Group Identity and Discrimination in Small Markets

Gerhard Riener*and Alexander Schacht†

February 1, 2011

*** Very preliminary draft, please do not quote ***

Abstract

This paper is an experimental study on the influence of group identity on the determination of prices and beliefs in a small market game. We induce group identity through common experience using a focal point game and additionally applying the color group assignment method. After inducing group identity, subjects play a three-person bargaining game where one seller can sell an indivisible good to one of two competing buyers. We observe buyers' offers and sellers' minimum willingness to accept the offers. Additionally, we elicit expectations of behavior over buyers and sellers. The main finding is that in-group buyers who compete with an out-group buyer offer significantly more compared to a complete out-group treatment. We also find that in-group seller expect in-group favoritism from their partner, i.e. expect a higher offer. However, we do not find discriminatory behavior on the side of the seller.

JEL classification: C91; D45; L14

*Graduate College "The Economics of Innovative Change", Friedrich-Schiller University, Carl-Zeiss-Str. 3, 07743 Jena, Germany; mail: gerhard.riener@uni-jena.de

†*Corresponding author:* Graduate College "The Economics of Innovative Change", Friedrich-Schiller University, Carl-Zeiss-Str. 3, 07743 Jena, Germany; phone +49 (0)3641 9-43277, mail: alexander.schacht@uni-jena.de

1 Introduction

Trade between members of groups that differ in non-economic, but social characteristics is ubiquitous in almost every society. Social characteristics should not matter in a market setting where subjects try to maximize their gains from trade. However, discrimination between groups is observed frequently in market settings such as housing markets (Yinger, 1995), car markets (Goldberg, 1996), consumer markets (Yinger, 1998), and labor markets (Bertrand and Mullainathan, 2004). Explanations for this phenomenon are either statistical discrimination (Phelps, 1972), or taste-based discrimination (Becker, 1957), where negative stereotypes or negative tastes toward another group lead to unequal treatment.

Various experiments in social psychology and economics show that people behave differently depending on whether they interact with people from the same or different groups.[1] We are interested how group identity influences the determination of prices and expectations on both the demand and supply sides.[2] In our experiment subjects participate in a three-person bargaining game where we observe buyers' offers and sellers' minimum willingness to accept the offers. Additionally, we elicit expectations of behavior over buyers and sellers. Our contribution is, to directly compare markets where discrimination via group membership is possible versus markets where this is not. We try to see whether in this experimental market, discrimination is driven by favoritism toward one's own group rather than negative feelings toward other groups also known as intergroup bias.

Experimental research rely on both natural (e.g. Goette et al., 2006) as well as artificially induced groups (e.g. Hargreaves Heap and Varoufakis, 2002) to study its effect on behavior and human decision making. The introduction of natural groups – e.g. by residential districts – lead to first mover discrimination in trust games based on expectations of trustworthiness (Falk and Zehnde, 2007). Similarly, the introduction of artificially induced groups by color group assignment leads to discrimination of outsiders in a repeated trust game (Hargreaves Heap and Zizzo, 2009).

For instance, Vaughan et al. (1981) divided 7 to 11 year old children into red and blue groups to play a simple division game and conclude that irrespective of the age, children gave more money to members of their own group. Kramer et al. (1995) report that responders are more willing to accept an unfair offer in a ultimatum game made by an in-group proposer than the same offer made by someone from the out-group. Fershtman and Gneezy (2001) show that identifying natural groups lead to a discrimination of outsiders in a repeated trust game. Chen and Li (2009) present a laboratory experiment that measures the effects of group identity on social preferences. They conclude that in-group matching generates significantly higher expected earnings than

[1] A nice review of the literature in social psychology on social identity can be found in Chen and Li (2009).

[2] Early work in social psychology by Tajfel and Turner (1979) developed a theory on group identity to understand the psychological basis for intergroup relations and discrimination. People define themselves – among other – via being member of particular groups in a society that may have behavioral consequences when two members of different groups deal with each other. As noted by Akerlof and Kranton (2000) group identity plays an important role in economic decision-making, hiring decisions and bargaining. In their study they propose a utility function including identity associated with different social norms and categories. They apply this model to analyze phenomena like gender discrimination, economics of poverty and social exclusion.

out-group matching.

However, only a few papers deal with the influence of group identity in market settings. For example Ball et al. (2001) investigate the impact of social status on market prices and earnings. They find that players randomly assigned to a high-status group earned significantly more of the surplus, regardless of whether they were buyers or sellers. Recently, Li et al. (2010) study the impact of group identity on partner selection and price offers in oligopolistic markets. They conduct a bargaining game with multiple proposers and responders and find that in-group sellers are more likely to make offers to in-group buyers. The authors point out that group identity may not be important in big markets where buyers and sellers act anonymously but may be more important in markets with a small number of sellers and buyers and, as we argue, infrequent trade.

Consequently, we study the influence of group identity in a controlled experimental small market setting with one seller and two buyers and infrequent trade, where identities are induced. To the best of our knowledge only a few studies combine multiple-person games with group identity.[3]

We find that in-group buyers who compete with an out-group buyer offer significantly more compared to a stranger's framework. We also find that in-group seller expect in-group favoritism from their partner, i.e. expect a higher offer. However, we do not find evidence of discriminatory behavior of the seller bargaining with an in-group and an out-group buyer simultaneously.

Our design is applicable to a variety of small markets: for example licensing markets, where only one seller (licensor) and a few buyers (licensees) bargain in the market. First, licensing is comparable to a matching procedure: Among all firms interested in licensing a technology, the firm that submits at least as much as the licensor asks and at the same time the highest offer becomes the exclusive licensee. Second, according to Contractor (1981) the number of potential licensees is limited since inventions are usually at an early stage and market success is uncertain. Therefore, in such markets social ties among actors may play an important role. For instance, it might be that some common experiences already exist between participants at the time of negotiation due to prior collaboration whereas other participants have no common experience or relation to the in-group and hence belong to the out-group.[4]

Dealing with within-group manipulations might encourage subjects' behavior into a direction the experiment is designed to test for – so to invoke an experimenter demand effect (EDE, Zizzo, 2010). To reduce this problem we formulated our instructions as neutral as possible. Moreover, we did not announce our objectives during the

[3] For example, the study of Bauernschuster et al. (2009) explores how competition and group identity effect trust and trustworthiness. They find that trustees react to competition among in-group and out-group investors by lowering return ratios. Tremewan (2010) conducts a three-person "divide the dollar" game and investigates the effect of group identity on the formation of coalitions and the resulting distribution of resources. He concludes that players in the out-group earn less, as a result of being more often excluded from the coalition.

[4] Licensing agreements typically entail royalty payments based on the success of the new product by the licensee, as well as upfront fixed fees (Katz and Shapiro, 1985). This structuring of contracts is comparable with splitting a pie among the contractual partners for the successful new product what is somehow related to a Nash demand game or Ultimatum game. According to Caves et al. (1983) the rent division between licensor and licensee is ambiguous since both parties cannot be sure about the potential payoff of the invention due to uncertainty and incomplete information. We do not take these points into account since we are interested in the pure effect of group identity on strategic interactions between subjects.

experiment, i.e. key goals and claims the experimenters actually try to achieve. Additionally we used the focal point game to avoid an obvious group formation process (Mehta et al., 1994). Furthermore, we are aware of the fact that for belief elicitations a lump-sum payment is not incentive compatible. Nonetheless, a lump-sum payment is justified by several studies which report that incentivization does not significantly improve stated beliefs (Sonnemans and Offerman, 2001; Dufwenberg and Gneezy, 2000; Guarino and Huck, 2006).

The remainder of the paper is organized as follows: In the next section we describe our experimental design and section 3 points out our hypotheses and behavioral prediction. Then we present the results. Concluding we discuss the implications of our findings in section 5.

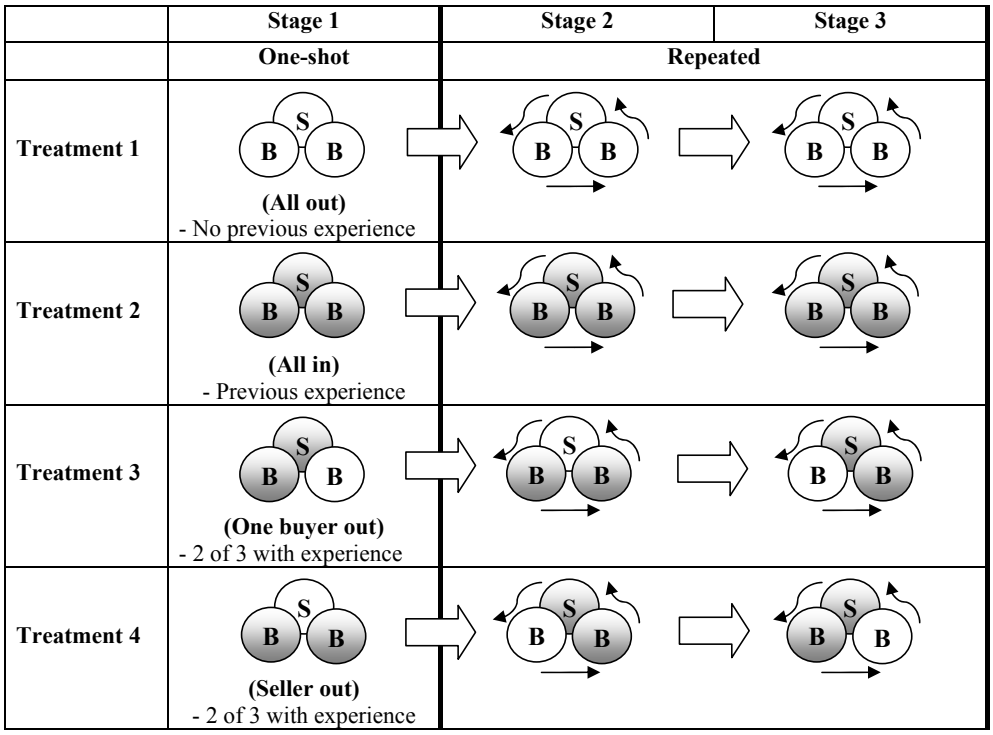
2 Experimental Design

In order to identify the influence of group identity on the determination of buyers' offers and sellers' claims in a market setting, we implemented four distinct experimental treatments. Each treatment consists of three parts and a concluding questionnaire which were computerized using zTree (Fischbacher, 2007). In Part 1 of the experiment – which was identical for all four treatments – we introduced group identity using a three-person coordination game. This coordination ensures a common, positive, experience among the upcoming in-group members. In Part 2 of the experiment, subjects were rearranged to groups of three subjects according to the four different treatments to participate in a three-person bargaining game which differs in its group composition. To strengthen group feelings we introduced wording and color assignments to identify in-group and out-group members in the subsequent treatments. In this bargaining game one seller and two buyers had to bargain about an indivisible good. Stage 1 of the three-person bargaining game corresponds to a one-shot game, as subjects knew that the second part of the experiment consists of 3 stages but the exact information about the content of stage 2 and stage 3 was disclosed at the end of the first bargaining game. That means that after completing the first bargaining game subjects were informed that in stage 2 and 3 the three-person bargaining game will be repeated keeping group membership and group identity constant but assigning new roles to the subjects. Every subject in each treatment played once as a seller and twice as a buyer. The third part concluded the experiment with a lottery choice game and a final questionnaire.

Subjects who were matched with at least one subject, with whom they played the first stage together, will be referred to as *in-group* members. Subjects who were matched with subjects, with whom they did not play the first stage together, will be referred to as *out-group* members. Figure 1 gives a graphical overview of the treatments where S stands for the seller and B stands for the buyer. In treatment 1 (*All out*) all subjects are out-group members - represented by white circles, in treatment 2 (*All in*) all subjects belong to the in-group pictured with gray circles, in treatment 3 (*One buyer out*) one buyer and the seller belong to the in-group while the other buyer belongs to the out-group which is represented with two gray and one white circles. In treatment

4 (*Seller out*) both buyers belong to the in-group while the seller belongs to the out-group pictured with two gray and one white circles. All four treatments were conducted in each session.

Figure 1: Treatment Overview



Note: S=Seller, B=Buyer. The arrows indicate how subjects changed roles over the stages.

Part 1: Coordination game and group formation In the first part of the experiment groups of three subjects were formed randomly. All subjects participated in a three-person coordination game played within each group to establish common experience among the randomly formed group. Subjects of a group, referred to as "partners", had to choose a meeting point in Paris (France), either the Eiffel Tower or the Centre Georges Pompidou (this coordination game has been used previously by Bauernschuster et al., 2009). Coordination is successful if all three players of a group pick the same meeting point. In case of a successful coordination the group receives an amount of 1.50€ which is split equally among the subjects of the group, which was also phrased in this way. In case of disagreement the group receives 0€. After the coordination game, subjects were informed about their own and their group-mates' choices, the outcome of the coordination and the profit of the group. After completing the coordination game in the first part, groups were rearranged according to the four treatments and subjects received information on the group composition. To strengthen in-group membership

we additionally used wording and color assignment. We assigned a color (blue) to all members of the in-group and informed participants about this color assignment. Subjects, who are supposed to interact as out-group members, were matched with two new subjects with whom they did not interact in the first part. We informed subjects belonging to the out-group that they are assigned to subjects who belong to the blue group referred to as "partners", who already collected experience in the first part together. To strengthen as well the out-group feeling,we assigned the color *red* to out-group members (see Hargreaves Heap and Varoufakis, 2002). Group membership, i.e. the colors and the corresponding information with whom they interacted in the first part was public knowledge to all matching-group members.

Part 2: Bargaining game In the second part of the experiment, matching-group members participated in a three-person bargaining game for three rounds where two buyers and one seller negotiate for an indivisible good.[5] The bargaining process proceeded as follows: All subjects of a matched group make their individual offers simultaneously and in private. The seller has to announce a payment request simultaneously for each of the two buyers (X_1, X_2), announcing the minimum amount of each buyer's budget wanted to obtain in exchange for the good. On the screen of the seller the two boxes for the payment request for each buyer were arranged vertically. The assignment of buyers who belong to the upper and to the lower boxes was randomized. At the same time each buyer states its offer indicating the willingness to pay for the indivisible good (Y_1, Y_2). Proposals and payment requests can range between an integer value of 0 and 113. After all subjects confirmed their proposal(s), the entry is obligatory and a renegotiation is not possible. Once all subjects have made their decisions, the offer of each buyer is compared to its corresponding threshold to decide if the good is sold and determine which buyer is successful. In case that none of the offers met the corresponding threshold of the seller, the good is not sold. If both offers are at least equal to the threshold of the seller $[(X_1 \leq Y_1) \vee (X_2 \leq Y_2)]$, he has to decide to whom the good has to be sold.[6] A single buyer acquires the good if his offer is equal or exceeds the sellers corresponding threshold and the offer of the other buyer does not $[(X_1 \leq Y_1 \ \wedge \ X_2 > Y_2) \vee (X_1 > Y_1 \ \wedge \ X_2 \leq Y_2)]$.

Subjects' payments depend on the successful contracting. If there is no agreement on the price, buyers' endowment of 113 ECU is lost and all participants receive a profit of zero. If the seller concludes a contract with one of the two buyers the seller receives buyers' winning offer. The buyer who acquires the good receives the difference between 113 ECU and the price offered to the seller. The other buyer leaves the bargaining stage empty-handed. Subjects played in total three bargaining rounds keeping group membership and group identity constant but assigning new roles to the subjects. Thus every subject played once as a seller and twice as a

[5] The negotiation is comparable to a Nash demand game Nash (1950) where two subjects have to make a proposal about splitting a pie of a certain amount of money. If the two proposals sum to no more than the total amount, both subjects get their proposal. Otherwise both get nothing. However, subjects do not make directly a proposal to split a pie of a certain amount but rather announce their willingness to pay (buyer) and their willingness to accept (seller).

[6] To the best of our knowledge all prior studies which investigate responder competition use a random draw to determine the winner (see Grosskopf, 2003). To check for potential discrimination in a bargaining process we allow for a choice of the seller in case that both buyers reach its corresponding threshold. However, we are aware that such a design could lead to payment requests of the seller close to zero.

buyer. The first stage of the bargaining game corresponds to a one-shot game. Subjects in the experiment were unaware of the fact that the game will be repeated two more times. In all three bargaining stages, subjects do not receive feedback about the prior bids as well as the outcome.

At the end of part two, one stage has been chosen randomly for payment. In case a clear result has been achieved, i.e. either no agreement or an agreement where one buyer meets the corresponding threshold of the seller whereas the other does not, all subjects receive feedback immediately. In case both buyers meet sellers' corresponding threshold, buyers receive a message that the seller has to choose from one of the two. The choice screen of the seller included two (colored) boxes for each buyer side by side which included the payment request of the seller as well as the corresponding offer. The assignment of buyers who belong to the left and to the right box was randomized. After the choice of the seller all subjects of the group received feedback.

Belief elicitation After each bargaining stage, we elicit beliefs from each subject depending on its role in the bargaining game. More precisely we elicit sellers' beliefs about the potential offer from each of the two buyers as well as buyers' beliefs about sellers' potential payment request for himself and for the other buyer. For the elicitation we used two different methods: First, we asked each subject for a point estimate, i.e. subjects had to declare an integer between 0 and 113. In a second step, we confronted subjects with twelve intervals of equal size apart from the first and the last one.[7] Subjects had to state for each interval a value between 0 and 100 to specify their beliefs about how likely it is that the expected value is located in the corresponding interval. In the end all stated values had to sum up to 100 which correspond to 100 percent.[8] Thus independent from the role, each subject had to answer four bonus questions after each bargaining game.[9] In total subjects received a lump-sum payment of 1.20€ for answering all bonus questions.

Part 3: Risk aversion elicitation and questionnaire To control for the role of risk aversion we apply a simplified procedure of Holt and Laury (2002).[10] Subjects were presented with five different lottery choices. In each case, subjects had the choice between a safe lottery X that paid 0.50€ for sure and a risky lottery Y that paid amounts from 0.90€ to 1.50€ with a probability of 0.5 and zero otherwise. In general, more risk averse

[7] The first interval [0,10] includes 11 values whereas the last interval [111, 113] includes only 3 values. All the other intermediate intervals include 10 values, respectively.

[8] Both methods asked the same question but in a different way. Whereas the first question just asks for an integer value, the second question asks for a probability distribution. Aim of the second method is to specify subjects' beliefs and to control for inequalities and inconsistencies. According to Delavande et al. (2008) eliciting probability distributions should be strictly preferred to the elicitation of point expectations. Therefore we only use probability distributions for the upcoming analyses.

[9] In the first question the seller was asked to state his belief about the potential offer from the first buyer. The second question asked the same question but the seller had to specify her beliefs for the first buyer with the probability distribution method. The third question asked the seller the same question as in the first one but for the second buyer. The fourth question elicits beliefs with the help of the probability distribution method but for the second buyer. The same structure of questions is used for the buyers. The first two questions covered buyers' belief about the payment request to oneself. The following two questions covered beliefs about the payment request to the counterpart.

[10] This procedure has previously been used by Durante and Putterman (2007).

people should switch from lottery X to lottery Y at a higher stage. One pair of lotteries was selected randomly and the decision was paid out. The experiment was concluded with a questionnaire where subjects answered a series of background questions regarding their gender, area of study, and socioeconomic background.

3 Hypotheses

First, we are interested in whether differences among buyers with respect to group identity have an effect on stated offers. We expect that a direct comparison of buyers in mixed groups leads to a stronger competition between each other, resulting in higher offers of both buyers compared to situations where buyers are not distinguishable. One explanation might be that sellers are not able to directly discriminate between the two, which might reduce the investment pressure of both buyers compared to buyers who differ in their group identity. However, the direction of the differentials is ambiguous (cf. Li et al., 2010). Following this argument, we predict:

Conjecture 1. *(a) In treatment One buyer out, in-group buyers offer more compared to buyers that are not distinguishable in terms of their group identity.*

(b) In treatment One buyer out, out-group buyers offer more compared to buyers that are not distinguishable in terms of their group identity.

Second, we are interested in sellers' payment requests and whether these requests differ taking different group identities into account. Ahmed (2007) conducted several economic experiments and concluded that discrimination is not necessarily a result of hostility toward out-group members, but is rather a result of in-group favoritism. However, recently, Li et al. (2010) observed that in-group sellers charge in-group buyers a higher price compared to out-group buyers. Related to the argumentation of Li et al. (2010) we suppose that in-group sellers might either demand a lower or a higher price from in-group buyers compared to out-group buyers. On the one hand, in-group sellers may demand lower prices from in-group buyers because of in-group favoritism. On the other hand, opportunistic in-group sellers may take advantage of buyer's in-group favoritism and charge in-group buyers a higher price in anticipation that in-group buyers are forced to offer more to save the contract. We therefore formulate following hypothesis for the case that sellers can directly discriminate between both buyers:

Conjecture 2. *In treatment One buyer out, in-group sellers payment requests will differ between in-group buyers and out-group buyers.*

In addition, several studies have shown that for most of the subjects, fairness considerations are rather unimportant in competitive environments (for an overview see Fehr and Schmidt, 1999). For example, if one seller is

linked to two buyers, competition between buyers might increase the offers to the extent that the seller extracts the whole surplus. This pattern should not be influenced by group identities.

Conjecture 3. *Due to the competitive frame, buyers will offer an amount close to their whole endowment and therefore sellers extract the whole surplus, independent of the group identity.*

Furthermore we are interested in the beliefs about other players' behavior of each role with respect to different group identities. Several studies elicit beliefs about other players' actions such as contributions in public good games (e.g. Offerman et al., 1996) and investment in trust games (e.g. Dufwenberg and Gneezy, 2000). In our experiment sellers might hold heterogeneous beliefs about expected offers of buyers considering differences in group membership. In-group sellers might expect that their "partners" from the first part of the experiment make them a higher offer compared to the out-group buyer. This would be in line with the argument of in-group favoritism (Tajfel, 1982) and common identity that is a major determinant for transactions in markets (Ben-Porath, 1980).

The same argument also holds for beliefs of buyers about potential payment requests of the seller. If buyers differ with respect to their group identity, they might expect different payment requests for themselves and for the counterpart. According to in-group favoritism in situations where distinction of the buyers is possible, in-group buyers might expect a lower price for themselves than for the out-group counterparts whereas out-group buyers might expect the other way round. Furthermore it might be that payment requests for themselves and for the counterpart differ between buyers. However, in situations where no distinction is possible, no differences should be observed.

4 Results

4.1 Implementation

We conducted the experiment in June 2010 at the laboratory of the Friedrich-Schiller-University Jena. All participants were undergraduate students from a broad variety of disciplines, excluding students from economics and psychology, recruited via ORSEE (see Greiner, 2004). In total we conducted 10 sessions with a total of 168 subjects with 18 subjects per session.[11] Before the experiment subjects received the same basic instructions in

[11] In two sessions we had to restrict the number of subjects to 12 due to no-shows. In these cases the first three treatments were conducted. In general, treatment *All out* and *All in* were run with 1 group each per session and treatment *One buyer out* and *Seller out* were run with 2 groups each per session, except for 1 session where treatment *Seller out* was run with 4 groups to balance the number of executed treatments.

print (see appendix A). At the end of each session, part 1 and one randomly picked stage from part 2 were paid according to subjects' decisions. Additionally, subjects received a lump-sum payment of 1.20€ for all bonus questions and further 0.56€ on average from the lottery game. Each subject received 2.50€ for participation. On average, subjects earned in total 7.28€, with a minimum payment of 4.20€ and a maximum payment of 14.50€. All rewards within the experiment were handled in ECU (Experimental Currency Unit), where 1 ECU corresponds to 0.08€.

4.2 Group induction

In part 1 – the coordination game – 99.4 percent of all subjects chose the Eiffel Tower as a meeting point in Paris. This leads to a successful coordination in 98,2 percent of all groups: Only one group out of 56 did not coordinate on the same focal point. Thus the coordination success is even larger compared to the study of Bauernschuster et al. (2009).

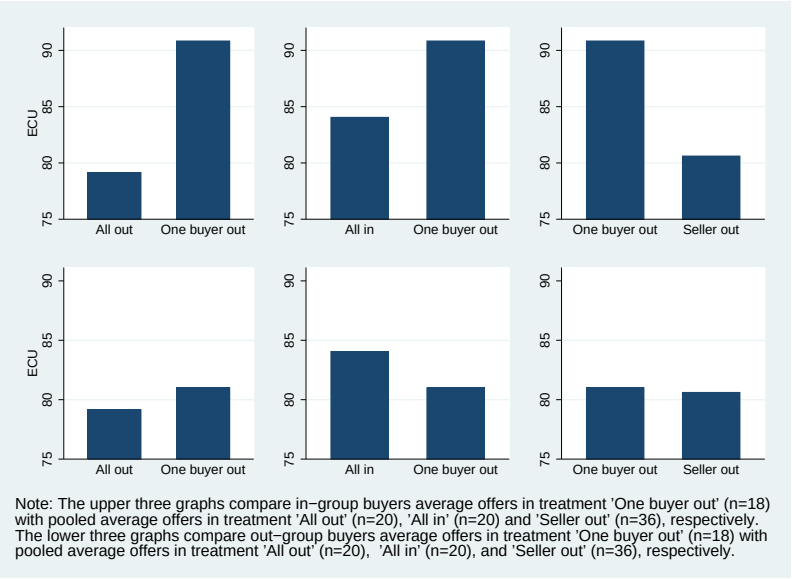
4.3 Bargaining game: First stage

First, we are interested in whether differences among buyers with respect to group identity have an effect on stated offers. To test Conjecture 1, offers of in-group and out-group buyers in treatment *One buyer out* are compared with pooled offers of buyers in treatment *All out*, *All in*, and *Seller out*, respectively.[12] Figure 2 presents in total six bar plots where the upper three depict comparisons of in-group buyers' offers and the lower three show comparisons of out-group buyers' offers with pooled offers in treatments *All out*, *All in*, and *Seller out*, respectively. In-group buyers in treatment *One buyer out* offer on average 90.83 ECU whereas pooled buyers in treatment *All out* offer on average 79.15 ECU, a difference of nearly 15 percent. The Mann-Whitney two sample statistic shows that the difference is statistically significant (p-value=0.048). It implies that in-group buyers who compete with out-group buyers offer significantly more compared to the stranger's framework. Comparing mean offers of in-group buyers in treatment *One buyer out* with pooled mean offers in treatment *All in* (84.10 ECU), the difference is not significant on the conventional confidence level (Mann-Whitney test, p=0.146). Additionally, testing mean offers of in-group buyers in treatment *One buyer out* with pooled mean offers in treatment *Seller out* (80.6 ECU) shows a significant difference between both (Mann-Whitney test, p=0.069). In-group buyers in treatment *One buyer out* offer significantly more compared to pooled buyers in treatment *Seller out*. In a next step we compare mean offers of out-group buyers in treatment *One buyer out* with pooled mean offers of treatments *All out*, *All in* and *Seller out*, respectively. All three comparisons, i.e. the

[12]The reason why we can pool buyers' offers in these treatments is because both buyers do not differ from each other. In both cases buyers have either no social identity or are both in-group members. Therefore we pool the offers to get more observations for the comparison between treatments.

difference between treatments *All out* and *One buyer out* (Mann-Whitney test, p=0.988), *All in* and *One buyer out* (Mann-Whitney test, p=0.453), and *One buyer out* and *Seller out* (Mann-Whitney test, p=0.985) do not show any significant differences between stated offers. Overall, the results suggest that in-group buyers tend to offer significantly more in treatment *One buyer out* compared to treatments *All out* and *Seller out*, respectively. For out-group buyers no significant difference can be observed. Our results partially confirm Conjecture 1a, i.e. in-group buyers in treatment *One buyer out* offer significantly more compared to offers in treatments *All out* and *Seller out*, respectively. However, we do not find support for Conjecture 1b that out-group buyers in treatment *One buyer out* offer a significantly larger amount to the in-group seller compared to treatments where buyers are equal with respect to their group identity.

Figure 2: Treatment comparisons of mean offers (between treatment)



Note: The upper three graphs compare in−group buyers average offers in treatment 'One buyer out' (n=18) with pooled average offers in treatment 'All out' (n=20), 'All in' (n=20) and 'Seller out' (n=36), respectively. The lower three graphs compare out−group buyers average offers in treatment 'One buyer out' (n=18) with pooled average offers in treatment 'All out' (n=20), 'All in' (n=20), and 'Seller out' (n=36), respectively.

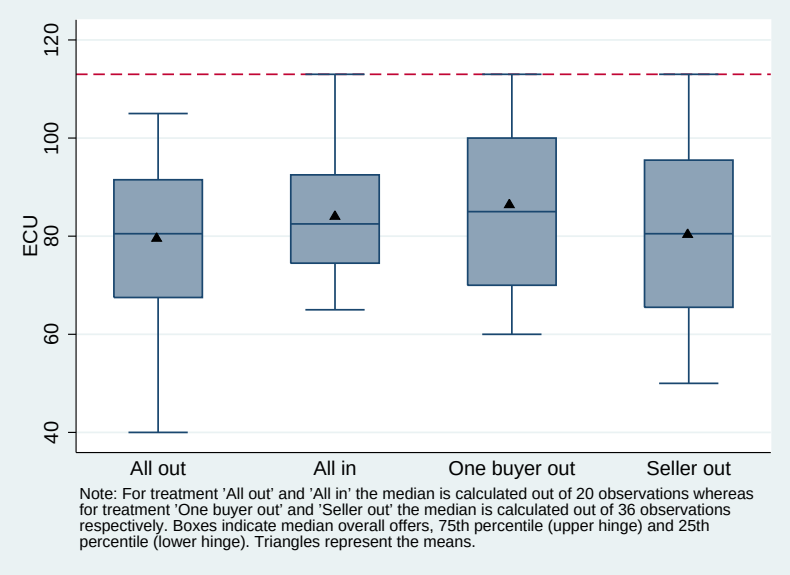
To test Conjecture 2 we analyze payment requests of in-group sellers in treatment *One buyer out*. Therefore we look at the mean payment requests for both the in-group and the out-group buyers, respectively. In-group sellers on average demanded 78.16 out of 113 ECU from in-group buyers compared to 76.61 out of 113 ECU from out-group buyers. The Wilcoxon signed rank test suggests no significant difference (p=0.547) among both requests to different groups. Thus, in-group sellers do not significantly discriminate between buyers who belong to either the same or to the other group. This result does not confirm Conjecture 2, that in-group sellers treat in-group and out-group buyers differently.[13]

Finally, we investigate whether competition influence buyers' offers to the extent that the seller extracts all

[13]That we do not see differences in the average is not driven by the fact that the two motivations cancel out on average, as the correlation of the payment requests towards the two sellers is 0.885.

surplus. We cannot test for the difference in offers with regard to competition and no competition. However, we can test whether competition leads to the theoretical prediction that buyers offer an amount close to their whole endowment and that therefore sellers extract all surplus at the expense of the buyers. First, we analyze buyers' median and mean pooled offers for all four treatments.[14] Figure 3 depicts box plots of buyers' median and mean overall offers for each treatment in the first stage of the bargaining game. The red dashed line in the graph represents the maximum amount buyers can offer. The triangles represent the corresponding means of overall offers. As can be seen in figure 3 irrespective of the treatment, competition between buyers does not lead to offered amounts close to the whole endowment. In all four treatments offers are statistically significantly different from 113 ECU (Wilcoxon signed rank test, p=0.000).

Figure 3: Median and mean overall offers



Since the profit of the seller heavily depends on a successful contract as well as on the randomly chosen stage, we do not use these observations for statistical analysis, however we present the raw data in Table 1. As the profit of sellers depends on what buyers are willing to offer, we calculate for each matching-group and for each treatment buyers' mean offers, which would correspond to seller's potential average profit from the bargaining game in stage 1. Indeed, for all four treatments the Wilcoxon signed rank test suggests that seller's potential profit would be significantly below 113 ECU, which contradicts Conjecture 3 (p<=0.005).

[14] For this purpose for each treatment, offers of both buyers are pooled and the median and mean are calculated. For treatment *All out* and *All in* the median is calculated out of 20 observations (10 observations for each buyer) whereas for treatment *One buyer out* and *Seller out* the median is calculated out of 36 observations (18 observations for each buyer), respectively.

Table 1: Number of successful contracts in randomly chosen stages of the bargaining game

	Randomly chosen stage			
Treatment	*Stage 1*	*Stage 2*	*Stage 3*	*Total*
All out	3	5	1	9
All in	2	2	4	8
One buyer out	2	11	1	14
Seller out	5	6	4	15
Total	12	24	10	46

Note: Numbers correspond to randomly chosen stages of the bargaining game for each treatment.

Expectations of sellers

Now we turn to sellers' expectations about buyers' potential offers in stage 1 among the 4 treatments . For this we use the elicited probability distributions over offers (see Table 2). We are especially interested in the beliefs of the seller in treatment *One buyer out* where both buyers differ within their group affiliation. Additionally, we investigate differences in beliefs between treatments.

Table 2: Sellers' elicit expectations about buyers' potential offers

	Sellers' expectations		
Treatment	*Identity 1st buyer*	*Identity 2nd buyer*	*Total*
All out	out-group		
	62.34	63.0	62.69
	6.90	*6.67*	*4.67*
	(10)	(10)	(20)
All in	in-group		
	65.57	66.02	65.80
	4.76	*3.02*	*2.74*
	(10)	(10)	(20)
One buyer out	in-group	out-group	
	76.43	71.08	73.75
	4.53	*4.74*	*3.26*
	(18)	(18)	(36)
Seller out	in-group		
	69.90	68.69	69.30
	3.51	*3.38*	*2.40*
	(18)	(18)	(36)

Note: This table presents the mean expectations of the seller differentiated with respect to both buyers, standard errors in italics, number of observations in parentheses.

In treatment *One buyer out* in-group sellers expect a mean offer of 76.4 ECU from in-group buyers compared to an expected mean offer of 71.1 ECU from out-group buyers. The Wilcoxon signed rank test confirms that

in-group sellers' expectations differ significantly from each other (p=0.064). This result suggests that in-group sellers expect on average a favorable offer from their "partner" compared to out-group buyers.

Comparing sellers' expectations about in-group buyers' potential offers in treatment *One buyer out* with pooled beliefs of treatments *All out* (Mann-Whitney test, p=0.090), *All in* (Mann-Whitney test, p=0.188), and *Seller out* (Mann-Whitney test, p=0.163), respectively the results suggest a significant difference between treatment *All out* and *One buyer out*. Sellers in treatment *All out* expect to receive a mean offer of 62.69 ECU from pooled buyers whereas in-group sellers in treatment *One buyer out* expect a mean offer of 76.43 ECU from in-group buyers. This difference might be driven due to seller's expectation of a stronger competition among buyers who differ in their group identities in treatment *One buyer out* compared to treatment *All out* where no direct differences can be observed. With regard to sellers' expectations about out-group buyers' offers we do not find any significant differences in treatment *One buyer out* compared to pooled beliefs in treatments *All out* (Mann-Whitney test, p=0.335), *All in* (Mann-Whitney test, p=0.599) and *Seller out* (Mann-Whitney test, p=0.910), respectively.

Expectations of buyers

In a next step we analyze buyers' expectations about sellers' potential payment requests for oneself and for the counterpart. Table 3 summarizes buyers' mean expectations for oneself and for the counterpart split up for the 4 treatments. First, comparing in-group and out-group buyers' expectations about sellers' potential payment requests for oneself we do not find a significant difference among them (Mann-Whitney test, p=0.506). The same is true matching in-group and out-group buyers' expectations (Mann-Whitney test, p=0.506) about seller's potential payment request for the counterpart. Hence, we do not find any significant differences of payment request for oneself and for the counterpart among in-group and out-group buyers within treatment *One buyer out*.

Second, we investigate whether beliefs, i.e. expected payment requests for oneself and for the counterpart differ in treatment *One buyer out* for each buyer. We are interested if both buyers who differ with regard to their group identity expect on average a difference between payment requests for oneself and for the counterpart. Analyzing expectations we do not observe a significant difference in beliefs (Wilcoxon signed rank test, p=0.225) for in-group buyers about payment requests for oneself and for the counterpart. For out-group buyers' expectations (Wilcoxon signed rank test, p=0.627) we receive a similar result. This implies that buyers do not expect to receive significantly different payment requests from the seller.

To get a more precise picture, differences of expectations across treatments are analyzed. In this regard buyers' expectations in treatment *One buyer out* are compared with pooled expectations in treatment *All out*, *All in*, and *Seller out*, respectively. The Mann-Whitney test suggests that in-group buyers' expectations for themselves (80.9 ECU) in treatment *One buyer out* differ significantly from pooled expectations (68.8 ECU) in treatment

Table 3: Buyers' mean expectations about payment requests for oneself and for the counterpart

	Buyers expectations					
	Identity 1st buyer		Identity 2nd buyer		Total	
Treatment	*exp. oneself*	*exp. other*	*exp. oneself*	*exp. other*	*exp. oneself*	*exp. other*
All out	out-group		out-group			
	73.02	76.05	72.75	72.75	72.88	74.40
	6.06	*6.77*	*3.71*	*3.77*	*3.46*	*3.79*
	(10)		(10)		(20)	
All in	in-group		in-group			
	74.79	77	62.76	67.24	68.75	72.12
	6.61	*6.37*	*2.94*	*4.05*	*3.78*	*3.84*
	(10)		(10)		(20)	
One buyer out	in-group		out-group			
	80.89	82.17	76.98	77.42	78.94	79.80
	4.06	*4.17*	*4.35*	*4.83*	*2.95*	*3.17*
	(18)		(18)		(36)	
Seller out	in-group		in-group			
	72.96	71.31	73.67	73.32	73.32	72.32
	5.16	*4.97*	*3.37*	*3.51*	*3.03*	*3.01*
	(18)		(18)		(36)	

Note: 1st buyer corresponds to the left buyer whereas 2nd buyer corresponds to the right buyer in picture 1, mean expectations of buyers with respect to sellers payment request for oneself (exp. oneself) and for the counterpart (exp. other), standard errors in italics, number of observations in parentheses.

All in (p=0.037). All other differences among treatments are not significantly different. This implies that in-group buyers expect a significantly larger payment request for themselves and therefore fierce competition in treatment *One buyer out* compared to treatment *All in*, where all buyers belong to the same group.

Moreover, we compare in-group buyer's expectation for the counterpart with pooled expectations in treatment *All out*, *All in* and *Seller out*, respectively. Expected payment requests for the counterpart (82.2 ECU) in treatment *One buyer out* do not differ significantly from pooled expectations for the counterpart (74.4 ECU) in treatment *All out* (Mann-Whitney test, p=0.169). However, comparing in-group buyers expected values in treatment *One buyer out* (82.2 ECU) with pooled expected values in treatments *All in* (72.1 ECU) and *Seller out* (72.3 ECU), respectively the Mann-Whitney test confirms a significant difference between expectations (p=0.075 and p=0.040, respectively). These results suggest that in-group buyers expect for their counterpart – who differs in its group affiliation – a higher payment request compared to treatments where differences among buyers cannot be directly observed.

With regard to out-group buyers' expectations we do not find significant differences between treatments neither for them self nor for the counterpart. Differences among buyers lead to different expectations. In-group buyers' expectations for themselves and for the counterpart differ significantly from pooled expectations in treatment *All in*. However, we do not find that buyers' expectations neither for themselves nor for the counterpart differ

significantly from each other in treatment *One buyer out*.

4.4 Panel Regressions

To check whether the above findings of buyer's offers are consistent we analyze all three stages of the bargaining game including covariates. We focus on buyer's behavior due to the structure of the data: For each subject we have two observations as a buyer and one observation as a seller. Table 1 presents GLS regressions with individual random effects and robust standard errors.[15] The regressors are buyers' offers to acquire the indivisible good. We include four explanatory variables - "in-group seller", "in-group self", "in-group counterpart", and "Expectation self".[16] Thereby "in-group seller", "in-group self" and "in-group counterpart" are indicator variables which state whether or not the seller, the buyer and its counterpart belong to an in-group. In our analysis we try to identify how buyer's behavior, who belongs to either an in-group or an out-group, is influenced by its own and teammates group affiliation. For this purpose we create interaction–indicators for each combination of the categories of the variables "in-group seller", "in-group self" and "in-group counterpart" to specify the group constellation. Thereby buyer's behavior ("in-group self") is compared to buyer's behavior in treatment *All out* which form the omitted reference group.

In all regression Models (1-3) the three-way interaction between "in-group seller", "in-group self" and "in-group counterpart" interacts additionally with the Stage variable to control for learning effects caused by role reversals. Furthermore, we include variables to control for session effects, gender effects, risk aversion and experience. More precisely, Session is a categorical variable transformed into a factor variable, gender is a binary variable and is equal to one for female, risk aversion is a ordinal variable and ranges from 1 to 6 where 1 corresponds to risk averse and 6 to risk loving, and experience is a binary variable which measures whether or not subjects already participated in an experiment.

Model 1 investigates the influence of group identity between "in-group seller", "in-group self" and "in-group counterpart" on buyer's offers controlling for stage effects. The results indicate a significant positive effect for the variable (1×1×0). In-group buyers who are confronted with in-group sellers and compete with out-group buyers, offer significantly more compared to buyers who belong to the out-group and interact with out-group sellers and out-group buyers (0×0×0). Among the buyers in treatment *One buyer out*, coefficients of those belonging to the in-group differ significantly from those belonging to the out-group (p=0.011). This implies that in-group and out-group buyers behavior in treatment *One buyer out* differs with respect to their own and the others group affiliations they interact with. In Model 2 we check additionally for robustness controlling for session effects, gender effects, risk aversion, and experience. Model 2 confirms the result that in-group buyers

[15] We estimated all models with GLS random effects and Tobit random effects. Since the estimated results are very similar, we report only GLS random effects. These additional results are available upon request.

[16] As both variables, "Expectation self" and "Expectation other" are highly correlated with each other (Spearman ρ=0.924) we include the former into the regression models.

who interact with in-group sellers and out-group buyers (1×1×0) offer significantly more compared to buyer's who interact with strangers. Furthermore comparing the coefficients of buyers in treatment *One buyer out* the result suggests that in-group and out-group buyers differ significantly from each other (p=0.002). Finally, Model 3 includes "Expectation self", i.e. the expected payment request for oneself as an additional explanatory variable. Results are qualitatively similar to those obtained in Models 1 and 2, respectively. Surprisingly, after controlling for expectations the interaction variable (1×1×1) becomes weakly significant. In-group buyers who interact with in-group sellers and compete with additional in-group buyers offer significantly more compared to out-group buyers who compete with an out-group buyer and interact with an out-group seller. Furthermore expectations are positively correlated with buyers' offers.

The results of the regression Models 1-3 suggest that in-group buyers who are confronted with an in-group seller and an out-group buyer offer significantly more compared to buyers who belongs to the out-group and interacts with an out-group seller and an out-group buyer. These results are in line with our previous finding that in-group buyers offer significantly more in treatment *One buyer out* compared to pooled offers in treatment *All out*. The results remain robust implementing expectations and other controls. Additionally the coefficients between an in-group buyer and an out-group buyer in treatment *One buyer out* differ significantly from each other. This suggests that the behavior of buyers not only depends on the own group identity but also on the group identity of other market participants.

Table 4: GLS regression results on buyer's offers

	Buyers' offers		
Model	(1)	(2)	(3)
in-group seller × in-group self × in-group counterpart			
1×1×1	5.599	5.975	10.282*
	(5.180)	(5.802)	(5.983)
1×0×1	-1.511	-1.829	-2.192
	(4.995)	(5.463)	(5.071)
1×1×0	9.872*	12.238**	10.446*
	(5.396)	(6.181)	(5.884)
0×1×1	4.413	6.247	5.636
	(5.086)	(5.864)	(5.568)
Expectation self			0.449***
			(0.070)
Female		3.359	-1.370
		(3.169)	(2.860)
Risk		-0.272	0.069
		(1.022)	(0.871)
Stage	yes	yes	yes
Session		yes	yes
Experience		yes	yes
Constant	79.34***	58.36***	28.64***
	(4.121)	(8.374)	(9.604)
Difference in coefs			
In-group and out-group buyer in treatment One buyer out	-11.38**	-14.07***	-12.64***
Observations	336	296	296
Number of subjects	168	148	148

Note: Robust standard errors in parentheses; *, **, *** denote significance at the .10, .05, and .01 levels, respectively. The coefficients of the interaction terms show the difference of behavior of a buyer of a particular type (*in* or *out*-group) in the respective buyer-seller constellation compared to the baseline treatment *All out*. A zero indicates that the respective person belongs to the out group, while a 1 indicates in-group. In model 2 and 3 we had to exclude twenty observations due to ambiguous choices in the 3rd part of the experiment. The variable experience indicates whether the person has participated in previous economic experiments (not in this one).

5 Conclusion

Using field data it is rather difficult, if not impossible, to investigate bargaining behavior among involved parties and especially among participants who differ in their group identities. We conducted a laboratory experiment to investigate the influence of group identity on the behavior of subjects in a market setting where two buyers and one seller bargain for an indivisible good.

We find that in-group sellers who interact with an in-group and an out-group buyer at the same time do not treat

both differently. However, in-group sellers who interact with buyers who differ in their group affiliation anticipate in-group favoritism and therefore expect a higher offer from their partner. Moreover, we find that in-group buyers who compete with out-group buyers offer significantly more than buyers who are not distinguishable from group identities. A potential reason for this behavior might be that in-group buyers are forced to offer a higher amount to outperform the out-group buyer to secure an agreement. This suggests a fierce competition in case two buyers of different groups face each other. This is supported by the result that in-group buyers offer significantly more compared to a stranger's framework.

Future research will include how different levels of experience and endogenous group formation (cf. Li et al., 2010) influence subject's behavior. Furthermore, repeated interactions among subjects with prior experience or group identity might lose its weight through ongoing interactions. To investigate a negotiation which is more related to a licensing process, sellers and both buyers have to be unaware about the potential benefit of the indivisible good.

References

Ahmed, A. M., 2007. Group identity, social distance and intergroup bias. Journal of Economic Psychology 28(3), 324–337.

Akerlof, G., Kranton, R., 2000. Economics and identity. The Quarterly Journal of Economic 115(3), 715–753.

Ball, S., Eckel, C., Grossman, P. J., Zame, W., 2001. Status in markets. Quarterly Journal of Economics 116(1), 161–188.

Bauernschuster, S., Falck, O., Grosse, N. D., 2009. Social identity, competition, and finance: A laboratory experiment. Jena Economic Research Paper 2009-052.

Becker, G., 1957. The Economics of Discrimination. Chicago: University of Chicago Press.

Ben-Porath, Y., 1980. The f-connection: Families, friends, and firms and the organization of exchange. Population and Development Review 6 (1), 1–30.

Bertrand, M., Mullainathan, S., 2004. Are emily and greg more employable than lakisha and jamal? a field experiment on labor market discrimination. American Economic Review 94 (4), 991–1013.

Caves, R. E., Crookell, H., Killing, J. P., 1983. The imperfect market for technology licenses. Oxford Bulletin of Economics and Statistics 45(3), 249–267.

Chen, Y., Li, S. X., 2009. Group identity and social preferences. American Economic Review 99 (1), 431–457.

Contractor, F. J., 1981. International Technology Licensing: Compensation, Costs, and Negotiation. Lexington, Mass.: Lexington Books.

Delavande, A., Giné, X., McKenzie, D., 2008. Measuring subjective expectations in developing countries: A critical review and new evidence. MimeoMimeo.

Dufwenberg, M., Gneezy, U., 2000. Measuring beliefs in an experimental lost wallet game. Games and Economic Behavior 30(2), 163–182.

Durante, R., Putterman, L., 2007. Preferences for redistribution and perception of fairness: An experimental study. Brown University, mimeo.

Falk, A., Zehnde, C., 2007. Discrimination and in-group favoritism in a citywide trust experiment. working paper 318.

Fehr, E., Schmidt, K. M., 1999. A theory of fairness, competition, and cooperation. Quarterly Journal of Economics 114(3), 817–68.

Fershtman, C., Gneezy, U., 2001. Discrimination in a segmented society: An experimental approach. Quarterly Journal of Economics 116(1), 351–377.

Fischbacher, U., 2007. z-tree: Zurich toolbox for ready-made economic experiments. Experimental Economics 10(2), 171–178.

Goette, L., Huffman, D., Meier, S., 2006. The impact of group membership on cooperation and norm enforcement: Evidence using random assignment to real social groups. American Economic Review 96(2), 212–216.

Goldberg, P. K., 1996. Dealer price discrimination in new car purchases: Evidence from the consumer expenditure survey. Journal of Political Economy 104(3), 622–654.

Greiner, B., 2004. An online recruitment system for economic experiments. Forschung und wissenschaftliches Rechnen GWDG Bericht 63, 79–93.

Grosskopf, B., 2003. Reinforcement and directional learning in the ultimatum game with responder competition. Experimental Economics 6(2), 141–158.

Guarino, A., Huck, S., 2006. Averting economic collapse and the solipsism bias. Games and Economic Behavior 57(2), 264–285.

Hargreaves Heap, S. P., Varoufakis, Y., 2002. Some experimental evidence on the evolution of discrimination, co-operation and perceptions of fairness. Economic Journal 112(481), 679–703.

Hargreaves Heap, S. P., Zizzo, D. J., 2009. The value of groups. American Economic Review 99(1), 295–323.

Holt, C. A., Laury, S. K., 2002. Risk aversion and incentive effects. American Economic Review 92(5), 1644–1655.

Katz, M. L., Shapiro, C., 1985. On the licensing of innovations. The RAND Journal of Economics 16(4), 504–520.

Kramer, R., Shah, P., Woerner, S., 1995. Why ultimatums fail. group identity and moralistic aggression in coercive bargaining. In: Negotiation as a Social Process. Sage: Thousand Oakes.

Li, S. X., Dogan, K., Haruvy, E., 2010. Group identity in markets. International Journal of Industrial Organization (in Press).

Mehta, J., Starmer, C., Sugden, R., 1994. Focal points in pure coordination games: An experimental investigation. Theory and Decision 36(2), 163–185.

Nash, J. F., 1950. The bargaining problem. Econometrica 18(2), 155–162.

Offerman, T., Sonnemans, J., Schram, A., 1996. Value orientations, expectations, and voluntary contributions in public goods. Economic Journal 106, 817–845.

Phelps, E., 1972. The statistical theory of racism and sexism. The American Economic Review 62 (4), 659–661.

Sonnemans, J., Offerman, T., 2001. Is the quadratic scoring rule really incentive compatibleMimeo, University of Amsterdam.

Tajfel, H., 1982. Social psychology of intergroup relations. Annual Review of Psychology 33, 1–39.

Tajfel, H., Turner, J., 1979. An integrative theory of intergroup conflict. In: Austin, W., Worchel, S. (Eds.), The Social Psychology of Intergroup Relations. Brooks/Cole, Monterey, pp. 33–47.

Tremewan, J., 2010. Experiments in group identity and coalition formation. In: ESA World Meeting Copenhagen.

Vaughan, G. M., Tajfel, H., Williams, J., 1981. Bias in reward allocation in an intergroup and an interpersonal context. Social Psychology Quarterly 44(1), 37–42.

Yinger, J., 1995. Closed Doors, Opportunities Lost: The Continuing Costs of Housing Discrimination. New York: Russell Sage Foundation.

Yinger, J., 1998. Evidence on discrimination in consumer markets. Journal of Economic Perspectives 12, 23.40.

Zizzo, D. J., 2010. Experimenter demand effects in economic experiments. Experimental Economics 13, 75–98.

A Printed instructions (English translation)

Welcome to the experiment and thank you for your participation!
In this experiment - financed by the German Research Foundation (DFG) - you can earn money, depending on your own decisions and the decisions of the other participants. It is therefore important to read the instructions carefully! If you have any questions at any time during the experiment, please press the ‚pause' key on the keyboard. We will come to you and answer your questions immediately and in privacy. Please pose your question quietly. All participants of this experiment receive the same printed instructions. Further information displayed on your screen are only intended for the respective participant. Please do not look at the screen of other participants and do not communicate with them. If you offend against these rules, we are unfortunately required to expel you from the experiment. Please switch of your mobile phone.

General schedule: This experiment will take approximately 60 minutes. It consists of four parts and a final questionnaire.

The experiment:
1. part: You will take part in a game with two other players. Detailed description are displayed on your screen.
2. part: In the second part you will participate in a negotiation game. Two buyers and one seller are negotiating about a indivisible good. The roles are matched randomly. The task of the seller is to sell the single good and the task of the buyers is to buy the indivisible good. Please note that the offered entity can only be bought by one of the buyers. For the purchase of the good an amount of 113 ECU (Experimental Currency Unit) is available for each of them.
The negotiation process: During the negotiation process either buyers and seller get into action: the seller will note down the minimum price he is asking from each buyer. At the same time each buyer notes down his offer. To determine who will purchase the good the demand of the seller is compared to the respective offer. If both offers do not match the seller's demand the good won't be sold. In this case, all parties end up with 0 ECU from this part of the experiment. If both offers match the seller's demand or are higher, the seller may choose between the two offers. If only one matches the good will automatically be sold to the respective buyer.
part 3 and 4: The third and forth part of the experiment will be explained to you in the course of the experiment.

Payment: Show up fee (2,50 €) + Profit of the first part (1 ECU = 0,08 €) + Profit picked randomly from the second, third or forth part. The conversion rate is 1 ECU = 0,08 €. Your earning will be privately paid to you after you filled in the questionnaire. No other participant will know how much you have earned.

Further schedule: After you have read the instructions carefully, please wait for the other participants

and then start with the computer program on your screen.

Good luck!

B Screenshots

Figure 4: Coordination screen

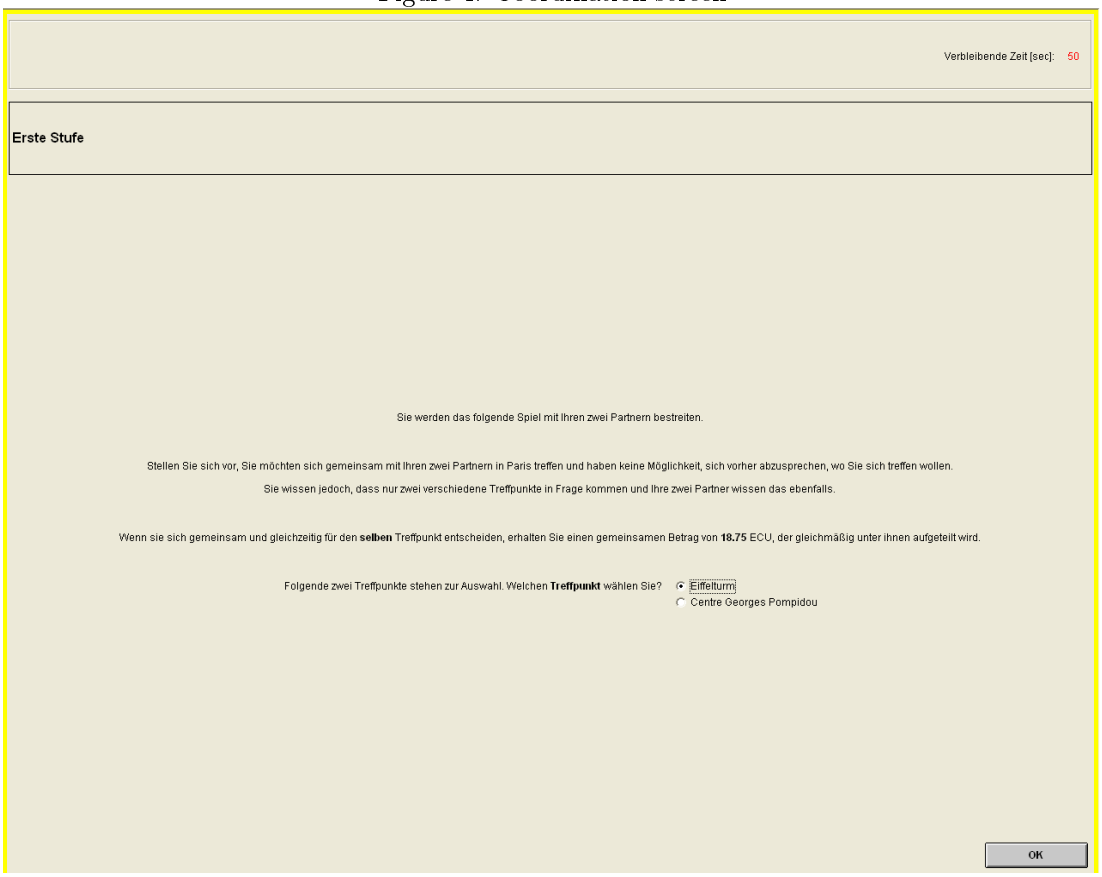


Figure 5: Request screen of the in-group seller for both buyers

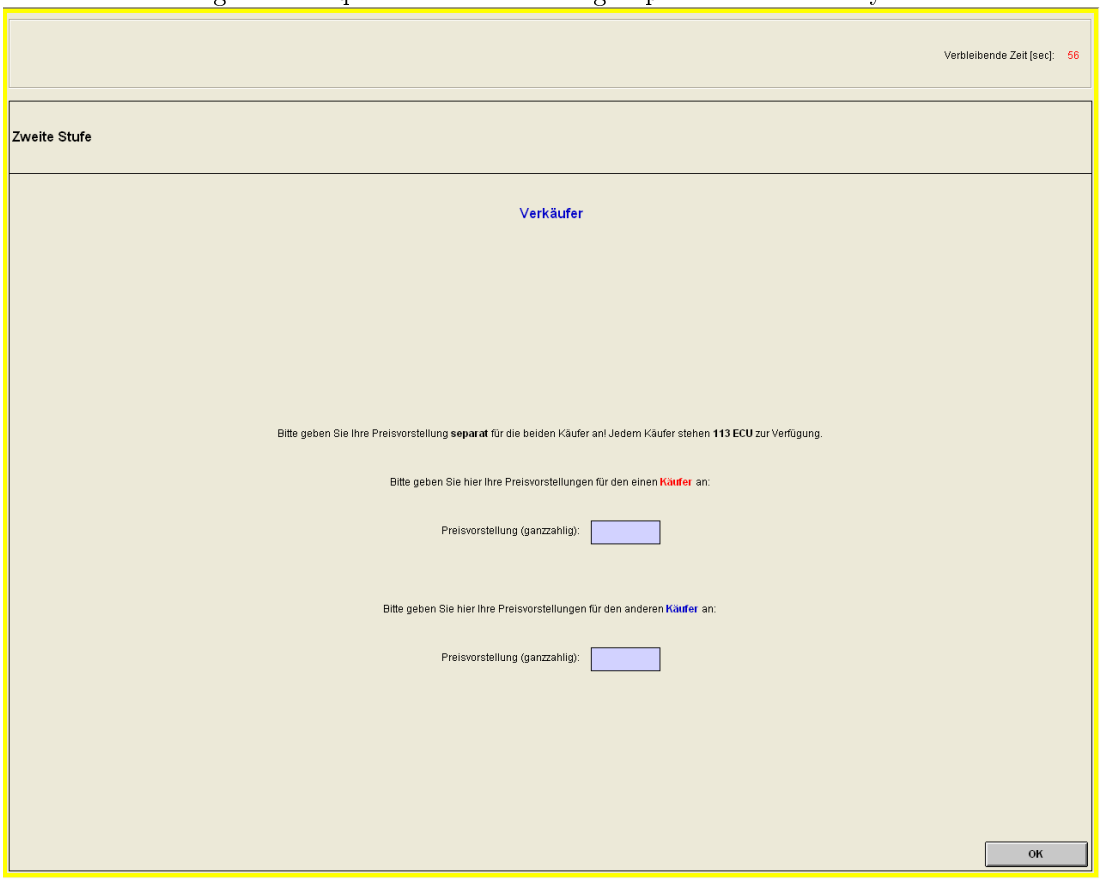


Figure 6: Offer screen of the in-group buyer

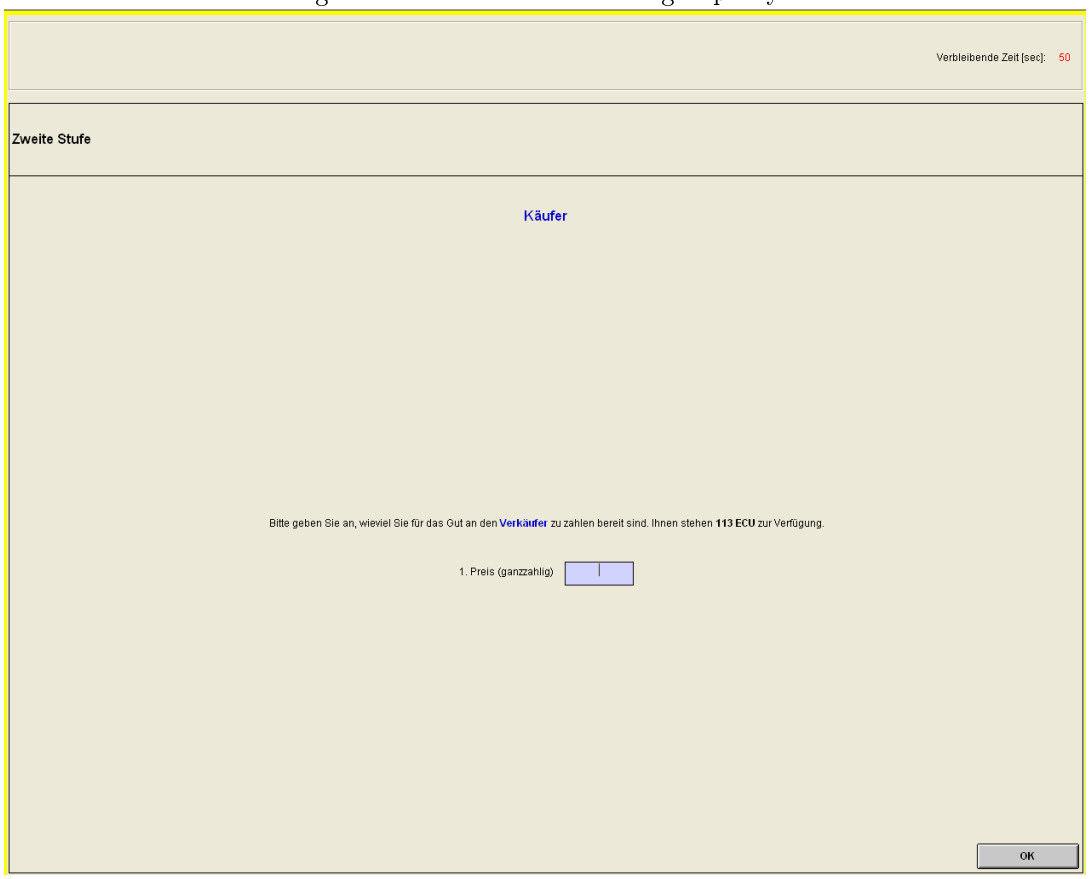


Figure 7: Decision screen of the out-group seller

Figure 8: Payoff screen