Parental Child Care and Child Development in the US

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Paid Childcare in the U.S.

- Most childcare, particularly for very young children, is privately provided.
- There is tremendous variation in quality, measured by a number of different characteristics, and price.
- Regulation of childcare providers varies greatly across municipalities and states.
- Between 1990 and 2011 (Herbst, 2015), the share of families paying for childcare:
  - Declined from 37 to 27 percent (with children aged 0-14)
  - Declined from 59 to 41 percent (with children aged 0-5)
- While many U.S. households with young children use formal childcare, the majority do not.

Overview

- The human capital of children, and its growth, is closely connected with adult outcomes (e.g., earnings, crime, marriage)
- Parental choices, regarding labor supply, the use of childcare, etc., are crucial in early childhood development.
- When the child enters the period of formal schooling, the choices and actions of other agents may be important determinants of the child's development.
- The child's own choices regarding what we may loosely call human capital investment activities become increasingly important during late child and adolescence.

Overview

Three major empirical tasks:

- Estimate production technology for child outcomes where child care (time, expenditures on children) form the inputs
  - How productive are various types of child care?
- Estimate household decision making process, including preferences
  - How do households make decisions about child care types?
- Evaluate possible policy interventions
  - How would households react to various forms of government transfers?
  - Which children would benefit from the government policy?

Existing Literature

- Many studies on parental time: some studies use mother's employment as proxy because of data limitations
- Direction of relationship not clear: mother's employment reduces time with children but additional income increases expenditures on the child (Brooks-Gunn, Han and Waldfogel 2001, Ermisch and Francesconi 2005)
- Which effect prevails? Estimates of the effect of maternal employment on child outcomes range from
  i) maternal employment harmful (Baydar and Brooks-Gunn,1991; Desai et. al., 1989)
  ii) no effect (Blau and Grossberg, 1992)
  iii) beneficial (Vandell and Ramanan, 1992)
- Studies on father's time also mixed:
  i) no effect (Averett et al, 2005)
  ii) long term benefit (Yeung, Hill and Duncan, 1999)

Existing Literature

- Bernal and Keane (2010) and Todd and Wolpin (2003) allow for unobserved endowment effects, potentially endogenous input choices, and for the cumulative impacts of investments in children
- Cunha, Heckman, and Schennach (2010) estimate models of skill formation where inputs are endogenous and only proxied by various measures. They find that cognitive and non-cognitive outcomes are largely determined early in life.
- Bernal (2008) estimates a model of maternal decision-making regarding labor supply and child care choices jointly with a child development technology.
- We expand on her work in Del Boca, Flinn, and Wiswall (2014) - henceforth referred to as DFW.

Overview: Data Sources

- We explore the allocation of parental time and its relationship with the child's cognitive test scores using data taken from the Panel Study of Income Dynamics, and a component of the PSID, the Child Development Study (PSID-CDS).
- This dataset provides nationally representative information on parental employment and earnings combined with detailed time diaries to study the types of parental care provide to children.
- In 1997, the PSID began collecting data on a random sample of the PSID families that have children under the age of 13. Follow-up in 2002-03.
- CDS provides extensive time diary information: each child (or caregiver if child too young) fills out 24 hour diary for one week day and one weekend day. Over the 24 hour period, the child records WHO time is spent with, and WHAT the child is doing (activity, intensity).

Overview: Analysis

- We first use these data to study how parental time investments vary with employment of the mother and father.
- Using a model-based estimation framework, we relate the time investments of parents and their money expenditures on the child to growth in cognitive ability test scores.
- In this way, we can evaluate the relative productivity of various inputs into the child development process.
- We have used the model estimates to examine the potential impacts on child development of a variety of hypothetical policies that transfer resources to households with children.

Parental Employment

	Fraction Working >0 Hours					
	One Child		Younger Child		Older Child	
Child Age	Mother	Father	Mother	Father	Mother	Father
3	0.750	0.937	0.651	0.977	–	–
4-5	0.821	0.982	0.781	0.979	0.750	0.979
6-8	0.822	0.985	0.792	0.971	0.712	0.975
9-11	0.882	0.961	0.783	0.992	0.796	0.984
12-15	0.835	0.987	0.891	0.957	0.833	0.978

Parental Labor Supply

	Average Hours Working					
	One Child		Younger Child		Older Child	
Child Age	Mother	Father	Mother	Father	Mother	Father
3	26.38	44.38	23.53	44.98	–	–
4-5	37.63	44.58	24.48	45.76	35.19	44.91
6-8	38.44	45.69	25.96	45.02	32.64	46.26
9-11	38.08	44.46	28.02	45.26	32.31	46.43
12-15	39.83	43.13	35.76	47.52	36.36	46.33

Parental Time: Active Time

	Active Time (Avg.)					
	One Child Families		Two Child Families			
			Younger Child		Older Child	
Child Age	Mother	Father	Mother	Father	Mother	Father
3	29.29	16.90	23.19	13.20	–	–
4-5	21.37	11.08	17.64	8.40	17.46	10.78
6-8	16.47	12.11	11.06	6.95	13.03	8.70
9-11	15.72	8.59	8.63	6.30	10.50	7.40
12-15	12.30	8.93	5.61	3.50	8.11	5.80

Parental Time: Passive Time

	Passive Time (Avg.)					
	One Child Families		Two Child Families			
			Younger Child		Older Child	
Child Age	Mother	Father	Mother	Father	Mother	Father
3	12.45	5.16	17.99	5.50		
4-5	13.22	6.37	20.10	8.12	16.93	8.28
6-8	9.47	8.07	11.10	6.07	16.68	6.96
9-11	10.88	8.08	7.08	4.84	9.69	5.22
12-15	15.22	13.19	5.59	5.57	7.18	5.35

Parental Time: Joint Time

Younger {passive,active,none}	Older {passive,active,none}	Mother's Time	Father's Time
active	-	4.49	2.38
passive	-	4.08	1.90
-	active	1.20	1.22
-	passive	1.87	1.73
active	active	11.45	7.09
active	passive	2.45	0.93
passive	active	1.86	1.16
passive	passive	10.72	4.65

Overview of Model

We estimate a model of the cognitive development process of children nested within a model of life cycle behavior.
Key elements:

- i) multiple parental inputs into child development, including mother's and father's time and child specific goods expenditures,
- ii) a production technology where the marginal productivity of parental time, child goods, and previous child quality varies as the child ages
- iii) distinct labor supply choices for mothers and fathers
- iv) distinct household preferences for parental leisure, consumption, and child quality
- iv) heterogeneity in the child's initial human capital
- v) parents face partially endogenous constraint sets that evolve over time
- vi) measurement process where child quality is only imperfectly measured in data

Model - 1

- We assume there are T stages (years) in the child quality investment process
- After period T, the child reaches adulthood and begins adult life with the final value k_{T+1}
- In each period parents select:
  - (h_{1t}, h_{2t}) Time supplied to the labor market by the parents in period t
  - $(\tau_{1t}, z_{1t}, \tau_{2t}, z_{2t})$ Active (τ) or passive (z) time spent in investment in the child in period t
  - e_t Household expenditures on child investment goods in period t

Model - 2

- Flow utility function (household)

$$\begin{aligned} u_t &= u(l_{1t}, l_{2t}, c_t, k_t) \\ &= l_{1t}^{\alpha_1} l_{2t}^{\alpha_2} c_t^{\alpha_3} k_t^{\alpha_4}, \end{aligned}$$

  where l_{jt} is the leisure of parent j in period t, c_t is total (public) consumption in period t, and $\alpha_4 = 1 - \alpha_1 - \alpha_2 - \alpha_3$.

- Child quality production

$$k_{t+1} = \tau_{1t}^{\delta_{1t}} \tau_{2t}^{\delta_{2t}} z_{1t}^{\delta_{3t}} z_{2t}^{\delta_{4t}} e_t^{\delta_{5t}} k_t^{\delta_{6t}}$$

Model - 3

- Wage offers vary over the parents' life-cycle and by parental education
- Time constraint of parents

$$TT = l_{jt} + h_{jt} + \tau_{jt} + z_{jt}, \;\; t = 1, \ldots, T; \;\; j = 1, 2.$$

- Expenditure budget constraint

$$c_t + e_t = w_1 h_{1t} + w_2 h_{2t} + I_t, \;\; t = 1, \ldots, T$$

Estimation Issues

- In household i with a child of age $t+1$, the production technology is

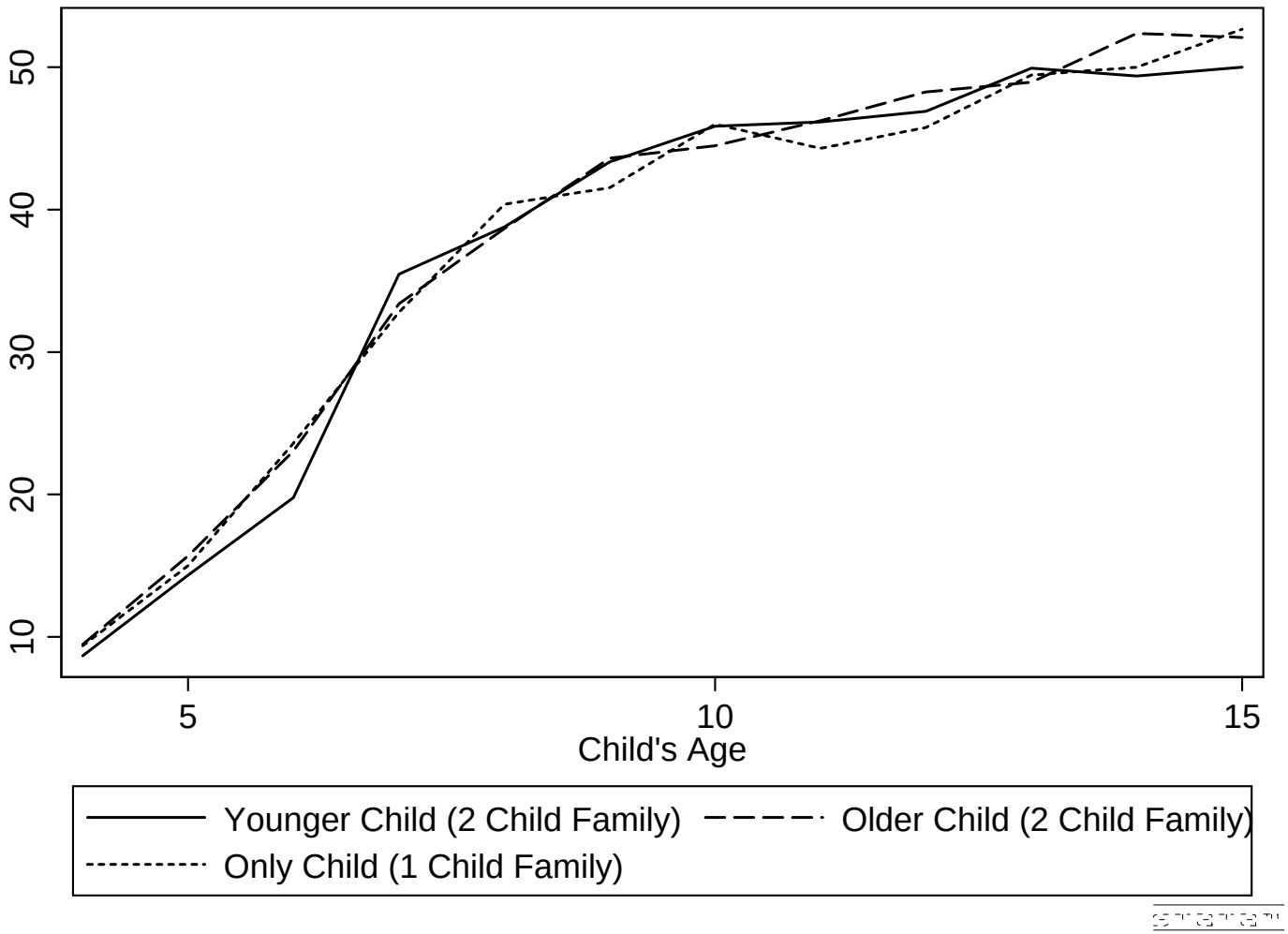
$$\begin{aligned} \ln k_{i,t+1} &= \delta_{0,t} + \delta_{1,t} \ln \tau_{i,1t} + \delta_{2,t} \ln \tau_{i,2t} + \delta_{3,t} \ln z_{i,1t} + \delta_{4,t} \ln z_{i,2t} \\ &\quad + \delta_{5,t} \ln e_{i,t} + \delta_{6,t} \ln k_{i,t} \end{aligned}$$

- The choices of inputs are functions of the δ_t and of the future values of $\delta_{6,s}$, $s = t+1, ..., T$, as well as the preferences of household i.
- In order to consistently estimate the production function, we also must model and estimate household preferences.
- Doing so allows us to consider hypothetical policies and the household's (hypothetical) reaction to them.

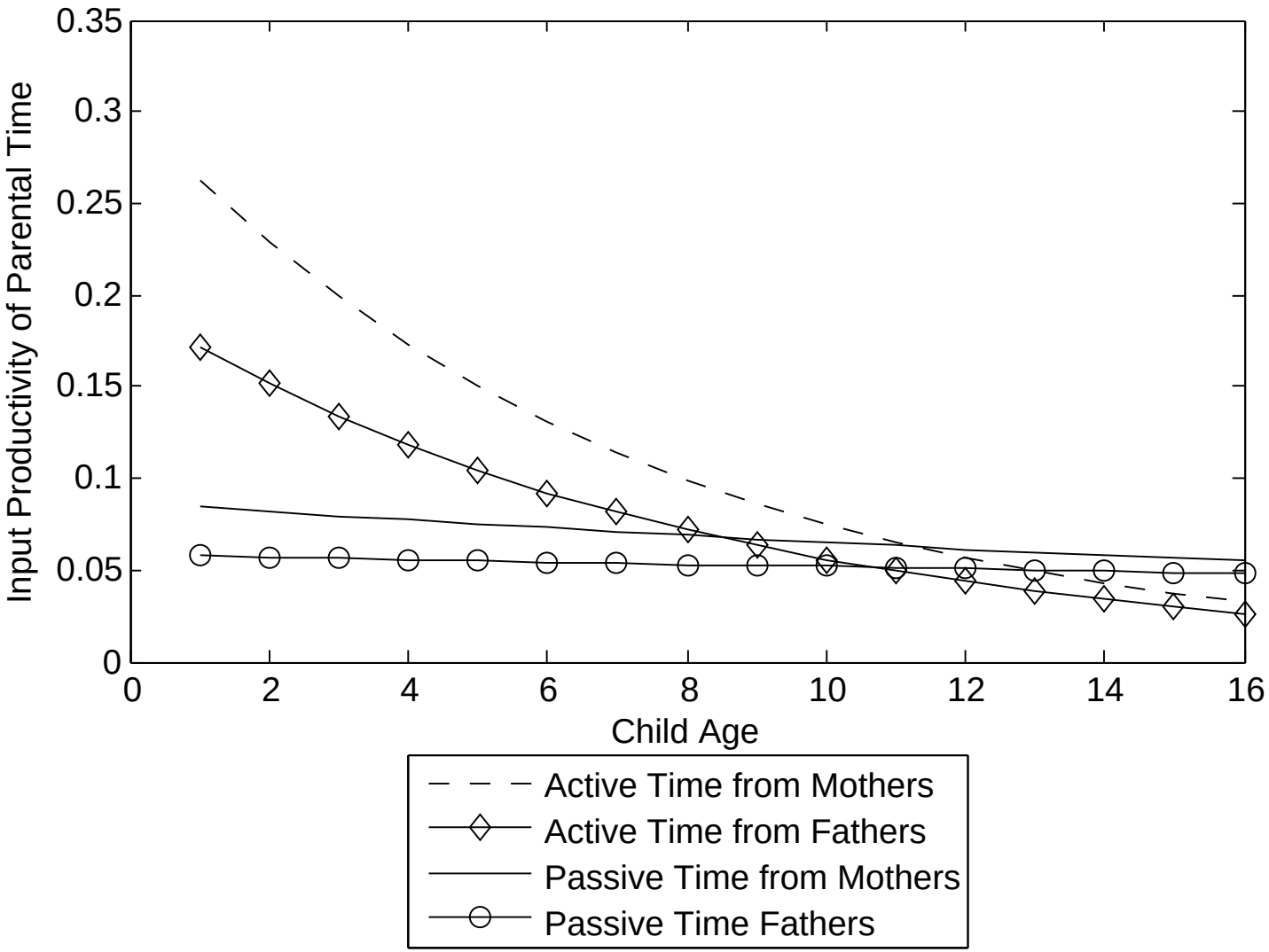
Estimation Issues - 2

- In estimation, we use measures of
  - Cognitive test scores (two points in time)
  - Parental wages (for many years, from the PSID)
  - Parental labor supply (for many years, from the PSID)
  - Nonlabor income (PSID)
  - Time spent with the child actively and passively, for each parent (two points in time)
- We use the Letter-Word score to measure cognitive ability (57 vocabulary items)
- Only a small number of (intact) households, but a number of endogenous variables.

Average Letter Word Score by Child Age



Estimated Child Development Parameters by Child Age (1 Child Model)



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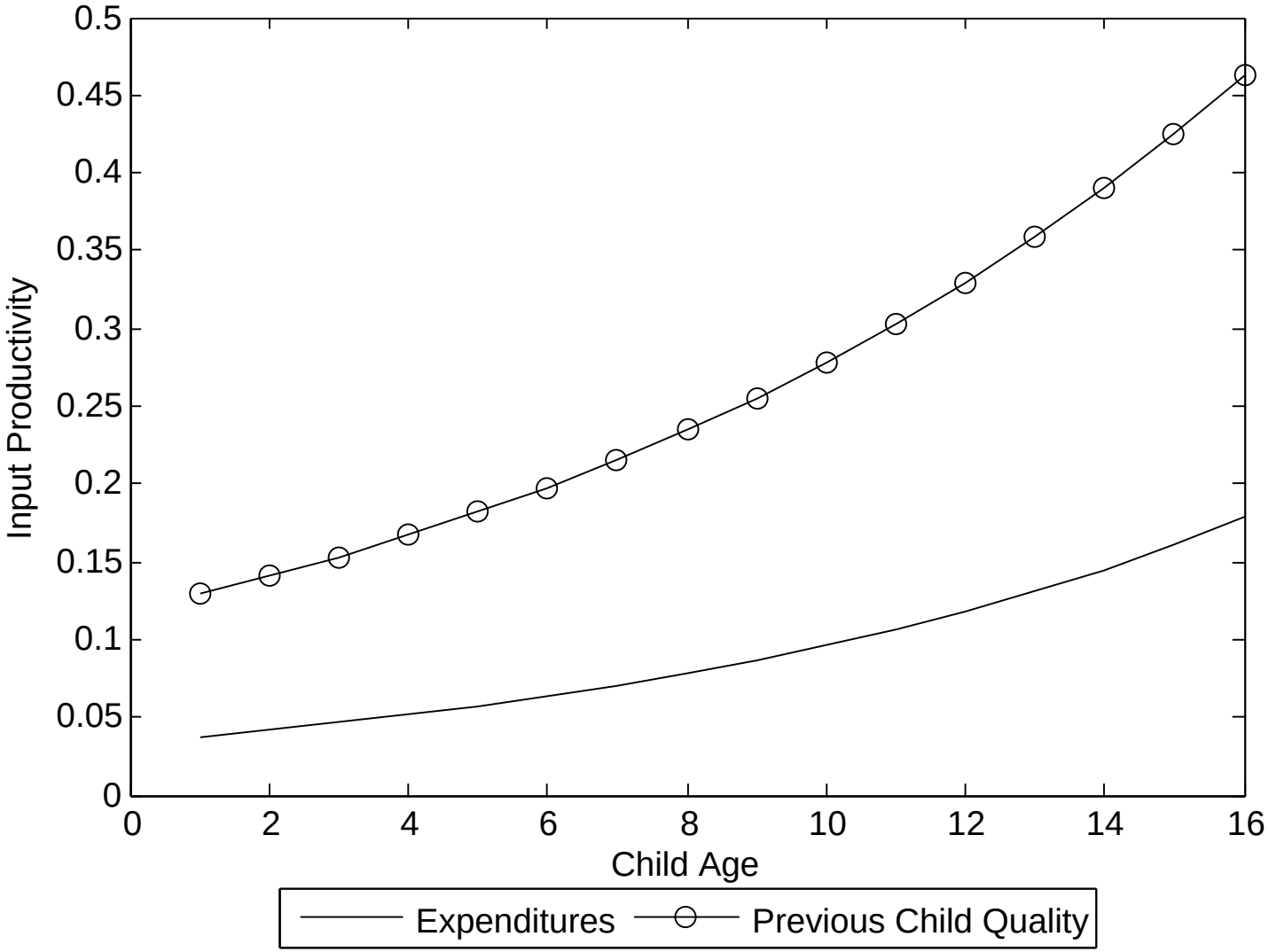


Transfer Policies and Child Development

- In DFW (2015), we use the estimates from DFW (2014) to examine the potential impact of transfer policies on child development within intact families (two parents and one child in our examples)
- We consider three types of policies:
  - Unrestricted transfers of money to the household with a child of age t
  - Restricted transfers of money or child investment goods that can only be spent on child investment
  - Conditional transfers, that involve money transfers but only when certain conditions are satisfied
    - Conditions on inputs are not considered by us (but see PROGRESA in Mexico)
    - Conditions on outputs, which for us involve performance on tests of cognitive ability.

Transfer Policies - Unrestricted Transfers

- Unrestricted transfers of X dollars to the household with a child of age t are simply treated as nonlabor income by the household.
- All households value child quality, so that some of this money is used to increase child quality, how much depends on the household's preferences as reflected by the vector α.
- In general, this is an inefficient way to increase child quality, but it is easy to administer.

Transfer Policies - Restricted Transfers

- In this case, X dollars worth of child investment goods are transferred to the household.
- If the household was planning to spend more than X dollars on child goods, this is essentially an unrestricted transfer.
- However, if the household is poor and/or places low weight on child quality, the restriction that X be spent on child goods is binding.
- These transfers typically result in larger increases in child quality, but are harder to administer and police, depending on the nature of the transfers.

Policy Experiments

	(1) Untargeted Trans. $250 in Non-Labor Income All Ages	(2) Targeted Transfer $250 in Child Goods All Ages
	Percent Change from Baseline	
Mean Latent Child Quality (Age 16)	1.61	4.628
Mean Hours Work (Mother)	-15.12	-10.36
Mean Hours Work (Father)	-12.62	-7.55
Mean Active Time w/ Child (Mother)	6.13	4.85
Mean Active Time w/ Child (Father)	8.22	6.17
Mean Passive Time w/ Child (Mother)	5.86	5.63
Mean Passive Time w/ Child (Father)	7.13	6.58
Mean Leisure (Mother)	5.32	3.01
Mean Leisure (Father)	8.53	4.33
Mean Child Expenditures	4.90	28.77
Mean Household Consumption	6.88	4.16
Mean Utility	6.13	4.41

Transfer Policies - Restricted Transfers and DFW

- We don't explicitly have childcare decisions in this model of development
- We consider it part of expenditures on child investment goods, e_t.
- Our estimates of returns to e_t are considerably less than returns to parental time when the child is very young.
- This may indicate that time in child care is considerably less productive than mother's or father's active time investment when the child is young.
- Restricted transfers may be providing funding for childcare activities, but these activities don't crowd out parental investments in DFW.

Transfer Policies - Conditional Transfers

- An experimental program in Torino, OpportunitàZeroSei, transfers money to experimental households that satisfy a sequence of conditions
- These conditions all involve what we view as inputs into the child development process, such as completion of courses in parenting and financial education.
- These are conditional transfers for *inputs*, in some form, into the child development process.
- In DFW 2015, we examine the performance of conditional cash transfer (CCT) policies for measured cognitive outcomes.
- These types of incentives are often used for teachers and educators in the U.S.

Transfer Policies - Conditional Transfers

- These simple policies directed to children of age t, and are paid given a performance criteria that may involve k_t and k_{t+1}.
- All households satisfying the requirement receive a payment of ϕ.
- For example, the performance requirement may be

$$k_{t+1} \geq k^*,$$

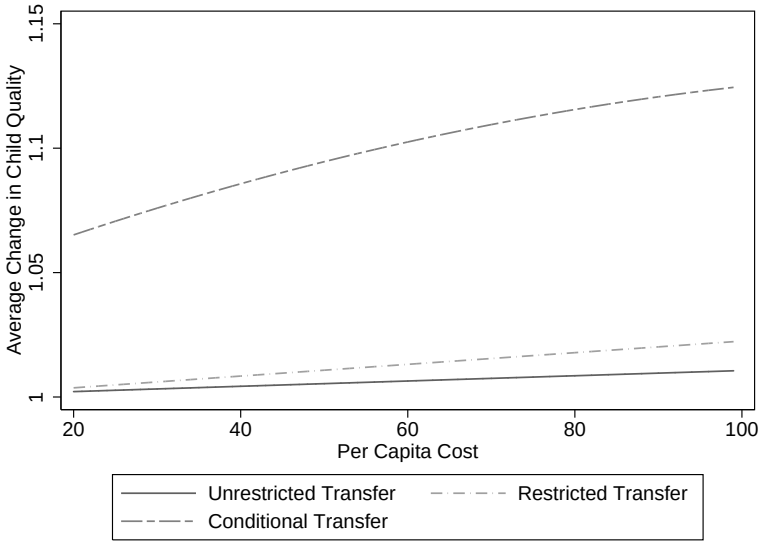
  which is some fixed level.
- A growth requirement may have the form

$$\frac{k_{t+1}}{k_t} \geq \rho^*.$$

Optimal Policy Design

- In our analysis, we assume that the policy-maker only cares directly about the child quality distribution.
- Our examples assume that the policy-maker is interested in increasing average child quality at age $t+1$ relative to what it would be at $t+1$ in the absence of any policy.
- We also impose the condition that the policy-maker achieve this objective at the minimum possible expenditure.
- For CCTs, this requires that the policy-maker optimally choose a criterion, k^* or ρ^*, and the transfer ϕ that is paid to the household if it satisfies the requirement.
- The possible *policy space* is infinite, we just evaluate a few simple examples.

Figure 9: Comparison of Unrestricted, Restricted, and Conditional Transfers



Notes: An unrestricted transfer is an increase in the household's non-labor income, which can be used for any purpose (household consumption or child expenditures). A restricted transfer is a transfer of φ_R in non-labor income with a restriction that the household spends at least φ_R on child goods Transfer is provided at age 10 ($t = 10$). A conditional transfer program transfers ϕ_G dollars to a household in period $t+1$ if the household meets the target of increasing child quality by $k_{t+1}/k_t \geq \rho_G$. The conditional policy here is the minimum cost combination of policy target and reward to achieve a given improvement in average child quality.

Transfer Policies - Conditional Transfers

- Using our model estimates, we find that (output-based) CCTs are considerably more efficient than restricted or unrestricted cash transfers.
- On the other hand, these policies are much more difficult to design and administer.
- Some policy-makers also feel that they are inherently unfair, because some households are inherently more interested in child quality or are able to produce it more easily than in other households.
- The fact that policy-makers cannot ever observe household preferences or human capital production possibilities directly makes the design of effective policy exceedingly difficult.