Parenting with Patience: Parental Incentives and Child Development

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Motivation

- As children reach adolescence, they gradually
  1. become less dependent on their parents,
  2. start investing more in themselves, and
  3. become more patient.

- Most work either considers children as passive recipients of investment (from parents or schools).

- Most economic models assume agents' discount factors are exogenous and fixed over time.

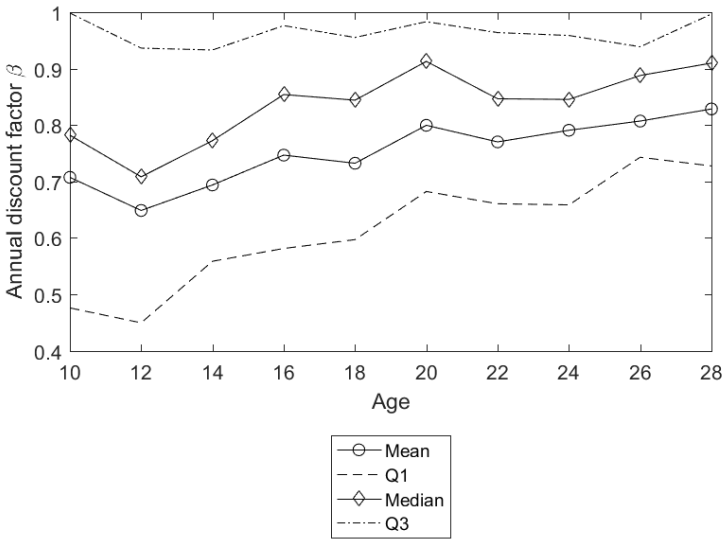
- We model the household as consisting of two forward-looking, heterogeneous agents, the child and the parents, who can both make active investments in the child's human capital.

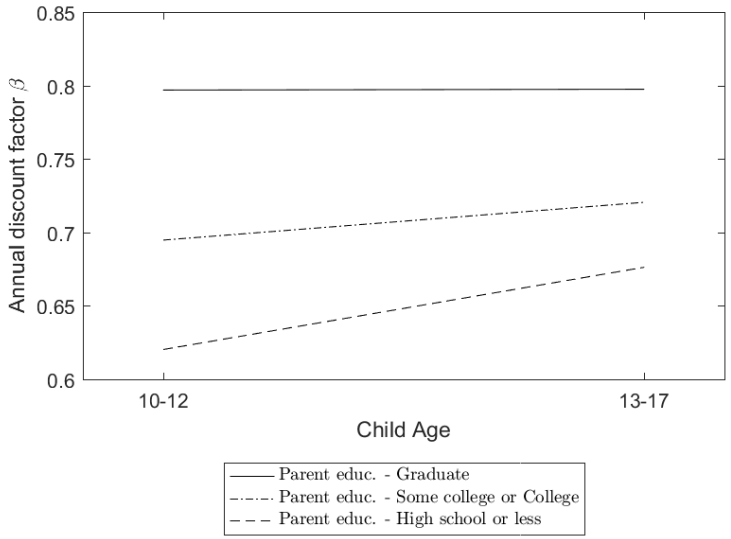
- Two types of human capital with interesting complementarity:
  - cognitive skills (child's test scores)
  - a particular type of noncognitive skills (child's discount factor).

Motivating evidence: Child discount factors

Annual discount factors of children and young adults

- display high amounts of heterogeneity conditional on age,
- are increasing throughout adolescence, and
- are positively correlated with parental educational attainment.





Source: Steinberg et al. (2009) experimental data. Only children ages 10-17 with known parental SES ($N = 502$).

Motivating evidence: Adult discount factors

Annual discount factors of adults (ages 25-65)

- display high amounts of heterogeneity conditional on education,
- are (weakly) positively correlated with educational attainment.

Figure: Annual Discount Factors of Adults

	Mean	St.Dev.
All individuals	0.936	0.064
High school or less	0.928	0.071
Some college or College	0.935	0.064
Graduate	0.945	0.057

Source: Osaka Preference Parameter Study, 2010 U.S. Survey. Only adults ages 25-65 with known SES ($N = 4625$).

Motivating evidence: Household time use (1)

As children age, they spend less time with their parents, and invest more time in themselves.

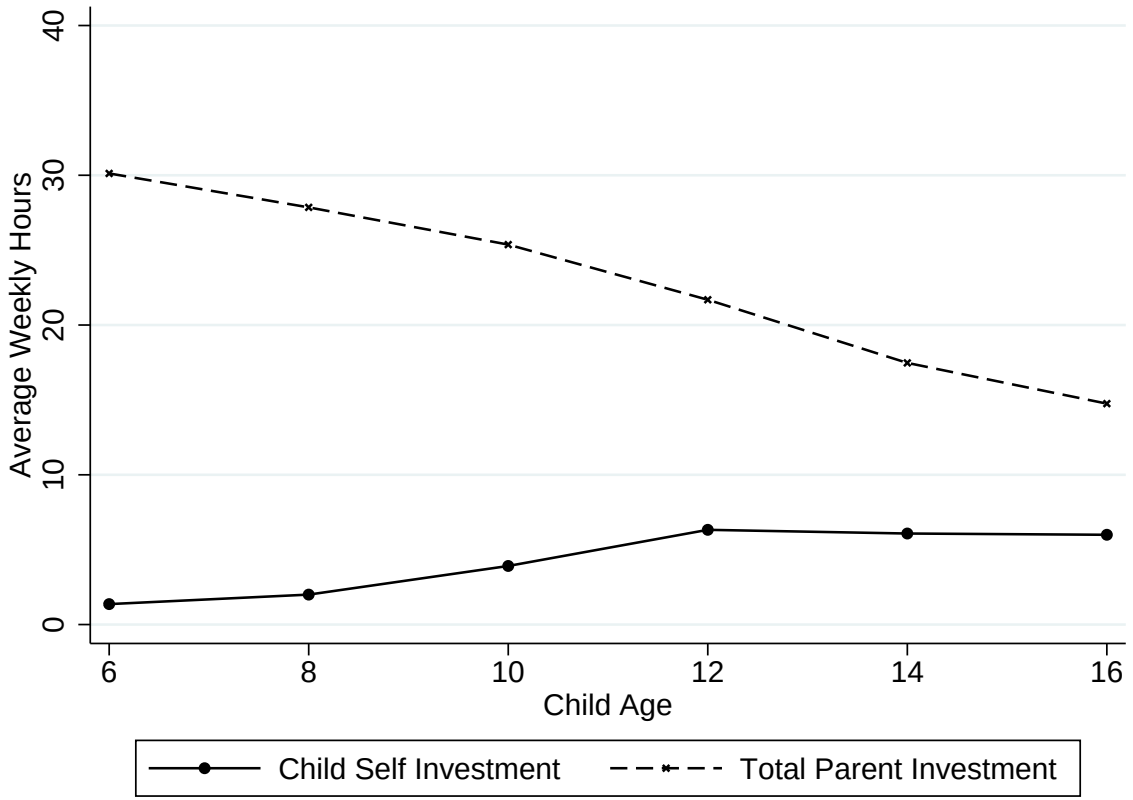
Table: Time Allocation by Child Age (Average Hours per Week)

Child Age	**3**	**4-5**	**6-8**	**9-11**	**12-16**
Mother's Active Time	30.77	27.73	21.20	17.82	11.51
Father's Active Time	16.21	11.18	8.00	8.40	6.49
Child's Self-Investment Time	0.00	0.67	1.42	3.38	6.13
Mother's Work Hours	22.10	22.12	22.81	24.47	26.97
Father's Work Hours	43.13	42.49	43.78	42.70	41.79

Source: PSID-CDS combined sample from 1997, 2002 and 2007 interviews and PSID core data between 1986 and 2010.

Motivating evidence: Household time use (2)

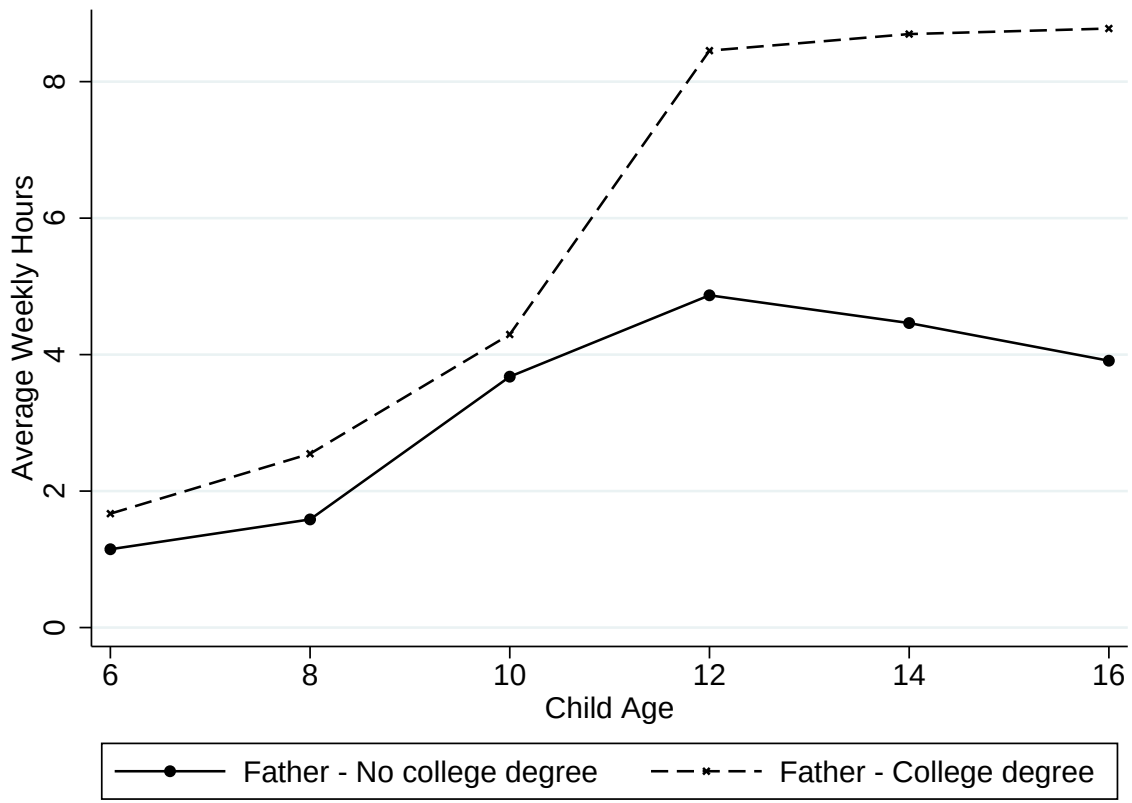
As a result, the fraction of the total (household) time investment made by the child increases dramatically with age.



Motivating evidence: Household time use (3)

Children with higher-educated parents self-invest more, especially during adolescence:

Figure: Child's Self-investment time, by Father's education



Motivating evidence: Raw correlations

Children's test scores, their self-investment time and their parents' characteristics are strongly positively correlated:

Child Ages	**9-12**	**13-16**
Letter Word Score, Child time	0.261	0.156
	(0.069)	(0.071)
Letter Word Score, Mother's Educ.	0.245	0.265
	(0.068)	(0.068)
Letter Word Score, Father's Educ.	0.301	0.342
	(0.067)	(0.066)
Letter Word Score, HH Income	0.325	0.287
	(0.076)	(0.077)
Child time, Mother's Educ.	0.069	0.175
	(0.072)	(0.071)
Child time, Father's Educ.	0.102	0.285
	(0.071)	(0.069)
Child time, HH Income	0.141	0.294
	(0.082)	(0.079)

Note: Standard Errors of the correlations are between brackets.

Motivating evidence: OLS

Table: Child Self-investment Time - OLS regressions

	(1) Study time	(2) Study time	(3) Study time
Father's years of schooling	0.386***	0.411***	0.558***
	(0.100)	(0.102)	(0.120)
Parental investment time		-0.0425***	-0.0549***
		(0.0135)	(0.0189)
Weekly allowance (dollars)			0.108*
			(0.0613)
Observations	572	572	404

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Each regression also contains a constant term, the child's age, and the child's age squared.

Source: PSID-CDS combined sample from 1997, 2002 and 2007 interviews and PSID core data between 1986 and 2010.

Intrinsic versus Extrinsic Motivation

- There is a debate regarding whether children should be "paid" for their actions or achievements.
- We address this debate by considering the impact of incentivizing the child with increased private consumption as a function of their study time. Call this a "Conditional Cash Transfer" (CCT).
- We consider the possibility that the short-run gratification of increased consumption may lead to a (stochastic) reduction in the child's future discount factor.
  - See e.g. Deci (1973), Greene and Lepper (1974), Deci, Koestner and Ryan (1999) for evidence of the detrimental effects of extrinsic rewards on intrinsic motivation.
- We loosely interpret this parental choice of whether, and how much incentives to use as a "parenting style".
  - See e.g. Doepke and Zillibotti (2017), Weinberg (2001), Lizzeri and Siniscalchi (2008).
- It is difficult to find data on the use of CCTs by parents.

Empirical Evidence on the Use of CCTs by Parents

- The best information we were able to obtain is from the PSID-CDS.
  - "Do you give your child an allowance?" (CDS 1997, 2002, 2007)
  - "If so, is the allowance contingent on the child doing his/her school work?" (CDS 2002, 2007).

- Interpret this joint event as a (noisy) measure of CCT use. Details

Average CCT use	0.239
Corr(CCT, child's age)	-0.197
Corr(CCT, mother's years of schooling)	-0.208
Corr(CCT, father's years of schooling)	-0.173
Corr(CCT, child's Letter Word score)	-0.189
Corr(CCT, mother's weekly time investment)	0.061
Corr(CCT, father's weekly time investment)	0.023

Notes: Data on CCT use for children between ages 8 and 16 (in the CDS-II and CDS-III waves). All correlations are contemporaneous.
Source: PSID-CDS combined sample from 1997, 2002 and 2007 interviews and PSID core data between 1986 and 2010.

Main Results on Extrinsic Motivation

- Our model broadly fits the data patterns, including the negative associations between parental CCT use and (1) child age, (2) parental education, and (3) child test scores.
- Intuition: Older children and/or children with higher-educated parents are more patient and therefore more willing to self-invest. Eventually, the negative effect of using a CCT on the child's future patience level outweighs the short-run incentive effect.
- We estimate that using a CCT reduces future (expected) discount factor by $3-7$ percentage points. The effects are more severe for older children.
- As Steinberg (2019) noted, the most remarkable things about inferred discount factors is the heterogeneity in the distribution. Heterogeneity in discount factors for parents and children may play a key role in the cycle of poverty.

Overview: Environment

- Two heterogeneous, forward-looking agents: parents and child
- Each agent takes action at each child age, $t \leq M$
- Both care about private consumption, leisure, and child's ability
- Parents act as Stackelberg leader, choosing
  - parental time and budget allocation
  - interaction "style": binary CCT use + reward intensity
- Child chooses self-investment time, residual is leisure
  - child's reaction function is known by the parents
- A cognitive skill production technology maps parental and child time investment, parental expenditures, and prior skills into future skills
- Child's discount factor develops as they age, stochastic Markov process that depends on child's age and parents' CCT use.
- Parental wage offers and non-labor income depend on parents' age, schooling level, and i.i.d. shocks.

Overview: Child-Parent Interaction - No CCT

Consider the parents' binary choice of whether to use a CCT or not.

Case 1: Non-Cooperative, parents do not provide incentives

- Child's best response is generally less than if parents could dictate choices (children less patient, value human capital less than parents)
- Parents invest more than when parents are dictator: Parents substitute their own time for the child's time (at the cost of foregone "leisure" or labor market hours)
- Parental time "crowds out" child's self-investment time
- Parents do not dictate child's action, but choose their investment knowing how the child will react, a kind of "permissive" parenting

Overview: Child-Parent Interaction - CCT

Case 2: Parents choose to provide incentives to child at some cost

- Offer a "reward function" where child's private consumption is made contingent on child's self-investment time.
- Child's reaction depends on parents' choice of "reward intensity"
- Incentives (CCTs) are costly to parents:
  - requires transfers to children,
  - might reduce child's (future) patience, and
  - general "psychic" or monitoring cost for parents
- If costs too high, parents and child revert back to Case 1.
- Optimal choice will depend crucially on relative preferences for child quality, relative discount factors, and productivity of child's self-investment time.

Preferences

- Let $t = 1, ..., M$ denote the child's age in years.
- Individual utility functions of parents (p) and child (c):

$$u_p(l_{1,t}, l_{2,t}, c_t, k_t) = \alpha_1 \ln l_{1,t} + \alpha_2 \ln l_{2,t} + \alpha_3 \ln c_t + \alpha_4 \ln k_t,$$
$$u_c(l_{c,t}, x_t, k_t) = \lambda_1 \ln l_{c,t} + \lambda_2 \ln x_t + \lambda_3 \ln k_t,$$

  where l is leisure (parents 1 and 2), c and x are consumption, k is child human capital.

- Parents are altruistic, with "total" utility given by:

$$\tilde{u}_{p,t} = (1 - \varphi)u_{p,t} + \varphi u_{c,t}, \ \varphi \in [0, 1]$$

  where φ measures the parents' degree of altruism.

- Terminal valuations at age $M + 1$:

$$V_{c,M+1}(k_{M+1}, \beta_{c,M+1}) = \frac{\lambda_3 \ln k_{M+1}}{1 - \beta_{c,M+1}}$$
$$V_{p,M+1}(k_{M+1}, \beta_{c,M+1}) = \left(\frac{(1 - \varphi)\alpha_4}{1 - \beta_p} + \frac{\varphi\lambda_3}{1 - \beta_{c,M+1}}\right) \ln k_{M+1}$$

Cognitive Skill Formation

– Technology of cognitive skill formation in household h at age t:

$$\begin{aligned} \ln k_{t+1} \quad = \quad & \ln R_t + \delta_{1,t}^h \ln \tau_{1,t} + \delta_{2,t}^h \ln \tau_{2,t} + \delta_{3,t} \ln \tau_{c,t} \\ & + \delta_{4,t} \ln e_t + \delta_{5,t} \ln k_t, \end{aligned}$$

- k_t is stock of child skills at the start of period t
- $\tau_{j,t}$ is (alone) active time with parent j
- $\tau_{c,t}$ is the child's self-investment time
- e_t is money investment made by the parents
- productivity of parental time may vary with parental education
- $R_t > 0$ is a scaling factor (TFP)

Non-cognitive Skill Formation

- We allow for non-cognitive development in the form of a dynamic and endogenous discount factor process for the child.
- For tractability, assume child's discount factor evolution is governed by a discrete Markov process:

$$\Pr(\beta_{c,t+1,h} = \beta_c^{j'} | \beta_{c,t,h} = \beta_c^{j}, t, CCT_{t,h}) \quad \forall (j, j') = 1, ..., Z,$$

where $\beta_{c,t,h}$ is a discrete random variable with Z points of support:

$$\beta_{c,t,h} \in \{\beta_c^1, \beta_c^2, ..., \beta_c^Z\}$$

- Intuition: using extrinsic motivation tools (like CCTs) may work in the short run, but might backfire by making children more myopic.

Parental Discount Factors

- The parents' discount factor, $\beta_p \in (0,1)$, is assumed to be time-invariant and potentially correlated with parental schooling.
- Assume that for every household $h = 1, ..., N$, $\beta_{p,h}$ is randomly drawn from a discrete distribution with Z points of support:

$$\beta_{p,h} = \beta_p^j \quad \text{w.p. } p^j(s_{h,2}) \quad \forall j = 1, ..., Z$$

  where $\sum_{j=1}^{Z} p^j(s_{i,2}) = 1$ for all schooling levels $s_{i,2}$.
- We estimate this exogenous process outside of the model using Osaka PPS data.

Endogenous Discount Factors: Empirical implementation

In our implementation, given data limitations we only allow children's and parental discount factors to take on on one three values.

- Grid points for children: $\beta_{c,(1)} = 0.34$, $\beta_{c,(2)} = 0.77$, $\beta_{c,(3)} = 0.98$
  - Calibrated using data from Steinberg (2009) on children aged 10-17.
  - The child begins with a draw from an initial conditions distribution of β_C at an early age (3). This distribution is conditional on the parents' educational attainment.
  - The Markov process determines movements over time.
- Grid points for parents: $\beta_{p,(1)} = 0.85$, $\beta_{p,(2)} = 0.95$, $\beta_{p,(3)} = 0.99$
  - Calibrated based on Osaka Preference Parameter Survey for adults aged 25-64 with observed educational attainment.
  - Parents take a fixed draw from exogenous distribution conditional on educational attainment.

Household Constraints

- Total household income in period t is

$$Y_t = w_{1,t}h_{1,t} + w_{2,t}h_{2,t} + I_t$$

- Total expenditures are

$$Y_t = e_t + x_t + c_t$$

- Time endowment of each parent is

$$T = l_{i,t} + h_{i,t} + \tau_{i,t}, \;\; i = 1, 2$$

- Time endowment of the child is

$$T = l_{c,t} + \tau_{p,t} + \tau_{c,t} + s_t,$$

where s_t is time spent in school, and $\tau_{p,t} = \tau_{1,t} + \tau_{2,t}$.

Model 1: Dynamic Choice Problem

- Parents act as the Stackelberg leader in every period t:
  1. After observing parents' actions $a_{p,t}$, the child chooses optimal study time $\tau_{c,t}$.
  2. Parents choose $a_{p,t}$ optimally, taking the child's reaction function $\tau^*_{c,t}(a_{p,t})$ as given.

- Child's problem in period t:

$$V_{c,t}(\Gamma_t|a_{p,t}) = \max_{\tau_{c,t}|a_{p,t}} u_c(l_{c,t}, x_t, k_t) + \beta_{c,t}\mathbb{E}V_{c,t+1}(\Gamma_{t+1}|\tau_{c,t}, a_{p,t}),$$

  where $\Gamma_t = (w_{1,t}\ w_{2,t}\ l_t\ k_t\ \beta_{c,t})$ are state variables.

- Parents' problem in period t:

$$V_{p,t}(\Gamma_t) = \max_{a_{p,t}|\tau^*_{c,t}(a_{p,t})} \tilde{u}_p(l_{1,t}, l_{2,t}, c_t, k_t, l_{c,t}, x_t) + \beta_p\mathbb{E}V_{p,t+1}(\Gamma_{t+1}|a_{p,t}),$$

Model 1: Optimal Time Allocation

Child's self-investment time depends on

- discount factor (patience), $\beta_c = 0$ implies child is myopic
- preference for own human capital
- productivity of self-investment
- time parents leave for child investment $(T - \tau_{p,t})$

Parent's investments in child depend on

- own return to child human capital
- productivity of (each type of) parental time
- child's choices
- parental discount factor β_p

Model 1: Non-cooperative Equilibrium

- Given that the child faces a time constraint and values her own leisure, her optimal study time is *crowded out* by the parents' time:

$$\frac{\partial \tau^*_{c,t}(a_{p,t})}{\partial \tau_{p,t}} < 0.$$

- In this setup, the only way for parents to increase $\tau_{c,t}$ is by reducing their own time investments.
- However, if the child makes little investment on their own (e.g. due to impatience), there is little investment.
- The resulting Stackelberg equilibrium is generally inefficient: too much parental investment (monitoring) and too little child investment on their own.

Model 2: Incentives

- In general, parents may be able to influence child behavior through incentives.
- We consider a natural incentive scheme in this model in which parents link the child's period t consumption to her period t study time, by choosing a *reward function*:

$$x_t = g_t(\tau_{c,t})$$

- We call this type of input-based reward scheme a *Conditional Cash Transfer* (CCT).
- Without loss of generality, we can focus on simple reward functions characterized by only two parameters (r_t, b_t):

$$\ln x_t = b_t + r_t \ln \tau_{c,t}$$

such that r_t is a "reward elasticity".

Model 2: Incentives

- In this expanded Stackelberg problem, the parents have an additional "degree of freedom", given by r_t.
- If they choose $r_t = 0$ (no CCT), we are back in the previous (inefficient) Stackelberg case.
- By using a CCT, the parents can
  - implement any desired level of $\tau_{c,t}$, by choosing r_t,
  - implement any desired level of x_t, by choosing b_t.

  Closed form solution
- Parents now essentially make all household choices.

Model 2: Incentives

- Because CCTs induce the child to study in accordance with the parents' first-best, all households would use them if they were costless and if they had no negative effect on the child's future patience.
- However, using a CCT may involve some form of monitoring the child's actions, and we allow for a general "psychic" cost to implementing these incentives.
- In addition, the use of CCTs may lower the child's future discount factor (probabilistically).
- This gives rise to our "benchmark" model where
  - In each period, parents optimally choose whether or not to use a CCT, i.e. whether or not to pay the periodic utility cost and choose $r_t \neq 0$.
  - Child chooses optimal response to this (typically by studying more than in the absence of incentives).
  - Given parental choices, the child's discount factor in the next period is randomly determined through the endogenous Markov matrix.
- We could thus think of the use of a CCT as a "parenting style".

Model 2: Incentives

Two basic features of the incentives considered here:

- Full information
  - Likely parents can observe child's time investment.
  - Output (grades) based incentives would be more problematic.
  - These incentives are short-run, and thus may be more likely to lead to "present-bias" in the child's decision-making
- Full commitment
  - Possible incentive for parents to renege.
  - Psychic cost may reflect that some households cannot commit.

Data

We estimate the model using data from Panel Study of Income Dynamics (1986-2010) and its Child Development Supplement (1997, 2002, 2007):

- Sample of 248 married couples, child aged 3 – 16
- PSID: labor supply history, earnings, parental characteristics
- CDS: detailed time survey, cognitive test scores, allowance use
- Each time entry records activity, location, duration, who was present at the time, etc.
- partition parents' time into labor, child investment and leisure
- partition child's time into parental, study and leisure
- observe each child at least twice

Supplement with external data moments on annualized discount factors

- Osaka Preference Survey: annual discount factors for adults aged 25-65, by SES. Based on 2010 U.S. wave, $N = 4625$.
- Steinberg et al. (2009) experimental survey: annual discount factors for children aged 10-17, by age and parental SES. $N = 502$.
- Consumer Expenditures Survey: annual expenditures on a child by married-couple families, by household income bracket.

Econometric Specification - Preferences

- Assume preferences are Cobb-Douglas with coefficients summing up to 1:

$$\begin{aligned} u_{p,t} &= \alpha_1 \ln l_{1,t} + \alpha_2 \ln l_{2,t} + \alpha_3 \ln c_t + \alpha_4 \ln k_t, \ \Sigma_j \alpha_j = 1, \\ u_{c,t} &= \lambda_1 \ln l_{c,t} + \lambda_2 \ln x_t + \lambda_3 \ln k_t, \ \Sigma_j \lambda_j = 1 \end{aligned}$$

- Instantaneous preferences are time invariant and assumed to be homogeneous in the population.
- Leisure is directly observed, child quality is anchored to test scores, so can be treated as an observable.
- Conditional on child age and parental education (i.e. "keeping technology fixed"), we can exploit remaining variation *across* and *within* households.

Econometric Specification - Technology

- We assume Cobb-Douglas technology of cognitive skill formation:

$$\ln k_{t+1} = \ln R_t + \delta^h_{1,t} \ln \tau_{1,t} + \delta^h_{2,t} \ln \tau_{2,t} + \delta_{3,t} \ln \tau_{c,t} + \delta_{4,t} \ln e_t + \delta_{5,t} \ln k_t,$$

- Production function in household h varies with age and schooling:

$$\begin{aligned}
&\text{Mother's investment time:} && \delta_{h,1,t} = \exp(d_{1,0} + d_{1,1}t + d_{1,2}s_{h,1}),\\
&\text{Father's investment time:} && \delta_{h,2,t} = \exp(d_{2,0} + d_{2,1}t + d_{2,2}s_{h,2}),\\
&\text{Child's self-investment time:} && \delta_{3,t} = \exp(d_{3,0} + d_{3,1}t),\\
&\text{Investment goods:} && \delta_{4,t} = \exp(d_{4,0} + d_{4,1}t),\\
&\text{Lagged ability:} && \delta_{5,t} = \exp(d_{5,0} + d_{5,1}t),\\
&\text{Total Factor Productivity:} && R_t = d_{6,0} + \frac{d_{6,1} - d_{6,0}}{1 + \exp(-d_{6,2}(t - d_{6,3})}
\end{aligned}$$

- Time inputs and test scores are observed, at least twice for each child.
- Conditional on parental education, technology is the same for all households.
- Exploit variation *within* households over time ("keeping preferences fixed").

Model Estimates: Preferences

(a) Parental preferences	Estimate	SE
Mother's Leisure (α_1)	0.218	(0.00305)
Father's Leisure (α_2)	0.318	(0.00362)
Consumption (α_3)	0.311	(0.00564)
Child Quality (α_4)	0.153	(0.00068)
(b) Child preferences	**Estimate**	**SE**
Leisure (λ_1)	0.828	(0.01047)
Consumption (λ_2)	0.099	(0.00615)
Child Quality (λ_3)	0.073	(0.00438)
(c) Other preferences	**Estimate**	**SE**
Parental altruism (φ)	0.333	-
Mean/Std. of CCT Utility Cost (κ)	0.003	(0.00064)

Notes: SEs are standard errors computed using a cluster bootstrap sampling each household with replacement. Parameters without SE are assumed (not estimated) values.

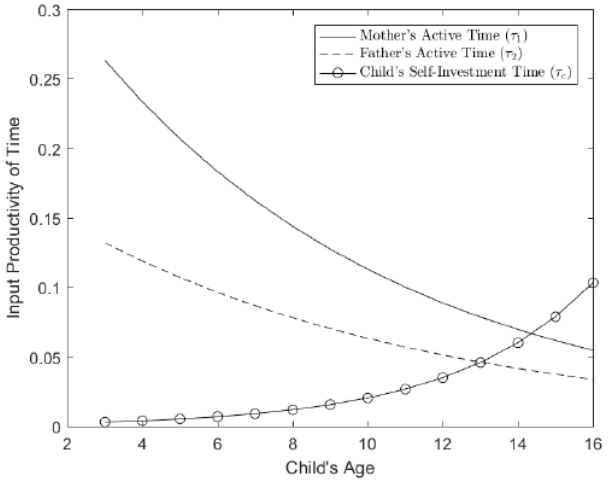
Model Estimates: Technology of Cognitive Skills (1)

(a) Cognitive Human Capital

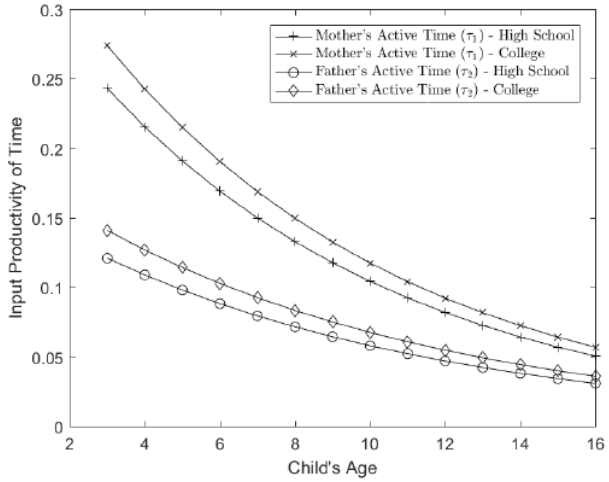
		Estimate	SE
Mother's Active Time (δ_1)	Intercept $d_{1,0}$	-1.408	(0.00779)
	Slope - Age $d_{1,1}$	-0.121	(0.00115)
	Slope - Educ. $d_{1,2}$	0.030	(0.00086)
Father's Active Time (δ_2)	Intercept $d_{2,0}$	-2.256	(0.01811)
	Slope - Age $d_{2,1}$	-0.105	(0.00153)
	Slope - Educ. $d_{2,2}$	0.038	(0.00250)
Child's Self-Investment Time (δ_3)	Intercept $d_{3,0}$	-6.598	(0.05655)
	Slope - Age $d_{3,1}$	0.271	(0.00394)
Child Expenditures (δ_4)	Intercept $d_{4,0}$	-7.154	(0.24507)
	Slope - Age $d_{4,1}$	0.072	(0.00283)
Last Period's Child Quality (δ_5)	Intercept $d_{5,0}$	-0.254	(0.00095)
	Slope - Age $d_{5,1}$	0.005	(0.00006)
Total Factor Productivity (R_t)	$d_{6,0}$	0.95594	(0.04368)
	$d_{6,1}$	2.51444	(0.00923)
	$d_{6,2}$	1.24575	(0.25336)
	$d_{6,3}$	5.28224	(0.06627)

Model Estimates: Technology of Cognitive Skills (2)

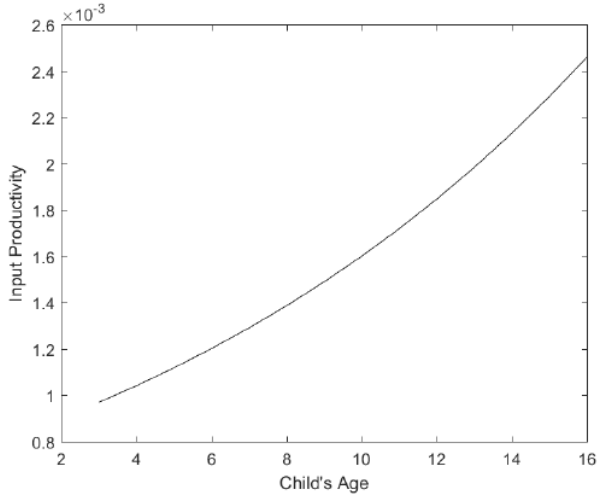
(a) All Time Inputs (avg.)



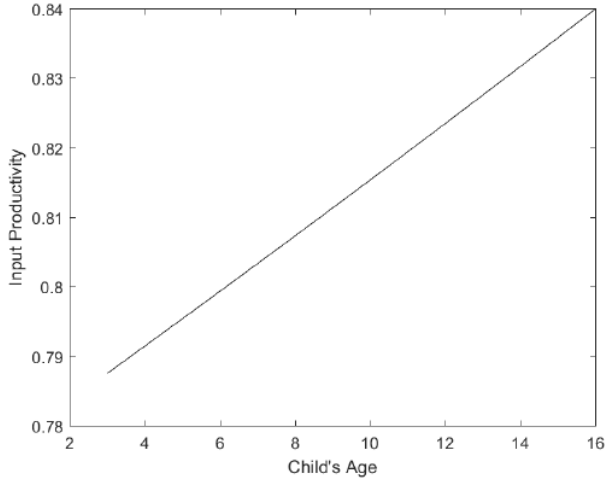
(b) Parental Time Inputs, by Educ.



(c) Child Goods

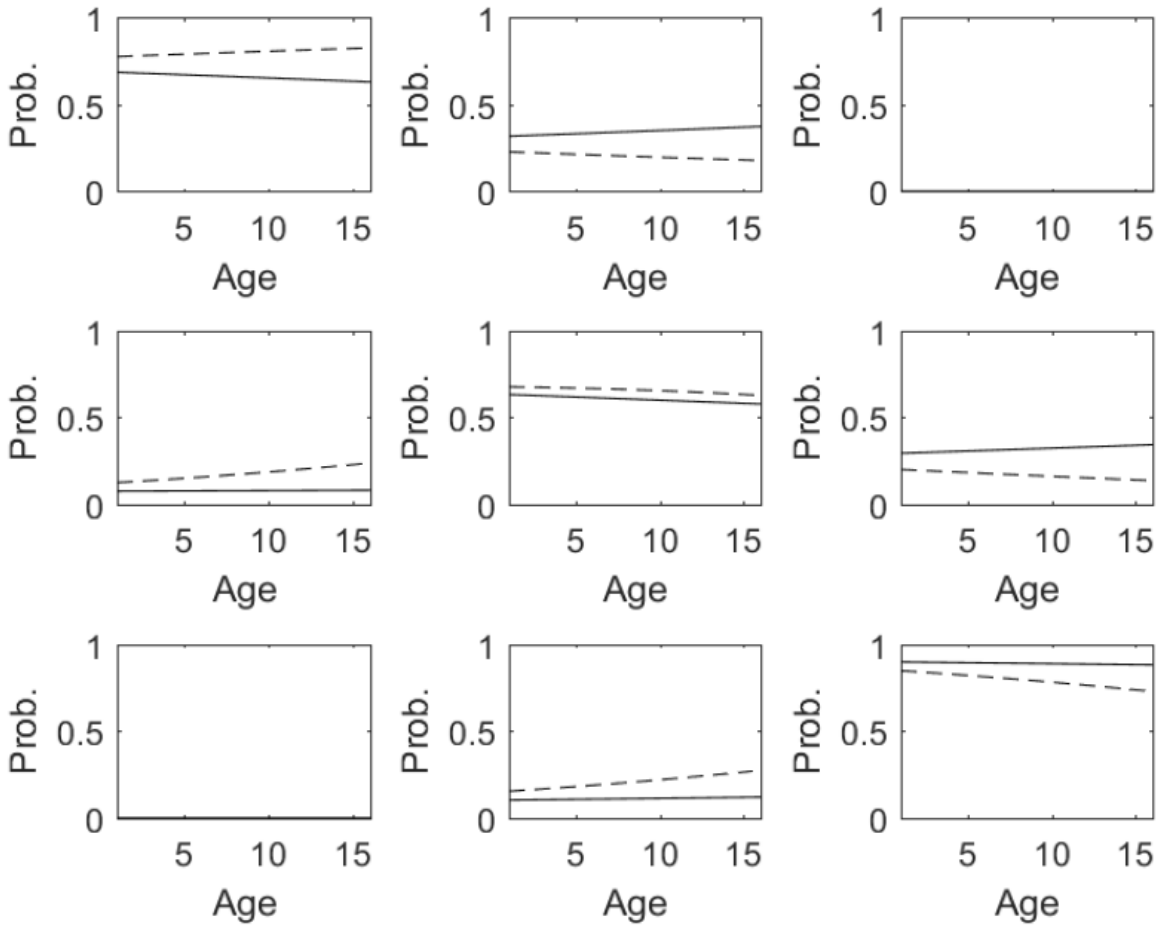


(d) Lagged Child Skills



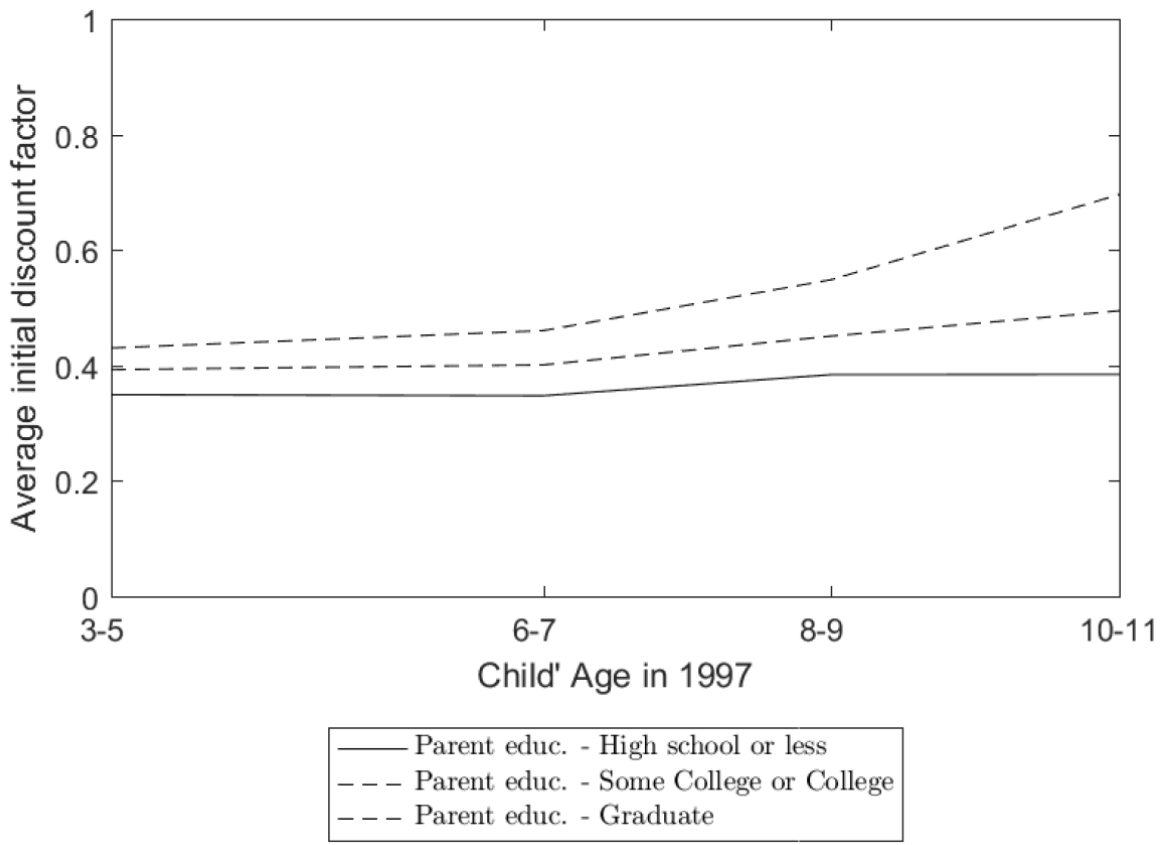
Model Estimates: Technology of Patience (1)

Figure: Markov Transition Probabilities, CCT vs. No CCT



Model Estimates: Technology of Patience (2)

Figure: Initial Conditions for Child's Discount Factor



Comparative Statics 1: Changing the costs of using a CCT

	Baseline	(1)	(2)	(3)	(4)
Model specifications					
- Util. Cost Mean/St.Dev. κ	0.003	$+\infty$	0	0.003	0
- Disc. factor process - CCT slope b_2^{up}	-0.421	-0.421	-0.421	0	0
- Disc. factor process - $CCT \times age$ slope b_3^{up}	-0.037	-0.037	-0.037	0	0
Simulated Outcomes					
Final Child Quality $\log(k_{17})$	7.29	7.12	7.28	7.62	7.63
Final Discount Factor $\beta_{c,17}$	0.81	0.88	0.80	0.88	0.88
Parents' Bellman value V_p, ages 3-16	71.95	70.93	71.94	73.73	73.76
Child's Bellman value V_c, ages 3-16	34.21	37.13	34.09	35.93	35.93
Other Simulated Moments					
Fraction using CCT, ages 8-16	0.35	0.00	0.37	0.90	1.00
Parental Investment Time $\tau_{p,t}$, ages 8-16	27.15	27.36	27.13	27.36	27.36
Self-investment Time $\tau_{c,t}$, ages 8-16	6.43	3.61	6.45	12.00	12.16
Corr. (CCT_t, age_t), ages 8-16	-0.23	-	-0.25	0.04	-
Corr. $(CCT_t, educ_2)$, ages 8-16	-0.08	-	-0.09	0.03	-
Corr. (CCT_t, LW_t), ages 8-16	-0.21	-	-0.24	0.20	-

New Data on Parenting

- Our model estimates and inferences are based on a number of untestable assumptions
- Perhaps the biggest assumptions regard the nature of the CCT mechanism employed by parents
- The only measure we have regarding the use of CCTs by parents is whether the receipt of an allowance is conditional on satisfactory performance in school and/or doing homework regularly
- We have no information regarding discount factors of parents or children from the CDS or the PSID, and utilize other sources of information to estimate the stochastic evoluation of the discount factor of the child

Our Survey

- We collected information from 400 Italian parents regarding the nature of their interactions with their child (aged 7-16)
- We did not interview the child, but asked the parents to report their child's grades and their opinions of how their child performed relative to their classmates.
- We also asked the parents to answer questions designed to reveal their trade-offs of future versus present rewards, and another series of similar questions where they were asked to respond as they think their child would.
- Standard demographic information was also gathered from the parent
- We asked them about their interactions with the child, time spent with them, and the nature and amounts of incentives given to the child.

Preliminary Results

We were able to construct estimates of β_p and β_c from the parent's responses to the hypothetical future-present choices, the vast majority of which were consistent.

	β_C	β_P	Ita	Math
β_C	1			
β_P	0.590	1		
Grade Ita	-0.017	0.003	1	
Grade Math	-.005	-0.054	0.760	1

Incentives and Perceived Child Effort

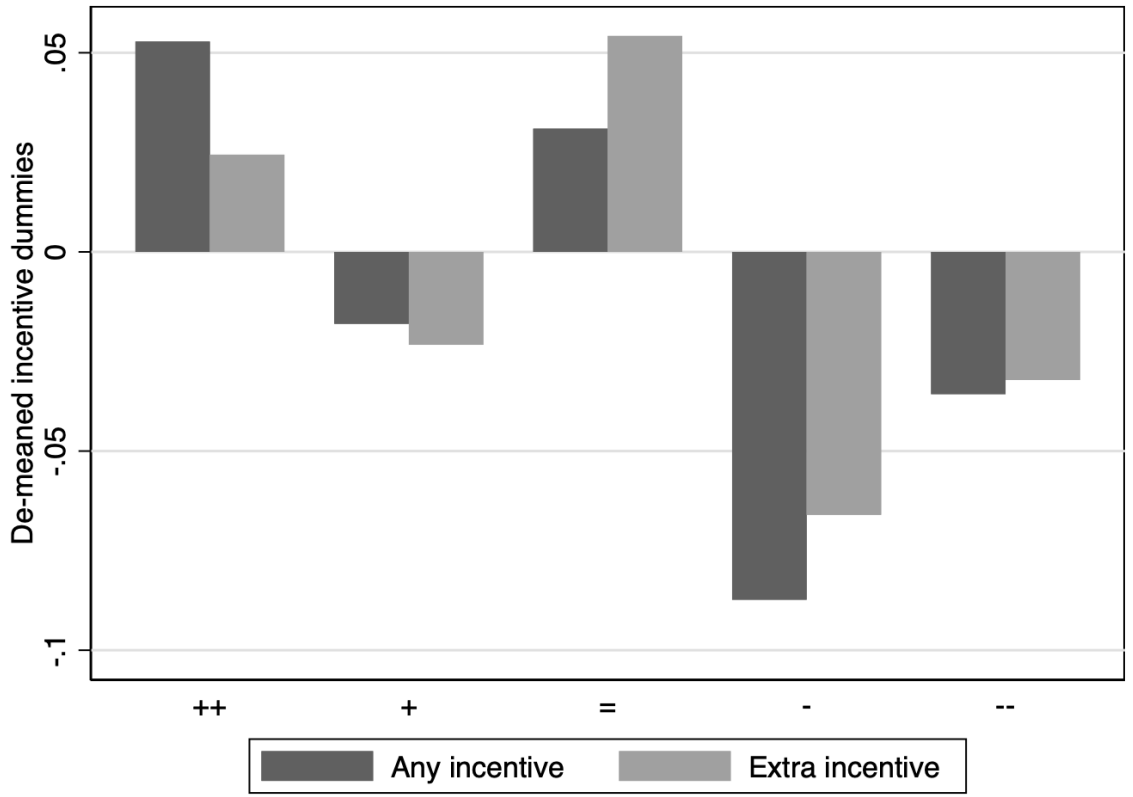


Figure: De-meaned dummy for providing incentives (either any, or "extra" i.e. rewards on top of allowance), by answer to Q4. Q4 asks parents how much they agree on the statement "I'd like my child to study more", "++" corresponding to "Strongly agree". Answers here are more spread out with respect to Q1, with about 1 parent out of 4 either disagreeing or strongly disagreeing with the statement.

Grades and Perceived Child Effort

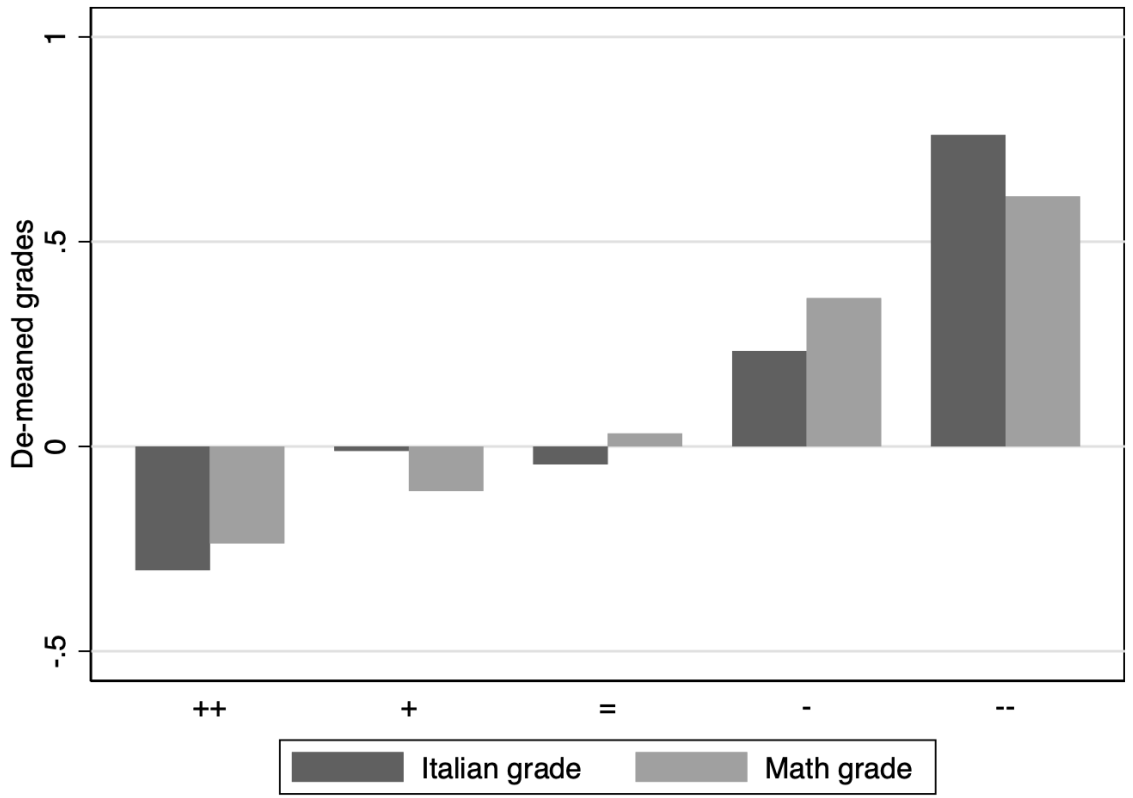


Figure: De-meaned grades and whether parents would like the child to study more. Question asks parents how much they agree on the statement "I'd like my child to study more", "++" corresponding to "Strongly agree".

Incentives Use and Child Age

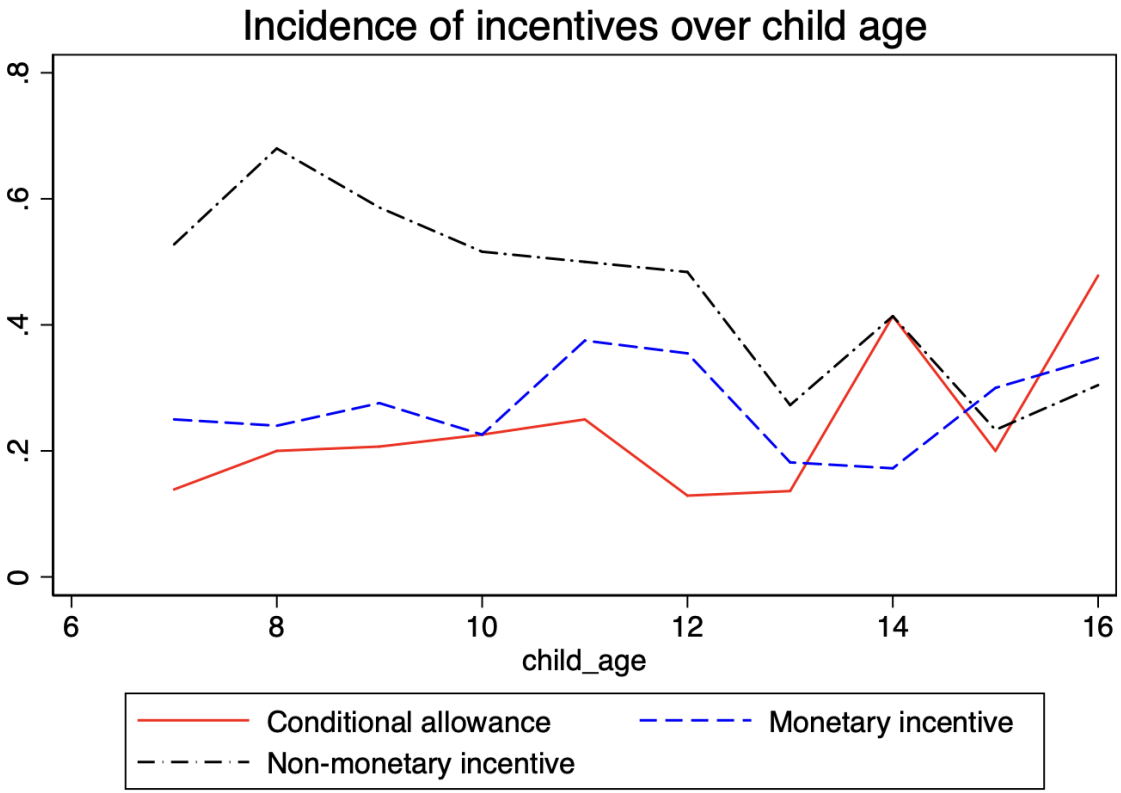
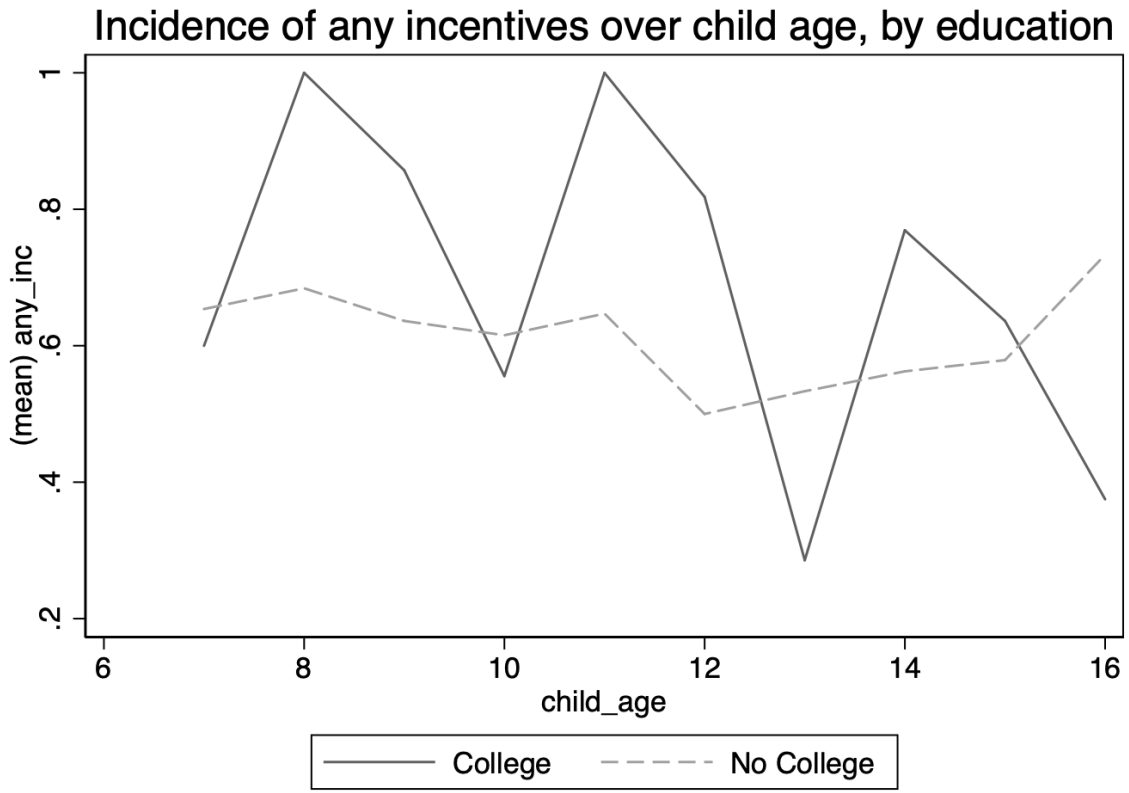


Figure: De-meaned grades and whether parents would like the child to study more. Question asks parents how much they agree on the statement "I'd like my child to study more", "++" corresponding to "Strongly agree".

Incentives Use by Child Age and Parent Schooling



β_c by Child Age

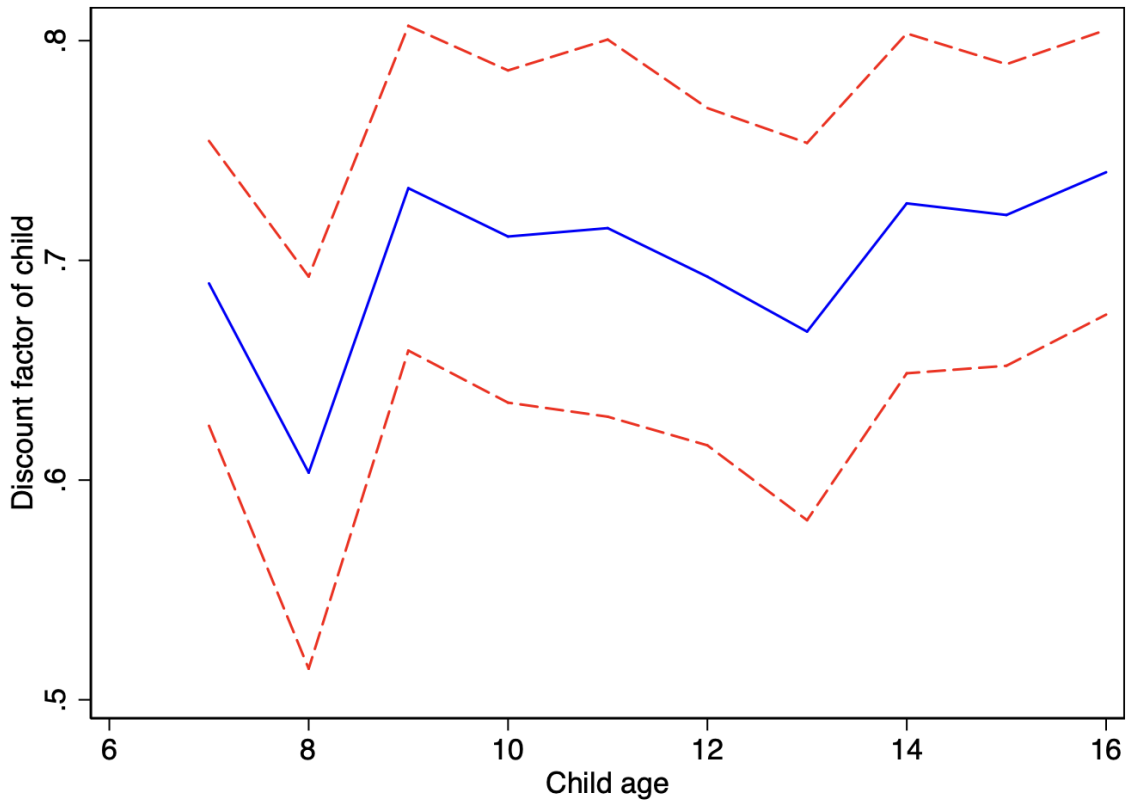


Figure: Average β_c and [0.05,0.95] Confidence Interval

β_c by Household Income