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by

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Social Identity, Competition, and Finance:

A Laboratory Experiment

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July 2009

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Social Identity, Competition, and Finance: A Laboratory Experiment

Abstract

There is extensive literature, both theoretical and empirical, on the effects of social identity on a wide range of economic and non-economic outcomes. However, there is only scarce knowledge about how social identity is affected by policies or market structure. We address the question how competition among suppliers of finance interacts with trust and trustworthiness in a laboratory one-shot trust game. In order to disentangle pure effects of competition and effects of competition that concern social identity, we apply a 2 x 2 treatment design. We induce social identity by letting subjects play coordination games with clear focal points, which leads to higher investments and trustworthiness in the trust game. Our results show that competition has no significant effects on trust and trustworthiness of individuals in a strangers' framework. However, in a framework with competition of in-group and out-group investors we see that competition leads to crowding out of social identity by reducing trustworthiness. We suggest that once competition comes into play, trustees see in-group trustors' investments as the outcomes of a competitive bidding process rather than voluntary trust, which crowds out reciprocity.

Keywords: Trust Game, Social Identity, Competition

JEL classification: C92, G11, Z13, L14

Introduction

Social identity is defined as the degree to which individuals see themselves as members of a group. In economics, this concept has recently gained attention as a means to solve principal-agent problems (Akerlof and Kranton, 2000, 2005). The sociological literature stresses the fact that group membership structures interpersonal interaction and results in trust and trustworthiness as a form of social capital (Coleman, 1988). After the seminal work of Putnam et al. (1993), a growing body of research has found that the level of trust among agents is correlated with a wide range of economic outcomes, such as economic growth (Knack and Keefer, 1997), job search (Mouw, 2003; Bayer et al. (2008) firm location, or entrepreneurial finance (Michelacci and Silva, 2007; Sanders and Nee, 1996). While all these studies deal with the *effects* of trust and trustworthiness, Glaeser et al. (2002) investigate mechanism lying behind the *creation* of these factors. However, up to now there is scarce knowledge about how personal relationships and attachment to fellow peers are affected by policies or market structure (cf. Tabellini, 2008). Aghion et al. (2008) raise the argument that fierce state regulation such as minimum wage requirements leads to a crowding out of trust in labor relations. In a similar argument, we suggest that the introduction of outside suppliers of finance that are not part of the social network might lead to a competition for financing that changes the nature of interpersonal relationships within social networks.

Looking at finance is of particular interest because in many developing countries, formal credit markets do not exist while they are characterized by information asymmetries in developed countries. Consequently, credit constrained individuals have to rely on members of their social networks, e.g. family members, neighbors and friends, as the most important source of financial capital (see e.g. Udry 1994). Precisely, we investigate the effect of competition by outside suppliers of finance on trust and trustworthiness in a laboratory trust or investment game. Berg, Dickhaut and McCabe (1995) can show experimentally that the majority of subjects place trust in the trustees and this trust is reciprocated by trustworthiness. Results of this game were replicated in a variety of settings (cf. Camerer, 2003). Especially trustworthiness as measured in the trust game and to a lesser degree trusting behavior correlates with attitudes of trust, real life social connections (Glaeser et. al., 2000) and with financial transactions in the field. For example, Karlan (2005) finds that trustworthy behavior in the trust game is a valid predictor of loan repayments among members of a Peruvian rotating savings and credit association. In our experiment, we modify the well-known trust

game across treatments by inducing social identity for some subjects and/or changing group composition.

By inducing social identity in some of our treatments we can investigate the effects of competition and its interaction with social identity. We know that the degree to which agents feel attached to each other and consider themselves members of the same group has important implications for trust and trustworthiness. Experimental research has dealt with both the effect of natural (e.g. Goette et. al., 2006) as well as artificially induced groups (e.g. Chen and Li, 2009) in a variety of games. The introduction of natural groups – e.g. by names that signal ethnic origin – lead to discrimination in trust games based on expectations of trustworthiness (Fershtman and Gneezy, 2001).[1] Similarly, the introduction of artificially induced groups by color group assignment leads to discrimination of outsiders in a repeated trust game where subjects play sequentially with subjects of the in-group and of the out-group (Hargreaves Heap and Zizzo, 2009). In their experiment, color group assignment does not lead to significantly higher in-group trust or trustworthiness compared to a control group without artificially induced groups. In this paper, we apply an alternative way of inducing in-group trust. Additional to color group assignment, subjects go through a group-building phase by playing coordination games that have a clear focal point (Schelling, 1960) as a solution. These games ensure a common successful experience that signals as little as possible about partner's trustworthiness as coordination is successful the large majority of cases. Our results show that this way of group building has significantly positive effects on trusting behavior and return rates compared to a control group. We interpret this as an indication that positive common experience leads to the creation of social identity among subjects.

In our main treatment, we let trustees choose between in-group and out-group investors. Prior research has shown that group membership does not only have an effect on behavior against others in the game, it also leads to discrimination through partner choice. For example, Slonim (2004) finds little evidence of discrimination by trustors based on gender in trust games but significant evidence of discrimination in partner selection. Slonim and Garbarino (2008) reach similar results with gender and age as possible criteria for partner selection. As a consequence, discrimination may not only lead to lower earnings in a bilateral game but also to lost opportunities of interaction in the presence of partner selection. So far, the modest attention on partner choice in the trust game has focused on choices made by trustors to select trustworthy trustees (e.g. Bornhorst et al. 2004, Huck et al. 2006). Complementary to this

[1] Fershtman and Gneezy (2001) find that only men respond strongly to ethnic stereotypes.

string of research, we investigate the effect of partner choice by trustees and competition among investors. To the best of our knowledge, this has not been done before.[2]

Competition among investors might have detrimental effects on reciprocity if reciprocal behavior is based on the interpretation of intentions (McCabe et al., 2002; Dufwenberg and Kirchsteiger, 2004; Falk and Fischbacher, 2006). With competition among investors, trustees might find it harder to interpret the behavior of investors as purely trusting. Rather, trustees might ascribe the sending behavior to strategic considerations among investors. We find that competition does not lead to significant changes in trusting behavior by in-group and out-group investors. However, trustees react to competition among in-group and out-group investors by lowering return ratios to in-group members significantly. We interpret this as crowding out of social identity in the form of trustworthiness due to competition among investors. We suggest that this effect can be explained by intention based approaches. Once competition comes into play, trustees see in-group trustors' investments as the outcomes of a competitive bidding process rather than voluntary trust, which crowds out reciprocity.

The remainder of the paper is organized in the following way: Section 2 describes our experimental design and section 3 points out our hypotheses. The experimental results are presented in section 4. Section 5 concludes with policy implications and further research questions.

Experimental Design

The experiment was conducted in May 2009 at the laboratory of the Friedrich-Schiller-University Jena. All subjects were undergraduate students of the Friedrich-Schiller-University from a wide variety of disciplines. Subjects were recruited via ORSEE (Greiner, 2004). Overall, 248 subjects participated in 14 sessions. The outline of the experiment was provided to subjects in print. Detailed instructions, the experiment and a final questionnaire were computerized with the use of zTree (Fischbacher, 2007). Translated instructions are provided in the appendix. The experiment consisted of four stages. In stages one to three, all subjects participated in different kinds of coordination games. Thereafter, subjects entered a one-shot trust game as the final stage of the experiment. All stages of the experiment were paid according to the subjects' decisions. Depending on assigned role and treatment, participants

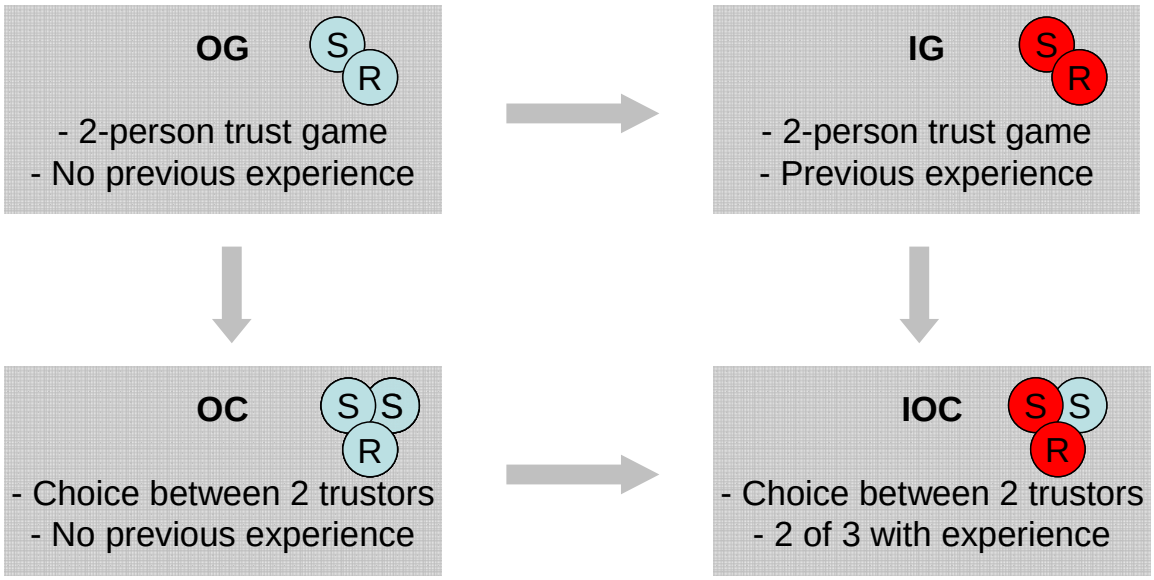
[2] In contrast to the trust game, the effects of supply side and demand side competition on fairness considerations have been systematically investigated in ultimatum bargaining, Competition seems to lead to more unfair distributions in both cases (e.g. Roth et al., 1991; see Fehr and Schmidt, 1999, or Fehr and Schmidt, 2006, for a discussion).

had the opportunity to answer up to two bonus questions, where they could earn another 0.10€ for each correct answer. On average, subjects earned 7.56€.

Experimental Treatments

In order to identify the effects of competition on social identity, we implemented four distinct experimental treatments that can roughly be characterized as altering group size and group composition in the final trust game. More specifically, treatments were implemented so that the final stage was a standard two-person trust game (OG), a two-person trust game with in-group members (IG), a trust game with choice between two (out-group) trustors (OC), and a trust game with choice between an in-group and an out-group trustor (IOC). Table 1 gives a graphical representation of this 2 x 2 design where S stands for "sender" (or "trustor") and R stands for "receiver" (or "trustee"). We ran three sessions per treatment OG and IG with 9 groups per sessions and 4 sessions per treatment OC and IOC with 6 groups per session. All sessions were conducted with 18 subjects each, except for one session of treatment IG and one session of treatment OC, where we had to restrict the number of subjects to 16 due to no-shows.

Table 1: Treatment overview



Note: S=Sender, R=Receiver; OG=Out-Group, IG=In-Group, OC=Out-Group Competition, IOC=In-Group vs. Out-Group Competition

Stages 1 to 3: Coordination Games

In these stages of the experiment, all subjects played three two-person coordination games. The first coordination game was framed as a choice of meeting points in Jena. One of the two

alternatives is a clear focal point ("Ernst-Abbe-Platz"), which is the place in front of the central campus cafeteria, whereas the other alternative ("Eichplatz", a parking lot in the city center) is not. Subjects were paid 0.25€ each in case of successful meeting. In the second coordination game, the subjects were asked to put the letters "A", "B", and "C" in a specific order. If both subjects could coordinate on the same order, they were paid 0.50€ each. Of course, the focal point in this game is the alphabetical order. The final coordination game again was framed as a choice of meeting points. However, this time it was no meeting in Jena but in Paris (France). The subjects could choose between the Eiffel Tower and the Centre Georges Pompidou, where we regard the first alternative as the focal point. In case of a successful meeting, subjects were paid 1.00€ each. Thus, in sum, subjects could earn 1.75€ in these three coordination games.

At the beginning of the experiment, groups of two were formed randomly. In treatments, where two players are supposed to interact as in-group members in the final stage (the trust game), we artificially induced in-group membership by wording, color assignment and feedback about performance in the coordination games. In treatment IG, all participants interacted with the same partner in all three coordination games (stage one to three) as well as in the trust game (stage four). This means, we induced in-group membership in all groups of treatment IG. In treatment IOC, two out of three subjects interacted with each other in the coordination games as well as the trust game. This is to say, we induced in-group membership in two thirds of all groups, i.e. all groups whose members also interacted in the trust game. In all other cases, participants were re-assigned to new groups in every single stage of the experiment, and in-group membership was not induced.

The aim of these coordination games was to produce both common experience on the basis of some joint cognitive effort as well as common success among subjects that later on will be partners in the trust game. To evoke this kind of in-group membership, we applied several strategies. First, in-group members in treatment IG and IOC were referred to as "partners". Additionally, the same color was assigned to all members of the same in-group and participants were informed about this color-assignment. Finally, all in-group members in treatment IG and IOC were informed that they and their partners jointly earned an amount of 0.50€, 1.00€, or 2.00€ respectively, if they were successful in the three coordination games. Additionally, they were informed that this joint profit was split equally among the two group members. In cases where we did not want to induce in-group memberships, participants were informed that they could earn 0.25€, 0.50€, and 1.00€ respectively, if they succeeded in playing the coordination games. All in-group members were informed that they would stay

with their partners for the rest of the experiment. Out-group members were informed that they were randomly assigned to new subjects in every single stage of the experiment. In treatment IG, partners got feedback about the choice of their partners and the jointly earned profit. In treatment IOC, only those groups whose members also interact in the final trust game got feedback about the choice of their partners and the earned payoffs. All other participants did not get any feedback about the choices of partners and the earned profits until the end of the experiment.

Stage 4: Trust Game

In this final stage of the experiment, we implemented a Berg, Dickhaut and McCabe (1995) trust game with slight modifications across treatments. The trustor and the trustee each receive an initial endowment e = 4€ - the roles as trustor and trustee are randomly assigned. The trustor can decide how many Euros (if any) to give to the trustee. The sent amount is called s and has to be a multiple of 0.1€. The trustee can then decide whether he wants to accept or reject the offer of the trustor.[3] If the trustee rejects the offer, s is returned to the trustor and the game ends. If the trustee accepts the offer, s is multiplied with a conversion rate $\lambda = 3$ and given to the trustee. The trustee then decides how many Euros (if any) to return to the trustor. The trustee is restricted to return at most $\lambda * s$ to the trustor and the returned amount r has to be a multiple of 0.1€.

$$\begin{aligned} s &\in [0, 4] \\ r &\in [0, \lambda * s] \end{aligned} \qquad (1)$$

Thus, the payoffs π of the trustor and the trustee are:

$$\begin{aligned} \pi_{trustor} &= e - s + r \\ \pi_{trustee} &= e + \lambda * s - r \end{aligned} \qquad (2)$$

The Out-group Trust Game (Treatment OG)

This treatment presents the baseline case of the experiment. Groups of two are randomly formed at the beginning and trustor and trustee are neutrally referred to as “sender” and “receiver”. After the sending decision, we elicit the trustor’s belief about the returned amount with a bonus question.

[3] We implemented this decision to be able to compare the two-player trust games with the three-player trustor-choice treatments IOC and OC without introducing effects that can be ascribed to selecting partners per se.

The In-group Trust Game (Treatment IG)

Again, we have groups of two. But in contrast to the OG treatment, all participants stay in the same group in the coordination games as well as in the final trust game. In this treatment, trustor and trustee are referred to as "partners", as they have already been referred to during the coordination games. Participants are reminded that they play the trust game together with their partners from the previous stages and that the partner is a member of the same color group. Again, we elicit the trustor's belief about the returned amount with a bonus question asked after the sending decision.

The Trust Game with Choice between Trustors (Treatment OC)

In this treatment, we introduce a choice between two trustors, A and B. Groups of three are randomly formed and roles of trustor and trustee randomly assigned. Thus, we extend the original trust game to a three-person game. Similarly, as in the standard trust game, the two trustors and the trustee each receive an amount of 4€. Then, each trustor can decide how many Euros (if any) to send to the trustor. We call the sent amounts s_A and s_B. After that, the trustee can decide whether he accepts s_A or s_B or neither of the two offers. If the trustee rejects both offers, s_A and s_B are returned to their senders and the game ends. If the trustee accepts an offer, the accepted amount is tripled and given to the trustee while the rejected offer is returned to its sender. Finally, the trustee can decide how many Euros (if any) to keep and how many Euros (if any) to return to the trustor whose offer was accepted. E.g., if the trustee accepts s_A, s_B is returned to trustor B and the trustee can only return an amount up to 3 times s_A to trustor A. Trustors are informed that there is another trustor and that only one of the two offers can be accepted by the trustee. In this treatment, we elicited the beliefs of trustors about the returned amount in the case of acceptance of the offer and about the amount sent by the other trustor with the help of bonus questions.

The Trust Game with Choice between In-group and Out-group Trustors (Treatment IOC)

In this treatment, the game is the same as the three-person game in treatment OC. However, now, trustor A and the trustee have gained some common experience in the previous coordination games. As in treatment IG, both trustor A and the trustee are reminded that they play together with their partner and that both are assigned to the same color group. However, there is also trustor B, which could offer an amount s_B to the trustee. As in treatment OC, both trustors are informed about the existence of the other trustor. Additionally, trustor A is

informed that B does not have any previous experience with the trustee and that B is not assigned to the same color group. Conversely, trustor B is informed that A has previous experience with the trustee from the coordination games. Concerning the instructions of the trustee, trustor A is referred to as “partner” while trustor B is referred to as “other sender”. After the trustors’ sending decisions, we elicited their beliefs about the returned amount in the case of acceptance of the offer and about the amount sent by the other trustor with the help of bonus questions.

Hypotheses

The standard prediction based on rational self-interested individuals is that in the one shot trust game, we should see no returns *r* that are greater than zero if agents only care about their own payoff and the game is not repeated. However, if trustors anticipate this behavior of the trustees, backward induction leads us to a situation where we see no investments *s* of trustors in trustees in the first place because trustors do not expect do get a return on their investment. Thus, the subgame perfect outcome is the same across all our treatments and can be described as:

$$\begin{aligned} s &= 0 \\ r &= 0 \end{aligned} \qquad (3)$$

This would leave us with a situation where both trustor and trustee keep their initial endowments *e*.

Contradicting this prediction, behavioral economics suggest that we should find a joint improvement to this subgame perfect outcome. Investors put trust in the trustee and take the risk to invest an amount that is greater than zero. Since this amount is tripled, both parties can reach a Pareto superior situation compared to the subgame perfect outcome. Reciprocity leads the trustee to return an amount that is larger than zero and often than the initial investment. In a setting where trustor and trustees have no previous experience, as in the treatment OG, we call the trust placed on the trustee *baseline* trust and the trustworthiness of the trustee *baseline* trustworthiness.

Hypothesis 1a: Baseline trust among members of the subject pool leads to investments of the trustors that are greater than zero in the OG treatment.

Hypothesis 1b: Baseline reciprocity towards members of the subject pool leads to return rates of the trustees that are greater than zero in the OG treatment.

If we are successful in inducing social identity in the laboratory, we should see higher investments as well as higher return rates in the IG treatment as compared to the OG treatment. We call this additional trust placed on partners *directed* trust and the additional trustworthy behavior of partners *directed trustworthiness*.

Hypothesis 2a: Directed trust that is built up through common experience leads to higher investments of the trustors in the IG treatment as compared to the OG treatment.

Hypothesis 2b: Common experience leads to directed trustworthiness in the form of higher return rates of the trustees in the IG treatment as compared to the OG treatment.

Trustors might hold heterogeneous beliefs about the trustworthiness that are reflected in different investment offers. If we introduce competition of investors into the standard trust game framework realized investments rise as the trustee can choose among a larger number of investors and accepts the highest offer. If beliefs about trustworthiness are on average right, competition among investors might lead to a situation similar to the winner's curse in which the chosen investor systematically overestimates the trustworthiness of the trustee (cf. Thaler 1988). Following this line of argument, realized investments should increase while average offers by investors should stay unchanged.

At the same time, trust might not be separable from competition as trustors now face a strategic interaction among each other about the opportunity to invest. Depending on her belief about the other investor's behavior and the trustworthiness of the trustee, investors might increase their offers in a competitive bidding process.

Hypothesis 3: Realized investments in a competitive environment increase as trustees have a large number of potential partners. Higher realized investments are expected in the three-person game compared to the two-person game.

Competition among investors might also affect the interpretation of investor's behavior by the trustee. Intention based reciprocity might be crowded out if trustees ascribe sending behavior to a strategic interaction with competitive bidding among investors and not to good intentions based on voluntary trust (see e.g. McCabe et al. 2003).

Hypothesis 4: Reciprocity in the form of trustworthiness of trustees towards investors decline in a three-person game since investments are seen as driven by a competitive race rather than as trusting behavior based on good intentions.

Results

The Coordination Games

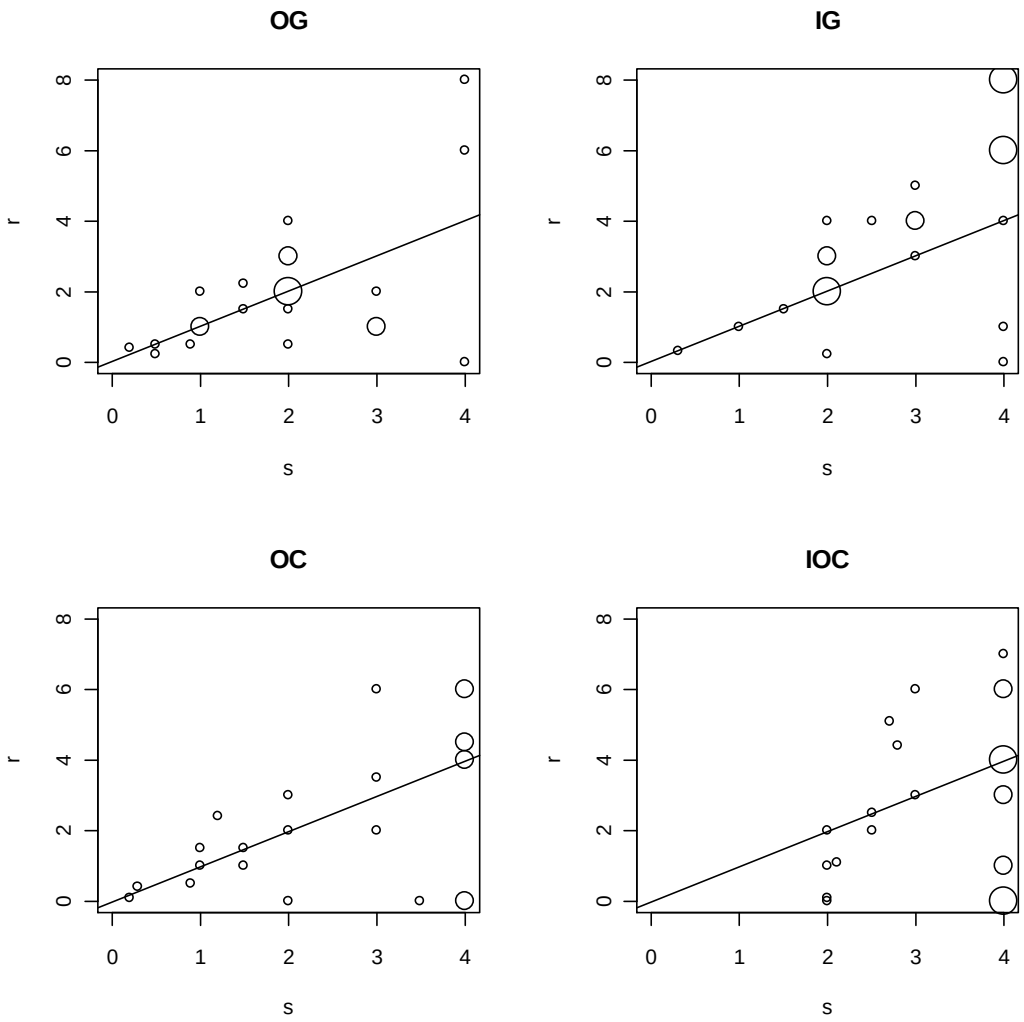
Descriptive statistics show that our coordination games indeed had focal points where subjects were able to coordinate on. 97.6 percent of all subjects chose Ernst-Abbe-Platz instead of Eichplatz as the common meeting point in Jena, which lead to a successful meeting in 95.2 percent of all cases. The second coordination game, where subjects were asked to put the letters A, B, and C in a certain order, proved to be slightly more difficult but we can still see a clear focal point: 85.1 percent of all subjects chose the alphabetical order. As a result, 75.8 percent of all groups successfully coordinated, out of which 96.8 percent chose the alphabetical order, and the remaining 3.2 percent coordinated on the order A, C, B. In the final coordination game, 96.8 percent of all subjects chose the Eiffel Tower as a meeting point in Paris, which lead to a successful coordination in 92.7 percent of the groups.

The Trust Game

As a first step in the analysis of the trust games, we look at simple bubble plots that give us amounts returned to the trustors by the trustees conditional on their investments (Graph 1). Be aware that the graphs only contain information on those subjects whose contracts were accepted by the trustee. What we can see is that across all treatments we find positive investments as well as positive returned amounts. The red lines are 45 degree lines, which signify a return ratio equal to one. The size of the bubble corresponds to the frequency of observations. Comparing the treatments, some striking patterns are observable. In the in-group treatment (IG), more subjects invested their full endowments (4€) than in the baseline out-group treatment (OG). Additionally, these high investments in the in-group treatment (IG) are often reciprocated with a higher amount than 4€. Invested amounts lower than 2€ are a rare event (only 3 observations) in the in-group treatment (IG) while quite frequent in the out-group treatment (OG). Returning less than received is also a rare event (only 3 observations) in treatment IG. Comparing the out-group competition treatment (OC) and the baseline out-group treatment (OG) a shift in investments from (2€) to high investments (4€) is observable

while no obvious pattern occurs regarding the return ratio. In the treatment with asymmetric competition (IOC), we see no accepted amount lower than 2€. This pattern of investment in the asymmetric competition treatment (IOC) is in line with the IG treatment but a change compared to the symmetric competition treatment (OC). As in the symmetric competition (OC), high investment (4€) is the modal amount in the asymmetric competition (IOC); however, more than half of these high investments are not reciprocated.

Graph 1: Received and returned amounts



Note: OG=Out-Group, IG=In-Group, OC=Out-Group Competition, IOC=In-Group vs. Out-Group Competition, s=accepted offered amount, r=returned amount.

To get a more precise picture of the differences across treatments, we start with the investor side and compare the means of the offered amounts across the different treatments and types. Table 2 presents the results of this step. In the OG treatment, trustors on average offered 1.74 out of 4.00 Euros. This is in stark contrast to the standard prediction with self-interested individuals and in line with other behavioral studies. As a consequence, we can confirm Hypothesis 1a. Furthermore, we can see that our attempt to build up social identity in the

laboratory was successful. Investors in the IG treatment sent 2.59 out of 4.00 Euros in their partners. The Mann-Whitney two-sample statistic shows that this is significantly ($p = 0.019$) more than in the OG treatment, which confirms our Hypothesis 2a.[4] If we introduce competition between investors in a framework where no social identity built up, we can see no significant effect on the sending behavior of investors (Mann-Whitney test, $p = 0.950$). However, there is a tendency that out-group investors increase their investments in a framework where they are confronted with a trustee and a trustor who have common experience. These out-group investors might feel that they have to increase their investments in order to have a chance of being chosen by an in-group trustee, who has built up social identity with the competitor investor. Still, the effect is not significant on the conventional confidence levels (Mann-Whitney test, $p = 0.139$). Moreover, we cannot find that competition significantly changes the investments of in-group trustors (Mann-Whitney test, $p = 0.904$). Overall, this would suggest that competition does not lead to a reduction of offers in our treatments where we induce social identity. Additionally, it might be interesting to note that introducing competition in a strangers framework (OC) does not increase investments to the level we observe in the in-group trust treatment without competition (IG). Indeed, the difference in investment behavior is statistically significant with higher investments in the IG treatment (Mann-Whitney test, $p=0.025$).

In all treatments, trustees have the opportunity to reject the investors' offers. Therefore, we look at the choice of investors by trustees before investigating realized investments. In the two-person trust games, all offers above 0.10€ were accepted while offers below were rejected. This resulted in two rejections in the IG treatment and three rejections in the OG treatment (see table 2). In the three-person games, there is only a single occasion in the OC treatment in which both offers were rejected (offers were 0€ and 0.50€); in 47 out of 48 observations, one of the two offers was accepted. Partner choice in the three-person trust game is mainly based on offered amounts. In one occasion in the IOC treatment, the in-group partner was preferred although her offer was lower (offers were 2€ by the in-group trustor and 3€ by the out-group trustor). Overall, in 46 out of 47 observations the selected trustor made an offer which was at least as high as or higher than the offer of the other trustor. Offers by trustors tied in 2 observation in the asymmetric competition treatment (IOC), in both cases all trustors offered the full amount of 4€. The in-group trustor was selected in one occasion and

[4] Already while running the experiment, we got the impression that our way of inducing social identity in the laboratory was successful. In the questionnaire that was put at the end of every session, several subjects in the IG and IOC sessions mentioned that they built up feelings of togetherness with their partners by playing these coordination games.

the out-group trustor in the other. From this pattern of partner choice we deduce that partner choice in out setting follows strict rationality in the vast majority of cases, i.e. positive amounts are accepted and higher offers are taken. Additionally, we do not observe an obvious preference for in-group partners in the asymmetric competition.

Splitting the investors into those whose offers were accepted and those whose offers were rejected, we find similar trends for both groups (see Table 2). Focusing on those offers that were accepted, we can see that competition tends to increase realized investments. This effect is statistically significant (Mann-Whitney test, p=0.002) when we compare the investments of out-group trustors in the OG and the IOC treatment. It is not surprising that we find this effect to be largest in this constellation since competition is especially fierce for out-group investors if they are confronted with an investor who has built up social identity with the trustee.

Table 2: Investment behavior of trustors

	Invested amount					
	Social capital induced			No social capital induced		
Treatment	**accepted**	**not accepted**	**total**	**accepted**	**not accepted**	**total**
IG	2.80	0	2.59			
	1.12	*0*	*1.32*			
	(24)	(2)	(26)			
OG				1.96	.03	1.74
				1.12	*.06*	*1.22*
				(23)	(3)	(26)
OC				2.53	1.18	1.83
				1.37	*1.16*	*1.42*
				(23)	(25)	(48)
IOC	3.21	1.84	2.7	3.38	1.64	2.29
	.91	*1.31*	*1.25*	*.78*	*1.37*	*1.45*
	(15)	(9)	(24)	(9)	(15)	(24)
Total	2.96	1.51	2.64	2.43	1.26	1.92
	1.05	*1.39*	*1.27*	*1.27*	*1.25*	*1.38*
	(39)	(11)	(50)	(55)	(43)	(98)

Note: standard errors in italics, number of observations in parentheses; OG=Out-Group, IG=In-Group, OC=Out-Group Competition, IOC=In-Group vs. Out-Group Competition

Now, we turn to the return behavior of the trustees (see Table 3). Again, our results are in clear contrast to the selfish prediction. Because individuals' relationships are based on trust, on average the investment game functions well and we often find mutual gains. In the treatment OG, where we did not induce social identity, trustees return an amount that is greater than zero (1.97 Euros), which corroborates our Hypothesis 1b. The returned amount in the IG treatment is 3.58 Euros and thus greater than the returned amount in the OG treatment. A Mann-Whitney test shows that the difference is statistically significant (p = 0.018), which confirms our Hypothesis 2b. If we look at the effects of competition, we might argue that

there is a slight tendency towards lower returns in the competition treatments for in-group trustors, whereas the returns for out-group trustors tend to be higher as compared to the respective treatments without competition. Yet, of course, these figures cannot give a clear picture of the trustworthiness of trustees in different frameworks as long as investments vary across treatments.

Table 3: Returns to investors

	Returned amount		
Treatment	**Social capital induced**	**No social capital induced**	**Total**
IG	3.58 *2.47* (24)		3.58 *2.47* (24)
OG		1.97 *1.90* (23)	1.97 *1.90* (23)
OC		2.34 *2.09* (23)	2.34 *2.09* (23)
IOC	2.95 *2.52* (15)	2.44 *1.70* (9)	2.76 *2.22* (24)
Total	3.34 *2.47* (39)	2.20 *1.93* (55)	2.67 *2.23* (94)

Note: standard errors in italics, number of observations in parentheses; OG=Out-Group, IG=In-Group, OC=Out-Group Competition, IOC=In-Group vs. Out-Group Competition

As long as we do not combine the return information with the original investment choices, the figures presented in Table 3 are difficult to interpret. This is why in a next step, we analyze return ratios *rr* for trustors that were computed by the equation $rr = r/s$, where *r* is the amount the trustee returned and *s* is the amount invested by the trustor. Since we have no accepted zero investments, the ratio is computable for all observations. Table 4 presents simple mean return ratio comparisons across treatments. In the treatments without competition, we see that the return ratio is greater for in-group trustors than for their out-group counterparts. However, the difference is not statistically significant according to a Mann-Whitney rank sum test ($p = 0.203$). Introducing competition between investors in a framework where no social identity was built up, does not alter the return ratio significantly. Yet, if we look at the effects of competition in the IOC treatment, we can find an intriguing pattern. A comparison of the mean return ratios across the IOC and IG treatments suggest that competition leads to crowding out of social identity. The return ratio declines substantially from 1.24 to .88. A Mann-Whitney rank sum test proves this decline to be statistically

significant (p = 0.095). The return ratio for investors who could not build up social identity with a trustee tends to decline as well if we move from the treatment without competition to the competition treatments. Yet, this change is far from being significant (Mann-Whitney test, (p = 0.284).

Table 4: Return ratios for investors

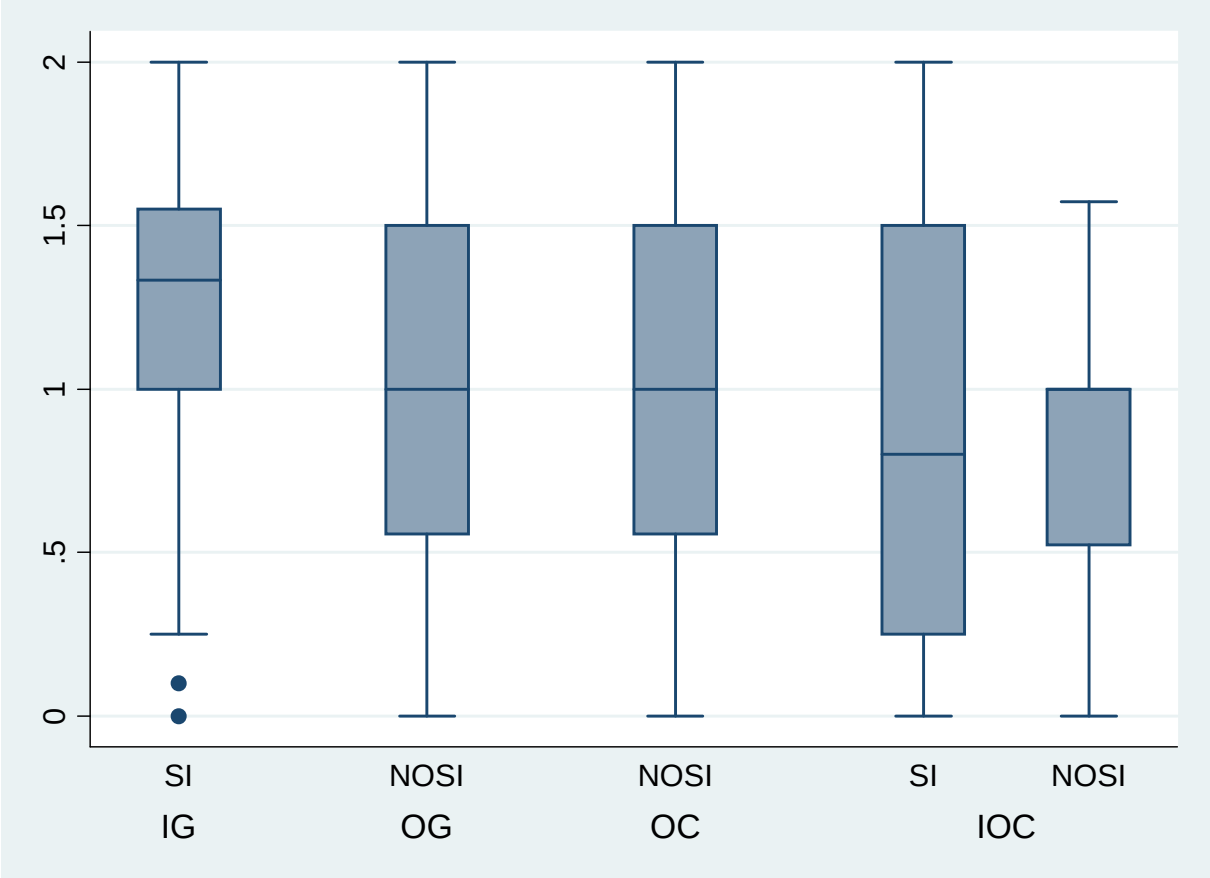
	Return Ratio		
Treatment	**Social capital induced**	**No social capital induced**	**Total**
IG	1.24 *.56* (24)		1.24 *.56* (24)
OG		1.05 *.61* (23)	1.05 *.61* (23)
OC		.96 *.60* (23)	.96 *.60* (23)
IOC	.88 *.71* (15)	.76 *.51* (9)	.84 *.63* (24)
Total	1.10 *.64* (39)	.97 *.59* (55)	1.02 *.61* (94)

Note: standard errors in italics, number of observations in parentheses; OG=Out-Group, IG=In-Group, OC=Out-Group Competition, IOC=In-Group vs. Out-Group Competition

We get a very similar picture if we use the medians instead of the means in our analysis. Graph 2 depicts box plots of return ratios for every possible treatment and trust type combination. Treatments are abbreviated as usual (IG, OG, OC, and IOC) and the trust type is abbreviated SI for those individuals where social identity was induced by repeatedly playing simple coordination games, and NOSI for those trustors where no in-group relationship with the trustee was induced in the first three stages of the experiment. A return ration of 1 indicates that trustors received exactly the amount they've invested. Apart from the pattern of median return ratios, we can see that competition substantially increases the variation in return ratios in in-group relationships. Even if we can still find trustees that offer their partners high return ratios, there now is also a considerable number of individuals for whom it seems to be true that competition crowds out social identity, which results in significantly lower return ratios as compared to the IG treatment. This crowding out of social identity can be explained by intention based approaches. Following McCabe et al. (2003), we suggest that with competition, investments of in-group trustors are seen as the result of a competitive bidding process rather than voluntary trust. This is why trustors do not reciprocate these

investments with high return ratios anymore, which confirms our Hypothesis 4. The finding that this effect is only statistically significant for in-group relationships might be explained by the fact that directed trust is especially sensitive to the interpretation of intentions in a competitive environment.

Graph 2: Return ratios for investors



Note: OG=Out-Group (n=23), IG=In-Group (n=24), OC=Out-Group Competition (n=23), IOC=In-Group vs. Out-Group Competition, SI=Social Identity Induced (n=15), NOSI=No Social Identity Induced (n=9). Boxes indicate median return rates, 75th percentile (upper hinge) and 25th percentile (lower hinge).

In a next step, we further investigate unfair return behavior. As unfair return behavior we define those return ratios that are not higher than .5 – this corresponds to the lower quartile of the overall return ratio distribution. Table 5 gives the absolute numbers and ratios of investors who are treated unfairly, conditional on treatment and type, where type is "TRUST" for those individuals that have built up in-group trust with their partners in coordination games and "NO TRUST" stands for those individuals that have not. We find that roughly 22 percent of investors from the latter group are treated unfairly, irrespective of treatment. The situation is quite different for the investors from the former group. Whereas only 12 percent are unfairly treated in the IG treatment, this ratio rises up to 40 percent in the IOC treatment. Fisher's

exact test shows that for those investors who have built up in-group trust, being unfairly treated by their partners is not independent from treatment (p-value: 0.063).

Table 5: Really unfairly treated investors

	Really unfairly treated		
	0	**1**	**Total**
TRUST			
IG	21 *87.50*	3 *12.50*	24 *100.00*
IOC	9 *60.00*	6 *40.00*	15 *100.00*
NOTRUST			
OG	18 *78.26*	5 *21.74*	23 *100.00*
OC	18 *78.26*	5 *21.74*	23 *100.00*
IOC	7 *77.78*	2 *22.22*	9 *100.00*

Note: percentages in italics, OG=Out-Group, IG=In-Group, OC=Out-Group Competition, IOC=In-Group vs. Out-Group Competition

If we check the accepted trustors' beliefs about the returns, we can observe that in general beliefs are higher than the actual returns. However, there is a striking pattern in the data which suggests that the gap between beliefs and actual returns becomes considerably larger once we introduce competition among investors. This is to say it seems that investors overestimate the reciprocity of their trustees in a competition framework. While the trustors' beliefs still have predictive power in treatments without competition, they lose this power in the competition treatments. This effect is especially prevailing in the IOC treatment. Consistent with our previous findings, we can also observe that in-group investors in the IG treatment expect their partners to return significantly more than their counterparts in the OG treatment (p-value 0.053). Introducing competition does not affect the investors' beliefs, neither in a strangers' framework nor in an in-group versus out-group framework. However, competition does affect the way investments, especially those of in-group members, are reciprocated by the trustees.

Finally, the investment and return behavior in the different treatments resulted in a payoff pattern that is shown in Table 6. Comparable to other studies that use the trust game, also in our study the payoffs of the trustees are higher than the payoffs of the trustors. This difference in the payoffs between trustor and trustee becomes even larger once we introduce

competition. The variance in payoffs is largest in the IOC treatment where we also observed crowding out of social identity.

Table 6: Profits in the Trust Game

	Profits in the Trust Game								
	Partner Sender			Strange Sender					
Treatment	Accepted	Not accepted	Total	Accepted	Not Accepted	Total	Partner Receiver	Strange Receiver	Total
IG	4.78	4	4.72				8.46		6.59
	1.96	*0*	*1.89*				*2.83*		*3.04*
	(24)	(2)	(26)				(26)		(52)
OG				4.01	4	4.01		7.46	5.73
				1.59	*0*	*1.49*		*2.92*	*2.88*
				(23)	(3)	(26)		(26)	(52)
OC				3.82	4	3.91		9.02	5.61
				1.78	*0*	*1.22*		*3.55*	*3.31*
				(23)	(25)	(48)		(24)	(72)
IOC	3.73	4	3.83	3.07	4	3.65	11.07		6.18
	2.31	*0*	*1.81*	*1.89*	*0*	*1.21*	*2.88*		*4.04*
	(15)	(9)	(24)	(9)	(15)	(24)	(24)		(72)

Note: standard errors in italics, number of observations in parentheses; OG=Out-Group, IG=In-Group, OC=Out-Group Competition, IOC=In-Group vs. Out-Group Competition

Conclusion

There is extensive literature on the *effects* of trust and trustworthiness on a wide range of economic and non-economic outcomes. Some studies have started to discuss the underlying mechanisms that lie behind the *creation* of trust. However, much less research has been done on the question how policies and market structure interact with trust and trustworthiness. Aghion et al. (2008) started to analyze the effects of state regulation on trust. Our study is the first to analyze the effect of competition among investors on social identity. This is done with the help of a laboratory experiment where trustees can choose between different investors in trust games. We use a 2 x 2 treatment design to disentangle simple competition from crowding out of social identity effects. Social identity is induced by letting subjects play simple coordination games with focal points which ensure common successful experience. This constitutes a novel way of inducing social identity in the laboratory. Our results suggest that there are no significant changes in sending behavior in a setting of symmetric investors as compared to the standard trust game. Even the introduction of asymmetry of investors by in-group membership of one trustor does not lead to significant changes in sending behavior. However, we find that trustees react to competition among in-group and out-group investors by lowering return ratios to insiders significantly. This effect can be interpreted as crowding out of social identity in the form of trustworthiness due to competition among investors. We suggest that this effect can be explained by intention based approaches. Once competition comes into play, trustees see in-group trustors' investments as the outcomes of a competitive bidding process rather than voluntary trust, which crowds out reciprocity.

In order to spur entrepreneurial finance and, eventually, economic development, one finds recommendations to improve the framework conditions for outside investors like venture capitalists and business angels around the globe (cf. EFI 2009). So far, the largest fraction of credit-constraint entrepreneurs has to rely on their social network as ultimate source of financial capital. Our results show that such recommendations also might have a shadow side: Improving the framework conditions for investors from outside the social network might induce competition among investors and, eventually, foster crowding out of social identity with detrimental effects on trustworthy behavior in the network.

To further elaborate the effects of competition on trust and trustworthiness, it seems worthwhile to analyze systematically how competition affects social identity in other laboratory games. Furthermore, it would be interesting to see how the introduction of repeated games and the possibility of reputation building might change our findings. Finally, since it is difficult to extrapolate laboratory findings to the outside world, we suggest identify interactions between competition and trust in real world situations, which is probably the most difficult but also promising endeavor.

References

Aghion, Philippe, Yann Algan and Pierre Cahuc (2008): Can Policy Interact with Culture? Minimum Wage and the Quality of Labor Relations, NBER Working Paper, No. 14327.

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

Akerlof, George and Rachel Kranton (2005): Identity and the Economics of Organization, *Journal of Economic Perspectives*, 19(1), 9–32.

Bayer, Patrick, Stephen Ross, and Giorgio Topa (2008): Place of Work and Place of Residence: Informal Hiring Networks and Labor Market Outcomes, *Journal of Political Economy* (in press).

Berg, Joyce, John Dickhaut, and Kevin McCabe (1995): Trust, Reciprocity, and Social History, *Games and Economic Behavior*, 10, 122–142.

Bornhorst, Fabian and Andrea Ichino and Oliver Kirchkamp and Karl Schlag and Eyal Winter (2004) How do people play a repeated trust game? Experimental Evidence, University of Mannheim SFB 504 Discussion Paper 04-43.

Camerer, Colin (2003): *Behavioral Game Theory – Experiments in Strategic Interaction*, Princeton University Press.

Chen, Yan and Sherry Li (2009): Group Identity and Social Preferences, *American Economic Review*, 99(1), 431–457.

Coleman, James (1988): Social Capital and the Creation of Human Capital, *Amercian Journal of Sociology*, 94, Supplement, 95–120.

Dufwenberg, Martin and Georg Kirchsteiger (20004): A theory of sequential reciprocity, *Games and Economic Behavior*, 47(2), 268-298.

EFI [Expertenkommission Forschung und Innovation] (2009): Expert Report on Reserach, Innovation and Technological Performance, Berlin.

Falk, Armin and Urs Fischbacher (2006): A theory of reciprocity, *Games and Economic Behavior*, 54(2), 293-315.

Fehr, Ernst and Klaus Schmidt (1999): A theory of fairness, competition, and cooperation, *Quarterly Journal of Economics*, 114, 817-868.

Fehr, Ernst and Klaus Schmidt (2006): The economics of fairness, reciprocity and altruism – experimental evidence and new theories, in: Kolm, Serge-Christopher and Jean Ythier (eds.), *Handbook of the economics of giving, altruism and reciprocity*, North Holland.

Fershtman, Chaim and Uri Gneezy (2001): Discrimination in a Segmented Society – An Experimental Approach, *Quarterly Journal of Economics*, 116(1), 351–377.

Fischbacher, Urs (2007): z-Tree: Zurich Toolbox for Ready-made Economic Experiments, *Experimental Economics*, 10(2), 171–178.

Glaeser, Edward L., David Laibson, and Bruce Sacerdote (2002): An Economic Approach to Social Capital, *Economic Journal*, 112(483): 437–458.

Glaeser, Edward, David Laibson, José Scheinkman and Christine Soutter (2000): Measuring Trust, *Quartertly Journal of Economics*, 115, 811–846.

Goette, Lorenz, David Huffman and Stephan Meier (2006): The Impact of Group Membership on Cooperation and Norm Enforcement: Evidence Using Random Assignment to Real Social Groups, *American Economic Review*, 96(2), 212–216.

Greiner, Ben (2004): An Online Recruitment System for Economic Experiments. In: Kurt Kremer, Volker Macho (Eds.): Forschung und wissenschaftliches Rechnen 2003. GWDG Bericht 63, Göttingen : Ges. für Wiss. Datenverarbeitung, 79–93.

Hargreaves-Heap, Shaun and Daniel Zizzo (2009): The Value of Groups, *American Economic Review*, 99(1), 295–323.

Huck, Steffen and Gabriele Lünser and Jean-Robert Tyran (2006) Competition fosters trust, CEPR Discussion Paper No. 6009.

Karlan, Dean (2005): Using Experimental Economics to Measure Social Capital and Predict Financial Decisions, *American Economic Review*, 95(5), 1688–1699.

Knack, Stephen and Philip Keefer (1997): Does Social Capital Have an Economic Payoff? A Cross-Country Investigation, *Quarterly Journal of Economics*, 112(4): 1251–1288.

McCabe, Kevin, Mary Rigdon, and Vernon Smith (2003): Positive Reciprocity and Intentions in Trust Games, *Journal of Economic Behavior and Organization*, 52: 267–275.

Michelacci, Claudio and Olmo Silva (2007): Why So Many Local Entrepreneurs?, *Review of Economics and Statistics*, 89(4): 615–633.

Mouw, Ted (2003): Social Capital and Finding a Job: Do Contacts Matter?, *American Sociological Review*, 68(6): 868–898.

Putnam, Robert D., Robert Leonardi, and Raffaella Y. Nanetti (1993): *Making Democracy Work*. Princeton: Princeton University Press.

Roth, Alvin and Vesna Prasnikar and Mashiro Okuno-Fujiwara and Shmuel Zamir (1991): Bargaining and Market Behavior in Jerusalem, Ljubiljana, Pittsburgh, and Tokyo: An Experimental Study, *American Economic Review*, 81(5): 1068-1095.

Sanders, Jimy M. and Victor Nee (1996): Immigrant Self-Employment: The Family as Social Capital and the Value of Human Capital, *American Sociological Review*, 61(2): 231–249.

Schelling, Thomas (1960): *The Strategy of Conflict*, Harvard University Press.

Slonim, Robert (2004): Gender Selection Discrimination: Evidence from a Trust Game, Mimeo, Case Western Reserve University.

Slonim, Robert and Ellen Garbarino (2008): Increases in trust and altruism from partner selection: Experimental evidence, *Experimental Economics*, 11, 134–153.

Tabellini, Guido (2008): The Scope of Cooperation: Values and Incentives, *Quarterly Journal of Economics*, 123(3): 905-950

Udry, Christopher (1994): Risk and Insurance in a Rural Credit Market – An Empirical Investigation in Northern Nigeria, *Review of Economic Studies*, 61(3): 495-526.