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### Abstract

In the standard intergenerational altruism model in which the child's utility level is an argument in the parent's utility function, there are no conflicts of interests between the parent and the child if they need to reach an agreement about the amount and the timing of a present that child receives from a third party. On the other hand, in the intergenerational altruism models of cultural transmission of preferences, this may not be true. This difference in two classes of the models can be used to distinguish between them in experiments. We conducted a time preference experiment to compare individual and joint decision makings with parent-child pairs in which (1) the child alone, (2) the parent alone, and (3) the parent-child pair as a group make decisions about the amount and the timing of the payment to the child. The experimental results are not consistent with the standard intergenerational altruism model but consistent with models of cultural transmission of preferences.

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## 1. Introduction

In the standard intergenerational altruism model of Barro (1974) and Becker (1974) in which the child's utility level is an argument in the parent's utility function, there are no conflicts of interests between the parent and the child if they need to reach an agreement about the amount and the timing of a present that child receives from a third party. On the other hand, in the intergenerational altruism models of cultural transmission of preferences (see Bisin and Verdier (2011) for a survey of these models), this may not be true. In the models of Akabayashi (2006) and Bhatt and Ogaki (2012), for example, the child's time discount factor is endogenous, and the parent evaluates the child's life time utility with a constant time discount factor that can be interpreted to reflect the parent's value judgment as to how patient the child should be. Therefore, the parent and the child may have conflicts of interest. This difference in two classes of the models can be used to distinguish between them in experiments.

We use a variant of time preference experiment to compare individual and joint decision makings within a household (see Kono et al. (2012), Abdellaoi, L'Haridon, and Paraschiv (2013), and Carlsson and Yang (2013)) for this purpose.<sup>1</sup> In our experiment with parent and child pairs, all payments are made to the child unlike the experiments in this literature. For each pair, we first had two treatments in which the parent and the child were separated and made decisions as to how much and when the child receives a payment for an increasing series of future payments (say, the first choice is between 1,000 yen now versus 1,000 yen two months from now, and the second choice is between 1,000 yen now versus 1,001 yen two months from now, etc.). Then in the third treatment, they made a joint decision for the same sequence of choices.

There are many possible frameworks to analyze how individual and joint decisions will be made. For example, consider a bargaining game between the parent and the child. The parent does not

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<sup>11</sup> See Charness and Sutter (2012) for a survey of experiments that compare group and individual decisions.

know the time discount factor of the child. If we use the Barro-Becker model, the only reason why the parent and the child make different decisions for any choice is because the parent does not know the child's time discount factor. Hence, the joint decision must always coincide with the child's decision. This result should be robust to various frameworks for the Barro-Becker model because there is no conflict of interests between the parent and the child.

By a collaboration of an educational organization in Japan, we conducted our experiment. For about half of the parent and child pairs in our experiments, the results show conflicts of interest when they make joint decisions. Therefore, for a substantial number of the parent-child pairs, the standard Barro-Becker model is inconsistent with their behaviors.

## **2. Experimental design**

We obtained a sample of data from 167 parent-child pairs for a time preference experiment conducted in Tokyo, Osaka and Nagano prefectures in Japan, between November 2011 and November 2013. An educational organization collaborated with us and allowed us to recruit volunteers to participate in our experiment in their events. Each parent received 3000 yen for participating in the experiment. All payments related to decisions during each experiment were received by the parent, and were to be paid to the child at the specified time (now or future) even when the decision is made by the parent. Each decision was about the amount and timing of the payment received by the child. Each parent-child pair had four treatments. In the first treatment, the child made binary choices for time preference questions, such as "which do you prefer to receive, 1000 yen today, or 1000 yen in 2 months." The amount of money that the child would receive in 2 months increased by various degrees such as 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1015, 1020, ..., 1450, 1500. The second treatment was conducted for the parent at the same time as the first treatment at a distant place, and the parent made decisions about

the amount and timing of the payment received by the child for each question. In the third treatment, the child and parent had to negotiate to make a decision together for each question. The fourth treatment was the same as the third treatment except that the future payment is received in 1 week rather than in 2 months. The actual payment for each of the four treatments was determined according to the lottery to choose the question whose decision will be used for payment.

We divided children into three categories and changed amount of money in the time preference questions as follows: 1st-3rd grade and under and under (100 yen today versus 101 yen in 2 months, etc. with the future payment ranging from 100 yen to 150 yen ), 4th-6th grade (500 yen today versus 501 yen in 2 months, etc. with the future payment ranging from 500 yen to 750 yen), and 7th grade and over (1000 yen today versus 1001 yen in 2 months, etc. with the future payment ranging from 1000 yen to 1500 yen).

### 3. Results

In this section we discuss our results of time preference and bargaining treatment conducted between child and their parent. Table 1 shows the cross-tabulation of category and gender for 167 children in our experiment. The 1st-3rd grade and under category includes 39 children, 4th-6th grade category has 48 children and last category has 80 children.

[Table 1 about here]

In our paper, the formula for calculating the rate of time preference is:

$$\{FV/PV - 1\} \times (365/t) \quad , \quad (1)$$

where FV = the future value, PV = the present value and t = the number of days from today. For 1st-3rd grade and under category, the mean of the rate of time preference (t = 60) of children is 0.684, with a standard deviation of 1.161. Similarly, for 4th-6th grade and 7th grade and over, the mean of

the rate of time preference are 0.394 and 0.346, with a standard deviation of 0.925 and 0.688 respectively. The results of calculating time preference for each of the three categories are shown in Table 2. Comparing two results (“after 2 months ( $t = 60$ )” and “after 1 week ( $t = 7$ )”), we observed higher standard deviation in “after 1 week” for all three categories.

[Table 2 about here]

Table 3 and 4 show the distribution of the bargaining index we defined. The explanation of the number of this index is as follows: 2 (parent fully accepts their child’s decision), 1 (parent makes some concession to their child’s decision), 0 (bargaining was determined at the average of their time preference), -1(child makes some concession to their parent’s decision) and -2 (child fully accepts their parent’s decision). We here excluded subjects who have identical rate of time preference between child and parent.

[Table 3 about here]

[Table 4 about here]

Although Barro-Becker model predicts that parent completely accepts their child’s decision as discussed in the Introduction, our results are different. As shown in Table 5, approximately 55% of all parents did not fully accept their child’s decision in our experiment. We also found that the bargaining result tends to be closer to the decision made by the more patient subject. For about 75% of the parent-child pairs, the bargaining result was closer to the patient subject’s decision.

[Table 5 about here]

#### **4. Conclusions**

In this paper, we reported our time preference experiment results with parent-child pairs. It is clear that the standard Barro-Becker model is inconsistent with a substantial fraction of the parent child pairs who participated in our experiment. We found that about a half of the pairs make joint decisions that are different from the child's individual decisions after excluding those whose individual decisions are the same.

It is more challenging to find convincing evidence as to which intergenerational altruism model explains the results. One hint is that joint decisions tend to be closer to individual decisions of more patient subject. This evidence is consistent with a view that patience of their children are valued by many parents, and that parents are trying to influence their children's patience as in Bhatt and Ogaki's (2012) tough love model. However, more convincing evidence requires panel data of experiments. We are in the process of creating such data by recruiting the same parent child pairs over time. In this paper, we ignored this panel data aspect because the sample size of the same pairs is small. However, we plan to increase the sample size of the panel data by continuing to works with the collaborating educational organization for this experiment.

Bhatt, Ogaki, and Yaguchi (2014) define the virtue of patience to be the time discount factor being one. This is when the child values her future self's utility as much as her present self's utility without any discounting. They propose a formulation in which a normative analysis of economic models with endogenous preferences gives considerations to virtue ethics as well as to welfarism. For policies based such a formulation, it is necessary for economists to know more about how parents affect discount factors of their children through their parenting. Our experiment results can have policy implications form such a point of view.

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**Table 1. Three categories in our experiment**

	Male	Female	Total
1st-3rd grade and under	16	23	39
4th-6th grade	22	26	48
7th grade and over	40	40	80
Total	78	89	167

**Table 2. The mean of the rate of time preference: Child and Parent**

	Child		Parent	
	(t = 60)	(t = 7)	(t = 60)	(t = 7)
1st-3rd grade and under	0.684 (1.161)	4.144 (8.360)	1.108 (1.327)	6.161 (9.643)
4th-6th grade	0.394 (0.925)	1.093 (3.774)	0.313 (0.718)	1.293 (4.017)
7th grade and over	0.346 (0.668)	1.563 (3.713)	0.597 (1.030)	4.314 (8.620)

**Table 3. Negotiation index: today versus after 2 months (t = 60)**

	-2	-1	0	1	2	Total
1st-3rd grade and under	8 23.5%	6 17.7%	1 2.9%	6 17.7%	13 38.2%	34 100%
4th-6th grade	9 22.5%	3 7.5%	1 2.5%	4 10.0%	23 57.5%	40 100%
7th grade and over	15 22.7%	10 15.2%	0 0.0%	14 21.2%	27 40.9%	66 100%
Total	32 22.9%	19 13.6%	2 1.4%	24 17.1%	63 45.0%	140 100%

**Table 4. Negotiation index: today versus after 1 week (t = 7)**

	-2	-1	0	1	2	Total
1st-3rd grade	9	2	0	2	13	26
and under	34.6%	7.7%	0.0%	7.7%	50.0%	100%
4th-6th	8	8	0	2	18	36
grade	22.2%	22.2%	0.0%	5.6%	50.0%	100%
7th grade	13	10	1	7	28	59
and over	22.0%	17.0%	1.7%	11.9%	47.5%	100%
Total	30	20	1	11	59	121
	24.8%	16.5%	0.8%	9.1%	48.8%	100%

**Table 5. Two main results in our experiment**

	parent fully accepts their child's decision		patient has advantage in negotiation	
	(t = 60)	(t = 7)	(t = 60)	(t = 7)
1st-3rd grade and under	38.2%	50.0%	76.5%	76.9%
4th-6th grade	57.5%	50.0%	62.5%	75.0%
7th grade and over	40.9%	47.5%	77.3%	76.3%
Total	45.0%	48.8%	72.9%	76.0%