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Group Identity and Discrimination in Small Markets: Asymmetry of In-Group Favors^{*}

Gerhard Riener[†] and Alexander Schacht[‡]

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Abstract

We experimentally study the influence of induced group identity on the determination of prices and beliefs in a small market game. We create group identity through a focal point coordination game. Subjects play a three-person bargaining game where one seller can sell an indivisible good to one of two competing buyers under four different treatments varying the buyer-seller constellation. We find evidence of in group favoritism on the buyer side. However we do not detect a lower ask prices for in-group sellers for in group buyers, indicating that in-group favoritism is in favor of the more powerful market participant.

JEL classification: C91; D45; L13; L14

Keywords: Group identity; Experiments; Markets; Bargaining

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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. We are interested how group identity influences the determination of prices and expectations on the demand and supply side in a simple market setting abstracting from statistical discrimination.

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 – as 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. 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.

Following this literature, we focus on a nearly minimal group design to isolate the effect of statistical discrimination that can not be excluded with natural groups. In our experiment one seller is trying to sell an indivisible good to one of the two buyers. The seller states her willingness to accept

separately for each buyer and the buyers state their willingness to pay. If the willingness to pay of both buyers is lower than the willingness to accept there is no trade. If both buyers are over their respective willingness to accept, the seller can choose to whom to transfer the good. This trade happens under four different treatment conditions: (1) Complete strangers, subjects have not interacted in the coordination game, (2) both buyers and the seller are in-group members, i.e. they have interacted in the coordination game (3) only one buyer is in-group (the other is out-group) and the seller is in-group, and (4) where the two buyers are in the in-group and the seller is out-group. 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.

Our results reveal 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. In-group favoritism appears to be asymmetric and depending on the market power of the actor: The seller as the more powerful market participant expects favorable treatment from in-group members, but she is not willing to reciprocate by accepting lower offers from in-group buyers.

A large body of experiments in social psychology and increasingly in economics studies the influence of group identity on behavior.¹ Thereby, experimental research relies on both natural identities (e.g. Goette et al., 2006) as well as artificially induced groups (e.g. Hargreaves Heap and Varoufakis,

¹A detailed review of the literature in social psychology on social identity can be found in Charness et al. (2007) and Chen and Li (2009).

2002).

Studies dealing with natural groups identify significant effects on behavior. For instance, involving members of two rival business schools, Kramer et al. (1995) find that responders are more willing to accept unfair offers by in-group proposer than the same offer made by someone from the out-group in a bargaining game. Fershtman and Gneezy (2001) show that identifying natural groups with distinct ethnic affiliation in the Israeli Jewish society leads to a discrimination of outsiders in both, the trust game and the ultimatum game, but not in the dictator game. Falk and Zehnde (2007) identify statistical discrimination and in-group favoritism in sequential trust games using natural groups divided into residential districts in Zürich. More precisely, they find that the magnitude of investments depend on the district responders live in and that people trust strangers from their own district significantly more than strangers from other districts. More recently, Leider et al. (2009) explore group identity and social ties in the context of dictator games and find evidence of in-group favoritism, i.e. dictators give nearly 52 percent more to friends (in-group) in a real-world social network than to random strangers (out-group).

In contrast to natural identities, using induced identities gives the researcher more control and flexibility over the group formation process. In an early experiment, Vaughan et al. (1981) divide 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 give more money to members of their own group than to the other group. Charness et al. (2007) investigate the influence of induced group membership and its saliency on individual behavior in prisoner's dilemma and battle-of-the-sexes games. In the minimal group treatment they do not find differences in the cooperation rate between in-group and out-group members. Increasing the saliency of the groups, the authors find that group membership significantly affects individual behavior. Likewise, 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). Chen and Li (2009) explore the effect of social identity across a variety of games and find that subjects are more altruistic towards in-group members.

While previous experiments have demonstrated the impact of group identity in various types of games, 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 earn significantly more of the surplus, regardless of whether they are 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.

There are several studies investigating interaction of three people: . Güth and Van Damme (1998) examine the effect of the presence of an observer in the ultimatum game. Holm (2000) conducts a three person game with natural groups and looks at coalition formation and sharing within a coalition. He finds that Swedish subjects when having the choice between a partner with a Swedish or a foreign name, choose the person with the Swedish name significantly more often. However, within the coalition he does not observe a difference in the distribution of resources. In a recent study, Bauernschuster et al. (2009) explore how competition and group identity affect trust and trustworthiness. They find that trustees react to competition among in-group and out-group investors by lowering return ratios. Closest to our study is the work by Tremewan (2010) who 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, because of being more often excluded from the coalition.

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, the number of potential licensees is limited since inventions are usually at an early stage and market success is uncertain (Contractor, 1981; Jensen and Thursby, 2001). Thus, social ties among actors may play an important role in these markets. 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.

A couple of caveats are worth mentioning: 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 formulate our instructions as neutral as possible. Moreover, we do not announce our objectives during the experiment, i.e. key goals and claims the experimenters actually try to achieve. Additionally we use 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 experimen-

tal design and Section 3 points out our hypotheses and behavioral prediction. Then we present the results. In Section 5 we conclude and discuss the implications of our findings.

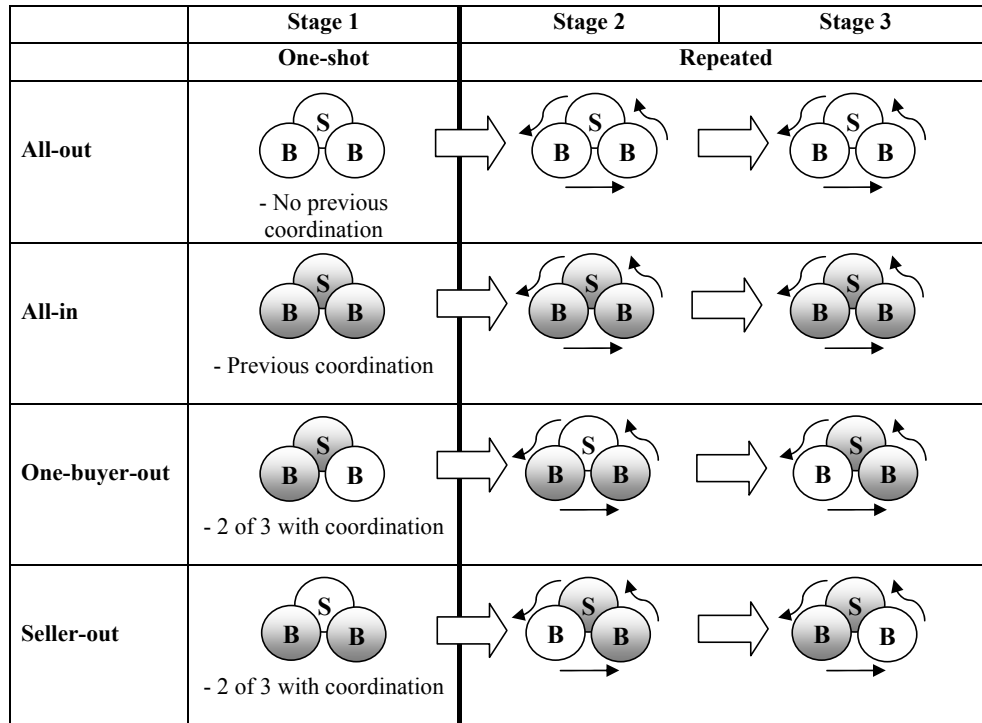
2 Experimental Design

In order to identify the influence of group identity on the determination of buyers' offers and sellers' claims in a market setting, we implement four distinct experimental treatments. Each treatment consists of three parts and a concluding questionnaire which are computerized using zTree (Fischbacher, 2007). In Part 1 of the experiment – which is identical for all four treatments – we introduce 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 are 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 introduce 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 have to bargain about an indivisible good. Stage 1 of the three-person bargaining game corresponds to a one-shot game, as subjects know that the second part of the experiment consists of 3 stages but the exact information about the content of stage 2 and stage 3 is disclosed at the end of the first bargaining game. That means that after completing the first bargaining game subjects are 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 plays 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 are matched with at least one subject, with whom they play the first part together, are referred to as *in-group* members. Subjects who are matched with subjects, with whom they do not play the first part together, are 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 are conducted in each session.

Part 1: Coordination game and group formation In the first part of the experiment groups of three subjects are formed randomly. All subjects participate 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*, have to choose a meeting point in Paris (France), either the Eiffel Tower or the Centre Georges Pompidou (see 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. In case of disagreement the group receives 0€. After the coordination game, subjects are 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 are rearranged according to the four treatments and subjects receive information on the group composition. To strengthen in-group membership we additionally use wording and color assignment. We assign a

Figure 1: Treatment Overview



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

color (blue) to all members of the in-group and inform participants about this color assignment. Subjects, who are supposed to interact as out-group members, are matched with two new subjects with whom they do not interact in the first part. We inform subjects belonging to the out-group that they are assigned to subjects who belong to the blue group referred to as *partners*, who has already collected experience in the first part together. To strengthen the out-group feeling, we assign 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 is public knowledge to all matching-group members. We use this nearly minimal group design in order not to confound the existence of groups with strong reciprocity motives.

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. The bargaining process proceeds as follows: All subjects of a matching-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 level of acceptance in exchange for the good. On the screen of the seller the two boxes for the payment request for each buyer are arranged vertically. The assignment of buyers to the upper and lower boxes is randomized. At the same time each buyer states her 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 ECU (Experimental Currency Units). 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 meet the corresponding threshold of the seller, the good is not sold. If both offers are at least equal to the threshold of the seller $[(X_1 \leq Y_1) \vee (X_2 \leq Y_2)]$, she has to decide to whom the good has to be sold.² A single buyer acquires the good if her 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 successful buyer receives the difference between 113 ECU and the price offered to the seller. The

²To the best of our knowledge all prior studies investigating 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.

other buyer leaves the bargaining stage empty-handed. In total, subjects play three bargaining rounds keeping group membership and group identity constant but assigning new roles to the subjects. Thus every subject plays once as a seller and twice as a buyer. The first stage of the bargaining game corresponds to a one-shot game. Subjects in the experiment are unaware of the fact that the game is 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 2, 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 next to each other 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 is 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 herself and for the other buyer. For the elicitation we use two different methods: First, we ask each subject for a point estimate, i.e. subjects have to declare an integer between 0 and 113 ECU. In a second step, we confront subjects with twelve intervals of equal size apart from the first and the last one.³ Subjects have to state for each interval a value between 0 and 100 to specify their beliefs

³The 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.

about how likely it is that the expected value is located in the corresponding interval. In the end all stated values have to sum up to 100, which correspond to 100 percent.⁴ Thus, independent from the role, each subject has to answer four bonus questions after each bargaining game. In total subjects received a lump-sum payment of 1.20€ for answering all bonus questions.

Part 3: Risk aversion elicitation To control for the role of risk aversion we apply a simplified procedure of Holt and Laury (2002).⁵ Subjects are presented with five different lottery choices. In each case, subjects have the choice between a safe lottery X that pays 0.50€ for sure and a risky lottery Y that pays amounts from 0.90€ to 1.50€ with a probability of 0.5 and zero otherwise. In general, more risk averse people should switch from lottery X to lottery Y at a higher stage. At the end, one pair of lotteries is selected randomly and the decision is paid out.

3 Hypotheses

First, we are interested 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

⁴Both methods ask 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. Furthermore, we do not incentivise belief elicitation in order not to risk hedging problems, that may be prevalent especially in market settings (see Blanco et al., 2010).

⁵This procedure has previously been used by Durante and Putterman (2007).

of both buyers compared to situations where buyers differ in their group identity. An alternative explanation is that in-group buyers may follow an in-group favoritism pattern. In this regard, Robert and Carnevale (1997) analyze the impact of groups on the formulation of ultimatum offers and find that proposers more often offer a fair share to a member of their own group. Likewise, Wilson (2007) conducts a dictator game with three different ethnic groups and finds strong in-group favoritism. Subjects send significantly higher economic awards to recipients from their own ethnic groups than to recipients belonging to another group. For the case of *One-buyer-out* we predict that the out-group buyer will offer more compared to the *All-out* case because of anticipated in-group favoritism from the seller for the in-group buyer. Following these arguments, we predict:

Conjecture 1. *In treatment One-Buyer-Out*

(a), *in-group buyers offer more compared to buyers in the All-Out treatment.*

(b), *out-group buyers offer more compared to buyers in the All-Out treatment.*

Second, we are interested in sellers' payment requests and whether these requests differ with regard to different group identities. We suppose that in-group sellers may 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. Recently, Li et al. (2010) have observed that in-group sellers charge in-group buyers a higher price compared to out-group buyers. We therefore formulate following hypothesis for the case that sellers can directly distinguish between both buyers:

Conjecture 2. *In treatment One-buyer-out, in-group sellers payment requests are higher for in-group buyers than for out-group buyers.*

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 investments 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 impact of in-group favoritism (Tajfel, 1982) and common identity as a major determinant for transactions in markets (Ben-Porath, 1980). The following relationship is expected:

Conjecture 3. *In treatment One-buyer-out, in-group sellers expect a higher offer from in-group buyers than from out-group buyers.*

The same argument (in-group favoritism) also holds for beliefs of buyers about potential payment requests of the seller. If buyers differ with respect to their group identity they may expect different payment requests for themselves and for their counterpart. According to in-group favoritism, in-group buyers may expect a lower price for themselves than for the out-group counterpart whereas out-group buyers may expect the other way round. We therefore predict the following:

Conjecture 4. *In treatment One-buyer-out, In-group buyers expect a lower threshold whereas out-group buyer expect a higher threshold for themselves.*

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.⁶ Before the experiment subjects received the same basic instructions in 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 a show-up fee of 2.50€. 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

⁶ 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.

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

In this section we use the results from the first period of the market game. First, we look at the differences of stated offers depending on group identity and treatments. To test Conjectures 1a and 1b, 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.⁷ 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)⁸. It implies that in-group buyers who compete with out-group buyers offer significantly more compared to the stranger's framework. Additionally, testing mean offers of in-group buyers in treatment *One-buyer-out* with pooled mean offers in treatment *Seller-out* (80.6 ECU), In-group buyers in treatment *One-buyer-out* offer significantly more compared to pooled buyers in treatment *Seller out* (p=0.069).

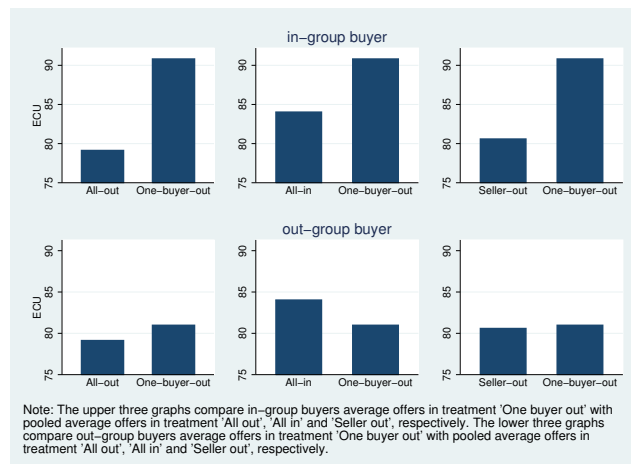
In the next step we compare mean offers of out-group buyers in treatment *One-buyer-out* with

⁷The 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.

⁸We report test statistics from the Mann-Whitney test throughout the rest of the paper if not indicated differently

pooled mean offers of treatments *All-out*, *All-in* and *Seller-out*, respectively. All three comparisons, i.e. the difference between treatments *All-out* and *One-buyer-out* ($p=0.988$), *All-in* and *One-buyer-out* ($p=0.453$), and *One-buyer-out* and *Seller-out* ($p=0.985$) 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 is observed. Our results confirm Conjecture 1a, i.e. in-group buyers in treatment *One-buyer-out* offer significantly more compared to offers in treatments *All-out*. 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 mean offers in treatment *All-out*.

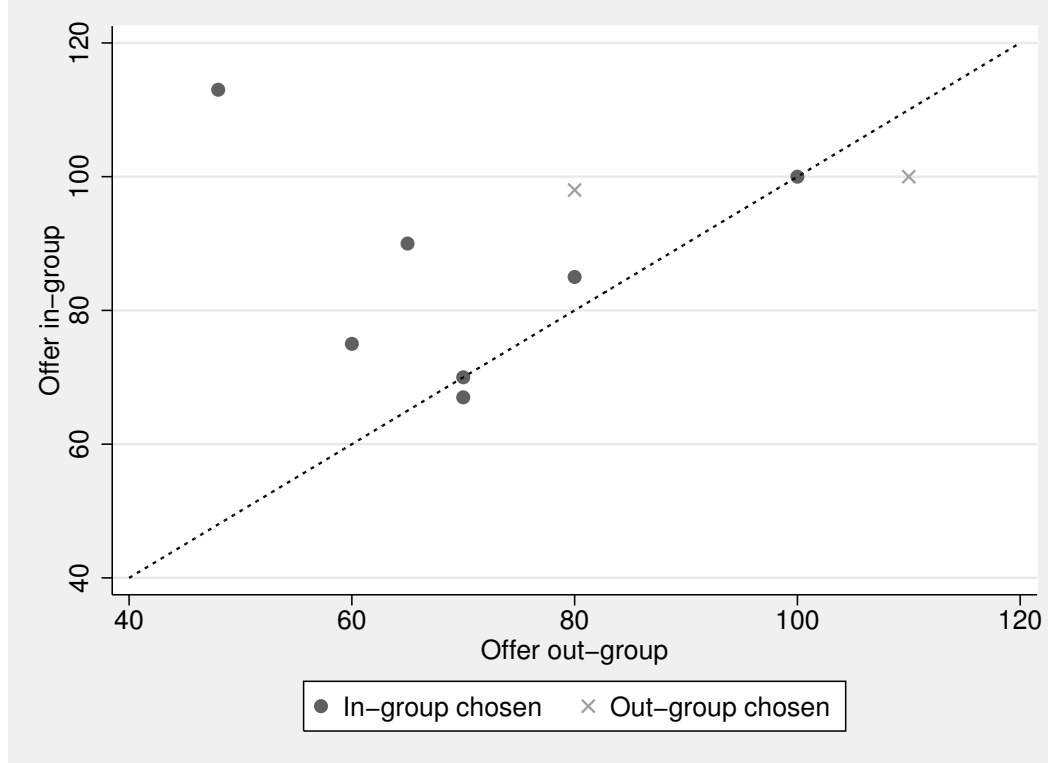
Figure 2: First Period Treatment comparisons of average offers



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. Thus, we do not find evidence that in-group sellers treat buyers, who belong to either the same or to the other group differently, which contradicts Conjecture 2. In Figure 3 we depict the offers from the out-group and the in-group buyers for treatment *One-buyer-out* in cases where both offers met the corresponding threshold of the seller. We see that most of the time with two exceptions, the highest offer was chosen. These offers were mainly made by in-group buyers. In the case of ties, the seller chose the in-group agent which is an indication of in-group favoritism. Surprisingly, in one case the in-group seller chose the partner although the in-group buyer offered less than the out-group buyer. However, this difference is not significant.

Figure 3: Choice of sellers for the case that both buyers reached the ask-price



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* to test Conjecture 3 where both buyers differ within their group affiliation. Additionally, we investigate differences in beliefs between treatments.

Table 1: Sellers' elicited expectations about buyers' potential offers

<i>Treatment</i>	<i>Identity 1st buyer</i>	<i>Identity 2nd buyer</i>	<i>Total</i>
All-out	Out-group		
	62.34	63.0	62.69
	<i>6.90</i>	<i>6.67</i>	<i>4.67</i>
	(10)	(10)	(20)
All-in	In-group		
	65.57	66.02	65.80
	<i>4.76</i>	<i>3.02</i>	<i>2.74</i>
	(10)	(10)	(20)
One-buyer-out	In-group	Out-group	
	76.43	71.08	73.75
	<i>4.53</i>	<i>4.74</i>	<i>3.26</i>
	(18)	(18)	(36)
Seller-out	In-group		
	69.90	68.69	69.30
	<i>3.51</i>	<i>3.38</i>	<i>2.40</i>
	(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 confirms Conjecture 3 and suggests that in-group sellers expect on average a favorable offer from in-group buyers.

Comparing sellers' expectations about in-group buyers' potential offers in treatment *One-buyer-out* with pooled beliefs of treatments *All-out* ($p=0.090$), *All-in* ($p=0.188$), and *Seller-out* ($p=0.163$), results suggest a significant difference between treatment *All-out* and *One-buyer-out*. Sellers in treatment *All-out* expect 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 in-group favoritism, i.e. in-group sellers expect on average a higher offer from their partner. Another explanation may be that in-group sellers expect a stronger competition among buyers who differ in their group identities in treatment *One-buyer-out* compared to treatment *All-out* where no direct difference is observable. 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* ($p=0.335$), *All-in* ($p=0.599$) and *Seller-out* ($p=0.910$), respectively.

Expectations of buyers

We now analyze buyers' expectations about sellers' potential payment requests for oneself and for the counterpart. Table 2 summarizes buyers' mean expectations 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 ($p=0.506$). The same is true matching in-group and out-group buyers' expectations ($p=0.506$) 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* which contradicts Conjecture 4.

Table 2: Buyers' mean expectations about payment requests for oneself and for the counterpart

	Identity 1st buyer		Buyers expectations Identity 2nd buyer		Total	
	<i>exp. oneself</i>	<i>exp. other</i>	<i>exp. oneself</i>	<i>exp. other</i>	<i>exp. oneself</i>	<i>exp. other</i>
All-out	out-group		out-group			
	73.02	76.05	72.75	72.75	72.88	74.40
	<i>6.06</i>	<i>6.77</i>	<i>3.71</i>	<i>3.77</i>	<i>3.46</i>	<i>3.79</i>
	(10)		(10)		(20)	
All-in	in-group		in-group			
	74.79	77.00	62.76	67.24	68.75	72.12
	<i>6.61</i>	<i>6.37</i>	<i>2.94</i>	<i>4.05</i>	<i>3.78</i>	<i>3.84</i>
	(10)		(10)		(20)	
One -buyer-out	in-group		out-group			
	80.89	82.17	76.98	77.42	78.94	79.80
	<i>4.06</i>	<i>4.17</i>	<i>4.35</i>	<i>4.83</i>	<i>2.95</i>	<i>3.17</i>
	(18)		(18)		(36)	
Seller-out	in-group		in-group			
	72.96	71.31	73.67	73.32	73.32	72.32
	<i>5.16</i>	<i>4.97</i>	<i>3.37</i>	<i>3.51</i>	<i>3.03</i>	<i>3.01</i>
	(18)		(18)		(36)	

Note: 1st buyer corresponds to the left buyer whereas 2nd buyer corresponds to the right buyer in Figure 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.

Furthermore, 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 *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 both buyers belong to the in-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* ($p=0.169$). However, comparing in-group buyers expectations in treatment *One-buyer-out* (82.2 ECU) with pooled expectations in treatments *All-in* (72.1 ECU) and *Seller-out* (72.3 ECU), respectively the Mann-Whitney test confirms a significant difference between them ($p=0.075$ and $p=0.040$, respectively). These results suggest that

in-group buyers expect for their counterpart (different in her group affiliation) a higher payment request compared to treatments where differences among buyers cannot be directly observed. With regard to out-group buyers' expectations, i.e. expected payment requests for oneself and for the counterpart we do not find significant differences between treatments.

4.4 Regression results

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 3 presents GLS regressions with individual random effects and robust standard errors.⁹ The regressors are buyers' offers to acquire the indivisible good. We include indicator variables which state whether or not group members, i.e. seller and both buyers belong to the in-group. In our analysis we try to identify how buyer's offer is influenced by its own and teammates group affiliation in comparison to buyers' offer in treatment *All-out* which form the omitted reference group.

In all regression Models (1-3) the group constellation interacts 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.

⁹We estimated all models with GLS random effects and Tobit random effects. Since the estimated results are very similar, we report only GLS random effects. Further results are available upon request.

The first model in Table 3 investigates the influence of group identity of group members on buyers' offer controlling for stage effects. The results indicate a significant positive effect for in-group buyers who bargain with in-group sellers and compete with out-group buyers. In-group buyers in treatment *One-buyer-out* offer significantly more compared to buyers who belong to the out-group and interact with out-group sellers and out-group buyers. 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 ($p=0.011$). In Model 2 we additionally control for session effects, gender, risk aversion, and experience. Results in Model 2 confirm that in-group buyers who bargain with in-group sellers and compete with out-group buyers offer significantly more compared to offers of the reference group. The coefficients of treatment *One-buyer-out* suggest that in-group and out-group buyers differ significantly from each other ($p=0.002$). Finally, in Model 3 we include buyers' expectation as an additional explanatory variable. Results are qualitatively similar to those obtained in Models 1 and 2, respectively. Surprisingly, after controlling for expectations we find that in-group buyers who interact with in-group sellers and compete with another in-group buyer (treatment *All-in*) offer significantly more compared to the control group *All-out*.

Overall, the results of the regression Models 1-3 suggest that in-group buyers who bargain with an in-group seller and compete with an out-group buyer offer significantly more compared to the case where buyers bargain with an out-group seller and compete with an out-group buyer. These results confirm Conjecture 1a. This suggests, that the behavior of a buyer does not only depend on the own group identity but also on the group identity of other members and therefore the entire group constellation.

Table 3: GLS regression results on buyer's offers

	Buyers' offers		
	(1)	(2)	(3)
in-group seller $\times$ in-group self $\times$ in-group counterpart			
1 $\times$ 1 $\times$ 1	5.599 (5.180)	5.975 (5.802)	10.282* (5.983)
1 $\times$ 0 $\times$ 1	-1.511 (4.995)	-1.829 (5.463)	-2.192 (5.071)
1 $\times$ 1 $\times$ 0	9.872* (5.396)	12.238** (6.181)	10.446* (5.884)
0 $\times$ 1 $\times$ 1	4.413 (5.086)	6.247 (5.864)	5.636 (5.568)
Expectation self			0.449*** (0.070)
Female		3.359 (3.169)	-1.370 (2.860)
Risk		-0.272 (1.022)	0.069 (0.871)
Stage	yes	yes	yes
Session		yes	yes
Experience		yes	yes
Constant	79.34*** (4.121)	58.36*** (8.374)	28.64*** (9.604)
<i>Difference in coefs</i>			
<i>In-group and out-group buyer in treatment</i> 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 difficult 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 buyers offer significantly more in situations where direct discrimination is possible and out-group buyers do not, although it might be expected due to anticipated in-group favoritism. Furthermore, we do not find evidence that market pressure extracts all the rents from the consumers, independent of the treatment.

The most interesting finding is that sellers expect in-group favoritism, but do not reciprocate this by offering lower ask prices for in-group buyers. We may explain this finding that in-group favoritism is asymmetric and depends on the market power of the actor. A more powerful market participant – the seller – expects favorable treatment, but she is not willing to accept lower offers from in-group members. This opens a path of further research whether market (or other) power leads to asymmetric in-group favoritism in favor of the more powerful.

Future research may also focus on the way how different levels of experience (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.

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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 her 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 ($1 \text{ ECU} = 0,08 \text{ €}$) + Profit picked randomly from the second, third or forth part. The conversion rate is $1 \text{ ECU} = 0,08 \text{ €}$. 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

The screenshot shows a web-based interface for a coordination game. At the top right, a timer indicates 'Verbleibende Zeit [sec]: 50'. Below this, a header bar is labeled 'Erste Stufe'. The main content area contains the following text:

Sie werden das folgende Spiel mit Ihren zwei Partnern bestreiten.

Stellen Sie sich vor, Sie möchten sich gemeinsam mit Ihren zwei Partnern in Paris treffen und haben keine Möglichkeit, sich vorher abzusprechen, wo Sie sich treffen wollen. Sie wissen jedoch, dass nur zwei verschiedene Treffpunkte in Frage kommen und Ihre zwei Partner wissen das ebenfalls.

Wenn sie sich gemeinsam und gleichzeitig für den **selben** Treffpunkt entscheiden, erhalten Sie einen gemeinsamen Betrag von **18.75** ECU, der gleichmäßig unter ihnen aufgeteilt wird.

Folgende zwei Treffpunkte stehen zur Auswahl. Welchen **Treffpunkt** wählen Sie?

☒ Eiffelturm

☐ Centre Georges Pompidou

An 'OK' button is located in the bottom right corner.

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

Verbleibende Zeit [sec]: 56

Zweite Stufe

Verkäufer

Bitte geben Sie Ihre Preisvorstellung **separat** für die beiden Käufer an! Jedem Käufer stehen 113 ECU zur Verfügung.

Bitte geben Sie hier Ihre Preisvorstellungen für den einen **Käufer** an:

Preisvorstellung (ganzzahlig):

Bitte geben Sie hier Ihre Preisvorstellungen für den anderen **Käufer** an:

Preisvorstellung (ganzzahlig):

OK

Figure 6: Offer screen of the in-group buyer

Verbleibende Zeit [sec]: 50

Zweite Stufe

Käufer

Bitte geben Sie an, wieviel Sie für das Out an den Verkäufer zu zahlen bereit sind. Ihnen stehen 113 ECU zur Verfügung.

1. Preis (ganzzahlig)

OK

Figure 7: Decision screen of the out-group seller

Verbleibende Zeit [sec]: 37

Verkäufer

Beide Käufer haben in der Stufe 3, die zufällig gezogen wurde, Ihre Preisvorstellung erfüllt.
Bitte wählen Sie **einen** der beiden Käufer aus, dem Sie das Gut verkaufen möchten.

Ihre Preisvorstellung an den Käufer lautet: 10 Das Angebot vom Käufer an Sie lautet: 67 Käufer	Ihre Preisvorstellung an den Käufer lautet: 20 Das Angebot vom Käufer an Sie lautet: 70 Käufer
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Figure 8: Payoff screen

Verbleibende Zeit [sec]: 40

Ihr **Profit** aus dem Experiment setzt sich wie folgt zusammen:

Ihr Profit für die Teilnahme am Experiment (in EUR):	2.50
Ihr Profit aus der ersten Stufe beträgt (in EUR):	0.50
Ihr Profit aus der dritten Stufe beträgt (in EUR):	5.60
Ihr Profit aus den Bonusfragen beträgt (in EUR):	1.20
Ihr Profit aus der Zusatzfrage beträgt (in EUR):	0.50
Ihr gesamter gerundeter Profit aus diesem Experiment beträgt (in EUR):	10.30

Weiter zum Fragebogen