Are social preferences stable in childhood and adolescence? A large-scale experiment in Austria and Sweden*

Matthias Sutter

Department of Public Economics, University of Innsbruck, Austria, and

Department of Economics, University of Gothenburg, Sweden

Martin G. Kocher

Department of Economics, University of Munich, Germany

Peter Martinsson

Department of Economics, University of Gothenburg, Sweden

Katarina Nordblom

Department of Economics, University of Gothenburg, Sweden

Daniela Rützler

Department of Public Economics, University of Innsbruck, Austria

This version 2009-03-31

Abstract: We examine the social preferences of 841 pupils of age 10 to 15 years in Austria and Sweden. Our study is based on the experimental design of Engelmann and Strobel (2004). We find that social preferences are by and large stable across age and across countries, indicating that by the age of 10 years social preferences can be considered as settled. Most of our subjects can be classified as either selfish or having maximin-preferences. Inequality aversion and efficiency concerns are less important. Only for the Swedish subsample we find a significant increase in efficiency concerns in the older subjects.

Keywords: Social preferences, children, efficiency, inequality aversion, maximin-preferences, distributional experiment.

JEL classification: C91; D63, D64.

* Financial support form the Austrian National Bank (Jubiläumsforndsprojekt 12588) is gratefully acknowledged.

1. Introduction

Despite a strong interest in research on social preferences, the economics literature has long remained silent on the important question on whether children at a relatively young age have developed stable social preferences or whether social preferences develop and change with age. Only recently this question has attracted more interest, as the answer to this question is crucial for the assessment whether recent models of economic decision making with social preferences (see, for instance, Fehr and Schmidt, 1999, Bolton and Ockenfels, 2000, Charness and Rabin, 2002, Dufwenberg and Kirchsteiger, 2004, Falk and Fischbacher, 2006) can claim broader or, at best, general applicability or whether they are peculiar models that apply only to the behavior of a highly selective sample of university students (since the experimental behavior of university students motivated the social preference models to which we refer).

In recent years several authors have examined how social preferences develop with age.[1] In a series of papers William Harbaugh and several coauthors have run experiments with children and teenagers to analyze their economic behavior. In Harbaugh *et al.* (2003), for instance, they report an experiment with 310 children and teenagers aged 7 to 18 years, finding that young children make considerably smaller dictator and ultimatum proposals than older children and adults. Furthermore they show that boys make smaller dictator proposals than girls. Fehr *et al.* (2008) present a study with 229 children, reporting that inequality aversion develops strongly between the ages of 3 and 8. Children at age 3 or 4 behave selfishly, whereas most children at age 7 or 8 prefer egalitarian allocations that remove advantageous and disadvantageous inequality.

In this paper, we present a large-scale experiment with 841 pupils aged 10 to 15 years. We use eight simple one-shot distribution experiments of Engelmann and Strobel (2004, henceforth E&S). These games were explicitly designed to test and discriminate between various theories of social preferences, such as the two prominent theories of inequity aversion by Fehr and Schmidt (1999, henceforth F&S) and Bolton and Ockenfels (2000, henceforth ERC) or the social preference-model of Charness and Rabin (2002). Using the games of E&S allows for a crisp test of various social preferences and how they might change with age. Such a theory-based experiment has not been conducted with children and teenagers yet.

Another novelty of our experiment with children is the fact that it has been run in two different countries that are pretty similar in socio-economic status and political orientation. Conducting the experiment in Austria and Sweden provides an opportunity for checking the

[1] See, e.g., also Benenson *et al.* (2007), Fliessbach et al. (2007), Sutter (2007), Sutter and Kocher (2007), Cesarini *et al.* (2008), Ellingsen and Johannesson (2008).

robustness of results, which seems an important endeavor in the emerging field of the economic decision making of children and teenagers. In our experiment participants in both countries had to make the same set of decisions that were incentivized by monetary rewards. From the choices made we can infer the relative importance of selfishness, inequality aversion, maximin-preferences or efficiency concerns for simply distribution tasks and we can analyze the influence of age, gender and country on social preferences. Our approach will contribute to a better understanding of the development of social preferences by age, gender and country, and as such it should become useful in the continuation of extensions and refinements of existing social preference models.

The results by E&S suggest that inequality aversion is not a major factor when making distributional choices. Rather, in their experiment with economics students E&S find efficiency concerns, maximin-preferences and selfishness to explain the large majority of choices in the distributional games. These results were questioned by Fehr et al. (2006), who argued that economics students are more likely to be influenced by efficiency-concerns than others. Using students from various disciplines as well as non-students, Fehr et al. (2006) find in their replication of E&S that non-economists are indeed more concerned with inequality aversion. Seen against the background of this debate (see also the reply of Engelmann and Strobel, 2006, to Fehr et al., 2006), our paper provides further evidence how non-economists make choices in distributional tasks and how these choices relate to the original findings of E&S. Our subject pool is a sample of school children in the Gothenburg area in Sweden and the urban areas of Schwaz and Innsbruck in Tyrol in Austria, and thereby can be supposed to be largely representative of a specific age cohort in these areas.

We find that social preferences are by and large stable across age and across countries, indicating that by the age of 10 years at the latest the development of social preferences seems to have settled. Most of our subjects can be classified as either selfish or having maximin-preferences, which is largely consistent with the findings of E&S. Inequality aversion and efficiency concerns are less important overall. Only for the Swedish subsample we find a significant increase in efficiency concerns in the older subjects. We find no significant gender differences concerning the various types of social preferences.

The paper is organized as follows. In the next section we introduce the theoretical framework and explain the experimental design. Section 3 discusses our subject pool and the experimental procedure. In Section 4 we present our results. The last section discusses the results and offers conclusions for the study of economic attitudes with children and teenagers.

2. Theoretical framework for inequality measures and experimental design

2.1. Theoretical framework[2]

In the experiment we use the design by E&S. This allows the identification of a number of different social preferences. The standard theory assumes a selfish individual as exemplified by homo oeconomicus who only focuses on maximizing her own payoffs. One alternative to the standard model of narrow self-interest is that preferences include social welfare. By assuming an equal weight to all individuals, the allocation that results in the highest efficiency is preferred. If all the weight is attached to the worst off individual, the preference is of (Rawlsian) maximin type, i.e. one would like to maximize the payoff for the player with the lowest payoff.

More recently, the notion of inequality aversion has gained increased attention and this approach assumes that individuals derive disutility both from receiving more and receiving less than others. While in the model of F&S inequality is measured as the difference of the own payoff to the other players' payoffs, in the model of ERC inequality is merely understood as the deviation of a subject's payoff from the average payoff in her group. More precisely, the utility function of player i in the model of F&S is specified as

$$U_i(x) = x_i - \alpha_i \frac{1}{n-1}\sum_{j \neq i} \max\{x_j - x_i, 0\} - \beta_i \frac{1}{n-1}\sum_{j \neq i} \max\{x_i - x_j, 0\},$$

where x_i is the payoff of player i, n is the number of players and $\beta_i \leq \alpha_i$ and $0 \leq \beta_i < 1$ are assumed. In the model of ERC it is assumed that player i maximizes her motivation function, which is given by

$$v_i = v_i(y_i, \sigma_i),$$

where y_i denotes the player's own payoff and σ_i player i's share of the total payoff in her group. For any given y_i the value of the motivation function is maximized if $\sigma_i = \frac{1}{n}$, with n denoting the number of players in the group.

2.2. Experimental design

E&S designed distributional games that allow an identification of the following motives: selfishness, efficiency, maximin, and inequality aversion according to F&S and ERC, respectively. The general set-up of the experiment is that a person must choose one out of

[2] There exist many other approaches modeling deviations from neoclassic theory, but in this subsection we focus on those approaches analyzed in the experiment.

three allocations. In each allocation, there are three persons (labeled person 1 to 3) each of whom will receive a specific amount of money. Each participant has to choose in each of the eight games among three different allocations of money to persons 1 to 3. When making a decision, the participant acts in the role of person 2, not knowing the identities of persons 1 and 3, of course. Only at the end the experiment roles were finally determined by a random draw, assigning the roles of person 1, 2 or 3 by drawing cards from a bag. This procedure is an application of the strategy method.[3] After determining roles, we randomly created groups with a person 1, a person 2 and a person 3, and paid out randomly one of the eight games. More details on the procedure are given in Section 3.2.

2.2.1. Taxation games

We selected two out of the four taxation games reported in E&S. In these games, the income of the decision maker (person 2) is the same in all three allocations and she is always the "middle income" earner. Person 1 is always the "high income" individual and Person 3 the "low income" individual. The two selected games are denoted Fx and Ex by E&S and their payoffs are presented in Table 1.[4]

Table 1. Taxation games (Payoffs in Euros)

	Treatment Fx			Treatment Ex		
	Left	Middle	Right	Left	Middle	Right
Person 1 payoff	6.8	7.2	7.6	8.4	6.8	5.2
Person 2 payoff	4	4	4	4.8	4.8	4.8
Person 3 payoff	3.6	2	0.4	1.2	1.6	2
Total payoff	14.4	13.2	12	14.4	13.2	12
Selfish prediction	Cannot be tested in these two games					
Efficiency prediction	Left			Left		
Maximin prediction	Left					Right
F&S prediction	Left					Right
ERC prediction			Right	Left		

The three allocations can be seen as involving different degrees of redistribution from Person 1 to Person 3. Note, that selfishness can not be used as a predictor of the behavior

[3] Note that E&S also used the strategy method, but report that using the actual play method (where roles are determined right from the beginning, meaning that only participants in the role of person 2 make decisions) does not yield any differences in the distribution of social preferences.

[4] The payoffs are in Euros for the Austrian subjects aged 14/15. The amounts were adjusted according to the average pocket money depending on age, so that the younger subjects received half of the presented amounts. The Swedish amounts were roughly half of the Austrian ones for the respective age group, but in SEK.

since the payoff of Person 2 is the same in all three allocations in both games. In both games the model of F&S and maximin predict the same choice, while the model of ERC predicts a different allocation. The efficient allocation coincides in treatment Fx with F&S and maximin, and in treatment Ex with the model of ERC. As a consequence, we are able to infer the relative importance of the two inequality concerns ERC and F&S without any confounding effect from efficiency motives.

2.2.2. Envy games

The taxation games reveal the importance of efficiency concerns. To get a deeper understanding of the performance of the two inequality aversion theories, E&S designed four envy games, and we selected three of them (N, Nx and Ny using the classification by E&S). Again, the decision-maker is Person 2 in the game and she is the "middle income" earner. The title "envy games" derives from the fact that in these three games the decision maker can take money both from the "high income" Person 1 and "low income" Person 3 at the same time. In treatment N the payoff of Person 2 is again fixed and the F&S choice is Pareto-dominated by the ERC allocation, whereas ERC is also Pareto-dominated by the efficient/maximin choice. Treatments Nx and Ny serve as a robustness check regarding the monetary incentives for Person 2. Both inequality aversion models (F&S and ERC) also take selfish motives into account, which may play a role in games Nx and Ny.

Table 2. Envy games (Payoffs in Euros)

	Treatment N			Treatment Nx			Treatment Ny		
	Left	Middle	Right	Left	Middle	Right	Left	Middle	Right
Person 1 payoff	6.4	5.2	4	6.4	5.2	4	4	5.2	6.4
Person 2 payoff	3.2	3.2	3.2	3.6	3.2	2.8	3.6	3.2	2.8
Person 3 payoff	2	1.2	0.4	2	1.2	0.4	0.4	1.2	2
Total payoff	11.6	9.6	7.6	12	9.6	7.2	8	9.6	11.2
Selfish prediction	Cannot be tested			Left			Left		
Efficiency prediction	Left			Left					Right
Maximin prediction	Left			Left					Right
F&S prediction			Right	Left		Right	Left		
ERC prediction		Middle		Left	Middle		Left	Middle	

2.2.3. Rich and Poor games

The remaining three games are called Rich and Poor games and they are presented in Table 3. In these games, the decision maker's (Person 2) payoff is held constant.

Table 3. Rich and Poor games (Payoffs in Euros)

	Treatment R			Treatment P			Treatment Ey		
	Left	Middle	Right	Left	Middle	Right	Left	Middle	Right
Person 1 payoff	2	3.2	4.4	3.2	4.4	5.6	5.2	6.8	8.4
Person 2 payoff	4.8	4.8	4.8	1.6	1.6	1.6	3.6	3.6	3.6
Person 3 payoff	1.6	1.2	0.8	2.8	2.4	2	2	1.6	1.2
Total payoff	8.4	9.2	10	7.6	8.4	9.2	10.8	12	13.2
Selfish prediction	Cannot be tested in these games								
Efficiency prediction			Right			Right			Right
Maximin prediction	Left			Cannot be tested			Left		
F&S prediction			Right	Left			Left		
ERC prediction			Right	Left			Left		

In treatment R, the decision maker receives the highest payoff, and in treatment P the decision maker receives the lowest payoff. The distinct feature of the last three games is that F&S and ERC predict the same choice of allocation. These treatments are designed to distinguish efficiency concerns, maximin-preferences and inequality concerns. Analog to the taxation games, the decision maker can reallocate money between Person 1 and Person 3, but in this case between the person with the "middle income" and the person with the "lowest income" (in treatment R), respectively the person with the "highest income" (in treatment P). Treatment Ey is identical to treatment Ex except that the payoff of person 2 is 3.6 € instead of 4.8 €. Note that this changes the ERC prediction and it is now in line with the F&S and maximin allocation.

In sum, using these eight games allows to investigate and discriminate which motives drive the various decisions.

3. Experimental procedures

3.1. Participants

We conducted experiments with 841 Austrian and Swedish children and teenagers aged 10 to 15 years. The experiments in Austria were run in four grammar schools[5] in the federal state of Tyrol from January 2008 until February 2008. Recruitment of the students was done through the directors of the schools, and was permitted by the central school administration board of Tyrol. The experiments in Sweden were conducted in one private and four public schools in Gothenburg during April and May 2008.

Our participants were divided into three different age groups and Table 4 describes the distribution of participants by age, sex and country. All parents of involved children and adolescents were informed about the experiments.[6]

Table 4: Distribution of participants by age and gender

	Austria			Sweden		
	Girls	Boys	Total	Girls	Boys	Total
10/11 years	144	95	239	34	20	54
12/13 years	121	89	210	36	37	73
14/15 years	107	64	171	44	50	94
Total	372	248	620	114	107	221

The Austrian sample is highly homogeneous, because all of these students attend the same secondary school form.[7] In addition they form a selective sample of students with relatively high ability, usually aiming at university education and white collar jobs. The Swedish sample, on the other hand, is less homogeneous, since there is no selection into different schools depending on ability before the age of 16. Hence, the Swedish subsample should be fairly representative of Swedish children in general.[8]

[5] From age 10, the Austrian school children attend one of two different levels of secondary education and the level depends on the elementary school outcomes.
[6] In Sweden, all parents also gave a written permission for their children to participate.
[7] Note, though, that one of the grammar schools involved is attended by girls only. Therefore, we have more girls than boys in our sample. Inclusion of this grammar school was voluntary on checking whether students in single-sex schools behave differently from those in schools with coeducation.
[8] One of the participating Swedish schools is a private one, where one could expect children of more engaged parents to attend. However, all education in Sweden is free of charge, so parents do not have to pay for their children attending private schools.

3.2. Further details of the experimental procedure

In order to give the same incentives to all of our participants, we varied the stake sizes with age. For the upper grade students (students aged 14/15 years) we doubled the stake sizes from those of younger children.[9] We also controlled for possible order effects using two different decision sheets where the eight games were presented in different orders (see Appendix B for a sample decision sheet). Contrary to E&S, we didn't report the average payoffs of person 1 and 3 and the total payoff for each allocation in the decision sheet to keep the decision sheet as simple as possible, especially for our youngest participants. Particularly for the youngest students this additional information would have caused confusion most likely.

The experiment was explained in detail to the students in class following a fixed script (see Appendix A). To check for complete understanding of the instructions we asked each participant to fill out a control sheet. In total 78.1% of the Austrian participants, respectively 76.5% of the Swedish participants, gave valid answers to both control questions. This indicates that the vast majority of our subjects completely understood the experiment. Table 5 shows the distribution of valid answers by age. Not surprisingly, we find that the percentage of valid answers is strictly increasing in age. The experiment was run as pen and paper experiment in 24 Austrian and 17 Swedish classes, and it took approximately 40 minutes. Participants also filled out a post-experimental demographic questionnaire. The students were informed (in the beginning) that they would be matched with one student from their parallel class and one student from the same age cohort in another class of another school. Thus, the matching and calculation of payoffs were not done the same day as the experiment was conducted. The payoffs were distributed in sealed envelopes marked with the student's id some weeks after the experiments had been conducted.[10]

[9] Students aged 10 to 13 years have a weekly allowance of about 4 to 6 €, whereas students aged 14/15 years have a weekly pocket money of nearly 13 €. All payoffs reported in this paper are payoffs for upper grade students.

[10] To dispel any possible doubts that the money might not be given to the participants after the experiment has been carried out, we previously conducted another experiment with all children where the payoffs were paid out immediately.

Table 5: Distribution of valid answers by age

	Austria			Sweden		
	# of participants	Valid cases	Percentage valid	# of participants	Valid cases	Percentage valid
10/11 years	239	167	69.9 %	54	37	68.5 %
12/13 years	210	170	81.0 %	73	55	75.3 %
14/15 years	171	147	86.0 %	94	77	81.9 %
Observations	620	484	78.1 %	221	169	76.5 %

4. Results

Table 6 summarizes the main data for the different game types (taxation, envy, Rich and Poor), and by country, but not for different age groups. For each type of game, we report the percentage of participants whose choices are consistent in all games of a specific type with either selfishness, efficiency, maximin-preferences or any of the two inequality models (F&S and ERC). In the taxation games, we find for the Austrian sample that almost every second participant acts in line with maximin-preferences or F&S. 15% of the Austrian participants choose in accordance with efficiency in the taxation games and only a small fraction in line with the model of ERC. Overall we find that the behavior of 67% of the Austrian subjects is consistent in both taxation games (Fx and Ex) with respect to the revealed preference type. The results are somewhat different for Sweden. 32% of the Swedish subjects are motivated by efficiency and 28% by maximin or F&S concerns. The ERC allocation is again only chosen by few subjects. 70% of Swedish children and teenagers behave consistently in the taxation games. It should be noted that in both taxation games, the income for Person 2 is the same across all three possible allocations. Thus, a selfish subject might be indifferent between the three allocations, i.e. she would just pick one of the three allocations in the taxation games randomly.

In the envy games, we find that selfish behavior explains a substantial fraction of choices between allocations. 38% of the Austrian and 32% of the Swedish participants are identified as behaving selfishly across all envy games. By using this information, we can now add a consistency measure in Table 6. Remember that in the taxation games, individuals with selfish behavior can choose any allocation since income for Person 2 is the same in all three allocations. If we add those selfish people from the envy games, who are not consistent with any model in the taxation games, we find that almost 80% of Austrian and Swedish subjects behave in a consistent way. For Swedish children and teenagers efficiency and maximin

concerns are particularly important. Again, the two models of inequality aversion explain only few choices. For the envy games we can not calculate the consistency measure because some types overlap.[11]

In the Rich and Poor games, we find that one third of the Austrian participants behave in line with maximin-preferences. Efficiency concerns (11%) and inequality preferences (3%) are less important. In the Swedish sample, we find that both efficiency concerns (31%) and maximin-preferences (27%) explain a large fraction of behavior. Only 1% of Swedish students choose the allocation which is predicted by F&S or ERC.

Overall, we find an indication that inequality aversion models only explain a small fraction of people's behavior both in the Austrian and Swedish sample. On the other hand, selfishness explains a large portion of behavior. Efficiency concerns are somewhat more prominent for Swedish subjects, while maximin-preferences are more important among Austrians.

Table 6. Distribution of preferences in each game

	Austria			Sweden		
	Taxation games	Envy games	Rich and Poor games	Taxation games	Envy games	Rich and Poor games
Selfishness		38 %			32 %	
Efficiency	15 %		11 %	32 %		31 %
		37 %			40 %	
Maximin			33 %			27 %
	45 %			28 %		
F&S		14 %			22 %	
			3 %			1 %
ERC	7 %	8 %		10 %	5 %	
Sum	67 %		47 %	70 %		59 %
Selfish people*	12 %		15 %	9 %		10 %
Sum	79 %		62 %	79 %		69 %

*Selfish people (envy games) who are not consistent with any model (divided by number of total people)

In the following we take a closer look at the influence of age on the distribution of social preference types. Figure 1 and Figure 2 show data for the taxation games. In both, the Austrian and the Swedish sample, efficiency concerns are increasing significantly with age (chi^2-test, $p_{Austria}=0.007$, $p_{Sweden}=0.000$). Whereas only 11% of the Austrian and 22% of the Swedish students in our youngest age group of 10 and 11 year olds act in line with the efficiency motive, 23% of the Austrian and 48% of the Swedish students in our oldest age group of 14 and 15 year olds can be classified as efficiency types. Maximin and F&S

[11] It is possible that an individual is classified as being selfish at the same time as being consistent with ERC or F&S.

preferences are constant across age groups in both samples. Between 44% and 48% of the Austrian subjects and 22% to 33% of the Swedish subjects choose allocations predicted by maximin or F&S. ERC types are negligible for both countries, but in Austria we observe a negative age trend (chi^2-test, $p_{Austria}=0.027$) whereas the behavior of the Swedish students does not vary significantly with age. Country differences can be found for all three types, but only for the older age groups they are significant. Swedish 14/15 year old students choose significantly more often the most efficient allocation (chi^2-test, $p=0.000$), whereas the Austrian 14/15 year old students behave significantly more in line with the maximin or F&S model (chi^2-test, $p_{Austria}=0.001$). Moreover, behaviour consistent with the ERC prediction is found to be significantly more frequent among the Swedish 12/13 year old subjects than the same Austrian cohort (chi^2-test, $p_{Sweden}=0.007$).

Figure 1. Behavior in taxation games in Austria

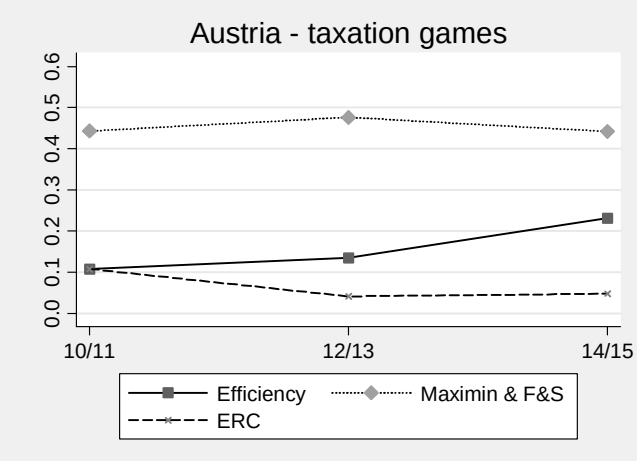


Figure 2. Behavior in taxation games in Sweden

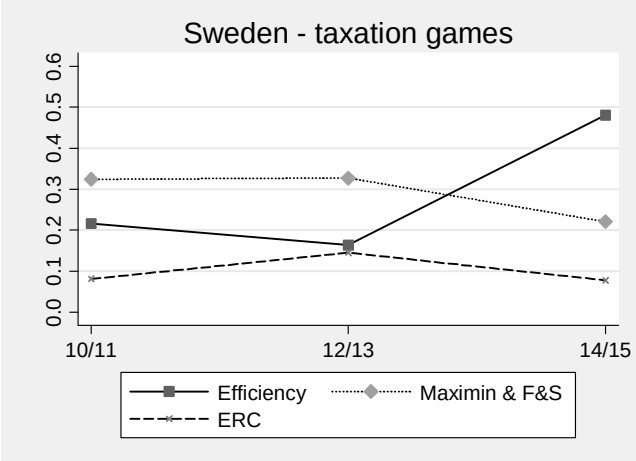


Figure 3 and Figure 4 shows the results for the envy games. In the Austrian sample, we find no significant age differences except for the F&S prediction. The likelihood of choosing in line with the F&S model is declining with age from 17% at the age of 10/11 years to 7% at the age of 14/15 years (chi^2-test, $p_{Austria}=0.012$). Between 33% and 42% of the Austrian subjects are classified as selfish, while between 35% and 41% show efficiency or maximin-preferences. ERC types are negligible. The development of behaviour among Swedes is somewhat different. Selfishness and ERC behavior are decreasing significantly with age (chi^2-test, $p_{Sweden}=0.025$ for selfishness, $p_{Sweden}=0.002$ for ERC), whereas efficiency and maximin concerns are increasing with age (chi^2-test, $p_{Sweden}=0.004$). The F&S prediction is not significantly different across the three age groups. Significant country differences are only found for the oldest age group. Swedish 14/15 year olds are significantly more efficiency or

maximin oriented (chi^2-test, p=0.007) and choose more often in line with the F&S model (chi^2-test, p_{Sweden}=0.036).

Figure 3. Behavior in envy games in Austria

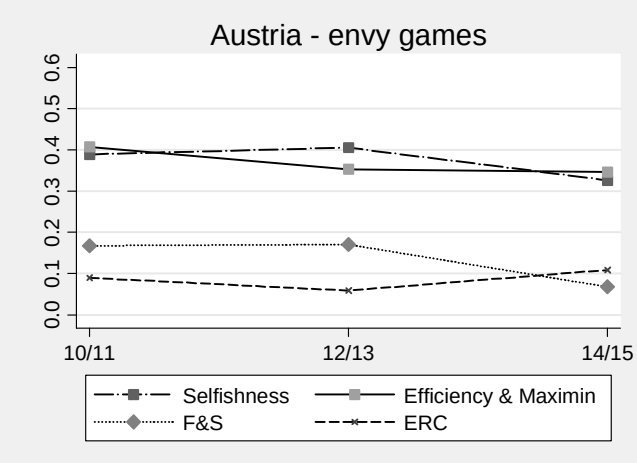


Figure 4. Behavior in envy games in Sweden

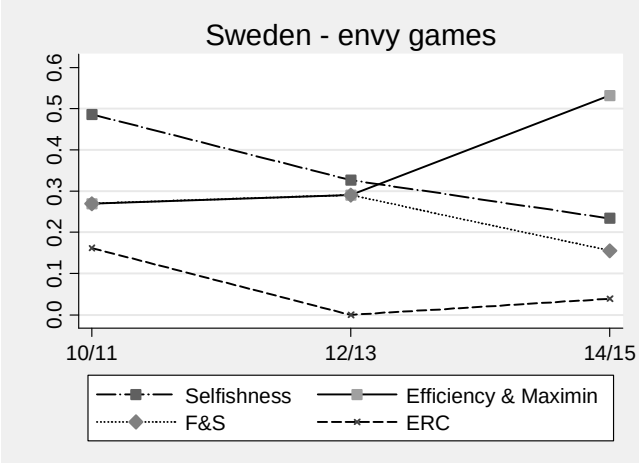


Figure 5 and Figure 6 display the results for the Rich and Poor games. We find no significant influence of age on social preferences in the Austrian sample. In the Swedish sample, efficiency concerns are increasing significantly with age (chi^2-test, p_{Sweden}=0.004), whereas no significant variations can be found for the other behavioural models. The Rich and Poor games were designed to distinguish the efficiency and maximin concerns from inequality aversion. The results show that for both countries inequality aversion models are performing very poorly and maximin-preferences are quite common. Country differences can again only found for older age groups. Similarly to the taxation and envy games we find that the Swedish subjects at age 12/13 and 14/15 are more efficiency oriented than their Austrian counterparts (chi^2-test, p_{Sweden}=0.033 for 12/13 year olds, p_{Sweden}=0.000 for 14/15 year olds).

Figure 5. Behavior in Rich and Poor games in Austria

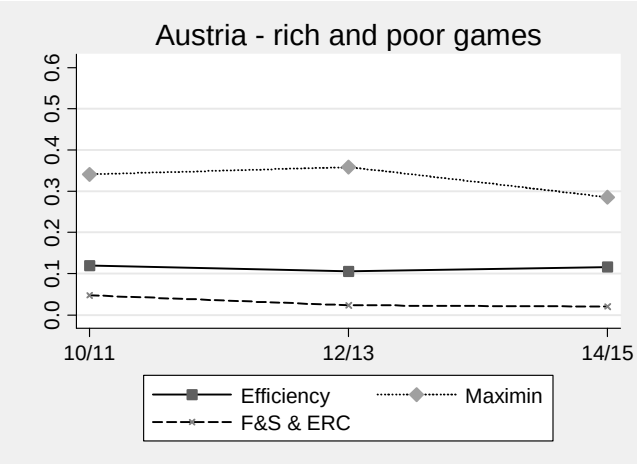
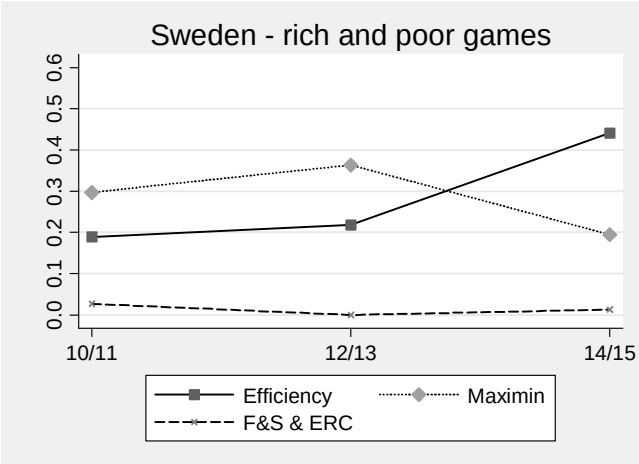


Figure 6. Behavior in Rich and Poor games in Sweden



Finally, we investigate in detail the choices of selfish people (as classified from the envy games) in the games where a selfish choice does not exist. Table 7 shows that roughly two thirds of the selfish people can be classified into another type of preference type ("a second best"). Most often selfish people are classified as having maximin or F&S preferences in the taxation games and maximin-preferences in the Rich and Poor games. Hence, it seems that selfish subjects are most often guided by maximin-preferences when making choices for which they are indifferent.

Table 7. Behavior of selfish people in taxation and Rich and Poor games (in % of selfish people in envy games)

	Austria		Sweden	
	Taxation games	Rich and Poor games	Taxation games	Rich and Poor games
Efficiency	10 %	8 %	17 %	26 %
Maximin	52 %	48 %	43 %	39 %
F&S		4 %		4 %
ERC	6 %		13 %	
Sum	68 %	60 %	73 %	69 %

5. Conclusion

We have presented a large-scale experiment with 841 pupils from Austria and Sweden, aged 10 to 15 years. Using eight simple one-shot distribution experiments of E&S we have examined what kind of social preferences prevail in this age group and whether there are important changes in social preferences between 10 year olds and 15 year olds.

We have found that social preferences are by and large stable across age and across countries, indicating that by the age of 10 years the development of social preferences seems to have settled to a large degree. Most of our subjects can be classified as either selfish or having maximin-preferences, which is largely consistent with the findings of E&S. Inequality aversion (in the spirit of Fehr and Schmidt, 1999, and Bolton and Ockenfels, 2000) and efficiency concerns (modeled, for example, by Charness and Rabin, 2002) are less important overall. Only for the Swedish subsample we have found a significant increase in efficiency concerns in the older subjects. Checking for gender differences we have found no significant differences concerning the various types of social preferences. Given that our data are largely consistent with the findings of E&S it seems justified to conclude that the distribution of

social preference types documented in experiments with university students is a good proxy for the distribution of social preferences also with different subject pools. Our paper has shown that it holds both for a much younger age group, i.e. for 10 to 15 year olds, and it holds basically also across two different European countries, namely Austria and Sweden.

Appendix A. Experimental instructions

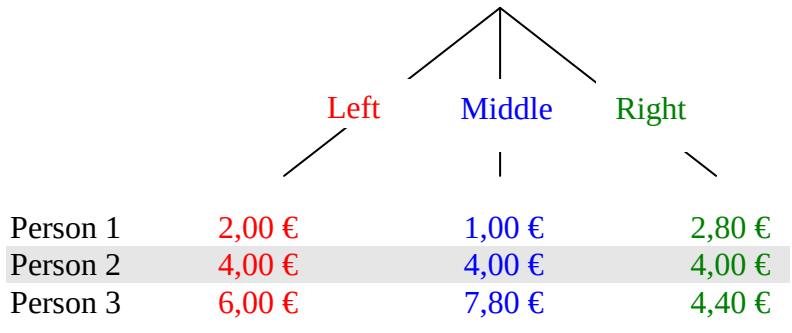
Welcome to our game. Before we start, we will explain the rules of our game to you. From now on, please don't speak to your neighbor and listen carefully. You can earn money in this game. We will give you the money in cash before the semester break. We will put your money in a sealed envelope, which is labeled with your catalogue number. This envelope will be given personally to you by us. It is important that you listen carefully now, so that you understand the rules of our game. If you have any questions, we will answer them after we have explained the rules of the game.

In this game you have to decide how you are going to divide a certain amount of money among three people. We call those three people person 1, person 2, and person 3. Person 2 decides upon the allocation of the money.

At the end of the game each of you will draw a role (thus person 1, person 2 or person 3) out of this bag. Additionally we will form groups of three people for this game. Each group consists of one student from your class, one student from your parallel class, and one student from another class in the same year. Furthermore each group consists of one person 1, one person 2 and one person 3. In each group person 2 decides upon the allocation of the payoffs.

Let's now come to the allocation of the payoffs. There are three possibilities to divide the money. With option "left" person 1 gets 2 €, person 2 gets 4 € and person 3 gets 6 € in this example. With option "middle" person 1 gets 1 €, person 2 gets 4 € and person 3 gets 7.8 €. With option "right" person 1 gets 2.8 €, person 2 gets 4 € and person 3 gets 4.4 €.

(slide)

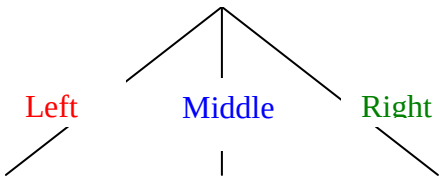


Example using the overhead projector: Let one student draw a role from the bag. Assume Sabine has chosen "left", Nicole has chosen "middle" and Franz has chosen "right". Sabine from your class has drawn the role 1. She is together with Franz (suppose he has drawn the role 2) from your parallel class and Nicole (suppose she has drawn the role 3) from another class in the same year in a group which was formed randomly. *The slides on the overhead projector represent their decision sheets.* **Remember, only person 2 decides upon the allocation of the payoffs.** *Ask students who will decide upon the division of the payoffs.* Right, as Franz has drawn role 2, he decides upon the allocation of the payoffs in his group. *Ask students how much money Sabine, Franz and Nicole get.* Right, in this case Sabine gets case 2.8 €, Franz gets 4 € and Nicole gets 4.4 €.

All of you receive a decision sheet with **altogether eight such decisions** to make. Please decide eight times either for "left", "middle" or "right", **always in the role of person 2**. *Ask students why they should fill out their decision sheet in the role of person 2.* In the end you will get the payoff of one of these eight decisions. Each of you may roll this 8-sided dice once after the decisions sheet has been completed. The number which was yielded will assign the decision which is paid out for real.

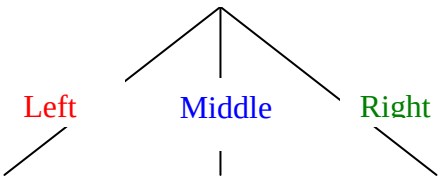
Appendix B. Decision sheet

Game 1



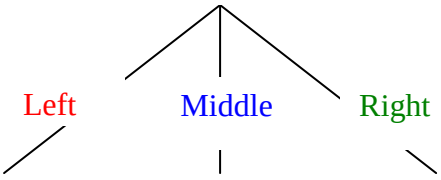
	Left	Middle	Right
Person 1	6,80 €	7,20 €	7,60 €
Person 2	4,00 €	4,00 €	4,00 €
Person 3	3,60 €	2,00 €	0,40 €

Game 2



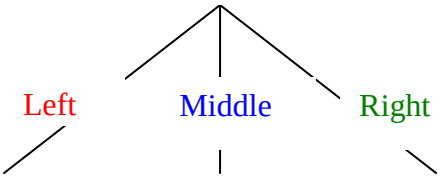
	Left	Middle	Right
Person 1	8,40 €	6,80 €	5,20 €
Person 2	4,80 €	4,80 €	4,80 €
Person 3	1,20 €	1,60 €	2,00 €

Spiel 3



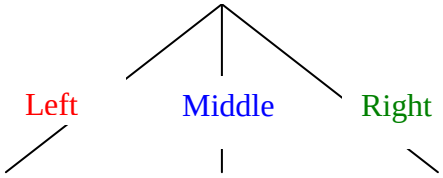
	Left	Middle	Right
Person 1	6,40 €	5,20 €	4,00 €
Person 2	3,20 €	3,20 €	3,20 €
Person 3	2,00 €	1,20 €	0,40 €

Game 4



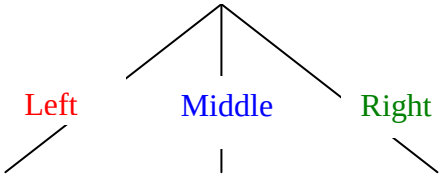
	Left	Middle	Right
Person 1	6,40 €	5,20 €	4,00 €
Person 2	3,60 €	3,20 €	2,80 €
Person 3	2,00 €	1,20 €	0,40 €

Game 5



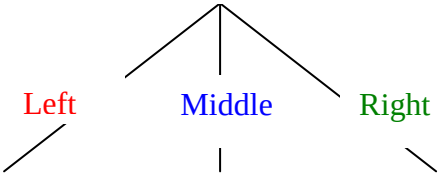
	Left	Middle	Right
Person 1	4,00 €	5,20 €	6,40 €
Person 2	3,60 €	3,20 €	2,80 €
Person 3	0,40 €	1,20 €	2,00 €

Game 6



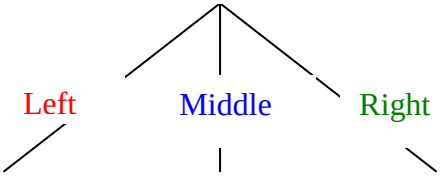
	Left	Middle	Right
Person 1	2,00 €	3,20 €	4,40 €
Person 2	4,80 €	4,80 €	4,80 €
Person 3	1,60 €	1,20 €	0,80 €

Game 7



	Left	Middle	Right
Person 1	3,20 €	4,40 €	5,60 €
Person 2	1,60 €	1,60 €	1,60 €
Person 3	2,80 €	2,40 €	2,00 €

Game 8



	Left	Middle	Right
Person 1	5,20 €	6,80 €	8,40 €
Person 2	3,60 €	3,60 €	3,60 €
Person 3	2,00 €	1,60 €	1,20 €

References

Benenson, J. F., J. Pascoe and N. Radmore (2007). Children's altruistic behavior in the dictator game. *Evololution and Human Behavior* 28, 168-175.

Bolton, Gary E., and Axel Ockenfels (2000). ERC: A Theory of Equity, Reciprocity, and Competition. *The American Economic Review* 90 (1), 166-193.

Bolton, Gary E., and Axel Ockenfels (2006). Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments: Comment. *The American Economic Review* 96 (5), 1906-1911.

Camerer, Colin F., and Ernst Fehr (2006). When Does "Economic Man" Dominate Social Behavior? *Science* 311, 47-52.

Cesarini, David, Christopher T. Dawes, James H. Fowler, Magnus Johannesson, Paul Lichtenstein, and Björn Wallace (2008). Heritability of cooperative behaviour in the trust game. *Proceedings of the National Academy Sciences* USA 105, 3721-3726.

Charness, Gary, and Matthew Rabin (2002). Understanding Social Preferences with Simple Tests. *The Quarterly Journal of Economics* 117 (3), 817-869.

Eisenberg, Nancy, Gustavo Carlo, Bridget Murphy, and Patricia Van Court (1995). Prosocial Development in Late Adolescence: A Longitudinal Study. *Child Development* 66, 1179-1197.

Ellingsen, T. and M. Johannesson (2008). Anticipated verbal feedback induces altruistic behaviour. *Evolution and Human Behavior* 29, 100-105.

Engelmann, Dirk, and Martin Strobel (2004). Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments. *The American Economic Review* 94 (4), 857-869.

Engelmann, Dirk, and Martin Strobel (2006). Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments: Reply. *The American Economic Review* 96 (5), 1918-1923.

Fehr, Ernst, and Klaus M. Schmidt (1999). A Theory of Fairness, Competition, and Cooperation. *Quarterly Journal of Economics* 114 (3), 817-868.

Fehr, Ernst, Michael Naef, and Klaus Schmidt (2006). Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments: Comment. *The American Economic Review* 96 (5), 1912-1917.

Fehr, Ernst, Helen Bernhard, and Bettina Rockenbach (2008). Egalitarianism in young children. *Nature* 454, 1079-1083.

Fliessbach, K., B. Weber, P. Trautner, T. Dohmen, U. Sunde, C.E. Elger, and A. Falk (2007). Social comparison affects reward-related brain activity in the human ventral striatum. *Science* 318, 1305-1308.

Gummerum, Michaela, Monika Keller, Masanori Takezawa, and Jutta Mata (2008). To Give or Not to Give: Children's and Adolescents' Sharing and Moral Negotiations in Economic Decision Situations. *Child Development* 79 (3), 562-576.

Harbaugh, William T., and Kate Krause (2000). Children's Altruism in Public Good and Dictator Experiments. *Economic Inquiry* 38 (1), 95-109.

Harbaugh, William T., Kate Krause, and Jr. Steven G. Liday (2003). Bargaining by children. *Working paper*.

Kahn Jr., Peter H., and Elliot Turiel (1988). Children's Conceptions of Trust in the Context of Social Expectations. *Marill-Palmer Quarterly* 34 (4), 403-419.

Krebs, Dennis L., and Frank Van Hesteren (1994). The Development of Altruism: Toward an Integrative Model. *Developmental Review* 14, 103-158.

List, John A., and Todd L. Cherry (2008). Examining the role of fairness in high stakes allocation decisions. *Journal of Economic Behavior & Organization* 65, 1-8.

McGillicuddy-De Lisi, Ann V., Cynthia Watkins, and Andrew J. Vinchur (1994). The Effect of Relationship on Children's Distributive Justice Reasoning. *Child Development* 65, 1694-1700.

Murnighan, J. Keith, and Michael Scott Saxon (1998). Ultimatum bargaining by children and adults. *Journal of Economic Psychology* 19, 415-445.

de Quervain. Dominique J.-F., Urs Fischbacher, Valerie Treyer, Melanie Schellhammer, Ulrich Schnyder, Alfred Buck, and Ernst Fehr (2004). The neural basis of altruistic punishment. *Science* 305, 1254-1258.

Sigleman, Carol K., and Kara A. Waitzman (1991). The Development of Distributive Justice Orientations: Contextual Influences on Children's Resource Allocations. *Child Development* 62, 1367-1378.

Sutter, Matthias (2007). Outcomes versus intentions: On the nature of fair behaviour and its development with age. *Journal of Economic Psychology* 28, 69-78.

Sutter, Matthias and Martin G. Kocher (2007). Trust and trustworthiness across different age groups. *Games and Economic Behavior* 59, 364-382.