Group Identity in Markets*

Sherry Xin Li
School of Economic, Political and Policy Sciences (EPPS)
University of Texas at Dallas, GR31
800 W. Campbell Rd.
Richardson, TX 75080
Phone: 972-883-4987
sherry.xin.li@utdallas.edu

Kutsal Dogan
School of Management, SM32
University of Texas at Dallas
800 West Campbell Road
Richardson, TX 75083-0688
kutsal.dogan@utdallas.edu

Ernan Haruvy
School of Management, SM32
University of Texas at Dallas
800 West Campbell Road
Richardson, TX 75083-0688
eharuvy@utdallas.edu

* The authors are indebted to Rachel Croson, Sandy Jap, Elena Katok, Tim Salmon, participants at the International ESA Meetings (Washington D.C. 2009), INFORMS Annual Meetings (Pittsburgh 2006), and the behavioral/experimental economics reading group meetings at UT–Dallas for helpful advice.

Group Identity in Markets

Abstract:

We present a laboratory experiment that measures the effects of group identity – one's perceived membership in social groups – on market transactions in an oligopoly market with a few sellers and buyers. We artificially induce group identity using art preferences and college majors in different treatments, respectively. Subjects are randomly assigned into the roles of buyers and sellers and interact repeatedly. We find that the presence of groups influences both the selection of trading partners and the determination of prices. All else equal, sellers are more likely to make offers to ingroup buyers, and the buyers are more likely to accept offers from ingroup sellers. There are considerable intergroup price differentials with the outgroup sellers charging a *lower* price than the ingroup sellers.

JEL codes: C91, D61, D63, L13, L14

Key words: group identity, experiments, markets, bargaining

Group Identity in Markets

1. Introduction

It is well established in the economic literature that other-regarding preferences play an important role in individual economic decision making. Nevertheless, markets are usually modeled as interactions between self-interested agents. Our study contributes by experimentally examining an oligopolistic market where a few sellers and buyers share social ties that are built on group identity – perceived membership in a social group. We study how group identity influences agents' choice of trading partners and the determination of prices. Results offer insights on market matches and welfare implications in the presence of social groups.

The concept of social identity theory in psychology was developed by Tajfel and Turner (1979) and has been used by researchers to explore phenomena such as ethnic and racial conflicts, discrimination, and political campaigns (see Abdelal et al. 2009 for a review). Akerlof and Kranton (2000) applied the concept in economics to analyze gender discrimination, poverty and social exclusion. Some studies in the growing literature use natural pre-existing identities, such as ethnicity (e.g., Fershtman and Gneezy, 2001) or the type of community in which one lives (Ruffle and Sosis, 2006). Other studies induce group identities in the laboratory and investigate their impact on prices and earnings in markets (Ball et al., 2001), cooperation (Eckel and Grossman, 2005; Charness et al., 2007), and social preferences (Chen and Li, 2009).

The influence of group identity has yet been addressed in market settings with a few notable exceptions including Akerlof and Kranton (2005) and Ball *et al.* (2001). Group identity may play a limited role where there are many anonymous buyers and sellers. However, it becomes more important when the number of buyers and sellers is relatively small, e.g., in an oligopoly market, since some buyers and sellers may share social ties (derived from perceived group membership) and have heterogeneous non-pecuniary preferences over each other. When group differentiation is present, a price-based market may include matching considerations.[1] The presence of group

[1] Markets with matching considerations have been modeled by Hatfield and Milgrom (2005), Bulow and Levin (2006), Niederle (2007), and Crawford (2008).

differentiations may affect behaviors of those who are part of these social ties. It may also affect *other* buyers' and sellers' behaviors. This study investigates how group identity affects buyers and sellers' choices of trading partners, and the resulting transaction prices.

The broader context to which this study contributes is the private procurement literature. Procurement refers to an entity's purchases of supplies through auction, negotiation or other processes. Public sector procurement often involves the government as the only potential buyer (e.g., government's highway and defense contracts) from multiple sellers. Private sector procurement in contrast is more likely to involve multiple potential buyers as well as multiple sellers. Recent private procurement literature includes studies on procurement negotiations (Thomas and Wilson 2006), procurement auctions (Engelbrecht-Wiggans, Haruvy and Katok 2007), procurement relationships (Jap and Haruvy 2008), and semi-competitive procurement contracts (Hubbard and Paarsch 2009). These studies show that the buyers' welfare is not only affected by price but also by some exogenous non-price attributes. The present study contributes to this literature by identifying the effect of social ties separately from the effect of seller-buyer differentiation (due to other non-price attributes) on partner selection and price determination.

The idea that social ties are a key element in differentiation is not new. Jap and Haruvy (2008) showed that buyer decisions on trading partners and bid selection in private procurement may be influenced by social ties. They combined survey with bid data to study procurement by automobile manufacturers (buyers) from auto-parts suppliers and found that the suppliers' self assessments of relationships with the buyer affected their bids and the auction outcome.[2] However, the evolution of relationships is not observable to researchers in such studies. Our experiment, in contrast, preserves the primary market structure of private procurement (i.e., multiple sellers and multiple buyers) while improving the identification of relationship considerations. We introduce group identity as a proxy for social ties that are *exogenous* to subject's previous experience

[2] The suppliers who failed to obtain the contract subsequently compete for other contracts by the same buyer or seek other buyers. This procurement process is similar in other industries (Emiliani 2000).

while the repeated interactions between buyers and sellers in the lab allow us to study how the effects of social ties evolve over time.

To capture seller-buyer differentiation due to other non-price attributes (e.g., due to quality, service, or reputation), we allow for heterogeneous preferences among sellers and buyers. Although this issue has received increasingly more attention recently (Engelbrecht-Wiggans, Haruvy and Katok 2007; Tonca, Wu and Zhong 2008), the commonly used approach is to model seller-buyer differentiation using vertical differentiation (e.g., Asker and Cantillon, 2008). Under that approach, sellers can be commonly ranked (same preference ranking is employed by all participants) based on differentiating attributes and a pre-announced scoring rule. In contrast, our approach is more similar to horizontal differentiation – preferences are heterogeneous among sellers and buyers. This approach better adapts to a market structure where multiple sellers deal with multiple buyers, and allows sellers or buyers to have subjective evaluations of their prospective trading partners.

The lab experiment reported here involves an oligopoly market with three sellers and three buyers who share some social ties. The social ties are built on perceived group membership that is induced through shared art preferences or common college majors. Subjects are then randomly assigned to be buyers or sellers, and make virtual transactions repeatedly. We find that group identity affects both partner selection and prices. Sellers are more likely to make offers to ingroup buyers, and buyers are likewise more likely to accept offers from the ingroup sellers. There are considerable intergroup price differentials with the outgroup sellers charging a *lower* price than ingroup sellers. We also find that the ingroup favoritism in partner selection and the intergroup price differentials are contingent on seller and buyer value profiles.

The paper is organized as follows. Section 2 discusses the setting we investigate and outlines the research questions. Section 3 presents the experimental design. Section 4 presents the analysis and main results. Section 5 concludes.

2. Setting and Research Questions

In this section, we briefly describe the experimental setting and introduce the research questions. In the social identity treatments, six subjects are categorized into two

groups based on their art preferences or college majors. They are then randomly assigned to be a seller (referred to as "she" hereafter) or a buyer (referred to as "he"). The roles of three sellers and three buyers remain unchanged throughout a session. Sellers and buyers have exogenous and heterogeneous preferences over each other. They make virtual transactions repeatedly for 50 rounds – seller proposes a price to buyer, buyer then decides which offer to accept. We discuss the experiment design in detail in section 3.

The main research questions include whether and how group identity influences partner selection and the determination of prices. Our setting links to the literature on bargaining that involves multiple proposers and responders (for studies with multiple responders see Güth et al., 1997; Grosskopf, 2003, and Gneezy et al., 2003 for bargaining games with multiple responders).

In our setting, a seller can be considered as a proposer facing multiple responders, and a buyer as a responder facing multiple offers. If the buyer deems none of the offers to be acceptable, he can reject all. Since there are the equal numbers of sellers and buyers, offers will be made one-to-one in the equilibrium, similar to the basic bargaining game. While this setting may resemble an ultimatum game in some aspects its main focus is the repeated market interactions. Hoffman et al. (1994) finds that offers were close to the Nash prediction when the game is framed as a market interaction.

We apply backward induction by analyzing the buyer's decision and then the seller's. Hypothesis 1 stems from findings in the previous literature of bargaining games and auctions with group identity. For example, Chaserant (2006) showed that responders are more likely to accept offers from members of the same social group. Ishii (2009) found that repeated public-work auctions in Japan have resulted in rings of firms that favor ingroup partners. Lee (2008) documented examples of ingroup favoritism motivated by nationalistic sentiments.

We conjecture that this pattern would extend to the present setting.

H1. All else being equal, offers from the ingroup sellers are more likely to be accepted.

The next question is whether sellers would consider buyers' group identity in their decisions on whom to make an offer to and at what price. The existing evidence suggests ingroup favoritism. In a series of experiments conducted by Fershtman and Gneezy

(2001) in Israeli Jewish society, ethnic group effects were found in both the trust game and the ultimatum game, but not in the dictator game. Wilson (2007) conducted a dictator game experiment in Bosnia, and found that participants from three ethnic groups – Bosniak, Croat and Serb – show strong ingroup favoritism by offering significantly more economic awards to recipients from the ingroup. Kramer, Shah and Woerner (1995), in a bargaining game involving members of two rival business schools, found that responders were more willing to accept unfair offers by ingroup members. Kahneman et al. (1986) observed that psychology students made less generous offers, and were less willing to accept unfair offers when paired with commerce students than when paired with other psychology students. Robert and Carneval (1997) found that proposers were more likely to offer a fair share to another person from their own class. In a bargaining game experiment with minimal groups, Chaserant (2006) found intergroup discriminatory behavior in one of two groups. Charness, Haruvy and Sonsino (2007) found that people were less generous to members of a different geographical group in a lost wallet game.

Therefore, we hypothesize that sellers would consider group identity in their decisions.

H2. Sellers are more likely to make offers to ingroup buyers.

H3. Prices offered to ingroup buyers will be different from those to outgroup buyers.

Hypothesis 3 is two-directional. On the one hand, sellers may make favorable price offers to ingroup buyers because of ingroup favoritism. In that case, ingroup affiliation would drive down prices. On the other hand, outgroup sellers may offer lower prices to compensate for their anticipated disadvantage. Likewise, opportunistic sellers may take advantage of buyers' perceived ingroup favoritism by charging ingroup buyers higher prices. This would result in a positive relationship between ingroup affiliation and price. In either case, we expect to observe intergroup price differentials, but the direction of the differentials is an empirical question.

3. Experimental Design

The experiment consists of two identity treatments and one control treatment. In the identity treatments, subjects were assigned to groups (based on their art preferences or college majors), and then participated in a series of trading tasks. The control treatment contained only the trading tasks. There were six subjects per session. In this section, we discuss the group categorization, trading tasks, and the experimental procedures.

Group Assignment

To assign subjects into groups, we use one of two approaches from the psychology literature. Under the first approach, we follow the minimal group paradigm to induce an *artificial* group identity by using subjects' preferences over paintings – hereafter the *Paintings* treatment. Under the second approach, we prime subjects' *natural* identities being certain college majors – hereafter the *Majors* treatment.[3]

The group categorization in the *Paintings* treatment closely follows the minimal group paradigm in psychology. In the classical application of the minimal group paradigm (Tajfel and Turner, 1979), subjects are told that their group assignments are based on their preferences for paintings by two artists, Wassily Kandinsky and Paul Klee. Results show that when subjects allocate tokens to others, ingroup members are treated more favorably than outgroup members (see Tajfel and Turner, 1979, Brown, 1986, and Wetherell, 1996, for reviews). In our experiment, subjects indicated their preferences over five pairs of paintings on a web site when they signed up for the experiment. Each pair included one painting by Kandinsky and the other by Klee. Subjects were classified as the Kandinsky group if they preferred Kandinsky paintings in at least three pairs, and Klee otherwise. To make the group identity salient, the experimenter started the sessions by briefly introducing the two artists' biographies and contrasting the styles of their work. Subjects were then reminded of their preferences. Four out of six sessions had two groups

[3] Both approaches have pros and cons. Results based on natural classifications of identities (e.g., gender, race, age) may usually be generalized. However, the results may be subject to confounds due to the multi-dimensionality of natural identities, and hence be affected by individuals' perceptions of their identities during the experiment. Priming makes salient the dimension of identity that interests the researchers, and thus may help minimize other confounds. In contrast, the approach of artificially inducing identities gives better control over the subjects' guiding identity. However, the results may not have straightforward generalizations to real-life cases.

with the equal number of subjects whereas two sessions had four Kandinsky subjects and two Klee subjects.[4]

In the *Majors* treatment, we primed subjects' natural identity distinguished by college majors. Priming is a psychology technique by which a stimulus, such as a list of words, a questionnaire, posters, or an article, is given to subjects to sensitize them to the later presentation of a similar stimulus. Psychology studies show that subtly activating one's natural social identity through priming can affect behaviors and outcomes (Bargh and Pietromonaco 1982; Aronson, Quinn and Spencer 1998). Priming is also used in a growing number of economics studies (Hoff and Pandey 2006, Benjamin, Choi and Strickland *forthcoming*). In our experiment, we recruited subjects who were either business or engineering majors. To prime subjects' college major identities, we used a questionnaire that contained questions on the comparison and contrast of one's college major with the other college major (Aronson et al.1998, Shih, Pittinsky and Ambady 1999). Specifically, subjects were asked to indicate their agreement, on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree), with three statements: *i*) "Being a business/engineering major is an important part of who I am"; *ii*) "Being a business/engineering major is an important part of the image that I project"; and *iii*) "Being a business major is a source of pride for me". The survey and summary statistics are included in Appendix A. Four sessions had an equal number of subjects from each college major, whereas the other two sessions had four subjects from one major and two from the other major since more students showed up from one major than the other.

Although in both treatments subjects are classified into two non-overlapping groups, the content of groups carried by college majors is more natural and less artificial than the painting groups. Since the category salience, the group status, and the relevance of comparison may enhance intergroup bias (Mullen, Brown and Smith, 1992) we conjecture that the group differentiations are stronger in the *Majors* treatment than in the *Paintings* treatment.

[4] To avoid using deception, subjects were categorized to groups truthfully based on their preferences over paintings (Chen and Li 2009). Since we solicited subjects' preferences in advance during online recruiting, we tried to invite equal numbers of both types to the experiment. Despite our effort, two sessions had more of one type than the other.

To make group affiliation more salient, we told subjects that the group average earnings would be revealed publicly after the experiment. However, group competition is not the focus in this study and subjects were not monetarily incentivized to obtain higher group earnings.

Trading Tasks

During the second stage, six subjects were randomly assigned to be a buyer or a seller. There were three buyers and three sellers. Their roles were fixed for the duration of the experiment. Sellers and buyers traded repeatedly for 50 rounds. In each round, each seller made a price offer to a buyer. The buyer then chose which offer to accept; he could accept only one offer or reject all offers. The price offer, if accepted, was paid by the buyer to the seller.

There were three distinct buyer roles and three distinct seller roles. Sellers and buyers were given exogenous and heterogeneous preferences over each other, as shown in the value profiles in Table 1.[5] The first number in each cell is the seller value – how much a seller earns in addition to the price; the second number is the buyer value – how much a buyer earns before the price is paid out. For example, in profile 1, seller 1 would earn 35, 25 and 15 tokens from buyers 1, 2 and 3, respectively, and hence prefers buyer 1 the most and buyer 3 the least, based on the intrinsic values. Similarly, buyer 1 prefers seller 3 the most and seller 1 the least based on the intrinsic values. If a transaction takes place the buyer payoff is the buyer value minus the price, and the seller payoff is the seller value plus the price. A subject who finds no trading partner would lose one token in that round. This design makes it possible that the seller extracts the entire surplus and the buyer gains zero payoffs in some transactions, since a rational buyer would strictly prefer such a transaction to no trade and losing one token. Every subject was given an endowment of 10 tokens at the beginning of the experiment.[6] For buyers who receive at

[5] Painting preferences or college majors were not related to the assignment of buyer or seller roles. If three subjects came from each of the two identity groups, two seller roles and one buyer role were assigned to one identity group and the remaining roles (two buyers and one seller) were assigned to the other group. If four subjects came from one identity group and two from the other group, two seller roles and two buyer roles were assigned to the first group, and the remaining seller and buyer roles were assigned to the second group. We took great care to ensure that no identity group was overrepresented in any role. Over all, each buyer and seller role was assigned to a roughly equal number of subjects in each identity group.

[6] Empirically, there was no one who made no transaction for ten consecutive rounds.

least one offer with a positive net payoff, rejection is a myopically dominated strategy but it might lead to better offers in future rounds.

Table 1. The Value Profiles and Preferences

		Buyer 1	Buyer 2	Buyer 3	Seller Preference over Buyers	Buyer Preference over Sellers
Profile 1	Seller 1	35, 15	25, 15	15, 35	$B_1 \underset{S_1}{\succ} B_2 \underset{S_1}{\succ} B_3$	$S_3 \underset{B_1}{\succ} S_2 \underset{B_1}{\succ} S_1$
	Seller 2	25, 25	35, 35	15, 15	$B_2 \underset{S_2}{\succ} B_1 \underset{S_2}{\succ} B_3$	$S_2 \underset{B_2}{\succ} S_3 \underset{B_2}{\succ} S_1$
	Seller 3	15, 35	35, 25	25, 25	$B_2 \underset{S_3}{\succ} B_3 \underset{S_3}{\succ} B_1$	$S_1 \underset{B_3}{\succ} S_3 \underset{B_3}{\succ} S_2$
Profile 2	Seller 1	15, 35	35, 15	25, 35	$B_2 \underset{S_1}{\succ} B_3 \underset{S_1}{\succ} B_1$	$S_1 \underset{B_1}{\succ} S_3 \underset{B_1}{\succ} S_2$
	Seller 2	15, 15	25, 25	35, 25	$B_3 \underset{S_2}{\succ} B_2 \underset{S_2}{\succ} B_1$	$S_3 \underset{B_2}{\succ} S_2 \underset{B_2}{\succ} S_1$
	Seller 3	25, 25	35, 35	15, 15	$B_2 \underset{S_3}{\succ} B_1 \underset{S_3}{\succ} B_3$	$S_1 \underset{B_3}{\succ} S_2 \underset{B_3}{\succ} S_3$

Note: In each cell, the first number is seller value and the second number buyer value.

One important part of the design is to select value profiles in order to introduce sellers and buyers' heterogeneous preferences over each other. We used two value profiles with profile 1 used in rounds 1-25 and profile 2 in rounds 26-50.[7] The parameters are selected such that no one shares the same preference rankings with others, as shown in the last two columns of Table 1. In addition, profile 1 is simpler than profile 2. With all prices being equal, profile 1 theoretically converges in two steps (one step after the initial offer), assuming each seller makes an offer to the buyer with the highest valuation for her who has not yet rejected her.[8] The structure of profile 2 is more complex. It theoretically converges in four steps – three steps after the initial offer. Appendix C details the step-by-step convergence process. The two profiles allow us to examine whether the impact of social identity on market trading is contingent on the complexity of the market structure.

The structure of the profiles also imposes competition among sellers. For example, in profile 1, both sellers 2 and 3 prefer buyer 2 the most based on their intrinsic

[7] In the instructions presented in Appendix B, the buyer values and seller values were presented in two separate tables for each profile so that it would be easier for subjects to follow.

[8] Matching theory typically ignores prices. This is because prices add a level of complexity, add ties and often destroy the lattice structure. One purpose of the present study is to fill this vacuum in a setting with group identity. Recent works on matching with prices include Hatfield and Milgrom (2005), Bulow and Levin (2006), Niederle (2007), and Crawford (2008).

values. This design allows us to study whether the group differentiations may maneuver competition on the supply side. For example, we may ask what role the group differentiations play in sellers' selection of buyers and price offers. On the demand side, the design makes it possible for some buyers to receive multiple price offers. In an identity-neutral environment, buyers may act rationally by accepting the offer that brings the highest monetary payoffs. In an environment with group differentiation, however, buyers may need to consider the tradeoffs between monetary payoffs and intergroup preferences. They may favor ingroup sellers when facing comparable offers. In this case the group differentiation facilitates buyers' selection of sellers. In other cases, the presence of group differentiations may lead buyers to deviate from their rational response. They may be willing to accept an ingroup offer with a *lower* net payoff in order to acknowledge their group identity.

Procedure

Subjects made decisions anonymously in private. Hard copies of the instructions, including the value profiles, were distributed and explained by the experimenter. Before making decisions, subjects were informed of the group affiliations of other subjects in the opposite role. Screen shots on seller and buyer decisions are included in Appendix D. At the end of each round, subjects were given feedback on the matches, the prices and their own earnings. Group average earnings were reported on the board after the experiment.

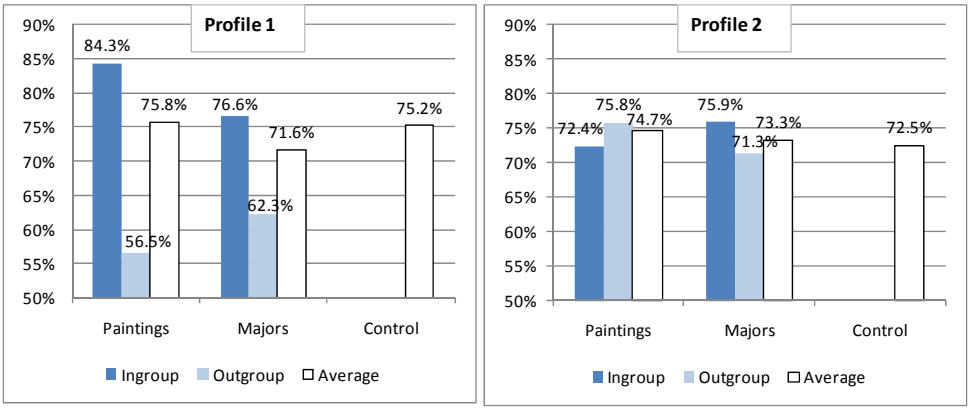
The experiments were conducted at the University of Texas at Dallas in fall 2006 and spring 2007. The experiments were programmed using z-Tree (Fischbacher 2007). The experiment lasted for about one hour. Subjects were paid their cumulated earnings through all rounds. The exchange rate was 200 lab tokens for a U.S. dollar. The average earning was $15.6 including a $5 participation fee. In total, six *Paintings* sessions, six *Majors* sessions, and five control sessions were conducted.

4. Results

In this section, we investigate the impact of group identity on the selection of trading partners and the determination of prices. For each hypothesis, we present summary statistics on the dependent variables followed by regression analysis.[9]

For a visual inspection of the results pertaining to hypothesis 1, Figure 1 summarizes the average acceptance rate of price offers by the buyers (i.e., the average rate of successful transactions). Statistics for ingroup match, outgroup match, and the overall average are represented using black, grey and white bars, respectively. We find that although the overall average acceptance rates are similar across the treatments, the sellers' group affiliation affects the likelihood of whether a price offer is accepted. In profile 1 of the *Paintings* treatment, 84.3% of price offers proposed to ingroup buyers are accepted, in contrast to 56.5% of acceptance rate for offers proposed to outgroup buyers. In profile 1 of the *Majors* treatment, the acceptance rate is 76.6% for offers proposed to ingroup, and 62.3% for offers proposed to outgroup. In profile 2, the difference between the ingroup and outgroup acceptance rates declines. For the *Majors* treatment, the acceptance rate is still higher for ingroup (75.9%) than for outgroup (71.3%). For the *Paintings* treatment, the relationship reverses with the acceptance rate for outgroup (75.8%) slightly higher than for ingroup (72.4%). The summary statistics suggest that on average, price offers proposed to ingroup buyers are more likely to be accepted.

Figure 1. Rate of offer acceptance



[9] We also present the summary statistics on the rate of offer acceptance and the average proposing price by treatment, groups and subject roles in Appendix E.

We next use a random effect logit model to investigate the factors that determine whether a seller's offer is accepted or rejected. Recall that in each round a seller can make a price offer to only one buyer. The rejection rate is 24.8% in the *Paintings* treatment, 27.6% in the *Majors* treatment, and 26.1% in control.[10]

The dependent variable of the random effect logit model is the probability that a seller's offer is accepted. The two main explanatory variables include the group affiliation (the *Ingroup* dummy) and the price (*Relative Price*) in the identity treatments.[11] The *Ingroup* dummy variable is coded as one if the proposing seller and the buyer come from the same group, and zero otherwise. The variable *Relative Price* is the seller's proposing price normalized by the buyer value. It represents the share of buyer's gross value that can be extracted by the seller if the offer is accepted. Our hypothesis is that the probability of offer acceptance increases with the ingroup matching but decreases with the relative price. We also include a *Time Trend* term (the period number) and interact *Time Trend* with the *Ingroup* variable to examine how ingroup considerations change over time.

Table 2: Determinants of seller offer acceptance – random effect logistic regressions

		Paintings		Majors		Control	
Profile 1	Ingroup	0.481***	(0.089)	0.170**	(0.083)		
	Relative Price	-0.723***	(0.169)	-0.808***	(0.125)	-0.398***	(0.089)
	Time trend	0.007*	(0.004)	0.008*	(0.004)	0.005	(0.003)
	Time trend*Ingroup	-0.008	(0.006)	-0.003	(0.007)		
	Constant	0.127	(0.096)	0.297**	(0.119)	0.283***	(0.090)
	Observations	450		450		375	
	Log likelihood function	-186.2		-201.7		-186.6	
Profile 2	Ingroup	-0.380	(0.345)	0.077	(0.206)		
	Relative price	-0.655***	(0.210)	-0.661***	(0.228)	-0.227***	(0.078)
	Time trend	0.002	(0.003)	0.008***	(0.002)	0.008***	(0.001)
	Time trend*Ingroup	0.008	(0.009)	-0.003	(0.005)		
	Constant	0.369	(0.249)	0.104	(0.191)	-0.046	(0.089)
	Observations	450		450		375	
	Log likelihood function	-212.9		-219.9		-205.9	

Note: Dependent variable is the probability that a seller's offer is accepted. Marginal effects are reported. Standard errors in the parentheses are clustered at the individual level. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

[10] Buyers sometimes rejected profitable offers even when these were the only offers available to them, presumably finding them unsatisfactory. In profile 1, this happened 23 times (6 times with ingroup offers and 17 times with outgroup) in the Paintings treatment and 22 times (1 time with ingroup and 21 times with outgroup) in the Majors treatment. In the control treatment, there were 33 rejections of profitable offers. Thus, it seems that buyers are more reluctant to reject ingroup sellers.

[11] The group affiliation variable is inapplicable in the control.

Table 2 presents the marginal effects of the explanatory variables. Standard errors in the parentheses are clustered on the individual level.[12] We find that buyers respond negatively to the relative price. The higher the price the lower the probability that the offer will be accepted ($p < 0.01$). This result is consistent across all the treatments and the value profiles. In addition, the effect of group affiliation on the offer acceptance exhibits interesting patterns. In profile 1 of both the *Paintings* and *Majors* treatments, the *Ingroup* matching increases significantly the likelihood of offer acceptance, conditional on the relative price. Particularly, the ingroup affiliation increases the likelihood of offer acceptance by 48.1% ($p < 0.01$) in the *Paintings* treatment and by 17.0% ($p < 0.01$) in the *Majors* treatment. It supports hypothesis 1 that buyers are more likely to accept an offer from an ingroup seller. In profile 2, however, buyer's preferential treatment towards ingroup sellers diminishes substantially. In the *Majors* treatment, the marginal effect of the ingroup dummy variable reduces from 0.170 in profile 1 to 0.077 ($p > 0.10$) in profile 2. In the *Paintings* treatment, its marginal effect of ingroup becomes -0.380 ($p > 0.10$). One conjecture is that the buyers' favorable treatment toward ingroup sellers may generate opportunistic responses from the latter, and buyers learn this over time and consequently withdraw their ingroup favorable choices. This conjecture is discussed when we investigate sellers' selection over buyers and the price determination. The time trend variable enters with a positive sign ($p < 0.10$ in profile 1 of both identity treatments, $p < 0.01$ in profile 2 of the *Majors* treatment and the control treatment), suggesting that the transaction success rate increases over time. The ingroup favoritism changes little over time, as suggested by the interaction effect between the time trend and the ingroup dummy variable. This leads to Result 1.

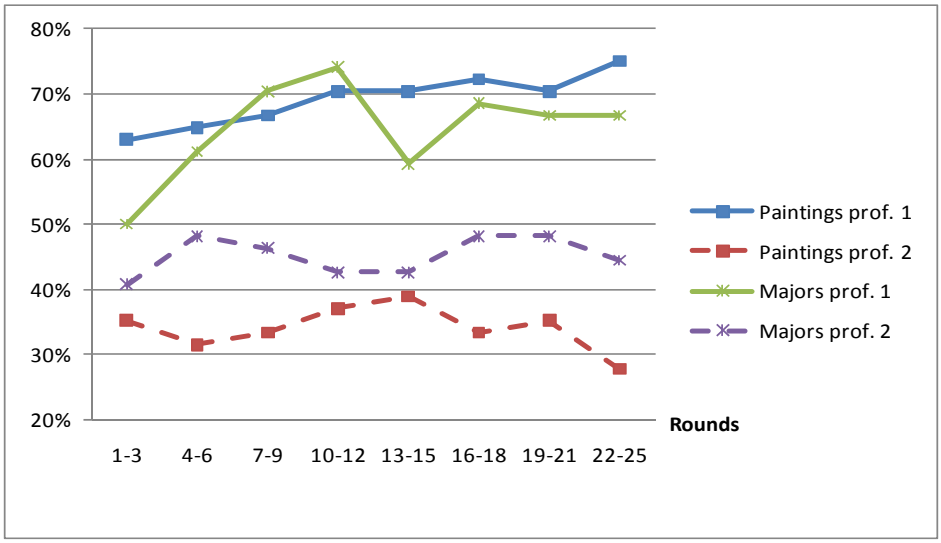
Result 1: All else being equal, the price offers from ingroup sellers are more likely to be accepted in profile 1, but not in profile 2.

We next investigate whether sellers' selection of buyers is influenced by group differentiation. We find that on average, sellers choose an ingroup buyer 69.3% of the

[12] A constant term is included in the random effect logit regressions for each treatment. It is omitted in the table since the marginal effects are reported here.

time in profile 1 and 33.8% in profile 2 for the *Paintings* treatment, and 64.7% in profile 1 and 45.1% in profile 2 for the *Majors* treatment. Figure 2 presents the dynamics of the probability that sellers choose ingroup buyers. Each dot represents a three-round average. The solid lines refer to profiles 1 and dashed lines profiles 2; lines with squares refer to the *Paintings* treatment and lines with asterisks the *Majors* treatment. Comparing these lines with the 50% reference line (in which case ingroup and outgroup are selected with 50-50% of chance) reveals that for both of the identity treatments, sellers are more likely to choose ingroup buyers in profile 1. In profile 2, sellers are more likely to choose outgroup buyers in the *Paintings* treatment, and also show marginal favoritism towards outgroup buyers in the *Majors* treatment.

Figure 2. Probability that sellers make a price proposal to ingroup buyers



We use a conditional logistic choice model to formally study the determinants of the sellers' choice of buyers. The dependent variable is the likelihood that buyer i (i = 1 for buyer 1, i = 2 for buyer 2, and i = 0 for buyer 3) is selected by the seller. The main explanatory variables are the sellers' and buyers' group affiliations (represented by the *Ingroup* dummy), and the sellers' payoff (*Seller surplus*). The *Ingroup* dummy takes a value of one if the seller and the buyer come from the same group, and zero otherwise. We also interact the time trend with the *Ingroup* dummy variable. There is no main effect for time trend in Table 3 because it drops out in a conditional logistic choice model. In addition, we control for the *Buyer Assignment*. Recall that the seller roles and buyer roles

are numbered, and each pair of the buyer and seller number represents a unique value profile. Since the value profiles are not generated randomly they need to be controlled for in the estimation and we do that with a dummy variable representing each profile. Results are reported in Table 3.[13]

Table 3. Determinants of sellers' choice over buyers– conditional logistic regressions with correlated random coefficients

		Paintings		Majors		Control	
Profile 1	Ingroup	0.828***	(0.275)	0.653***	(0.227)		
	Seller surplus	0.084***	(0.009)	0.027***	(0.008)	0.015*	(0.009)
	Time Trend×Ingroup	0.038**	(0.018)	0.021	(0.015)		
	Buyer 1	-1.107***	(0.185)	-0.288**	(0.149)	-0.350**	(0.152)
	Buyer 2	-0.495***	(0.184)	0.209	(0.164)	0.021	(0.171)
	Observations	450		450		375	
	Log likelihood function	-360.5		-441.5		-404.1	
Profile 2	Ingroup	-0.221	(0.605)	-0.188	(0.584)		
	Seller surplus	0.050***	(0.008)	0.037***	(0.007)	0.062***	(0.009)
	Time Trend×Ingroup	-0.011	(0.016)	0.007	(0.15)		
	Buyer 1	-0.136	(0.150)	-0.343**	(0.147)	-0.227	(0.153)
	Buyer 2	-0.465***	(0.133)	-0.125	(0.117)	-0.691***	(0.136)
	Observations	450		450		375	
	Log likelihood function	-443.6		-466.1		-372.9	

Note: Dependent variable is the probability that a seller proposes a price to a buyer;* significant at 10%, ** significant at 5%, *** significant at 1%.

We find that for both of the identity treatments, sellers are more likely to choose ingroup buyers than outgroup buyers in profile 1 ($p < 0.01$) but not in profile 2 ($p > 0.10$). In all cases except profile 1 in the control treatment, the *Seller surplus* variable enters with a positive and significant effect ($p < 0.01$). It suggests that the higher the payoff the seller obtains from a buyer, the more likely that the seller will make an offer to that buyer. The interaction between the time trend and the *Ingroup* dummy variable has a positive and significant impact on the sellers' selection of buyers only in profile 1 of the *Paintings* treatment ($p < 0.05$), suggesting that the impact of ingroup affiliation increases over time. But there is no change of this impact in the *Majors* treatment and profile 2 of the *Painting* treatment. We summarize the results in Result 2.

[13] The coefficients are reported as standard estimates rather than the marginal effects because there is a separate marginal effect for each of the three choices, resulting in three marginal effects per regression. Given that each individual has three error terms, we cannot implement standard clustering for standard errors. However, the correlated random coefficients are intended to capture the full correlation between individual errors in a manner comparable with clustering of standard errors.

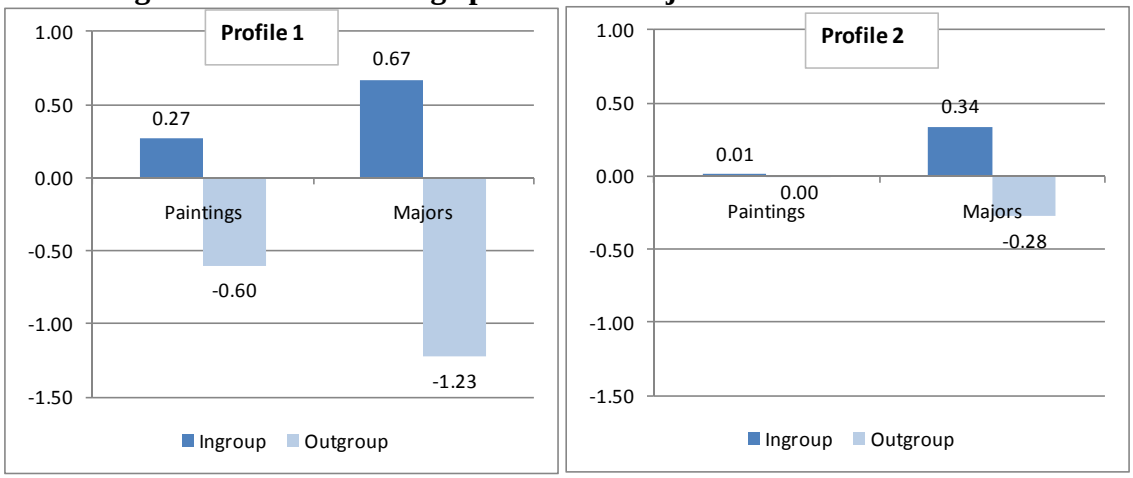
Result 2: All else being equal, ingroup membership significantly increases the probability of an offer in profile 1. The ingroup favoritism is insignificant in profile 2.

We next investigate hypothesis 3 on the sellers' price offers. For a visual inspection, we summarize sellers' average price offers, adjusted for individual effect, in Figure 3. Specifically, for each seller, individual means are subtracted from the observations of each price, before the average price is computed. Figure 3 presents this adjusted average price for ingroup (black bars) and outgroup (grey bars) matching, respectively, in the *Paintings* and *Majors* treatments. Note that, by definition, the adjusted average price is zero for the control treatment since the average of individuals' deviations from the mean is zero. We find that in all cases, the sellers' average price is higher for ingroup than for outgroup. In profile 1 the ingroup-outgroup price difference is 0.87 (0.27 plus 0.60) tokens for the *Painting* treatment and 1.9 tokens for the *Majors* treatment. In profile 2 the difference is 0.01 tokens for the *Paintings* treatment and 0.62 tokens for the *Majors* treatment. All but the second-to-last of these differences are economically sizable. The average proposed price is 9.6 tokens in both profiles 1 and 2 in the *Paintings* treatment, and 10.0 and 8.4 in profiles 1 and 2 for the *Majors* treatment. Thus, the ingroup-outgroup price differences represent 9%, 19%, and 7% of the corresponding average proposed price for *Painting* profile 1, *Majors* profile 1, and *Majors* profile 2, respectively.

We also find sellers' price offers are state dependent, and are highly correlated with prices offered in previous rounds. For example, the correlation between individual prices with the average price of successful transactions in the previous round ranges from 0.20 to 0.68 (all with p value less than 0.01).[14] This is not surprising since, in each round after transaction, subjects were given feedback on all the prices in that round. Therefore, it is expected that the feedback on prices may influence sellers' ask prices in the subsequent rounds.

[14] The correlations are 0.56 (profile 1 in the *Paintings* treatment), 0.35 (profile 2 in *Paintings*), 0.20 (profile 1 in *Majors*), 0.40 (profile 2 in *Majors*), 0.68 (profile 1 in control) and 0.28 (profile 2 in control), all with p values less than 0.01.

Figure 3. Sellers' average price offers adjusted for individual effect



We use a random effects linear model to formally investigate the determinants of price proposed by sellers. The dependent variable is the price that a seller proposed. The explanatory variables include group affiliation (the *Ingroup* dummy), seller and buyer joint payoffs (*Total surplus*), one period lag of average price (*Lag price*), and the interaction between the time trend and the *Ingroup* dummy variable.[15] The dummy variable *Ingroup* is coded as one if the seller and the buyer (to whom the seller just proposed) come from the same group, and zero otherwise. The *Total surplus* variable is constructed as the sum of the buyer value and the seller value. *Lag price* is included to control for state dependence of the price.[16] The interaction between *Ingroup* and *Time Trend* (i.e., the period number) is used to allow the ingroup effect to vary over time. Note that the main effect for time trend is not included. This is intentional for consistency with Table 3 (where this term dropped out in a choice framework) and for an accurate report of standard errors. All regressions in Table 4 were also run with a separate term for the *Time Trend* main effect. In all cases this added no significant improvement over the regression reported in Table 4, but the standard errors in that case are distorted due to multi-collinearity.

[15] In a separate regression for the Majors treatment, we incorporated the survey measures on identity as proxies for group affiliation. The effects of the *Ingroup* dummy, *Total surplus*, and *Lag price* variables are robust. The identity variables did not have any significant effect at any conventional level.
[16] The price offers which were rejected were not included in the *Lag price* variable.

Table 4 reports the estimated coefficients in the random effects regressions. The coefficient of the *Ingroup* variable is positive and significant in profile 1 of the *Majors* treatment ($p < 0.05$). In profile 1 of the *Paintings* treatment and profile 2 of the *Majors* treatment, the *Ingroup* price is significantly larger than the outgroup price but this effect occurs through an interaction of *Ingroup* with the time trend. The price differential reaches the peak, 1.825 (0.073×25), in period 25. However, it is still substantially lower than the main effect in profile 1 of the *Majors* treatment. The Ingroup effect of profile 1 in the *Painting* treatment is remarkably similar to the effect in profile 2 of the *Majors* treatment (coefficients of both interaction terms are estimated to be about 0.07). In profile 2 of the *Paintings* treatment, neither the *Ingroup* variable nor its interaction with the time trend has any significant effect.

Table 4. Determinants of seller's proposing price – random effects regressions

		Paintings		Majors		Control	
Profile 1	Ingroup	0.321	(0.796)	2.578**	(0.856)		
	Total surplus	0.073**	(0.038)	0.027	(0.037)	0.021	(0.042)
	Lag price	0.423***	(0.041)	0.249***	(0.044)	0.594***	(0.041)
	Time trend × Ingroup	0.071**	(0.037)	-0.013	(0.044)		
	Constant	0.530	(2.219)	4.403**	(2.171)	3.354	(2.505)
	R^2	0.43		0.15		0.59	
	Observations	432		432		360	
Profile 2	Ingroup	0.959	(2.726)	-1.604	(1.503)		
	Total surplus	-0.006	(0.029)	0.051***	(0.020)	0.048 *	(0.030)
	Lag price	0.465***	(0.046)	0.418***	(0.046)	0.153***	(0.053)
	Time trend × Ingroup	-0.038	(0.069)	0.073**	(0.037)		
	Constant	5.818***	(1.734)	1.387	(1.330)	5.052***	(1.978)
	R^2	0.37		0.31		0.17	
	Observations	432		432		360	

Note: The dependent variable is the price proposed by seller. Standard errors in the parentheses are clustered at the individual level; * significant at 10%, ** significant at 5%, *** significant at 1%.

Note that the effect of ingroup affiliation on the proposed price is in general higher in the *Majors* treatment than in the *Paintings* treatment. This is consistent with the conjectures made by Mullen, Brown and Smith (1992) which suggest the ingroup effects are stronger in a setting associated with a non-minimal group classification (e.g., based on college majors) than with a minimal group classification (e.g., based on art preferences).

We also find that since the prices proposed to ingroup are generally higher than to outgroup the price differential actually works against the ingroup buyers. We have two

conjectures on why this may happen. One conjecture is that anticipating their offers are more likely to be accepted by the ingroup buyers, opportunistic sellers may take advantage of it by charging the ingroup buyers a higher price. This finding does not contradict other-regarding preferences. It only suggests that the advantaged party puts a lower weight on the equity term than the disadvantaged party, which is noted in the seminal work by Fehr and Schmidt (1999).

A second conjecture is that anticipating the buyers would favor their ingroup, the sellers may try to offer competitive (i.e., lower) prices to win the business whenever proposing to their outgroup buyers.

Over all, we find that the sellers' price offer increases with the buyer and seller joint payoff (*Total surplus*), but the effect varies across treatments and profiles. The effect is 0.073 ($p < 0.05$) in profile 1 of the *Paintings* treatment, 0.051 ($p < 0.01$) in profile 2 of the *Majors* treatment, 0.048 ($p < 0.10$) in profile 2 of the control treatment, and close to zero in other cases ($p > 0.10$). The variable *Lag price* enters with a significant positive effect ($p < 0.01$), indicating substantial state dependence of sellers' price offers. This gives us result 3.

Result 3: Sellers differentiate ingroup and outgroup when making price offers. On average, outgroup sellers charge a lower price than ingroup sellers.

The results above suggest that the presence of groups affects both partner selection and price in markets. Result 1 shows that in profile 1, all else being equal, both sellers and buyers show preferences for ingroup trading partners relative to outgroup counterparts (in the Paintings treatment the ingroup favoritism is shown in the interaction of time trend and ingroup in profile 1). However, the buyers' ingroup favoritism works against them since the ingroup sellers charge a significantly higher price than the outgroup sellers. The findings are consistent across the *Paintings* and *Majors* treatments.

The ingroup favoritism in partner selection and the intergroup price differentials substantially decrease in profile 2. For both of the treatments, neither the sellers nor the buyers show intergroup differences in their choices of trading partners. In addition, the intergroup prices differential vanishes in the Paintings treatment, but persists in the

Majors treatment (through the interaction with time trend). The change in the sellers and buyers' behaviors from profile 1 to profile 2 cannot be explained entirely by the declining strength of group identity over time since the interaction between the time trend and the *Ingroup* dummy variable has little effect in most cases. The change may be explained by the increased complexity in the new value profile and learning. On the one hand, the new value profile is designed to increase the difficulty for the equilibrium to emerge. On the other hand, subjects, especially the buyers, may adjust for their ingroup bias which works in their disadvantage.

5. Conclusion

We report a lab experiment to analyze the impact of group identity on market exchanges in an oligopolistic market with a few buyers and sellers who interact with each other repeatedly. We find that sellers are more likely to make offers to ingroup buyers, but the effect is contingent on the intrinsic preferences between the sellers and buyers. Buyers are more likely to accept offers from ingroup sellers than from outgroup sellers. It also appears that the outgroup sellers, anticipating buyers' ingroup favoritism, may have reacted by offering *lower* prices to compete with the ingroup sellers.

The findings in this paper sheds light on how the considerations over social ties may affect the match of trading partners and the determination of prices in the procurement exchanges. The market in our experiment simulates a seller-proposing framework which is most common in the procurement settings (e.g., requests for quotes). Our results imply that the ingroup considerations may be likely to adversely affect the party (the buyers in this study) who makes accept/reject decisions, since it may be more difficult to reject a disadvantageous offer by an ingroup member than to make a self-serving offer to an ingroup member. We expect the similar results to hold in a *buyer-proposing* framework, i.e., the ingroup favoritism may adversely affect the *sellers'* net payoffs since they may find it harder to reject disadvantageous offers by ingroup buyers.

We note that the social ties in this study arise from pre-determined groups rather than emerge from the dynamic seller-buyer interactions. In contrast, social ties in the real world markets may develop from learning, commitment of resources to joint operations

or joint investments, etc. (Jap and Haruvy, 2008). In future work, we hope to study how the endogenous group formation influences the dynamics of market transactions.

Appendix A. Survey in the college Majors treatment

(The following survey was used for business majors.)

Please answer the following survey questions. Your answers will not affect your earnings during this experiment and will be used for this study only. Individual data will not be exposed.

1. What is your major? _____ Business _____ Engineering
2. What is the major of most of your friends on campus?
3. Please list three characteristics that your major is different from the engineering major.
4. Please list three characteristics that your major is similar to the engineering major.
5. Please rate on a 5-point scale from "strongly disagree" to "strongly agree" with the following statements.

   a). Being a business major is an important part of who I am

   (*Summary statistics: Mean 3.5, median 4, standard deviation 1.3, min 1, max 5*)

   b). Being a business major is an important part of the image that I project.

   (*Summary statistics: Mean 3.5, median 4, standard deviation 1.3, min 1, max 5*)

   c). Being a business major is a source of pride for me.

   (*Summary statistics: Mean 4.0, median 4, standard deviation 1.1, min 1, max 5*)

Appendix B: Experimental Instructions (Sample for the Paintings treatment)

WELCOME!

Below you will find a short description of two key artists in the expressionist movement.

Prior to this experiment, you were asked to choose between pairs of paintings. Each pair contained a painting by Kandinsky and a painting by Klee. We classified you into one of two groups, according to your choices. If the majority of your choices were Kandinsky, you are classified as Kandinsky. If the majority of your choices were Klee, you are classified as Klee.

At the end of the experiment, we will compare the average earnings of the Klee and Kandinsky groups and write the average earnings of each group on the board.

Now, we will explain how your choices in this experiment affect your earnings.

In this experiment you are assigned the role of either SELLER or BUYER. SELLERS can make a price offer to one of three buyers. BUYERS can accept a price offer from one of three sellers. The price is added to the earnings of the seller and subtracted from the earnings of the buyer. You are predetermined to be a seller or a buyer.

Sellers are assigned values over buyers. These values are displayed on the screen in front of them. These values remain fixed over time until you are told otherwise. If a seller sells to a particular buyer, the seller gets the value of that buyer to the seller plus the price stated in the offer. For example, if the screen in front of a participant in the role of seller 1 says:

You are Seller 1:

Value of buyer 1 to you 35
Value of buyer 2 to you 15
Value of buyer 3 to you 25

Then by selling to buyer 2 for a price of 5 the participant in the role of seller 1 would get 15 + 5 = 20 tokens.

Buyers are assigned values over sellers. These values are displayed on the screen in front of them. These values remain fixed over time until you are told otherwise. If a buyer accepts an offer from a particular buyer, the buyer gets the value of that seller to the buyer minus the price stated in the offer. For example, suppose the screen in front of buyer 3 says:

You are buyer 3:
Value of seller 1 to you 15
Value of seller 2 to you 35
Value of seller 3 to you 25

If seller 2 made buyer 3 an offer of price=7 and the buyer accepted, then buyer 3 would get 35 – 7 = 28 tokens by accepting seller 2's offer.

If you are a seller, it is important to keep in mind that there are two other participants also in the role of seller. They are also going to try and sell to a buyer. If you and another seller make offers to the same buyer, that buyer can only accept an offer from one of you.

If a participant in the role of a buyer receives no offer, he should type '0' in the decision text area and then press CONTINUE.

Each period proceeds as follows: First, each seller decides which buyer he will make an offer to and at what price. Next, each buyer decides which seller's offer to accept, if any seller made an offer to him in the first stage.

In the case more than one seller made an offer to the same buyer, all but one of the sellers who made an offer to the same buyer will be unmatched in that market.

You will be shown the values of buyers to sellers and the values of sellers to buyers in each period.

After each period, you will also find out which buyer each seller made an offer to, at what price, and to whom each seller and each buyer is matched. These will be given on your screen after the end of each period.

At the beginning of the experiment you will have 10 tokens as a starting fee. If you make your choices wisely, you will earn additional tokens, which will be translated into dollars at the end of the experiment (200 tokens = $1). Your cumulative earnings will be displayed on the screen at all times.

You may also lose money: If you end up being unmatched to a buyer or to a seller in any market, you will lose 1 token in that market.

You will repeatedly make decisions in 50 periods. Your earnings will be the sum of all tokens you earned.

The Values of Sellers and Buyers: There are two value profiles that will be used in the experiment. In the first 25 periods, Profile 1 will be used. In the next 25 periods, Profile 2 will be used. The values of buyers to sellers are given in the top panel and the values of sellers to buyers are given in the bottom panel. For example in profile 1 top panel, value of buyer 2 to

seller 3 is 35. This, plus the price, is what seller 3 will earn when he gets matched to buyer 2. In the bottom panel value of seller 3 to buyer 2 is 25. This, minus price, is what buyer 2 will earn when he gets matched to seller 3.

Periods 1-25: Profile 1

Payoffs of Sellers – This is the number of tokens a participant in the role of a SELLER would earn by matching with a buyer, in addition to the price

	Buyer 1	Buyer 2	Buyer 3
Seller 1	35	25	15
Seller 2	25	35	15
Seller 3	15	35	25

Payoffs of Buyers – The number of tokens a participant in the role of a BUYER would earn by matching with a seller, before subtracting price

	Seller 1	Seller 2	Seller 3
Buyer 1	15	25	35
Buyer 2	15	35	25
Buyer 3	35	15	25

Periods 26-50: Profile 2

Payoffs of Sellers – This is the number of tokens a participant in the role of a SELLER would earn by matching with a buyer, in addition to the price

	Buyer 1	Buyer 2	Buyer 3
Seller 1	15	35	25
Seller 2	15	25	35
Seller 3	25	35	15

Payoffs of Buyers – The number of tokens a participant in the role of a BUYER would earn by matching with a seller, before subtracting price

	Seller 1	Seller 2	Seller 3
Buyer 1	35	15	25
Buyer 2	15	25	35
Buyer 3	35	25	15

Appendix C. An explanation of the steps to convergence

Assumptions:

1. Each seller makes an offer to her most preferred buyer based on her preferences in Table 1.

2. Each buyer accepts his most preferred seller and rejects all others (all else equal)..

3. Each rejected seller makes an offer to her next most preferred buyer.

Profile 1:

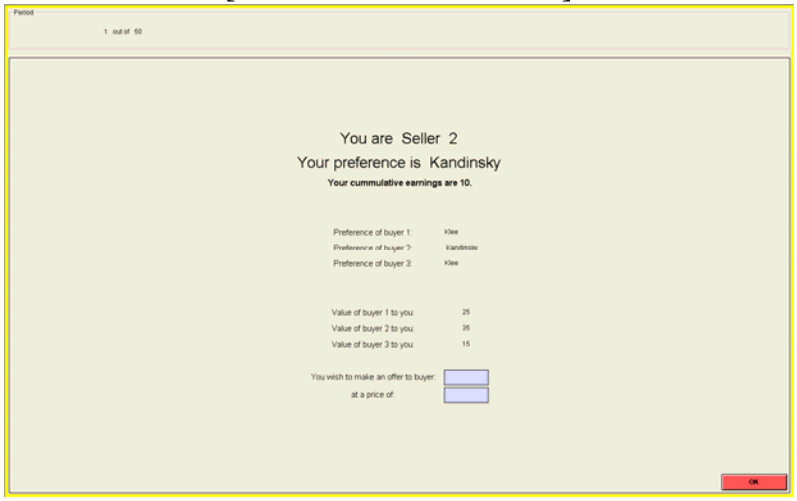
	Step 1	Step 2
Seller 1	Offers to buyer 1 – accepted	Stays with buyer 1
Seller 2	Offers to buyer 2 – accepted	Stays with buyer 2
Seller 3	Offers to buyer 2 – rejected	Offers to buyer 3 – accepted

Profile 2:

	Step 1	Step 2	Step 3	Step 4
Seller 1	Offers to buyer 2 – rejected	Offers to buyer 3 – accepted	Stays with buyer 3	Stays with buyer 3
Seller 2	Offers to buyer 3 – accepted	Stays with buyer 3 – rejected	Offers to buyer 2 – rejected	Offers to buyer 1 – accepted
Seller 3	Offers to buyer 2 – accepted	Stays with buyer 2	Stays with buyer 2	Stays with buyer 2

Appendix D. Screenshots of the *Paintings* treatment

[Decision screen for seller]



[Decision screen for buyer]

[Feedback screen: similar to sellers and buyers]

Appendix E. Summary statistics for key variables

	Rate of Offer Acceptance				Average Seller Proposing Price			
Paintings	Profile 1		Profile 2		Profile 1		Profile 2	
	Ingroup	Outgroup	Ingroup	Outgroup	Ingroup	Outgroup	Ingroup	Outgroup
Seller 1	0.80	0.59	0.78	0.65	9.50	7.63	12.26	10.67
Seller 2	0.89	0.67	0.67	0.74	12.17	2.00	6.49	5.32
Seller 3	0.80	0.55	0.75	0.82	8.00	7.96	13.63	11.44
Average	0.84	0.57	0.72	0.76	10.49	7.73	9.60	9.63
Majors	Profile 1		Profile 2		Profile 1		Profile 2	
	Ingroup	Outgroup	Ingroup	Outgroup	Ingroup	Outgroup	Ingroup	Outgroup
Seller 1	0.60	0.72	0.86	0.78	9.72	9.64	10.16	8.69
Seller 2	0.89	0.73	0.68	0.51	8.88	7.45	5.96	7.37
Seller 3	0.77	0.54	0.79	0.75	13.18	10.61	10.73	8.97
Average	0.77	0.62	0.76	0.71	10.13	9.85	8.16	8.56
Control	Profile 1		Profile 2		Profile 1		Profile 2	
Seller 1	0.68		0.77		12.82		9.86	
Seller 2	0.92		0.63		8.75		4.51	
Seller 3	0.66		0.78		11.50		13.18	
Average	0.75		0.73		11.02		9.19	

References

Abdelal, Rawi, Herrera, Yoshiko, Johnston, Alastair Iain, McDermott, Rose, 2009. Measuring Identity: A Guide for Social Scientists. Cambridge University Press, April.

Akerlof, George, Kranton, Rachel, 2000. Economics and Identity. Quarterly Journal of Economics 115 (3), 715–753 August.

Akerlof, George, Kranton, Rachel, 2005. Identity and the Economics of Organizations. Journal of Economic Perspective 19 (1), 9–32 Winter.

Aronson, Joshua, Quinn, Dianne, Spencer, Steven, 1998. Stereotype Threat and the Academic Underperformance of Minorities and Women. In J. Swim & C. Stangor (Eds.) Prejudice: The Target's Perspective. New York: Academic Press.

Asker, John & Estelle Cantillon, 2008. "Properties of scoring auctions," *RAND Journal of Economics*, 39(1), 69-85.

Ball, Sheryl, Eckel, Catherine, Grossman, Phillip, Zame, William, 2001. Status in Markets. Quarterly Journal of Economics 155 (1), 61-181 February.

Benjamin, Daniel, Choi, James, Strickland, A. Joshua, forthcoming. Social Identity and Preferences. American Economic Review.

Brown, Roger W., 1986. Social Psychology: The Second Edition New York: The Free Press.

Bulow, J., Levin, J., 2006. Matching and Price Competition. American Economic Review 96 (3), 652-668 June.

Charness, G., Haruvy, E., Sonsino, D., 2007. Social Distance and Reciprocity: An Internet Experiment. Journal of Economic Behavior and Organization 63 (1), 88-103 May.
Charness, Gary, Rigotti, Luca, Rustichini, Aldo, 2007. Individual Behavior and Group Membership. American Economic Review 97 (4), 1340-1352 September.
Chaserant, Camille, 2006. Minimal Group Identity and Gender in Ultimatum Games. Universite Paris X-Nanterre working paper 2006-13.
Chen, Yan, Li, Sherry Xin, 2009. Group Identity and Social Preferences. American Economic Review 99 (1), 431-457 March.
Crawford, V. P., 2008. The Flexible-Salary Match: A Proposal to Increase the Salary Flexibility of the National Resident Matching Program. Journal of Economic Behavior & Organization 66 (2), 149-160 May.
Croson, Rachel T. A., Gneezy, Uri, 2009. Gender Differences in Preferences. Journal of Economic Literature 47 (2), 448-472 June.
Eckel, Catherine, Grossman, Philip, 2005. Managing Diversity by Creating Team Identity. Journal of Economic Behavior & Organization 58 (3), 371–392 November.
Emiliani, M. L., 2000. Business-to-Business Online Auctions: Key Issues for Purchasing Process Improvement. Supply Chain Management, 5 (4), 176-86.
Engelbrecht-Wiggans, R., Haruvy, E., Katok, E., 2007. A Comparison of Buyer-Determined and Price-Based Multi-Attribute Mechanisms. Marketing Science 26 (5), 629-641 September-October.
Engelbrecht-Wiggans, R., Katok, Elena, 2006. E-Sourcing in Procurement: Theory and Behavior in Reverse Auctions with Non-Competitive Contracts. Management Science 52 (4), 581-596 April.
Fehr, E., Schmidt, K.M., 1999. A Theory of Fairness, Competition and Cooperation. Quarterly Journal of Economics 114 (3), 817-868 August.
Fershtman, Chaim, Gneezy, Uri, 2001. Discrimination in a Segmented Society: An Experimental Approach. Quarterly Journal of Economics 116 (1), 351–377 February.
Fischbacher, Urs. 2007. Z-Tree: Zurich Toolbox for Ready-Made Economic Experiments. Experimental Economics 10 (2), 171–178 June.
Gneezy, U., Haruvy, E., Roth, A., 2003. Deadline in Bargaining: Evidence from the Reverse Ultimatum Game. Games and Economic Behavior 45 (2), 347-368 November.
Güth, W., Marchand, N., Rulliere, J., 1997. On the Reliability of Reciprocal Fairness-An Experimental Study. Mimeo.
Grosskopf, Brit, 2003. Reinforcement and Directional Learning in the Ultimatum Game with Responder Competition. Experimental Economics 6 (2), 141-158 October.
Hatfield, J. W., Milgrom, P. R., 2005. Matching with Contracts. American Economic Review 95 (4), 913-935 September.
Hoff, Karla, Pandey, Priyanka, 2006. Discrimination, Social Identity, and Durable Inequalities. American Economic Review Papers and Proceedings 96 (2), 206-211 May.
Hoffman, E., McCabe, K., Smith, V. L., 1994. Preferences, Property Rights, and Anonymity in Bargaining Games. Games and Economic Behavior 7 (3), 346–380 November.
Hubbard, T.P., Paarsch, H.J., 2009. Investigating Bid Preferences at Low-Price, Sealed-Bid Auctions with Endogenous Participation. International Journal of Industrial Organization 27 (1), 1-14 January.
Ishii, R., 2009. Favor Exchange in Collusion: Empirical Study of Repeated Procurement Auctions in Japan. International Journal of Industrial Organization 27 (2), 137-144 March.
Jap, Sandy D. 2002. Online reverse auctions: Issues, themes and prospects for the future. *Journal of the Academy of Marketing Science* 30(4) 506-525.

Jap, Sandy D., Haruvy, Ernan, 2008. Interorganizational Relationships and Bidding Behavior in Industrial Online Reverse Auctions. Journal of Marketing Research 45 (5), 550-561 October.

Kahneman, D., Knetsch, J., Thaler, R., 1986. Fairness and the Assumptions of Economics. In: Hogarth, R., Reder, M. (Eds), Rational Choice. The Contrast between Economics and Psychology. University of Chicago Press: Chicago, 101-116.

Kramer, R., Shah, P., Woerner, S., 1995. Why Ultimatums Fail. Group Identity and Moralistic Aggression in Coercive Bargaining. In: Kramer, R., Messick, D. (Eds), Negotiation as a Social Process. Sage: Thousand Oakes, 285-308.

Lee, J.S., 2008. Favoritism in Asymmetric Procurement Auctions. International Journal of Industrial Organization 26 (6), 1407-1424 November.

Mullen, Brian, Brown, Rupert, Smith, Colleen, 1992. Ingroup Bias as a Function of Salience, Relevance and Status: An Integration. European Journal of Social Psychology 22 (2), 103-122 March/April.

Niederle, M., 2007. Competitive Wages in a Match with Ordered Contracts. American Economic Review 97 (5), 1957-1969 December.

Robert, C., Carnevale, P.J., 1997. Group Choice in Ultimatum Bargaining. Organizational Behavior and Human Decision Processes 72 (2), 256-279 November.

Roth, A. E., Prasnikar V., Okuno-Fujiwara M., Zamir S., 1991. Bargaining and Market Behavior in Jerusalem, Ljubljana, Pittsburgh, and Tokyo. American Economic Review 81 (5), 1068-1095 December.

Ruffle, B. J., Sosis, R., 2006. Cooperation and the In-Group-Out-Group Bias: A Field Test on Israeli Kibbutz Members and City Residents. Journal of Economic Behavior & Organization 60 (2), 147–163 June.

Shih, Margaret, Pittinsky, Todd, Ambady, Nalini, 1999. Stereotype Susceptibility: Identity Salience and Shifts in Quantitative Performance. Psychological Science 10 (1), 81-84 January.

Tajfel, Henri, Turner, John, 1979. An Integrative Theory of Intergroup Conflict, in Stephen Worchel and William Austin, eds., The Social Psychology of Intergroup Relations, Monterey, CA: Brooks/Cole.

Thomas, C. J., Wilson, B., 2006. Horizontal Product Differentiation in Auctions and Multilateral Negotiations, working paper.

Tonca, T.I., Wu, D.J. and Zhong, F.V. 2008. An Empirical Analysis of Price, Quality, and Incumbency in Service Procurement Auctions, Georgia Tech Working paper.

Wetherell, Margaret, 1996. Group Conflict and the Social Psychology of Racism, in Group Conflict and the Psychology of Racism, Margaret Wetherell, ed. Thousand Oaks, CA: SAGE Publications.

Wilson, Rick, 2007. What Have I (We) Learned from Dictator Games at Home and Abroad? Results from Siberia, Bosnia and Houston. Working Paper, University of Houston.