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Donations, risk attitudes and time preferences: A study on altruism in primary school children[*]

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We study in a sample of 1,070 primary school children, aged seven to eleven years, how altruism in a donation experiment is related to children's risk attitudes and intertemporal choices. Examining such a relationship is motivated by theories of reciprocal altruism that provide a cornerstone for understanding human social behavior. We find that higher risk tolerance and patience in intertemporal choice increase, in general, the level of donations, albeit the effects are non-linear. We confirm earlier results that altruism increases with age during childhood and that girls are more altruistic than boys. Having older brothers makes subjects less altruistic.

JEL-Code C91, D03, D63, D64

Keywords Altruism, donations, risk attitudes, intertemporal choices, experiment, children

20 August 2014

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1. Introduction

Non-selfish, other-regarding behavior is an important prerequisite for cooperation in human societies where large numbers of genetically unrelated strangers interact with each other. This means that such behavior is a lubricant for the well-functioning of institutions, markets and societies as a whole (Bowles, 2004; Boyd and Richardson, 2005). Therefore, the reasons for other-regarding preferences towards genetically unrelated strangers have been under close scientific scrutiny for decades. A fundamental contribution for a better understanding of the roots of other-regarding behavior has been provided by Trivers (1971) who argues that cooperation among non-kin can be maintained at high levels through reciprocal altruism. An individual engages in reciprocal altruism if she foregoes immediate benefits by acting altruistically towards another person in the expectation of receiving a larger payoff from the interaction partner in return later. Trivers' (1971) model generalizes to multiparty interactions in which the decision maker does not benefit directly from the reciprocity of her interaction partner (this phenomenon is coined "indirect reciprocity"). In fact, "… the donor of a good deed does not necessarily expect to be rewarded by the recipient but perhaps by another individual who may be the recipient of other good deeds by other donors" (Mohtashemi and Mui, 2003, p. 523; see also Alexander, 1987). Reciprocal behavior is frequently observed in humans (Fehr and Gächter, 2000), but it obviously involves a component that is related to intertemporal choices, because altruism is expected to pay off at some time in the future only while the costs of it have to be borne now. Individuals with higher discount rates of future rewards can therefore be expected to engage less in altruistic behavior than more patient individuals (Axelrod, 1984). This will be the first hypothesis tested in this paper.

Apart from patience, risk preferences are potentially important for reciprocal altruism. If an individual helps another subject hoping to be repaid later, the individual has to bear the risk that the other subject is not going to reciprocate in the future. From this it follows that more risk averse individuals could be less likely to engage in reciprocal altruism. This will be studied as our second hypothesis.

Our setting to study our hypotheses involves more than 1,000 primary school children in the bilingual city of Meran in Italy. The children are seven to eleven years old and represent 86% of all primary school children in this city with its 38,000 inhabitants. We let children decide in a dictator-game like framework how many experimental tokens they want to keep for themselves and how many they want to donate to a well-known charity in this part of Italy. While the determinants of donations have been extensively studied with adults (List,

2011), we can examine which factors influence children's altruistic giving to needy recipients. Of course, our paper is also related to previous work on how altruism develops in childhood. Both psychologists and economists are interested in this issue (see Eisenberg and Fabes, 1998, for a review from the perspective of developmental psychology). The common bottom-line seems to be the insight that altruism develops and gets stronger in childhood. In other words, the evidence from dictator, ultimatum and trust games suggests that humans become less selfish as they grow older (Murnighan and Saxon, 1998; Harbaugh and Krause, 2000; Harbaugh et al., 2003; Benenson et al., 2007; Sutter and Kocher, 2007; Fehr et al., 2008; Gummerum et al., 2008, 2010). However, none of these previous studies has addressed how pro-social behavior in the various bargaining games or allocation tasks relates to risk attitudes and intertemporal choices. For this reason we are contributing to this literature on social preferences and their development during childhood by examining the hypotheses outlined above. In addition to testing the relation of pro-social behavior to risk attitudes and intertemporal choices, our dataset allows us to study the effects of socio-demographic variables such as the children's IQ, the number of siblings and measures for the socioeconomic status and education of their parents.

Our results suggest a significant, yet largely non-linear, relation between altruism in our donation experiment and risk tolerance, respectively patience. Altruism increases with age, a finding that confirms previous studies. Girls are more generous in their donations, and so are subjects with a higher relative IQ. Having older brothers reduces donations. We find no difference in the donations of Italian- and German-speaking children.

The rest of the paper is structured as follows: The next section describes the experimental design. The results are presented in Section 3 and Section 4 concludes the paper.

2. Experimental Design

The experiments were conducted in October and November 2012 in the city of Meran in the province of South Tyrol, Italy. This city provides an almost unique natural setting since half of its 38,000 inhabitants are German-speaking and the other half speak Italian. Schools are segregated by language, despite serving children from the same neighborhoods. This enables us to assess whether the language spoken influences the children's attitudes towards altruism.[1] We obtained permission from 86% of parents of all primary school children in Meran to run

[1] In a recent study, Chen (2013) shows that languages with strong future tense reference (like Italian) induce less future-oriented economic behavior than languages with weak future tense reference (like German). Thus, it is sensible to test whether this language-effect extends to other dimensions of economic behavior such as distributional preferences.

experiments with their children.[2] The experiments were conducted during regular school hours. Participation in each experimental session was, of course, voluntary for children, but all except one single child consented to participate. In total, 1,117 children, aged seven to eleven years and attending grades two to five of the primary schools in the city, participated in the experiment. Each subject was asked to repeat the instructions in own words in order to check for understanding. 14 children were not able to do so adequately, and thus were excluded from the analysis below. Moreover, 33 other children were not considered for the analysis because they stated to have close ties to the charity, either through relatives working there or because their family received support from the charity. Table 1 indicates the final number of subjects (N = 1,070) that is used for the analysis, broken down by grade, gender and language spoken.

Table 1 about here

As one central aspect of this study is to investigate the connections between altruism and other dimensions of experimentally elicited economic behavior, we used the same subject pool to run experiments on altruism, risk attitudes and intertemporal choices. The experiments were always run in the same order.[3] All experiments were incentivized with tokens which could be exchanged for fruits, sweets and other little presents by the decision maker.[4] All of these experiments were part of a larger research project on the development of economic decision making of primary school children. By visiting the same students several times in the course of two academic years, they were generally familiar with experimental procedures and that sometimes rewards could only be distributed after a temporary delay (for instance in experiments on intertemporal choices or in strategic games where the matching needed to be done manually after an experiment).

[2] Since we don't have any information about the 14% of parents who did not give consent, we cannot study whether the sample of participating children (86% of all primary school children in Meran) is different from the non-participating children.

[3] This might potentially give rise to order effects. First, children participated in the risk experiment. Before determining the outcome of the lottery (if a child chose a risky option), children had to make their donations as the second task. By this procedure we tried to minimize a spillover from the risk task to the donation task. The intertemporal choice task was run only one month later, and does not seem to be influenced by the previous experiment either (because using a slightly different intertemporal choice task that was run in a previous school year yields practically the same results, as indicated in the Appendix).

[4] Experimental instructions of all experiments are provided in the Appendix.

2.1 The donation task[5]

We employed the following dictator game-like experiment on donations to a charity: Each child received an endowment of six tokens and was asked to allocate them between him- or herself and a needy recipient. The decision maker could exchange the retained tokens for little presents right after the experiment. The cash equivalent of the donated tokens was transferred to one of the province's largest charities – called "Menschen in Not: Kinderarmut durch Kinderreichtum – Umanità che ha bisogno: famiglia numerosa = famiglia povera?", an initiative to support underprivileged children in South Tyrol. This charity is run by the well-known Caritas diocese Bolzano-Bressanone. For each token donated the charity received 50 Euro cents. Subjects were not informed about the exact cash value of the tokens. Instead, we told them that one token was converted into the monetary value it buys on average in the experimental shop (which was 50 Euro-cents). In total, 951.50 Euro were donated to the charity.

As we used a one-on-one explanation for assuring comprehension, experimenter demand effects may affect our results. In order to minimize such potential effects, children were asked to allocate their endowment between a grey envelope (for them) and a white envelope (for the needy child) and seal them in private.[6] Each subject was instructed to insert the white envelope (with the donation) into a donation box which was located in the middle of the room.[7] At the end of the experiment, each child took his or her grey envelope and was escorted to another room in which the experimental shop was set up where children could exchange the retained tokens into presents. Children entered the experimental shop one-by-one in order to guarantee anonymity of decisions towards other children. An experimenter in the shop (different from the one running the experiment with the child) then recorded the number of tokens in the grey envelope and let the child exchange these tokens into presents.

2.2 Elicitation of risk attitudes

Risk attitudes were elicited with a simple investment task in the same experimental session. In this task, each child was endowed with five tokens and had to decide how many of these tokens to invest in a lottery that doubled the number of invested tokens with a 50% probability, while with 50% probability the child lost its investment (this follows the design

[5] While this study is motivated by reciprocal altruism, the donation task does not measure *direct* reciprocal altruism. However, Trivers' (1971) model also extends to indirect reciprocity and, moreover, unconditional altruism and reciprocal altruism are closely related since the former can evolve as a consequence of the latter (Lotem et al., 2003).

[6] In order to assure privacy while not violating custody, the experimenter turned around until the child indicated that the task was completed.

[7] Children were instructed to do so even if the white envelope was empty.

of Charness and Gneezy, 2010). Non-invested tokens were safe earnings for the child. We take the number of invested tokens as an indicator of risk-tolerance.

2.3 Elicitation of intertemporal choices

In this experiment children were endowed with five tokens and they had to decide how many tokens to consume immediately (by exchanging them into small presents) and how many tokens to invest into the future. Each invested token was doubled and paid out only four weeks after the experiment (similar to the design of Andreoni and Sprenger, 2012). In the case of delayed payments, the classroom teacher delivered the presents to the children in sealed envelopes exactly four weeks after the experiment. The intertemporal choice experiment was run with the same subject pool about one month after the other two experiments.[8]

3. Results

3.1 Descriptive analysis

Figure 1 shows the distribution of donations across age cohorts. Due to the low incidence of 4, 5 and 6 donations, we pooled subjects who donated more than half of their endowment. We find that the share of subjects deciding to donate zero tokens decreases monotonically from 29% for second graders (7/8-year-olds) to 13% for 5th graders (10/11-year-olds). This decreasing trend is statistically significant (p<0.01, Cuzick's Wilcoxon-type test for trend). While the share of subjects who donate one, two or three tokens remains constant at about 30%, 20-25% and 20%, respectively, the fraction of subjects giving more than half of their endowment increases significantly with age (p<0.01, Cuzick's Wilcoxon-type test for trend), albeit it remains fairly small. Taken together, these observations indicate that altruism increases with age.

Figure 1 about here

Apart from age effects, Figure 1 reveals a high degree of heterogeneity in donations within each age group. Hence, we investigate in a next step the effects of additional individual-specific characteristics that may explain the potential sources of this variation.

In panel (a) of Figure 2 we show the relative frequency of donations, conditional on risk tolerance as measured by our investment task. The width of the different columns represents

[8] Since the intertemporal choice task was run one month after the other two experiments, there is some attrition between the experimental sessions. In total, 1,118 children participated in the intertemporal choice task and 1,080 of these children also participated in the risk- and donation task.

the relative frequency with which children invested from zero to five tokens into the lottery. Therefore, moving to the right along the horizontal axis indicates more risk tolerance. The data suggests a negative relationship between risk taking and the probability of donating zero tokens for low levels of risk tolerance (up to 3 tokens invested), but a positive relation for high levels of risk tolerance (from 3 to 5 tokens). A reversed non-linear pattern can be observed for donating two or more tokens. Thus, children with intermediate risk attitudes are less likely to donate zero tokens and more likely to give more of their endowment as compared to subjects with relatively extreme risk attitudes.

The relationship between donations and patience is illustrated in panel (b), with columns again indicating the relative frequency with which children invested a particular amount of tokens into the future (to get two presents per token in four weeks). There is a significant relationship between patience and the likelihood of donating a positive amount of money to the charity. More patient subjects are significantly less likely to retain all the tokens for themselves ($p < 0.01$; Cuzick's Wilcoxon-type test for trend). The overall level of donations is also significantly increasing with patience ($p < 0.01$; Cuzick's Wilcoxon-type test for trend). However, the impact of patience on donations resembles the pattern of risk tolerance by showing a non-linear relationship: Very impatient and very patient children are less likely to donate two or more tokens than children who invest an intermediate amount of tokens.[9] A possible explanation for the similarity between panel (a) and (b) could be a high within-subject correlation between risk attitudes and time preferences (like in Anderhub et al., 2001, for an adult sample). In fact, we find a significant positive, but rather weak, correlation between risk tolerance and patience in our sample (Spearman rank correlation $\rho = 0.077$; $p < 0.05$).

Figure 2 about here

Figure 3 displays the average donations across age and gender, showing that girls donate significantly more ($p<0.01$ across all age groups, Wilcoxon Rank Sum Test). Moreover, Figure 3 confirms the frequent finding that children become more altruistic as they become older ($p<0.01$ for both genders, Cuzick's Wilcoxon-type test for trend; see also, for instance, Bar-Tal et al., 1980; Benenson et al., 2007; Fehr et al., 2008; 2013; Gummerum et al., 2010; Evans et al., 2013). It is furthermore noteworthy that the donation rates of our oldest subjects

[9] We test this non-linear relationship between the amount of donated tokens and patience respectively risk attitudes, more formally by adding quadratic terms to our regressions presented in section 3.2.

are similar to the share usually observed in adults whereas the youngest children give significantly less.[10]

Figure 3 about here

3.2 Regression analysis

In order to explore further determinants of non-selfish behavior we present in Table 2 a regression analysis with the number of donated tokens as the dependent variable. Model (1) shows the basic model with dummies for being female, being a member of the German language group, for the participant's grade level (age), an only child dummy and whether the child knows the Caritas as explanatory variables. Besides replicating the effects of gender and age as discussed in our descriptive analysis, we find that only children donate more tokens. We disentangle this effect by including detailed background information on siblings as dependent variables in Model (2) and find that the number of older brothers is driving the result.[11]

We measured children's IQ with Raven's "Colored Progressive Matrices" as a proxy for cognitive abilities and include this variable in Model (3). We find that higher IQ – relative to the age cohort's average – is associated with larger donations, as shown in Model (4), albeit the effect is not significant in all models. In general, our finding on IQ is in line with the study of Houser and Schunk (2009) who found that children with good mathematics grades are more generous. In addition, models (3) to (5) indicate that risk tolerance and patience affect donations in a non-linear way. One possible explanation for this non-linear trend might be that children with "extreme" risk attitudes and time preferences are also more likely to exhibit an "extreme" choice of giving zero in the donation experiment. For instance strict payoff-maximizers with low discount rates or individuals with very low impulse control might donate zero tokens. Similarly, with respect to risk preferences, the effect could be driven by subjects who donate zero tokens and (i) invest all their endowment into the lottery (in order to maximize prospective payoffs) or (ii) invest zero tokens into the lottery (in order to maximize secure payoffs). To test whether the non-linear trend is driven by subjects who are either very patient (risk averse) or very impatient (risk tolerant) and give nothing at the same time, we ran another ordered probit regression (not shown here) and exclude subjects who donated zero

[10] In his meta-analysis, Engel (2011) finds that adult subjects usually give away about thirty percent of their endowment.

[11] Fehr et al. (2008) report the same effects for only children and show that older siblings are more altruistic. Our results are aligned with their findings, providing a refined analysis for the effects of older sisters and brothers.

tokens. This "extremist"-explanation is not supported by our data, however: The results reveal that risk tolerance as well as patience are still significantly and non-linearly related to the number of tokens donated.

In Models (4) and (5) we also take into account parent's occupation and use this information as a proxy for parents' unemployment status, income and education[12] in order to control for the socioeconomic status of children's parents. The model shows that parental unemployment has no effect on donations, nor has the parents' estimated income. Including the variables on the parent's education and income decreases our sample size to 679 observations, however. The reason for this is that it was not possible to obtain this information for all subjects. A post estimation Wald test on the joint effect of the education and income of the children's parents on the number of tokens donated turns out to be significant (p=0.0581). This suggests that the socioeconomic status has an overall effect on altruistic giving in the donationexperiment. This is in line with the findings of Benenson et al. (2007).

Table 2 about here

4. Conclusion

In this paper we study the determinants of donations by children to a charity. We control for a host of background variables and in particular we are interested in the relationship of risk attitudes and time preferences with donations. While the existence of other-regarding preferences and their economic significance have been established in many studies over the past decades (e.g., Titmuss, 1971; Andreoni, 1989; Fehr and Schmidt, 1999; Carter and Castillo, 2011), the relationship with other economically important preferences such as risk- and time preferences has not been directly tested in children. As argued in the introduction, we expected larger donations of children who are more risk tolerant and more patient. Based on experiments with more than 1,000 primary school children, we have found some, but not unequivocal support for our hypotheses. In fact, we find that more patient children donate more tokens, in line with our hypothesis on the relationship with time preferences. However, the relationship is non-linear, both for risk attitudes and time preferences. Up to an intermediate level of risk tolerance and patience, donations increase, as expected. Yet, at the upper tail of risk tolerance and patience, donations decrease again, a finding which requires further exploration in the future. One possible conjecture – that these non-linear findings

[12] See the Appendix on how we measured these attributes of parents.

would not be robust to considering only positive donations (and thus excluding all subjects who donate nothing) – has failed to provide an explanation. It is difficult to speculate which factors drive the non-linear relationship between risk and time preferences and altruism in charitable giving, so more work is clearly needed. Despite this, we consider it important to have shown that there *is* a relationship between risk attitudes, time preferences and altruism, the latter measured in a simple, and incentivized, donation experiment.

In addition to this main finding, we show that the positive age trend in altruism can be attributed to the fact that the relative share of subjects who retain the whole pie decreases with age while the willingness to offer more than half of the endowment increases. Moreover, we find that the heterogeneity of preferences within different age groups can be explained by several factors: First, our analysis reveals that girls are significantly more generous than boys. Second, we replicate the result that the number of siblings has a negative impact on dictator offers (see Fehr et al., 2008) and find that this effect can be attributed to older brothers. Third, our analysis reveals that children with higher IQ-test scores relative to their peers donate more tokens. Future research should try to investigate the influence of further non-cognitive abilities, such as the Big Five personality traits, on altruistic preferences and its development with age.

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Tables and Figures

Table 1. Number of subjects included in the analysis, by age, language and gender (number of male participants in parenthesis)

Grade level (age group)	Italian	German	Total
2 (7/8 years)	147 (75)	113 (63)	260 (138)
3 (8/9 years)	145 (81)	125 (76)	270 (157)
4 (9/10 years)	132 (77)	144 (72)	276 (149)
5 (10/11 years)	157 (81)	107 (62)	264 (143)
ALL	**581 (314)**	**489 (273)**	**1,070 (587)**

Each subject was asked to repeat the instructions in own words in order to check for understanding. In addition to the 1,070 children with full understanding included in the analysis, we had 14 subjects who had problems with understanding, and thus were excluded from the analysis. Moreover, 33 other children were excluded because they had close ties to the charity, either by relatives working there or by receiving transfers from the charity.

Table 2. Number of tokens donated to needy recipient (min=0; max=6). Ordered probit regressions.

	(1)	(2)	(3)	(4)	(5)
Female (=1)	0.307***	0.311***	0.329***	0.339***	0.331***
	(0.064)	(0.064)	(0.061)	(0.065)	(0.077)
German school (=1)	-0.066	-0.065	-0.109	-0.125	-0.106
	(0.075)	(0.075)	(0.082)	(0.085)	(0.095)
Grade level (age cohorts)	0.141***	0.144***	0.104***	0.134***	0.143***
	(0.035)	(0.035)	(0.039)	(0.040)	(0.043)
Knows Caritas (=1)	0.074	0.076	0.047	0.046	0.094
	(0.079)	(0.079)	(0.080)	(0.080)	(0.099)
Only child (=1)	0.175*				
	(0.101)				
Number of younger brothers		-0.073	-0.034	-0.057	-0.088
		(0.068)	(0.070)	(0.074)	(0.098)
Number of older brothers		-0.125**	-0.119**	-0.118**	-0.127
		(0.055)	(0.056)	(0.060)	(0.078)
Number of younger sisters		-0.066	-0.052	-0.020	-0.005
		(0.066)	(0.073)	(0.078)	(0.092)
Number of older sisters		-0.045	-0.043	-0.055	-0.080
		(0.046)	(0.048)	(0.053)	(0.076)
Patience[&]			0.266***	0.236***	0.253***
			(0.064)	(0.068)	(0.083)
Patience^2			-0.052***	-0.049***	-0.060***
			(0.012)	(0.013)	(0.015)
Risk tolerance[†]			0.574***	0.556***	0.640***
			(0.131)	(0.152)	(0.191)
Risk tolerance^2			-0.098***	-0.096***	-0.104***
			(0.024)	(0.028)	(0.035)
Relative IQ[$]			0.309	0.442**	0.359
			(0.189)	(0.202)	(0.251)
Father unemployed (=1)				0.288	
				(0.240)	
Mother unemployed (=1)				0.472	
				(0.378)	
Income father[§]					-0.0002
					(0.0001)
Income mother[§]					-0.0002
					(0.0002)
Education father[§]					0.080
					(0.052)
Education mother[§]					0.081
					(0.071)
cut1					
Constant	-0.261**	-0.382***	0.576**	0.750***	0.601
	(0.116)	(0.118)	(0.267)	(0.279)	(0.440)
cut2					
Constant	0.650***	0.531***	1.555***	1.756***	1.655***
	(0.120)	(0.119)	(0.273)	(0.285)	(0.439)
cut3					
Constant	1.338***	1.220***	2.262***	2.439***	2.306***
	(0.123)	(0.122)	(0.276)	(0.288)	(0.439)
cut4					
Constant	2.223***	2.105***	3.174***	3.345***	3.236***
	(0.125)	(0.126)	(0.286)	(0.302)	(0.449)

cut5					
Constant	2.591***	2.473***	3.552***	3.731***	3.564***
	(0.147)	(0.147)	(0.293)	(0.309)	(0.448)
cut6					
Constant	2.769***	2.651***	3.723***	3.903***	3.738***
	(0.148)	(0.152)	(0.296)	(0.311)	(0.451)
Observations	1,070	1,070	1,009	881	679
Pseudo R^2	0.017	0.017	0.037	0.040	0.046

Notes. ***, **, * denote significance at the 1%, 5%, 10% level, robust standard errors in parentheses. Clustered on class level.

† Number of tokens invested in risk experiment (min=0; max = 5).

& Number of tokens invested in time experiment (min=0; max = 5).

$ The IQ was measured relative to the respective age cohort (values above 1 indicate above average IQ in the respective age cohort; values below 1 indicate below average IQ)

§ For a detailed description of these variables see the notes on "Parents' estimated income and education" in the Appendix. We did not get information about parents' professions for all children. Hence, the sample size is smaller when this variable is included as independent variable, yet the main results remain unchanged.

Figure 1: Frequency of donations across age groups.

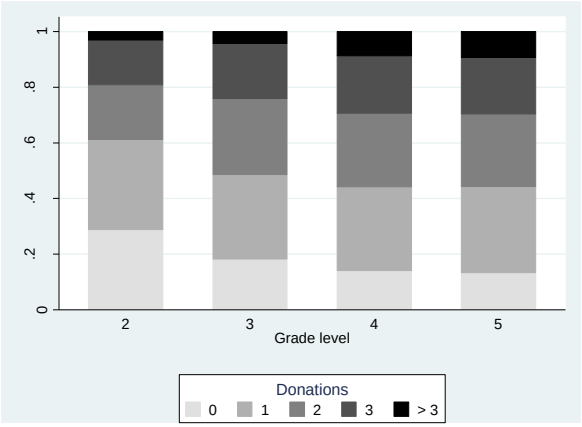
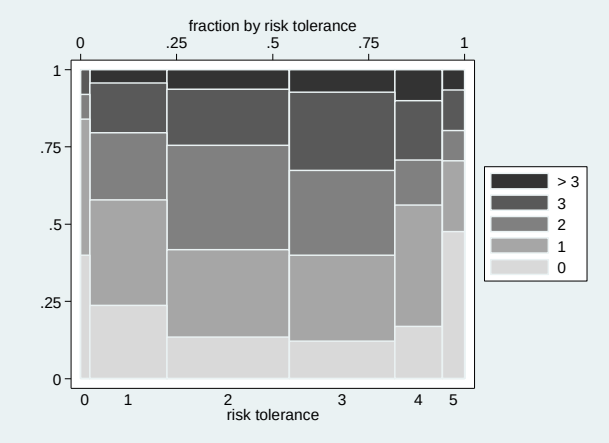
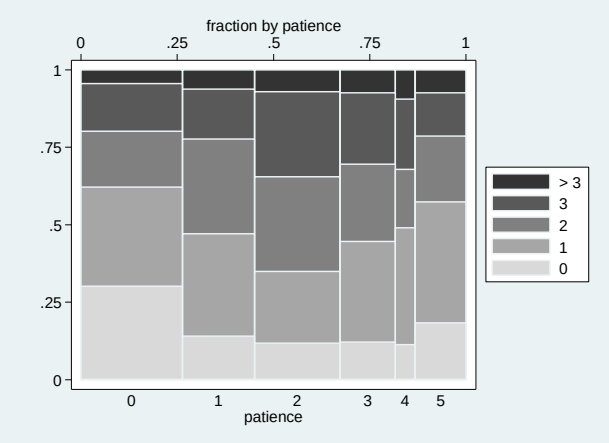


Figure 2: Share of donations conditional on the decisions in the risk (a) respectively time task (b).

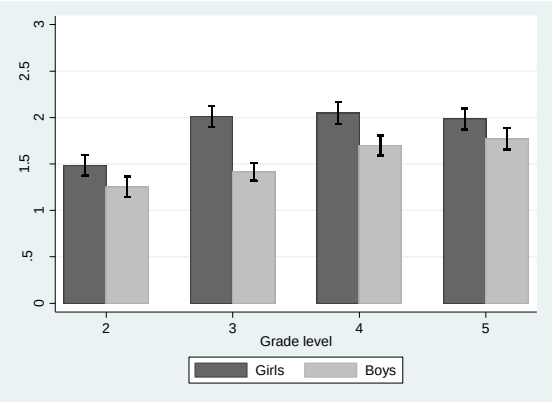


(a)



(b)

Figure 3: Average donations by age and gender.



Error bars indicate mean ± standard error.

Appendix A1. Additional table for robustness check

Table A1. Number of tokens donated to needy recipient (min=0; max=6) with a different method for eliciting intertemporal choices as explanatory variable. Ordered probit regression.

Female (=1)	0.336***
	(0.062)
German school (=1)	-0.079
	(0.083)
Grade level (age cohorts)	0.083**
	(0.034)
Knows Caritas (=1)	0.075
	(0.086)
Number of younger brothers	-0.017
	(0.067)
Number of older brothers	-0.107*
	(0.060)
Number of younger sisters	-0.062
	(0.068)
Number of older sisters	-0.040
	(0.047)
Patience[&] (other measure)	0.197**
	(0.100)
Patience^2 (other measure)	-0.087**
	(0.034)
Risk tolerance[†]	0.670***
	(0.136)
Risk tolerance^2	-0.115***
	(0.025)
Relative IQ[$]	0.375**
	(0.191)
cut1	
Constant	1.006***
	(0.353)
cut2	
Constant	1.962***
	(0.358)
cut3	
Constant	2.667***
	(0.358)
cut4	
Constant	3.558***
	(0.363)
cut5	
Constant	3.922***
	(0.378)
cut6	
Constant	4.096***
	(0.374)
Observations	985

Pseudo R^2	0.034

Notes. ***, **, * denote significance at the 1%, 5%, 10% level, robust standard errors in parentheses. Clustered on class level.

† Number of tokens invested in risk experiment (min=0; max = 5).

& Number of patient choices in an intertemporal choice experiment with three binary decision problems (min=0; max = 3). Each choice problem involved a decision between receiving 2 tokens at the end of the experiment and receiving a larger number of tokens with a delay of 4 weeks. The delayed payoff was either 3 tokens, 4 tokens or 5 tokens. This experiment was run in April/May 2012 (almost 4 month before the donation task).

$ The IQ was measured relative to the respective age cohort (values above 1 indicate above average IQ in the respective age cohort; values below 1 indicate below average IQ)

Appendix A2. Notes on estimated income and education of parents

Estimated income

In order to get a measure for income we asked the children to state their parent's profession as precisely as possible. The children's answers were categorized with the use of the Public Employment Service Austria (AMS). They provide information on the average gross starting salary per month of almost 1,800 different types of professions. If a child could only give information on the company the parent works at, we used the most common profession within the same company. We used the Austrian Public Employment Service (AMS) classification because the information provided there on different types of professions is much more detailed than the information provided by the census bureau in South Tyrol (ASTAT). However, the average gross starting salary provided by both the AMS and the ASTAT have a highly significant positive correlation. Note that we did not get information about parents' professions for all children participating in our experiment.

Education

In addition to the average gross starting salary the Public Employment Service Austria (AMS) provides information on the minimum level of education necessary to pursue a particular profession (see http://www.berufslexikon.at/):

1. Other occupations ("Sonstige Berufe"):

This form of education is appropriate for subjects who have already completed another education (apprenticeship or high school degree) but want to start a new profession or for subjects who want to pursue an occupation where no other form of education exists.

2. Apprenticeship ("Lehre"):

Prerequisite: graduation from 9 years compulsory school (at age 15) and holding of an apprenticeship position. The duration of the latter varies between 2 and 4 years depending on the type of profession.

3. Middle/High school ("Schule"):

Prerequisite: graduation from 8 years compulsory school (at age 14); plus 4-5 years of middle and high school with a school leaving examination (which qualifies students for entering higher education).

4. University („Universität, Fachhochschule, Pädagogische Hochschule"):

Prerequisite: higher education entrance qualification. Degrees: Bachelor, Master and Doctorate.

Appendix A3. Experimental instructions (translated from German/Italian)

Note: Italic font is used for the instructions to the experimenter.

Donation task

This game works as follows:

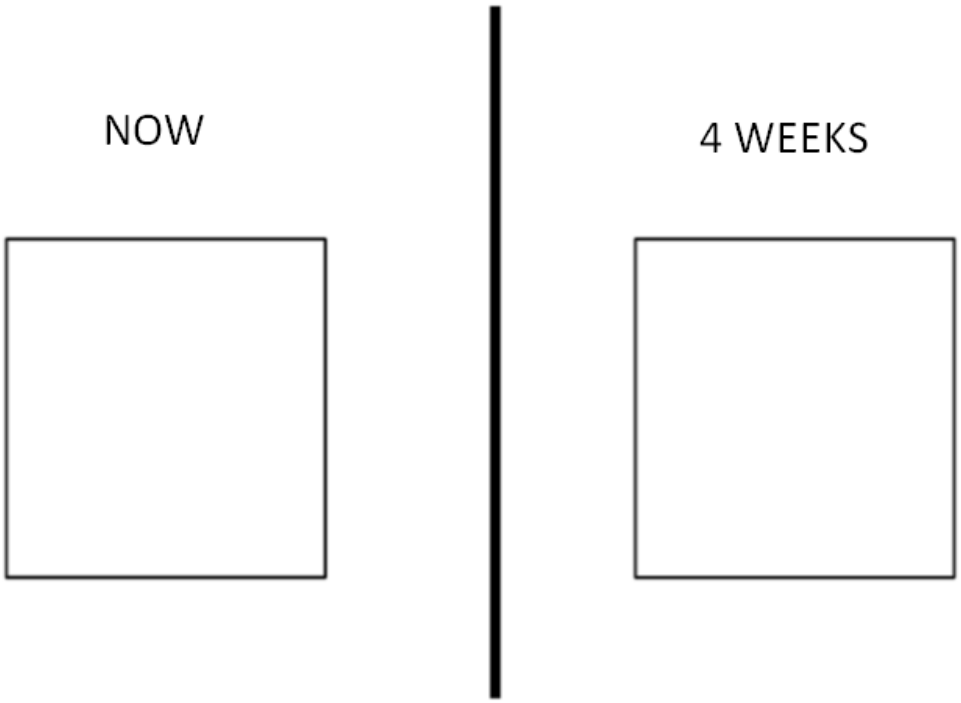
At the beginning you will receive 6 tokens (*put tokens in front of the child*). You have to decide how many tokens you want to keep for yourself and how many you want to put in the donation box over there (*point at the box in the middle of the room*). The tokens you keep for yourself you can exchange into presents in our shop. The tokens you put in the donation box will be given to poor children here in South Tyrol. We calculated how much money a token in our shop is worth and the money, which we collect with the donated tokens, will be given to Caritas South Tyrol (*point at the logo of caritas*). Do you know Caritas? (*Record the answer)*

Caritas will give the money to poor children in South Tyrol, whose families have little money at home. With the money from Caritas, the parents are able to buy important things such as warm clothes and school things for the children. You can now decide whether you want to donate none, one, 2, 3, 4, 5 or all of your tokens. Please put the tokens, which you want to keep for yourself, in this grey envelope and seal it (*put grey envelope in front of child*). Please put the tokens, which you want to donate to the children, in this white envelope and seal it (*put white envelope in front of child*). Even if you put all the tokens in just one envelope you have to seal both envelopes. While you make your decision, I will turn around so that you are completely undisturbed. Please let me know, when you are done. You can then put the white envelope in the donation box over there. It is really important, that no other child ever knows how many tokens you donated and how much you kept for yourself. Can you tell me in which envelope you have to put the tokens you want to keep for yourself? (*Answer: grey envelope*). And in which envelope do you have to put the tokens you want to donate? (*Answer: white envelope*). Please make your decision now. Take as much time as you need for your decision and let me know when you are done. (*Turn around so that you really cannot see the child anymore. Turn back when child is done. After the decision: check whether the envelopes are really sealed; WRITE THE CODE ON THE GREY ENVELOPE; DO NOT WRITE THE CODE ON THE WHITE ENVELOPE*)

Intertemporal choice experiment

Good morning. My name is … Today's game works as follows:
At the beginning you will receive 5 tokens *(please place the 5 tokens in front of the child).* You have to decide how many of these 5 tokens you want to put in the box labeled NOW (*point at the left box*) and how many tokens you want to put in the box labeled "4 WEEKS" (*point at the right box*). You will receive the tokens that you put in the box "NOW" immediately after the game and you can use these tokens for buying presents in our present shop. You can take these presents home today. Each token that you put in the box "4 WEEKS" will be doubled and you will receive the presents that you choose with these tokens in 4 weeks only.
Let's consider an example: If you, for instance, want to receive two tokens today, what do you have to do? (*Answer of the child: "I have to put 2 tokens in the left box)* And what happens with the other 3 tokens? (*Answer: I have to put these tokens in the right box"; please let the child demonstrate this*) How many tokens will be added to this box? (*point at the right box*; *answer of the child: "3"; please demonstrate!*) How many tokens are in the box in total? *(Answer: 6).* When will you receive the presents which you can choose with these 6 tokens? *(Answer: in 4 weeks).* And what happens if you put 5 tokens in that box? (*point at the left box; Answer: then I will receive 5 tokens immediately after the game and I can choose presents with these 5 tokens which I can take home today).* And what happens if you put all 5 tokens in that box? (*point at the right box; Answer: then these tokens will be doubled and I can choose presents with the 10 tokens which I will receive only in 4 weeks.)* Could you please repeat the rules of the game?
Please take your decision now. You have to put the tokens which you want to receive today in this box (*point at the left box*) and the tokens with which you can buy presents which you will receive in 4 weeks in that box (*point at the right box*). Take as much time as you need for your decision. In the meantime I will turn around so I don't disturb you. Just call me when you are done.

Decision sheet for the intertemporal choice experiment (translated form German/Italian)



Risk experiment

Good morning. My name is … Today's game works as follows:

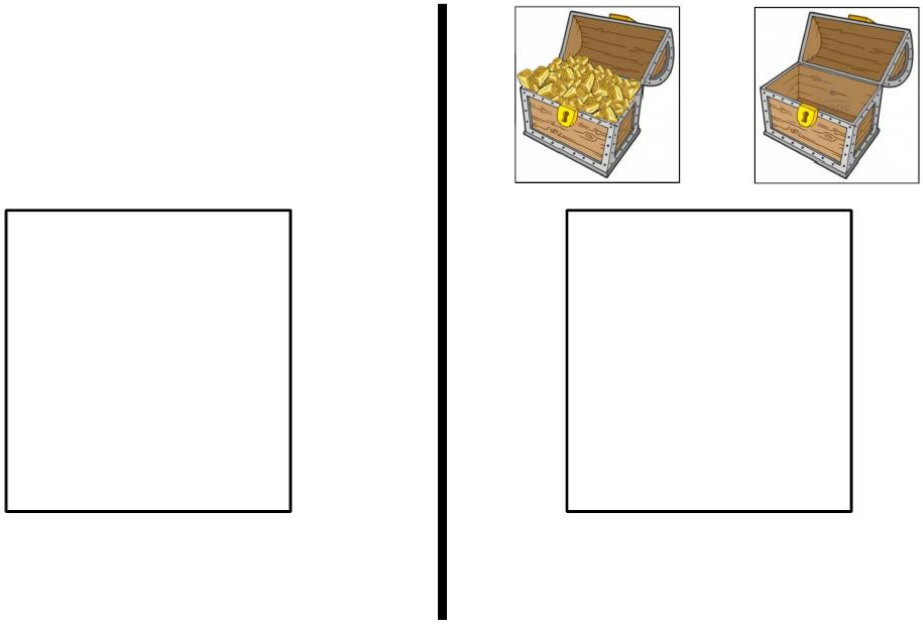
At the beginning you will receive 5 tokens *(please place the 5 tokens in front of the child).* You have to decide how many of these 5 tokens you want to keep for sure and with how many of these tokens you want to play the "treasure"-game. You have to put the tokens you keep for sure in this box (*point at the left box*). Likewise, you must put the tokens with which you want to play the treasure-game in that box (*point at the right box*). Each token that you put in the treasure-game will be doubled. The rules of the treasure-game are as follows: Here I have two cards. On this card you see a full treasure chest and on the other card there is an empty treasure chest (*show the respective cards*). I will mingle the two cards under the table and then I will put the cards on the table upside down (*please demonstrate*; *Attention: you have to mingle the cards, such that the child is not able to see the picture on the respective card)*. Then you can draw one of the cards. If you, for example, draw the full treasure chest, (*point at the full treasure chest on the decision sheet*), then you will receive all the tokens from this box. On the other hand, if you draw the empty treasure chest (*point at the empty treasure chest on the decision sheet*) then you will lose all the tokens from this box. At the end you will receive the tokens that you keep for sure (*point at the left box*) and the tokens that you win in the treasure game (*point at the right box*).

Let's consider an example: If you, for instance, want to keep one token for sure and play the treasure-game with the other 4 tokens, what do you have to do? (*Answer of the child: "I have to put 1 token in the left box and 4 tokens in the right box"; please let the child demonstrate this*) How many tokens will be added to this box? (*point at the right box*; *answer of the child: "4"; please demonstrate!*) What happens next? How does the treasure-game work? (*Child has to repeat the rules of the game*). How many tokens will you win if you draw the full treasure chest? (*Answer of the child: "8 tokens"*). And how many tokens will you receive in total? (*Answer of the child: "9"*). Exactly. You will receive 8 tokens from the treasure-game plus 1 additional token which you kept for sure. What happens if you draw the empty treasure chest? (*Answer of the child: "I lose all the tokens of the treasure-game"*) Exactly. How many tokens will you receive in total? (*Answer of the child: "1"*) Exactly. This was only an example. Let's consider another example: Could you please explain the rules of the game if you want to keep 4 tokens for sure and play the treasure-game with 1 token? (*The child has to recapitulate the game with the new example*). What happens if you, for instance, put all your 5 tokens in this box? (*point at the right box; let the child recapitulate the game*) What happens

if you, for instance, put all your 5 tokens in this box? (*point at the left box; let the child recapitulate the game*). Could you please repeat the rules of the game?

Please take your decision now. You have to put the tokens which you want to keep for sure in this box (*point at the left box*) and the tokens with which you want to play the treasure-game have to be put in that box (*point at the right box*). Take as much time as you need for your decision. In the meantime I will turn around so I don't disturb you. Just call me when you are done.

Decision sheet for the risk experiment



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Silvia Angerer, Daniela Glätzle-Rützler, Philipp Lergetporer, Matthias Sutter

Donations, risk attitudes and time preferences: A study on altruism in primary school children

Abstract
We study in a sample of 1,070 primary school children, aged seven to eleven years, how altruism in a donation experiment is related to children's risk attitudes and intertemporal choices. Examining such a relationship is motivated by theories of reciprocal altruism that provide a cornerstone for understanding human social behavior. We find that higher risk tolerance and patience in intertemporal choice increase, in general, the level of donations, albeit the effects are non-linear. We confirm earlier results that altruism increases with age during childhood and that girls are more altruistic than boys. Having older brothers makes subjects less altruistic.

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