-3 cognitive skill (h_1) develops from initial skill, care mix, & unobserved influences (η_h)

$$\ln h_1 = \delta_{h_0} \ln h_0 + \underbrace{\delta_m(h_0) \frac{\tau_m}{T_c} \ln q_m}_{\text{maternal}} + \underbrace{\delta_n(h_0) \frac{\tau_n}{T_c} \ln q_n}_{\text{nonmaternal}} + \underbrace{\delta_p(h_0) \frac{\tau_p}{T_c}}_{\text{program}} + \eta_h$$

- η_h assumed mean independent of inputs
- quality of each care type q_* matters as a function of type's child-time share ($\frac{\tau_*}{T_c}$)
- $\delta_*(h_0)$ permits same inputs to have different effects by initial skill

Model: budget constraint (standard)

$$c + q_n \tau_n = R(wL, Y)$$

- c : consumption
- $q_n \tau_n$: expenditure on non-maternal care (price π normalized to 1)
- Program care is free
- R after tax income
- w : hourly wage offer
- $L \geq 0$: labor hours
- $Y \geq 0$: non-labor income, including father's earnings & govt transfers

Model: maternal-care quality production function (more novel)

Maternal-care quality (q_m)

$$\ln q_m = h'_m \delta_1 + \delta_2 NC_{<5} + \delta_3 NC_{\geq 5} + \ln e$$

- h_m : maternal characteristics (education, test scores, age)
- $NC_{<5}$ and $NC_{\geq 5}$: parenting experience or crowd-out

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- h_m : maternal characteristics (education, test scores, age)
- $NC_{<5}$ and $NC_{\geq 5}$: parenting experience or crowd-out
- e : parenting “effort” choice. Embodies ideas that
 - Each parent can provide better or worse care
 - Better parenting is harder than worse parenting
 - Permits relief channel: less parenting can promote better parenting

Model: preferences

Mother values more consumption, leisure hours, & child skill.

Parenting effort imposes psychological cost. Parenting & program time can go either way

$$U = \ln c + \gamma_l \ln l + \gamma_{h_1} \ln h_1 + \gamma_{\tau_m} \ln(\tau_m + 1) - \gamma_{e,1} e^{\tau_m^{\gamma_{e,2}}} + \gamma_p \tau_p$$

- "taste" for maternal time τ_m
- effort is costly: $\gamma_{e,1} > 0$
- effort is increasingly costly with maternal time: For any e , how does disutility rise with maternal-care hours (τ_m)? Linear iff $\gamma_{e,2} = 1$
- γ_p : distaste for using program care (e.g. stigma, hassle)
- Heterogenous preferences: $(\gamma_l, \gamma_{h_1}, \gamma_{\tau_m}, \gamma_{e,1}, \gamma_p) \sim F$

Model: optimal decision making

- Mother jointly decides her labor supply, time and effort in her own maternal childcare, and quantity and quality of non-maternal care (including CDC quantity if treated)
- Mother's utility maximization problem is:

$$\max_{\Gamma} u(c, l, \tau_m, e, h_1, \tau_p)$$

subject to (i) child's time constraint, (ii) mother's time constraint, (iii) budget constraint, and (iv) the skill-production technology and maternal-care quality functions

Discussion: behavioral responses to subsidized child care

Households take-up subsidized child care if

- Subsidized care is of sufficiently high quality (relative to alternatives)
- Other sources of care are more costly
 - non-maternal (non subsidized) care has high price/low quality
 - maternal care is costly in foregone earnings or dis-taste for parenting effort or time
- Policy offering low-cost, low-quality care could lead some households to substitute away from higher-quality non-maternal or maternal care, making household better off but child worse off

Discussion: behavioral responses to subsidized child care

- Subsidized care can also increase maternal care quantity and quality through two channels:
 - Income effect: subsidized care reduces labor supply and increases maternal care
 - Relief effect: subsidized care reduces strain on mothers, allowing higher effort in remaining time
- Subsidized care can also cause increase in *quality* of other types of non-maternal care through an income effect: free care gives the household more resources to spend on higher quality non-maternal care

Estimation overview

- STEP 1: Constraints
 - Estimate child skill and maternal quality production functions
 - Estimate wage and non-labor income functions
- STEP 2: Preferences
 - Estimate preference vector given STEP 1 estimates

Maternal Quality Identification

Maternal-care quality is measured using observed items from the age 36-month HOME inventory

$$\ln q_{mi} = X_i' \delta_{q_m} + \nu_i$$

where, given that maternal effort e is unobserved, the residual is $\nu_i \equiv \ln e_i$

We have two inextricably-linked tasks:

- (1) identify the δ_{q_m} productivity parameters (e.g. the productivity of maternal human capital) in producing maternal-care quality
- (2) identify the level of effort (e) each household is employing

Because maternal characteristics are related to the endogenous effort decision (X is correlated with ν), we cannot directly identify δ_{q_m} from a regression of $\ln q_m$ on X

Maternal Quality Identification

Step 1: Identify the "exhaustion" effect $\gamma_{e,2}$

Re-arranging the analytic solution:

$$\ln e_i = \ln \gamma_{hi} + \ln \delta_m(h_{0i}) - \ln T_c - \ln \gamma_{e,1,i} + (1 - \gamma_{e,2}) \ln \tau_{m,i}$$

Substituting into the maternal-care quality function:

$$\ln q_{mi} = X_i' \delta_{q_m} + \alpha \ln \tau_{m,i} + \chi_i$$

where $\alpha = 1 - \gamma_{e,2}$ and χ_i is the remaining terms

- To solve this endogenous-regressors problem, we use the experimental randomization as an instrument for maternal time.

Maternal Quality Identification

Step 2: Identify productivity of maternal characteristics δ_{qm}

- We use the model to inform the selection of additional variables W to proxy for return and preference for effort and are pre-determined before the experiment:
 - initial skill level h_0 (as these relate to the productivity of effort)
 - variables that relate to effort preferences, including pre-natal maternal behaviors such as smoking, drinking, and drug use
- We then estimate the productivity of maternal characteristics using a regression of an exhaustion effect purged measure of home quality on maternal characteristics X and proxies for effort W :

$$(\ln q_{mi} - \hat{\alpha} \ln \tau_{mi}) = X_i' \delta_{qm} + W_i' \nu + \zeta_i$$

Maternal Quality Identification

Step 3: Identify effort e

The residual or “unexplained” level of each household’s maternal-care quality identifies the level of effort expended:

$$\ln e_i = \ln q_{mi} - X_i' \delta_m.$$

Non-Maternal Quality Identification

- We normalize the cost of care $\pi = 1$, implying that quality q_n is in terms of \$ per hour
 - $\delta_n(h_0)$ then relates \$ per hour to outcomes (IQ, h_1)
- For households that pay for care, we use their expenditure on care per hour to measure q_n
- For households that do not pay for care, we impute their non-maternal quality using observer based measures from a separate contemporaneous survey
 - Study of Early Child Care and Youth Development (SECCYD) provides observational quality of various types of non-maternal time (e.g. grandma, center, nanny)
 - We use type of care observed in IHDP and a rich set of common household characteristics to compute the market price of their non-maternal care

Preference Identification

Given estimates of the technologies, we then use the observed decisions to infer preferences for control group.

- 4 "observed" choices: Labor supply (L_i), maternal time (τ_{mi}), maternal effort (e_i), expenditure on non-maternal quality (q_{ni})
- Use FOC from choice problem to uniquely solve for preferences for each sample member:

$$(\gamma_{li}, \gamma_{\tau_{m,i}}, \gamma_{e,1,i}, \gamma_{h,i}) = g(L_i, \tau_{mi}, e_i, q_{ni})$$

- Solve for γ_{pi} (IHDP program care preference) to rationalize take-up
- In practice, we impose more structure to avoid over-fitting:
 - assume preferences are distributed joint Normal, with mean varying by observables
 - assume treatment group draws preferences from same distribution as control group, up to observables

Preference Identification

An example: Solution for optimal maternal quality demand:

$$q_n^*(L, \tau_n) = R(L) \frac{\gamma_h \Delta_{q_n}}{\pi \tau_n (1 + \gamma_h \Delta_{q_n})}$$

Inverting the non-maternal quality expenditure solution to find preference for child skills for each household i :

$$\gamma_{hi} = \frac{q_{ni} \tau_{ni}}{\Delta_{q_{ni}} (R_i(L_i) - q_{ni} \pi \tau_{ni})}$$

- $R_i(L_i)$ is after-tax income as a function of labor supply
- $\Delta_{q_{n,i}} \equiv \delta_n(h_{0i}) \frac{\tau_{ni}}{T_c}$ is return to human capital

Re-write as

$$\gamma_{hi} = \text{return to child quality}^{-1} \times \frac{\text{expend on child quality}}{\text{consumption}}$$

Baseline Balance Tests

| | Treatment | Control | Difference | P-Value |
|--------------------------|-----------|---------|------------|---------|
| Birth weight, kg. | 1.82 | 1.79 | 0.03 | 0.46 |
| Gestational Age, weeks | 33.03 | 33.06 | -0.03 | 0.90 |
| Cog. skill at 12-months | 0.06 | 0.07 | -0.02 | 0.84 |
| Maternal age, years | 25.57 | 25.87 | -0.30 | 0.54 |
| Maternal cognitive skill | -0.00 | 0.01 | -0.01 | 0.86 |
| 1(married) | 0.43 | 0.51 | -0.08 | 0.04 |
| 1(never married) | 0.49 | 0.42 | 0.07 | 0.07 |
| 1(prev. married) | 0.08 | 0.07 | 0.01 | 0.63 |
| 1(Less than high school) | 0.39 | 0.35 | 0.04 | 0.37 |
| 1(High school grad) | 0.29 | 0.29 | -0.01 | 0.87 |
| 1(Some college) | 0.20 | 0.22 | -0.02 | 0.53 |
| 1(College graduate) | 0.13 | 0.14 | -0.01 | 0.77 |
| # of kids < age 5 | 1.43 | 1.44 | -0.00 | 0.95 |
| # of kids \geq age 5 | 0.48 | 0.48 | 0.00 | 0.95 |

Estimates: Maternal Quality Production

| <i>Panel A: Maternal-Care Quality Validation</i> | | | | |
|--|---------------------|------------------------------|--------------------------------------|--------------------------------|
| Dep. Variable: | (1) 36-Month | (2) 12-Month (Placebo) | (3) (36 - 12) Month Difference | (4) Non-Effort (Placebo) |
| 1(treatment) | 0.253*** (0.063) | 0.016 (0.065) | 0.256*** (0.072) | -0.066 (0.071) |
| N | 652 | 687 | 633 | 652 |
| <i>Panel B: Exhaustion-Effect Estimation</i> | | | | |
| Estimator: | Naive OLS | IV 1st Stage | IV 2nd Stage | |
| Dep. Variable: | 36-Month L&L | Log Hours | 36-Month L&L | |
| Log Hours | -0.157 (0.123) | | -1.536*** (0.415) | |
| 1(treatment) | | -0.165*** (0.019) | | |
| N | 652 | 652 | 652 | |

Estimates: Maternal Quality Production

- Treatment offer estimated to reduce maternal hours by 16.5 percent
- Given the linear-log form of the estimating equation, the 2SLS IV estimate indicates that a 1 percent increase in maternal hours reduces maternal quality by 0.015 standard deviations
- 1 hour increase in maternal hours reduces maternal quality by 0.026 standard deviations
- IV estimate implies a convex cost to effort parameter of $\gamma_{e,2} = -\alpha + 1 = 2.5$
- Higher maternal-care hours makes effort increasingly costly for mothers, reducing the effective quality per hour of maternal care.

Estimates: Maternal Quality Production

| | Estimate | (SE) |
|-----------------------------|----------|---------|
| Maternal cognitive skill | 0.31 | (0.058) |
| Maternal years of education | 0.01 | (0.028) |
| # of kids < age 5 | -0.17 | (0.054) |
| # of kids \geq age 5 | -0.19 | (0.050) |
| Maternal age, years | 0.02 | (0.008) |

- Maternal cognitive skill raises productivity in parenting
- Age too: 30-year old 0.10 σ higher care quality than 20-year old
- Reduction in maternal quality with more children in the household

Estimates: child skill production function

| | Estimate | (SE) |
|---|----------|---------|
| <i>Child cognitive skill for above-median endowment</i> | | |
| δ_{h_0} (Self-Productivity) | 6.84 | (1.658) |
| δ_m (Maternal Care) | 11.90 | (1.210) |
| δ_n (Non-Maternal Care) | 14.84 | (3.436) |
| δ_p (Program Time) | 45.90 | (6.720) |
| <i>Child cognitive skill for below-median endowment</i> | | |
| δ_{h_0} (Self-Productivity) | 7.21 | (1.170) |
| δ_m (Maternal Care) | 8.86 | (1.358) |
| δ_n (Non-Maternal Care) | 16.57 | (4.376) |
| δ_p (Program Time) | 40.32 | (7.163) |

Estimates: child skill production function

- **Non-Maternal Care** Given the normalization on the price of non-maternal care ($\pi = 1$), an additional 1 percent increase in non-maternal expenditure raises IQ scores by δ_n/T_C for every hour of non-maternal care, where $T_C = 87.5$ (the total weekly hours each child receives)
 - Given δ_n estimate, a 1 percent increase in non-maternal care quality increases IQ by about 0.19 points (0.013 standard deviations)

Estimates: child skill production function

- **Program Care** For IHDP care, we can solve for the equivalent private market care: hourly care expenditure x from $\delta_n \ln x = \delta_p$, or $x = \exp(\delta_p/\delta_n)$.
 - IHDP care is equivalent to care costing about \$15, well above the average quality of non-program care families purchase in our data
 - For comparison, using the actual cost of the CDC care, at about \$336 per week (in 2018\$), and with about 15.7 hours of care per week on average, the hourly cost of the CDC is \$21.40.

Estimates: wage & nonlabor income

Wage Offer

| | Estimate | (SE) |
|--------------------------|----------|--------|
| Maternal Cognitive Skill | .052 | (.021) |
| Maternal Education | .061 | (.012) |
| Maternal Age | .049 | (.008) |
| Intercept | .623 | (.187) |

Non-Labor Income

| | Estimate | (SE) |
|--------------------|----------|--------|
| Maternal Education | 0.054 | (.017) |
| Maternal Age | 0.012 | (.012) |
| Married | 1.031 | (.127) |
| Single | 0.156 | (.143) |
| Intercept | 4.396 | (.297) |

Table: Parameter Estimates - Wage Offer and Non-Labor Income

Average Elasticities Implied by the Estimated Model

| | Baseline Level (1) | Wage Offer Elasticity (2) | Care Cost Elasticity (3) | Non-Lab. Inc. Elasticity (4) |
|---------------------------------------|--------------------------|---------------------------------|--------------------------------|------------------------------------|
| Child cog. skill, 36-months (h_1) | 87.00 | 0.07 | -0.08 | 0.00 |
| Maternal-care hours (τ_m) | 60.76 | -0.15 | 0.10 | 0.05 |
| Nonmaternal-care hours (τ_n) | 26.74 | 0.59 | -0.40 | -0.19 |
| Earning hours (L) | 16.92 | 2.81 | -0.39 | -2.37 |
| Maternal-care quality (q_m) | 0.10 | 1.21 | -0.87 | -0.57 |
| Nonmaternal-care quality (q_n) | 3.09 | 0.68 | -0.92 | 0.32 |
| Effort (e) | 1.23 | 0.23 | -0.16 | -0.07 |

Sample Fit: Do control-group's observed choice match simulated?

Within-Sample Fit and Validation Test

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|---------|-------|-----------|-------|-----------------------|-------|
| | Mean | SD | Mean | SD | Mean | SD |
| Type of outcome: | Data | | Simulated | | Simulated | |
| Sample: | Control | | Control | | Treated No Program | |
| <i>Panel A: Control Condition</i> | | | | | | |
| Program Hours (τ_p) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Non-Program Hours ($\tau_m + \tau_n$) | 87.50 | 0.00 | 87.50 | 0.00 | 87.50 | 0.00 |
| Child cognitive skill, 36-months (h_1) | 86.59 | 19.16 | 87.00 | 20.17 | 87.47 | 21.33 |
| Maternal-care hours (τ_m) | 62.07 | 15.54 | 60.76 | 14.53 | 61.65 | 15.07 |
| Nonmaternal-care hours (τ_n) | 25.43 | 15.54 | 26.74 | 14.53 | 25.85 | 15.07 |
| Earning hours (L) | 16.68 | 17.05 | 16.92 | 16.77 | 17.60 | 16.39 |
| Maternal-care quality (q_m) | 0.09 | 0.99 | 0.10 | 1.02 | 0.12 | 1.06 |
| Nonmaternal-care quality (q_n) | 3.10 | 1.93 | 3.09 | 1.94 | 3.22 | 1.92 |

Sample Fit: Do treatment-group's observed choice match simulated?

| | (1) | (2) | (3) | (4) |
|--|-----------|-------|-----------|-------|
| | Mean | SD | Mean | SD |
| Type of outcome: | Data | | Simulated | |
| Sample: | Treatment | | Treatment | |
| Program Hours (τ_p) | 18.18 | 8.84 | 18.68 | 8.99 |
| Non-Program Hours ($\tau_m + \tau_n$) | 69.32 | 8.84 | 68.82 | 8.99 |
| Child cognitive skill, 36-months (h_1) | 96.10 | 18.38 | 94.85 | 20.87 |
| Maternal-care hours (τ_m) | 52.40 | 11.64 | 57.49 | 10.88 |
| Nonmaternal-care hours (τ_n) | 16.92 | 11.00 | 11.32 | 12.83 |
| Earning hours (L) | 17.97 | 16.11 | 16.40 | 15.98 |
| Maternal-care quality (q_m) | 0.32 | 0.90 | 0.21 | 1.07 |
| Nonmaternal-care quality (q_n) | 3.08 | 2.15 | 3.47 | 2.12 |

Extrapolation

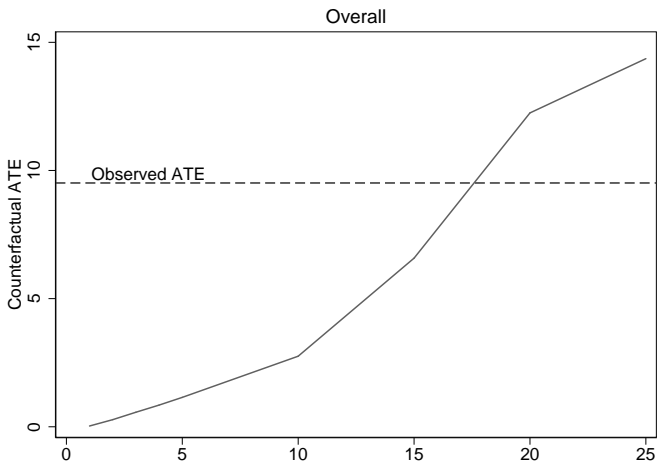
IHDP experiment/RCT provides average treatment effect of this particular program for the endogenous complier group of this program

- Experimental results are "local" to this program/treatment and "local" to this complier group

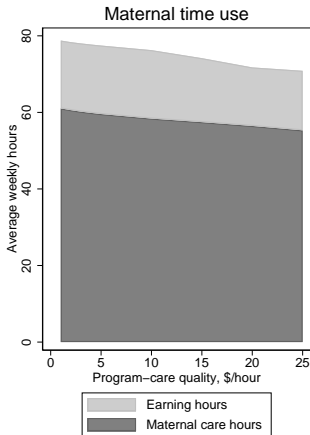
Two distinct extrapolation tasks:

- **Within Treatment Extrapolation:** For a given treatment (policy/program), extrapolate effects to non-compliers
 - Intuition: reduce "cost" to program such that more households take-up the program
- **Across Treatments Extrapolation:** For a given household, extrapolate effects of different treatments (policy/program)
 - Intuition: change care quality offered and observe effects on household

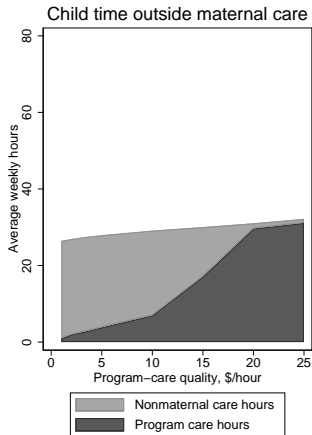
Vary Offer of Program Quality: ATE on IQ of Offer



Vary Offer of Program Quality: ATE on Time Allocation



Note: all other time uses ("leisure") omitted.



Note: maternal-care hours omitted.

Quality Matters: Québec Case

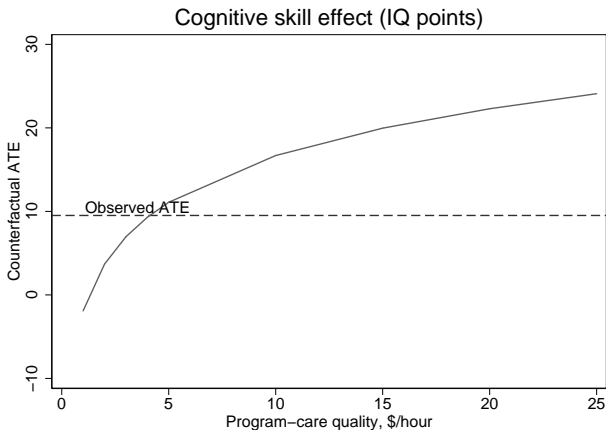
- Starting in the 1990s, the Canadian province of Québec provided universal care to children of all ages
- Using differences between Québec and other Canadian provinces, Baker et al (2008, 2015) find that this program had substantial deleterious effects on child outcomes

Quality Matters: Québec Case

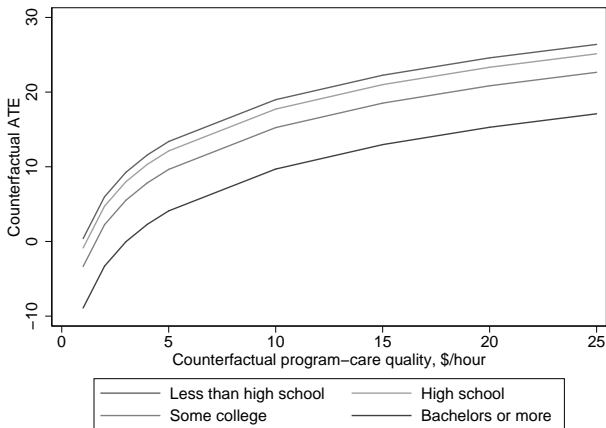
Two key differences between the Québec care and IHDP care:

- **Care Quality:** Québec care was of lower quality than the programs considered in the U.S. (IHDP and Head Start)
 - Based on a audit study of the centers: 61 percent had only a “minimal” educational component, and an additional 12 percent were of “inadequate quality.”
- **Take-up/Complier Group:** The Québec program take-up was twice as large for educated mothers (some college or more) than for less educated mothers (high school or less)
 - Low income households already had access to subsidized care at time of expansion
- Baker et al (2015) conclude: “Our findings for young children clearly contrast with those of the Perry, Abecedarian, and Head Start studies. These latter programs both provide higher quality care and are targeted at less advantaged children.”

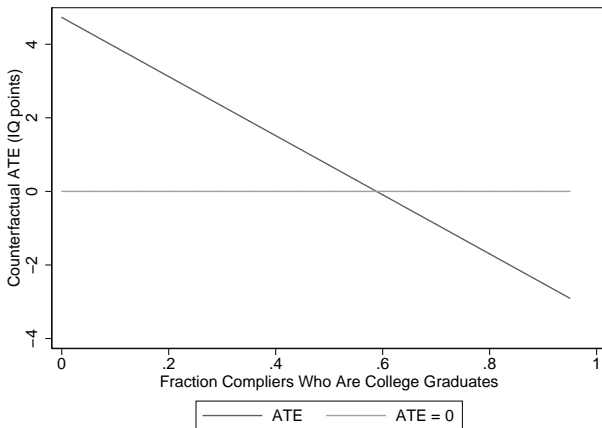
Simulated average effects of full take-up of program care by quality, overall



Simulated average effects of full take-up of program care by quality, by mother education



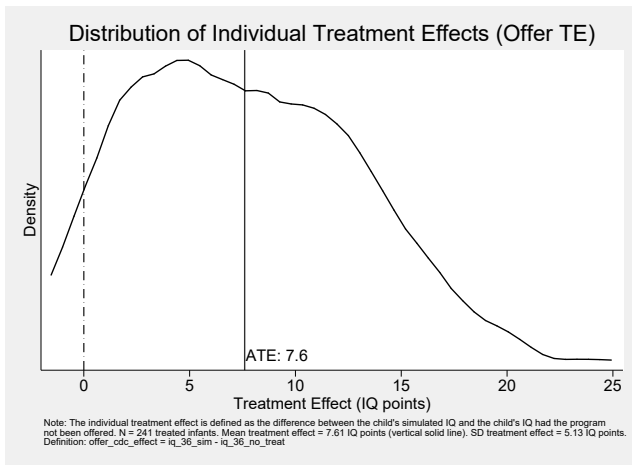
Simulated average effects varying composition of complier group



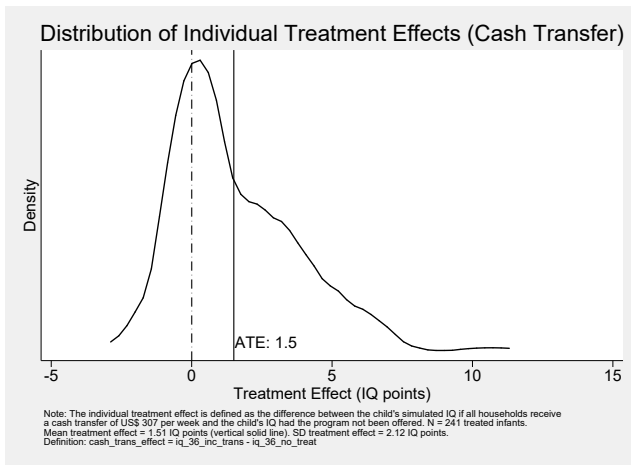
Counterfactual policy simulations

| | Control No Offer (1) | Program Offer (2) | Cash Transfer (3) |
|--|----------------------------|-------------------------|-------------------------|
| Program Hours (τ_p) | 0.00 | 18.68 | 0.00 |
| Non-Program Hours ($\tau_m + \tau_n$) | 87.50 | 68.82 | 87.50 |
| Child cognitive skill, 36-months (h_1) | 87.47 | 94.85 | 88.97 |
| Maternal-care hours (τ_m) | 61.65 | 57.49 | 62.04 |
| Nonmaternal-care hours (τ_n) | 25.85 | 11.32 | 25.46 |
| Earning hours (L) | 17.60 | 16.40 | 7.60 |
| Maternal-care quality (q_m) | 0.12 | 0.21 | 0.10 |
| Nonmaternal-care quality (q_n) | 3.22 | 3.47 | 4.72 |
| Effort (e) | 1.27 | 1.42 | 1.26 |

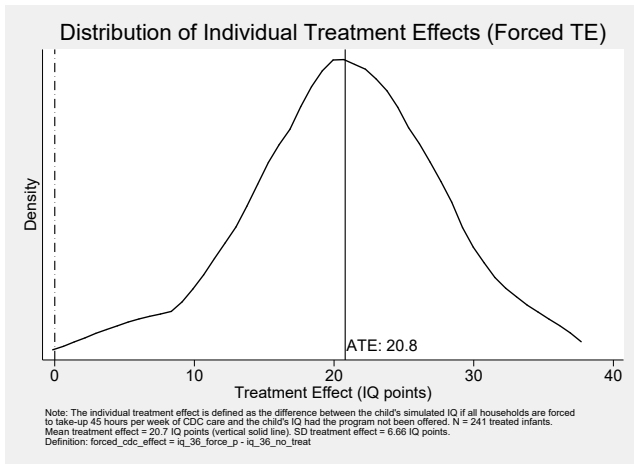
Distribution of Treatment Effects of Offer of Program Care



Distribution of Treatment Effects of Income Transfer



Distribution of Treatment Effects w/Full Program Take-up (45 hours)

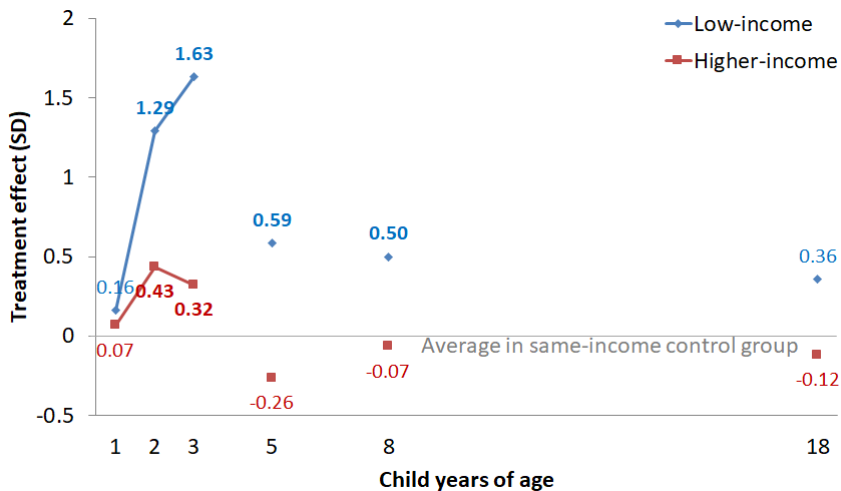


Conclusions

- Child time is scarce, and a key investment opportunity
- We identify an important spillover of care subsidies on parental care:
 - Parenting can be exhausting. Parenting less can mean parenting better. Quantity-quality tradeoff
- Quality and take-up matter:
 - Offer of attractive (high take-up), high-quality care has largest effects on kids' development
 - Offer of low-quality care can have negative effects, especially if complier group already has access to good care
- Moving away from in-kind policy has smaller effects on development:
 - Cash transfers make parents happier but not as effective in increasing child development

Appendix

IHDP Long-run IQ effects by family income



Data

We combine several types of data:

- IHDP: measures of h_0 (birth weight, gestation age, length, age-1 Bayley MDI) and h_1 (age-3 Stanford Binet IQ), and time allocation
- NLSY: additional measures of h_0 (birth weight, gestation length, motor social development) and h_1 (Peabody Picture Vocabulary, Motor Social Development), labor supply, wages
 - NLSY subsample constructed to match IHDP sample (low birth weight and premature)
 - Comparison of IHDP and NLSY samples is very close using common variables we did not match on (e.g. labor supply)

Data

- Study of Early Child Care and Youth Development (SECCYD): collected panel data on child and family characteristics and their use of various care settings
 - Provides observational quality of various types of non-maternal time (father / partner, grandparent in-home, grandparent out-of-home, other relative in-home, other relative out-of-home, non-relative in-home, non-relative out-of-home, child care center and others).

Data

- Sample of 1,364 children aged 0 to 3 during 1991 to 1994 in 10 study sites around the country, 2 of which overlap with the IHDP's 8 sites
- For each child and each nonmaternal care setting used, the SECCYD measured care quality using the Observational Record of the Childcare Environment (ORCE) (NICHD, 2003; Vandell, 2004)
- We match these data based on the observed non-maternal care characteristics and characteristics of the household to impute the quality of non-maternal care in the IHDP data