

**Investment in Outside Options as Opportunistic Behavior:
An Experimental Investigation**

Hodaka Morita
School of Economics, UNSW Business School
University of New South Wales
h.morita@unsw.edu.au

Maroš Servátka
New Zealand Experimental Economics Laboratory
Department of Economics and Finance, University of Canterbury
maros.servatka@canterbury.ac.nz

November 1, 2014

Abstract: We contribute to the theory of the firm by experimentally investigating a bilateral trade relationship in which standard theory assuming self-regarding preferences predicts that the seller will be better off by investing in the outside option to improve his bargaining position. The seller's investment, however, might negatively affect the buyer's other-regarding preferences if the investment is viewed as opportunistic. We find overall support for our hypotheses that arise from the link between other-regarding behavior and opportunism. In our experiment the seller can become worse off by investing, suggesting that costly solutions to opportunistic behavior such as vertical integration may be unnecessary.

JEL Classification: C91, L20

Keywords: altruism, experiment, relationship-specific investment, opportunistic behavior, other-regarding preferences, outside option, theory of the firm

Acknowledgements: We are particularly grateful to Daniel Woods for excellent research assistance and to David Cooper, Cary Deck, Nick Feltovich, David Fielding, Richard Holden, Hideshi Itoh, John Spraggon, Rado Vadovič, Mike Waldman, James Tremewan, seminar participants at the University of Canterbury, University of Otago, Massey University, and participants of the 8th ANZ workshop on experimental economics, 2014 Bratislava Economic Meeting, and 2014 ESA in Honolulu for providing helpful comments and suggestions. Hodaka Morita gratefully acknowledges financial support from the UNSW Business School and the Australian Research Council and Maroš Servátka from the College of Business and Economics, University of Canterbury.

1. Introduction

How does opportunistic behavior associated with investment in an outside option affect the split of appropriable quasi-rents? In bilateral trade relationships, relation-specific investment often creates a surplus to be shared between two parties because the value of trade within the relationship exceeds the value of outside trading opportunities. The surplus, often referred to as appropriable quasi-rents, plays a critical role in the theory of the firm literature. Appropriable quasi-rents open up possibilities for *ex-post* opportunistic behavior, which can be prevented by costly remedies such as vertical integration or contracts (Williamson, 1979, 1985; Klein, Crawford, and Alchian, 1978). Investment in an outside option is an important example of *ex-post* opportunistic behavior, as pointed out, for instance, by Klein et al. (1978). In their example of bilateral trade between a printing press company and a publisher, Klein et al. argue that the publisher may decide to hold its own standby press facilities (an investment in an outside option) in order to increase its bargaining position against the printing press company.¹ If agents are selfish and care only about their monetary return, investment in outside options will be made whenever the monetary return from doing so is positive. It is well known, however, that agents often care for others to some degree rather than being completely selfish (see Camerer, 2003 and Cooper and Kagel, 2010 for nice surveys). The presence of other-regarding preferences makes it difficult to predict actions that agents take regarding investment in outside options.

One party's investment in an outside option may crowd out its trade partner's other-regarding preferences. We experimentally investigate this link by analyzing the following interaction between a seller and a buyer. A potential gain from trade between the seller and the buyer, denoted by G , is available, where G is interpreted as appropriable quasi-rents. First, the seller decides whether to invest in an outside option at the cost F in case he later rejects the buyer's offer. If the seller invests, then his outside option is X , where $G > X > F$. If the seller does not invest, then his outside option is 0. Next, the buyer makes a take-it-or-leave-it offer p to the seller to divide the gain G . The buyer gets to keep the remainder $G - p$ only if the seller accepts the offer. Finally, the seller learns about the offer and decides whether to accept or reject it. If the seller accepts the offer, he receives p and his outside option becomes irrelevant in this case. If the seller rejects the offer, he receives the outside

¹ See also Baker and Hubbard (2004), who analyze the U.S. trucking industry and show that, when a driver owns a truck, the truck ownership may encourage the driver to engage in a costly search for alternative hauls, in order to strengthen his bargaining position with the dispatcher. Holmstrom and Tirole (1991) study transfer pricing and the organization of trade between a selling unit and a buying unit. When the unit managers are allowed to trade with outsiders, they will spend resources to improve outside offers in ways that do not contribute to overall efficiency. Cai (2003) also points out that, in bilateral trade relationships, a party may want to exert efforts in searching for alternative business partners in order to enhance his bargaining position, even if it does not add value to the trade with his partner.

option of X if he invested, and receives 0 otherwise. The buyer receives 0 regardless of the investment.

The standard economic theory predicts that the seller will invest in the outside option if agents care only about their own monetary payoffs. To see this, suppose that the seller did not invest at Stage 1. The buyer then offers $p = 0$, which is accepted by the seller under the tie-breaking assumption that the seller behaves in favor of the buyer when the seller is indifferent between accepting and rejecting the offer. Similarly, if the seller invested at Stage 1, the buyer offers $p = X$. Anticipating this, the seller will invest in the outside option at Stage 1 because $X > F$. The seller's investment is opportunistic in the sense that it increases the seller's payoff from 0 to X by effectively reducing the buyer's payoff from G to $G - X$. The investment is inefficient because it adds no value to the seller's trade with the buyer.

In reality, agents often behave in other-regarding ways. The seller's investment in the outside option might have a negative impact on the buyer's other-regarding behavior if the buyer views the investment as opportunistic. Consequently, the seller may become worse off by investing in the outside option, and hence he may decide not to invest in it. If other-regarding behavior prevents inefficient investment in outside options, costly solutions aimed at mitigating opportunism, such as vertical integration or contracts, are unnecessary.

The connection between other-regarding behavior and *ex-post* opportunistic behavior can therefore yield important implications for the design of a governance structure. To the best of our knowledge, however, no previous papers have studied this link. This paper attempts to take a first step towards understanding of this link by experimentally investigating conjectures that arise in our setup. We derive conjectures based on the logic of Revealed Altruism theory (Cox, Friedman, and Sadiraj, 2008). First, consider the case in which the seller invested to establish the outside option of X . When dividing gain G , an altruistic buyer may offer more than X , even if the seller accepts any offer greater than or equal to X . Let $p_I \equiv X + Z$ denote the buyer's offer following the seller's investment, where Z is a premium price on top of the outside option, resulting from the buyer's altruistic preferences. Next, consider the case when the seller did not invest in the outside option. Let p_{NI} denote the buyer's offer following the seller's non-investment, where an altruistic buyer may offer $p_{NI} > 0$ even if the seller accepts any non-negative offer.

We postulate that the buyer views the seller's investment as opportunistic behavior. The lack of investment in an outside option means that the seller chose not to engage in opportunistic behavior even though there was a chance to do so. Hence, we postulate that the buyer views non-investment as kind behavior. This logic yields three conjectures. First, we conjecture that the premium price Z is

smaller than the offer following non-investment p_{NI} . The seller's (opportunistic) investment reduces the degree of the buyer's altruism towards the seller, whereas the seller's (kind) non-investment increases it. This implies that Z (which is a measure of the buyer's altruism following investment) is less than p_{NI} (a measure of the buyer's altruism following non-investment). Second, we conjecture that Z is decreasing in X . As the level of the outside option increases, the buyer views the seller's investment as increasingly more opportunistic. This reduces the buyer's altruism towards the seller, implying that the buyer offers a lower premium price to the seller. Third, we conjecture that p_{NI} is increasing in X . This third conjecture hinges on the buyer's perception of non-investment being kind behavior, where the degree of perceived kindness increases as the forgone outside option increases. This implies that p_{NI} increases as X increases.

We design a laboratory experiment that allows us to test our conjectures in a basic setup, focusing on the underlying mechanism that drives the behavior of economic agents. This approach enables us to study the interaction of opportunistic and other-regarding behavior in a situation in which we are able to control details that affect behavior in the field in an uncontrolled manner and thus allows us to draw causal inferences. In the experiment, we vary the size of the outside option X , and observe the following results, which suggest that there is a significant link between other-regarding behavior and investment in an outside option. Consistent with the first conjecture, we find that the premium price Z is smaller than the offer following non-investment p_{NI} for all three levels of X that we have implemented in our design. We also find evidence supporting our second conjecture that Z is decreasing in X . Regarding the third conjecture, our data show that (i) p_{NI} is increasing in X when X is high; and (ii) p_{NI} is not affected by changes in X when X is low.

Our finding yields a new implication for the theory of the firm. In our setup, standard economic theory assuming self-regarding preferences predicts that the seller's investment in the outside option, although inefficient, is profitable as long as $X > F$ holds, and hence the seller invests in it. Costly remedies to prevent the inefficient investment such as vertical integration or contracts will be valuable if the cost of the remedy is relatively small (i.e., less than $X - F$). Our experimental results suggest that such remedies may be unnecessary because the investment may not be profitable in the presence of the link between other-regarding behavior and investment in the outside option. Since the seller's investment reduces the buyer's other-regarding preferences, the buyer's offer following investment may not be sufficiently high compared to his offer following non-investment in order for the seller to recover the investment cost. In fact, in our experiment, we find that the seller becomes worse off on average by investing in relatively low outside options.

2. Relationship to the literature

The literature on the theory of the firm, which originated with Coase's (1937) seminal essay, now spans a large body of research. Gibbons (2005) clearly defines and compares four strands of this literature. The relation-specific investment plays an important role in two of these strands: the property-rights theory (Grossman and Hart, 1986; Hart and Moore, 1990; Hart, 1995) and the rent-seeking theory (Williamson, 1971, 1979, 1985; Klein et al., 1978). In the property-rights theory, the surplus (appropriable-quasi rents) created by relation-specific investment is shared between two parties through efficient bargaining. The surplus-sharing leads to inefficiency in relation-specific investment when contracts are incomplete, and the theory studies the roles of asset ownership in mitigating this *ex-ante* inefficiency. In contrast, the rent-seeking theory focuses on *ex-post* inefficiency, where appropriable quasi-rents open up possibilities for *ex-post* opportunistic behavior, which can be prevented by vertical integration or contracts. A key hypothesis in the rent-seeking theory is that a larger return from opportunistic behavior makes integration more likely (see Klein et al., 1978; Whinston, 2003; Gibbons, 2005).²

The aim of the present paper is to contribute to the rent-seeking theory of the firm by studying the link between investment in an outside option and other-regarding behavior. While we are not aware of any previous research that studies this link directly, it bears a certain similarity to the relationship between implementation of a minimum performance requirement and a worker's intrinsic motivation studied by Falk and Kosfeld (2006), referred to as FK hereafter. In their experimental principal-agent game, the agent chooses a productive activity x , which is costly to him but beneficial to the principal. The cost for the agent is x , while the benefit to the principal is $2x$. The agent has an initial endowment of 120, while the endowment of the principal is 0. Before the agent chooses x , the principal decides whether or not to force a minimum requirement $\underline{x} > 0$. The agent's choice set is $x \in [\underline{x}, 120]$ with the minimum requirement, and $x \in [0, 120]$ without it. FK implement three control treatments: a low ($\underline{x} = 5$) treatment; a medium ($\underline{x} = 10$) treatment; and a high ($\underline{x} = 20$) treatment. For all three treatments, they find that most agents choose smaller values of x when minimum requirements are enforced. Their results suggest that the use of control entails "hidden costs" that should be considered when designing employment contracts and workplace environments.

The seller's investment in the outside option in our setup plays a role in a certain sense similar to enforcement of a minimum payment requirement. This is because, if the seller invests, the buyer may think that he must offer a price at least equal to the outside option, $p = X$. The

² See Shelanski and Klein (1995) for a survey of studies testing this hypothesis empirically.

requirement, however, is indirect because the seller may accept an offer $p < X$, whereas the requirement in FK is direct. Furthermore, investment in outside options is costly, whereas a minimum performance requirement is costless in FK. Our focus is to study the aforementioned conjectures regarding the link between investment in an outside option and other-regarding behavior, whereas the focus in FK is to show that most agents reduce their performance as a response to the principal's control decision.

Implementation of the minimum performance requirement in FK has an effect similar to investment in rent-seeking activities in Oosterbeek, Sloof, and Sonnemans (2011), referred to as OSS hereafter. OSS experimentally study the link between productive incentives and rent-seeking incentives in a multi-tasking environment. In their extension of the trust game, a seller chooses two investment levels, a productive one and an unproductive (rent-seeking) one. A buyer then decides how much money to transfer back to the seller, where back-transfers should be in between a minimum amount M and the overall surplus S (with $M < S$). Unproductive investments only affect M , whereas productive investments increase S and M . OSS find that subjects typically choose higher rent-seeking levels when the marginal returns to rent-seeking increase, but the observed increases are much smaller than the levels predicted by standard theory. Moreover, the investments in productive activities are typically higher than the levels predicted by standard theory and the investments in rent-seeking are usually lower. OSS point out that reciprocity considerations seem to mitigate the adverse effects of rent-seeking opportunities.³

Despite certain similarities in experimental designs, the three studies are significantly different and their contributions are complementary. We contribute to the theory of the firm by studying the link between investment in an outside option and other-regarding behavior. Our finding suggests that costly remedies for *ex-post* opportunistic behavior, such as vertical integration or contracts, may be unnecessary in the presence of other-regarding behavior. FK contribute to labor/personnel economics by studying the link between implementation of a minimum performance requirement and a worker's intrinsic motivation, and their findings yield implications for the design of employment contracts and workplace environments. OSS contribute to the analysis of incentives in multi-tasking environments by studying the link between productive and rent-seeking activities in the presence of intension-based reciprocity.

³ For a related experimental paper, see Oosterbeek, Sonnemans, and van Velzen (2003), who study a marriage situation in which a spouse who invests in relationship-specific human capital increases the surplus. Such an investment decreases her outside option, which might in turn result in underinvestment in relationship-specific human capital. They find that although underinvestment occurs, it is less frequent than game theory predicts. Unlike unproductive investments in OSS, relationship-specific investment decreases the outside option in Oosterbeek, Sonnemans, and van Velzen.

3. Theoretical framework, experimental design, and hypotheses

3.1. Theoretical framework

We analyze the interaction between a seller and a buyer presented in the introduction. As a benchmark, consider the case in which the seller has no option to invest in the outside option. To split the gain G , an altruistic/inequality-averse buyer would offer a strictly positive price, even if the seller accepts any non-negative offer $p \geq 0$. The seller, however, may in fact reject low-price offers because of his own inequality aversion. This would work in the direction of further increasing the buyer's offer, because by doing so, the buyer can reduce the probability of rejection. Let us now introduce the seller's option to invest in the outside option. If the seller invested to establish the outside option of X , the buyer may offer more than X for reasons analogous to the reasons for a strictly positive price offered in the benchmark case. Recall that $p_I \equiv X + Z$ denotes the buyer's offer following the seller's investment, where $Z (\geq 0)$ is a premium price on top of the outside option X resulting from buyer's altruistic preferences, and that p_{NI} denotes the buyer's offer when the seller did not invest in Stage 1.

The focus of our experiment is the interaction of opportunism with other-regarding behavior. Revealed Altruism theory (Cox, Friedman, and Sadiraj, 2008) has been quite successful in predicting outcomes in various experimental settings testing for the presence and nature of other-regarding behavior and has recently received increased attention in the related literature. We derive our conjectures based on the logic of the theory.

The key elements of the theory are a partial ordering of opportunity sets, a partial ordering of preferences, and two axioms about reciprocity. The partial ordering of opportunity sets is defined as follows. Let b denote the buyer's money payoff and let s denote the seller's money payoff. Let b_H^* denote the buyer's maximum money payoff in opportunity set H and let s_H^* denote the seller's maximum money payoff in opportunity set H . Opportunity set G is 'more generous than' opportunity set F for the buyer if: (a) $b_G^* - b_F^* \geq 0$; and (b) $b_G^* - b_F^* \geq s_G^* - s_F^*$. In the original version of the theory, our three treatments include the same opportunity sets, $[0, 100]$, for the buyer, regardless of whether or not the seller chooses to invest in the outside option. To see this, suppose that the seller decides to invest in the outside option. Our setup does not rule out the possibility that the buyer offers $p = 0$ and the seller accepts the offer instead of rejecting it and receives the outside option of X . Hence, the buyer's maximum money payoff is 100, regardless of the seller's investment decision.

We modify the definition of the opportunity set based on the idea that the seller's investment imposes *de facto* restrictions on the buyer's opportunity set. Let $G = [0, 100]$ denote the buyer's opportunity set if the seller chooses not to invest. If the seller decides to invest in the outside option, the buyer thinks that he must offer at least $p = X$, anticipating that any offer $p < X$ would be rejected by the seller. This, in turn, *de facto* restricts the buyer's opportunity set to be $F_X = [0, 100 - X]$. According to our modified definition, opportunity set G is more generous for the buyer than opportunity set F_X for all $X > 0$, meaning that investment in the outside option is less generous. By the same logic, the higher the outside option, the less generous the investment in it is. That is, for any X and X' , such that $X \geq X'$, $F_{X'}$ is 'more generous than' F_X .

The partial ordering of preferences is defined as follows. The buyer's willingness to pay to increase the seller's dollar payoff can depend on the absolute and relative amounts of their respective payoffs. Two different preference orderings, A and B , over allocations of dollar payoffs might represent the preferences of two different buyers or the preferences of the same buyer in two different situations. For a given domain, preference ordering A is 'more altruistic than' preference ordering B if the buyer's willingness to pay to increase the seller's payoff in situation A is greater than or equal to his willingness to pay in situation B .⁴

Revealed Altruism theory postulates that an individual's preferences can become more or less altruistic depending on the choices of another agent. Axiom R (for reciprocity) states that if the seller provides a more (less) generous opportunity set to the buyer, then the buyer's preferences will become more (less) altruistic towards the seller.⁵ In our setup, when the seller invests in the outside option, he provides a less generous opportunity set to the buyer ($F_X = [0, 100 - X]$ instead of $G = [0, 100]$), and hence the buyer's preferences will become less altruistic. The buyer's willingness to pay to increase the seller's payoff is then smaller following the seller's investment than following non-investment. This leads to our first conjecture that the premium price Z is smaller than p_{NI} , the offer following non-investment. Furthermore, notice that the buyer's opportunity set following investment, $F_X = [0, 100 - X]$, becomes less generous as the outside option X increases. Given this, we postulate that the higher the outside option, the buyer offers a lower premium price following the seller's investment, meaning that Z is decreasing in X . This is our second conjecture.

⁴ The formal definitions of the two partial orderings and the two axioms can be found in Cox, Friedman, and Sadiraj (2008), sections 2- 4.

⁵ Axiom S (for the *status quo*) then states that the buyer's altruistic response will be stronger if the seller overturns the *status quo* budget set than when the *status quo* is upheld, making a distinction between acts of commission and omission. See Cox, Servátka, and Vadovič (2014) for a detailed discussion of Axiom S's implications.

Our third conjecture concerns the seller's non-investment decision. When the seller chooses not to invest in the outside option, he provides a more generous opportunity set ($G = [0, 100]$) instead of $F_X = [0, 100 - X]$) to the buyer, and hence the buyer's preferences will become less altruistic. Since $F_X = [0, 100 - X]$ becomes increasingly less generous as X increases, we postulate that the higher the foregone outside option, the more generous non-investment is.⁶ This, in turn, will make the buyer's preferences more altruistic, meaning that he will offer a higher p_{NI} as X increases.

3.2. Experimental design and testable hypotheses

The objective of the current experiment is to investigate the link between investment in outside options and other-regarding behavior. When calibrating our experiment, we relied on the previous findings from the ultimatum bargaining literature. Camerer (2003), who surveys the literature on ultimatum games, states that, on average, the proposers offer between 30-40 percent of the pie, and offers of 40-50 percent are rarely rejected. Offers below 20 percent or so are rejected about half the time (p. 49). Based on these results, we chose to implement three treatments in which we vary the outside option to be $X = 25, 35,$ and 65 tokens. 25 percent of the total pie is below the average offer and 35 percent is about average. 65 percent, on the other hand, represents a significant portion (almost two-thirds) and the change is likely to trigger the behavioral response that we set out to study. We decided to include the above three treatments in order to test for robustness of our findings with respect to small and large changes in the outside option.

Within this setup, our three conjectures that (1) the premium price Z is smaller than the offer following non-investment p_{NI} ; (2) Z is decreasing in X ; and (3) p_{NI} is increasing in X translate into the following testable hypotheses.

Hypothesis 1: $Z^X < p_{NI}^X$ for $X = 25, 35,$ and 65 .

Hypothesis 2: $Z^{25} > Z^{35} > Z^{65}$.

Hypothesis 3: $p_{NI}^{25} < p_{NI}^{35} < p_{NI}^{65}$.

⁶ A similar argument is presented in Dufwenberg and Gneezy (2000) and Cox, Servátka, and Vadovič (2010) with respect to behavior in the lost wallet game and in Brandts, Güth, and Stiehler (2006) in a three-player, pie-sharing game.

The experiment took place in the New Zealand Experimental Economics Laboratory (NZEEL) at the University of Canterbury, with 202 undergraduate students serving as subjects. The participants were selected randomly from the NZEEL database using the ORSEE recruitment system (Greiner, 2004). Each subject only participated in a single session of the study. All sessions were run under a single-blind social distance protocol, meaning there was full anonymity between the participants; the experimenters, however, could track subjects' decisions and identities. An experimental session lasted 60 minutes on average, including the initial instruction period and the payment of subjects. The experiment was programmed and conducted with the software z-Tree (Fischbacher, 2007). The subjects earned an average of NZD 17.61 (New Zealand dollars) including a NZD 5 show up fee.

Upon entering the laboratory, all participants were seated in cubicles. Neutrally framed instructions (provided in the Appendix) were handed out, projected on a screen, and read aloud. The subjects were informed that their earnings would be denoted in experimental currency units, referred to as *tokens*, and at the end of the experiment exchanged into New Zealand dollars using the following exchange rate: 1 token = NZD 0.30. The instructions explained that each participant would be randomly and anonymously paired with another person and that within each pair, one person was going to be randomly assigned to be the seller (in the subject instructions referred to as the 'First Mover') and the other person to be the buyer (the 'Second Mover'). The seller started the experiment with an endowment of 10 tokens and the buyer with 0 tokens.

The decisions were divided into three stages. In Stage 1, the seller had to decide whether to invest his 10 tokens in order to create an outside option of X tokens for himself in case he later rejected the buyer's offer made in Stage 2. If the seller invested, then his outside option was X tokens. If the seller did not invest, then his outside option was 0 tokens, but he got to keep the initial 10 tokens. In Stage 2, 100 tokens were made available to be split between the pair. The buyer decided how much out of 100 tokens to offer to the seller. The buyer got to keep the remainder only if the seller accepted the offer. We used the strategy method (Selten, 1967; Brandts and Charness, 2011) to elicit the buyer's behavior. Therefore, the buyer was not notified of the seller's investment decision until the end of the experiment and made an offer for both of the two possible scenarios, i.e., one if the seller had invested and his outside option was X tokens and the other if the seller had not invested and his outside option was 0 tokens. The two scenarios were presented to each buyer by the software in a random order. In Stage 3, the seller learned about the offer (either following investment or non-investment, depending on his own Stage 1 decision) and decided whether to accept it or reject it. If the seller accepted the buyer's offer, the 100 tokens were split according to the offer and the seller's outside option was irrelevant in this case. If the seller rejected the buyer's offer, the buyer

received 0 tokens. The seller received the outside option of X tokens if he had invested in Stage 1, and received 0 tokens if he had not invested.⁷

The parameterization of the game is presented in Figure 1. This game tree was *not* shown to the subjects.

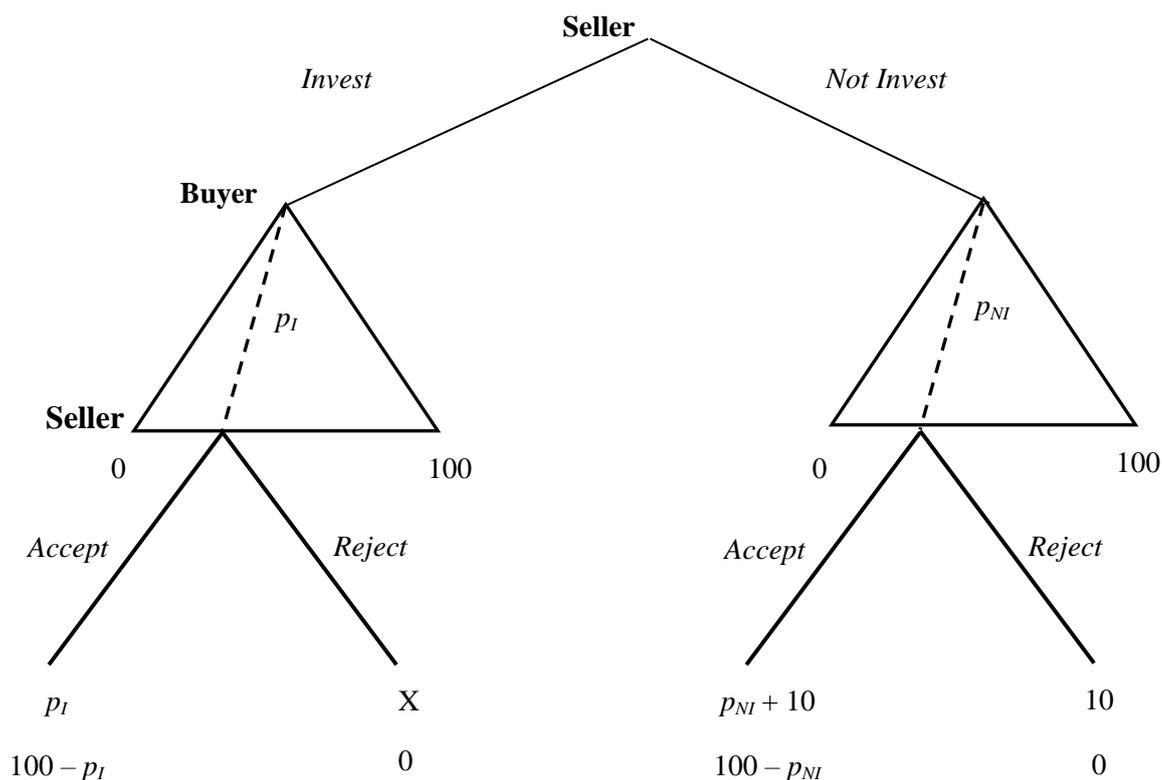


Figure 1. The game

In order to minimize confusion in the minds of subjects in this three-stage game, we opted to include four control questions, which all participants had to answer correctly before proceeding to the decision-making part.⁸ While the subjects were answering the control questions, the experimenters privately answered any questions and, if necessary, provided additional assistance and

⁷ Note that, this way, both movers made exactly two decisions. Asking the seller to accept/reject an offer under investment if he had not previously invested (or *vice versa*) would be unintuitive and could lead to confusion. Furthermore, asking the seller to provide a full strategy would be burdensome and time consuming, and could potentially dilute his attention to the decision that truly mattered for his payoffs.

⁸ The control questions along with subject instructions are provided in the Appendix.

explanation until the subject calculated all answers correctly. Then, the four scenarios were reviewed publicly by the experimenter and correct answers projected on the screen. Finally, during the decision-making part, the buyers had on their screens a calculator that would display their own as well as their paired seller's payoffs following acceptance and rejection of any offer they decided to input. At the end of the session, the subjects were asked to complete a short post-experiment questionnaire. Upon completion, all subjects were privately paid their earnings for the session.

4. Results and implications

4.1. Investment in the outside option and other-regarding behavior

Table 1 presents summary statistics of subject behavior in our three treatments. Since we used the strategy method to elicit the behavior of buyers (but not of sellers), we provide a detailed explanation of how the statistics were calculated. We use treatment $X = 25$, presented in the first column, as an example. Thirty-four subject pairs participated in this treatment. Fifteen out of thirty-four sellers invested, yielding an investment rate of 44.1%. The thirty-four buyers offered, on average, 39.68 tokens, contingent upon their paired seller's investment. The average premium price, Z , is equal to $39.68 - X = 14.68$. The fifteen sellers who actually invested in Stage 1 learned about their paired buyers' offers following investment, and thirteen of them accepted their respective offers, resulting in an average accepted offer of 44.00 tokens. Two of the fifteen sellers rejected their respective offers, resulting in a rejection rate of 13.3% and the rejected average offer of 28.00 tokens.

The buyers offered, on average, 37.94 tokens contingent upon non-investment (again, averaged over all thirty-four of them due to the strategy method). Nineteen sellers who chose not to invest in Stage 1 learned about their paired buyers' offers following non-investment, and eighteen of them accepted their respective offers, resulting in an average accepted offer of 37.83 tokens. One of the nineteen sellers rejected his/her paired buyer's offer of 20.00 tokens, resulting in a rejection rate of 5.3%. The distributions of offers following investment and non-investment are presented graphically in Figures 2a and 2b, respectively.

Table 1. Summary statistics

Treatment	X = 25 (34 obs.)	X = 35 (35 obs.)	X = 65 (32 obs.)
Investment rate	15/34 (44.1%)	20/35 (57.1%)	27/32 (84.4%)
Behavior following investment			
Average offer: p_I	39.68 (st. dev. = 9.91)	43.94 (st. dev. = 8.92)	56.22 (st. dev. = 15.70)
Median offer	40	45	65
Average premium price: $Z = p_I - X$	14.68	8.94	-8.78
Average accepted offer	44.00 (st. dev. = 5.55)	45.78 (st. dev. = 3.46)	64.11 (st. dev. = 3.29)
Median accepted offer	45	45	66
Rejection rate	2/15 (13.3%)	2/20 (10%)	9/27 (33.3%)
Average rejected offer	28.00 (st. dev. = 1.41)	39.00 (st. dev. = 1.41)	46.11 (st. dev. = 15.16)
Behavior following non-investment			
Average offer: p_{NI}	37.94 (st. dev. = 11.29)	38.09 (st. dev. = 12.23)	45.13 (st. dev. = 21.87)
Median offer	40	40	50
Average accepted offer	37.83 (st. dev. = 11.00)	40.08 (st. dev. = 10.68)	28.00 (st. dev. = n/a)
Median accepted offer	40	40	28
Rejection rate	1/19 (5.3%)	2/15 (13.3%)	4/5 (80%)
Average rejected offer	20.00 (st. dev. = n/a)	12.50 (st. dev. = 3.54)	16.25 (st. dev. = 9.46)

The average offer is averaged over decisions of all buyers due to the strategy method. The average accepted offer following investment (non-investment) is averaged only over the accepted offers by the sellers who actually chose to invest (not to invest). The average rejected offer is calculated analogously.

Hypothesis 1 states that the premium price Z is smaller than the offer following non-investment p_{NI} . A quick look at the average values of Z and p_{NI} presented in Table 1 reveals that p_{NI} is indeed greater than Z for all treatments. The Wilcoxon signed-rank test for paired samples detects that this difference is statistically significant for all three within-treatment comparisons (p-value < 0.001 in all three cases).

Result 1: The measure of the buyer’s altruism following the seller’s investment (Z) is smaller than the measure of the buyer’s altruism following non-investment (p_{NI}).

Hypothesis 2 states that the offer following investment minus the outside option (Z) is decreasing in the outside option, that is, $Z^{25} > Z^{35} > Z^{65}$. The sixth row of the “Behavior following investment” panel in Table 1 presents the average value of Z for the three treatments. It is evident that Z decreases as the outside option increases. The Jonckheere-Terpstra non-parametric test confirms that this is indeed the case (p-value < 0.001).⁹ The non-parametric Mann-Whitney ranksum test, presented in the third row of Table 2, provides further support that Z^{25} is significantly higher than both Z^{35} and Z^{65} (p-value = 0.013 and < 0.001, respectively) and Z^{35} is significantly higher than Z^{65} (p-value < 0.001).¹⁰ These test results are robust to using the accepted offers only. The Jonckheere-Terpstra test detects that $Z^{25} > Z^{35} > Z^{65}$ at p-value < 0.001. Z^{25} is significantly higher than both Z^{35} and Z^{65} , and Z^{35} is significantly higher than Z^{65} , all at p-value < 0.001. The summary statistics for accepted offers are presented in Table 1.¹¹

Result 2: The buyer’s offer following the seller’s investment minus the outside option is decreasing in the size of the outside option.

⁹ The Jonckheere-Terpstra test is a test for ordered hypotheses for an across-subject design that allows for *a priori* ordering of the populations from which the samples are drawn.

¹⁰ An interested reader might be curious about the statistical comparison of offers (p_I ’s) themselves. We find that offers following investment in treatment $X = 25$ are significantly lower than in $X = 35$ (p-value = 0.055) and in $X = 65$ (p-value < 0.001) and that offers in $X = 35$ are significantly lower than in $X = 65$ (p-value < 0.001).

¹¹ Regarding accepted offers themselves (rather than premium prices) following investment, we find no statistical difference between accepted offers in treatments $X = 25$ and $X = 35$ (p-value = 0.455). The accepted offers in $X = 65$ are higher than in $X = 25$ as well as in $X = 35$ (p-value < 0.001 in both cases).

Table 2. Statistical tests for treatment differences

	X = 25 v. X = 35	X = 25 v. X = 65	X = 35 v. X = 65
Investment rate ^a	(0.339)	(0.001)	(0.018)
Offers following investment (p_I)	$z = 1.92$ (0.055)	$z = 4.89$ (0.000)	$z = 4.58$ (0.000)
Offers following investment minus outside option ($p_I - X$)	$z = -2.48$ (0.013)	$z = -6.27$ (0.000)	$z = -6.43$ (0.000)
Offers following non-investment (p_{NI})	$z = -0.16$ (0.870)	$z = 1.94$ (0.053)	$z = 2.06$ (0.040)

^a Fisher's exact test; z-statistic for Mann-Whitney ranksum test; p-values in parentheses.

Our third hypothesis concerns the effect that a foregone outside option has on the buyer's offer, i.e., whether p_{NI} increases as the outside option increases. We begin by testing the ordered hypothesis that $p_{NI}^{25} < p_{NI}^{35} < p_{NI}^{65}$. The Jonckheere-Terpstra test provides strong overall support for this hypothesis (p-value = 0.030).

Result 3: The buyer's offer following the seller's non-investment is increasing in the size of the outside option.

Next, we investigate whether the relative change in the size of the outside option has any effect on p_{NI} by performing pair-wise treatment comparisons. First, we compare offers following non-investment in $X = 25$ and $X = 35$ treatments and observe that the Mann-Whitney test, presented in the fourth row/first column of Table 2, finds no statistical difference between the two treatments (p-value = 0.870). This result is robust to comparing the accepted offers following non-investment only (p-value = 0.761).

Result 4: For a low outside option, the buyer's offer following non-investment is unaffected by an increase in the size of the outside option.

Finally, we test whether the offer following non-investment is higher in treatment $X = 65$ than in treatment $X = 35$, i.e., whether $p_{NI}^{65} > p_{NI}^{35}$. The Mann-Whitney test presented in the fourth

row/third column of Table 2 reports that the difference is statistically significant (p -value = 0.040). Note that we cannot meaningfully conduct the robustness check on accepted offers, as following non-investment there is only one accepted offer in $X = 65$.

Result 5: For a high outside option, the buyer's offer following non-investment increases with the size of the outside option.

Our data thus provide some support that as the foregone outside option increases, the buyer's conditional altruism increases, which in turn results in a higher offer being made to the seller. The evidence, however, is not as strong as with the premium price offered on top of the outside option. There are at least a couple of (*ex-post*) explanations for why this is the case. The first explanation is tied to Axiom S of Revealed Altruism theory, which draws a distinction between acts of commission and acts of omission. Axiom S states that if a decision of an agent overturns the *status quo* (which is an act of commission), then for individuals with preferences consistent with Axiom R (i.e., reciprocal people), the reciprocal response will be stronger than when the *status quo* is upheld (an act of omission). While in our experiment we have not taken any steps to make the *status quo* particularly salient, one might argue that the *status quo* is the lack of investment, meaning that a person who does not invest commits an act of omission as opposed to investment, which would be considered an act of commission. For a more detailed discussion, see Cox, Friedman, and Sadiraj (2008) and Cox, Servátka, and Vadovič (2014).

The second explanation is related to the fact that in the presence of other-regarding preferences, the buyer would offer a strictly positive price, denoted p' , even in the absence of the seller's decision to invest in the outside option (the benchmark case discussed above). It is then possible that the seller's non-investment conveys no sense of generosity when the foregone outside option is less than p' . This is quite plausible, especially in light of the already mentioned observation by Camerer (2003), who concludes that in ultimatum bargaining the proposers offer between 30-40 percent of the pie on average. Given that, investment in the outside option in our $X = 25$ treatment might not be "salient" in the sense that the buyers do not view it as bindingly restricting their opportunity set.

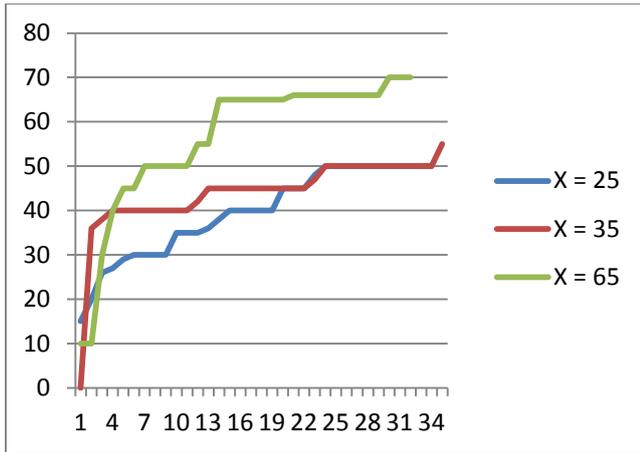


Figure 2a. Offers following investment

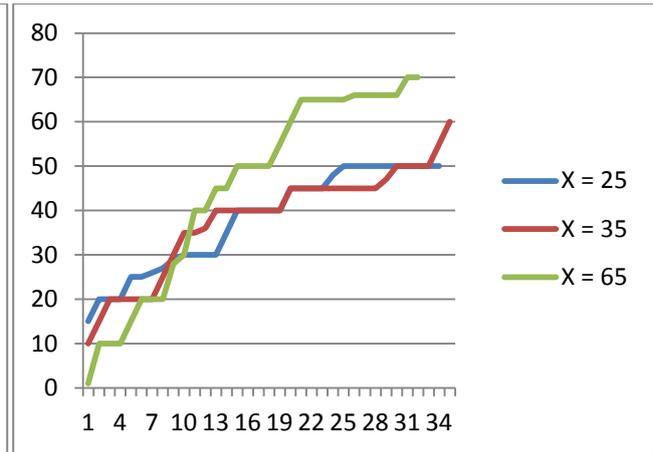


Figure 2b. Offers following non-investment

We conclude this subsection with one final observation. When one inspects the increase in average offers following investment across treatments (from 39.68 to 43.94 and 56.22), this increase is not commensurate with the increase in the outside option (from 25 to 35 and 65, respectively). This observation is in line with the result of Anbarci and Feltovich (2013), who study the responsiveness to changes in bargaining position and find that an exogenous increase in the disagreement payoff in a Nash demand game and Unstructured bargaining game leads to a smaller increase in the final payoff than predicted by the standard theoretical techniques used for analyzing bargaining situations.

In our experiment, the outside option is created endogenously, as it is the seller who decides whether to invest in the outside option or not. A key idea of our paper is that the seller's investment in the outside option decreases the buyer's (conditional) altruism if the buyer views the investment as opportunistic. Based on this idea, we test behavioral hypotheses derived from the logic of Revealed Altruism theory. In contrast, in Anbarci and Feltovich's setup the disagreement payoffs are given exogenously to test the predictions of standard bargaining theories. Anbarci and Feltovich find that their experimental results do not support these predictions and then illustrate that a model of other-regarding preferences can explain their main experimental results.

4.2 Profitability of investment in the outside option

We next analyze the profitability of investment in the outside option. The seller's net return from investment is $\max\{X + Z, X\} - F$ as he can accept the buyer's offer or, if the offer is smaller

than the outside option, take the outside option. The investment is therefore profitable when $\max\{X + Z, X\} - F > p_{NI}$. The standard economic theory assuming self-regarding preferences predicts that $Z = p_{NI} = 0$, and hence $X > F$ implies $p_I - p_{NI} > F$. The link between investment in the outside option and other-regarding behavior, however, suggests that $Z - p_{NI}$ can be negative because Z is decreasing and p_{NI} is increasing (at least weakly) in X , implying that $p_I - p_{NI}$ may be less than F , even though $X > F$.

In what follows, we investigate whether the seller becomes worse off by investing.¹² Let us start with treatment $X = 25$. The average p_{NI} is 37.94 tokens, while the average p_I is 39.68 tokens. Since the average p_I is greater than the outside option $X = 25$, the seller's average net return from investment is $39.68 - 10 = 29.68$ tokens, which is lower than the average p_{NI} (p-value < 0.001 ; Wilcoxon signed-rank test for paired samples). This means that the seller is worse off by investing in the outside option if the outside option is low. When $X = 35$, the average p_{NI} is 38.09 tokens, while the average p_I is 43.94 tokens, which is greater than the outside option $X = 35$. Hence, the seller's average net return from investment is $43.94 - 10 = 33.94$ tokens, which is lower than the average p_{NI} (p-value = 0.014; Wilcoxon signed-rank test for paired samples). Treatment $X = 35$ thus provides further evidence that it is not profitable to invest in a low outside option.

Finally, when $X = 65$, the average p_{NI} is 45.13 tokens, while the average p_I is 56.22 tokens. The difference, $56.22 - 45.13 = 10.09$, is roughly equal to $F = 10$, suggesting that the offer following investment is just high enough to recover the investment cost. In fact, the Wilcoxon signed-rank test for paired samples does not detect a statistically significant difference between $p_I - p_{NI}$ and F (p-value = 0.280). Rather than accepting p_I , however, the seller can choose to reject it and pocket $X = 65$. The net payoff of $X - F = 55$ is weakly statistically significantly greater than p_{NI} (p-value = 0.097).

Our findings can be summarized as follows.

Result 5: It is not profitable for the seller to invest in a low outside option. If the outside option is high, the offer following investment is just high enough to recover the investment cost. The seller can, however, choose to exercise the outside option and become better off than if he had not invested.

If the seller becomes worse off, or does not become better off by investing in the (relatively low) outside option, then costly solutions such as vertical integration and contracts to prevent *ex-post*

¹² In the analysis that follows, we abstract from rejections and consider all offers made by the buyers, as this is a more accurate test of whether investment pays off. Nevertheless, we also conducted the tests on accepted offers only and found the result that the seller is not better off by investing to be robust for $X = 25$ and $X = 35$ treatments (the Mann-Whitney test p-value = 0.254 and 0.062, respectively). Recall that in $X = 65$ there was only one accepted offer following non-investment, and hence we cannot perform any meaningful test for this treatment.

opportunism may be unnecessary. To better understand this point, let us consider the following variant of our setup. Suppose that, prior to Stage 1, in Stage 0, the seller decides whether or not to sign a fixed-price contract that forces the buyer to offer $p = X$ and the seller to accept the offer. If the seller signs the contract, there is no point for him to invest in the outside option because he must accept the buyer's offer $p = X$. To sign the contract, the seller must incur a fixed cost $K < F$. If the seller decides not to sign the contract, the rest of the interaction remains exactly the same as above. If agents care only about their monetary payoff, the seller's net return will be $X - K$ if he signs the contract, and $X - F$ otherwise. Given $K < F$, the seller will sign the contract. That is, the contract, although costly, is a useful tool to prevent the opportunistic behavior because the contracting cost is less than the cost to invest in the outside option.

Our experimental findings, however, suggest that the seller may not sign the contract when agents are other-regarding. As an illustration, let us consider the case of $X = 35$. Suppose that, if the seller does not sign the contract, the buyer's offer following investment is $p_I = 43.94$ and the offer following non-investment is $p_{NI} = 38.09$. Notice that $p_I = 43.94$ and $p_{NI} = 38.09$ are the average values we found in our experiment when $X = 35$. If the seller does not sign the contract, he will not invest in the outside option and his net return will be 38.09. If the seller signs the contract, his monetary return is $35 - K$, which is less than 38.09. Hence, in this example, the costly contracting is not needed to prevent the opportunistic behavior in the presence of other-regarding preferences. Note, however, that this is just an example of a possibility based on the assumption that the buyers choose average values found in our experiment if the seller does not sign the contract in Stage 0. The presence of Stage 0 itself, however, might affect their behavior in subsequent stages even if the seller chooses not to sign the contract in Stage 0. Although a natural progression of the current study, this part is outside of the scope of this paper and we leave it for future research.

5. Summary and conclusion

An agent often invests in an outside option in bilateral trade relationships to improve his bargaining position. In our setup, the standard economic theory predicts that the buyer will capture the entire trade surplus by making a take-it-or-leave-it offer to the seller, and, anticipating this, the seller will invest in the outside option as long as the net return on investment is positive. It is well known, however, that agents often care for others to some degree rather than being completely self-regarding, as the standard theory assumes. The seller may then become worse off by investing in the outside option if the investment has negative impacts on the buyer's other-regarding behavior towards the seller.

This paper offers a new perspective on the analysis of *ex-post* opportunistic behavior, a key concept in the theory of the firm, by experimentally investigating its link to other-regarding behavior. In our laboratory experiment, we test conjectures based on the idea that the seller's investment in the outside option weakens the buyer's altruism towards the seller, whereas the seller's non-investment strengthens it. Our results provide overall support for our conjectures, and suggest that the seller may become worse off by investing in the outside option, even though the standard theory predicts otherwise. In fact, in two out of three implemented parameterizations, sellers become worse off on average by investing in the outside option. Costly means, such as vertical integration or contracts, to prevent *ex-post* opportunistic behavior may therefore be unnecessary in the presence of other-regarding behavior.

We conclude the paper by pointing out three directions for future research. First, as mentioned in the previous section, one can study an extension of our setup in which the seller and the buyer have an option of writing a contract or vertically integrate themselves to prevent *ex-post* opportunism. Such experimental studies would yield useful implications for roles that other-regarding behavior can play in the design of governance structures. Second, one might argue that while our experimental design perhaps applies to one-person firms (e.g., the trucking industry example studied by Baker and Hubbard, 2004), in everyday life, there also exist firms with complicated organizational structures and sophisticated decision-making processes. While in laboratory experiments it is possible to use groups as decision-makers as first approximations, it is not obvious how these groups are supposed to make decisions, whether this is done by unanimous/majority voting, selecting a leader who has the final word, etc. We view this as a fruitful avenue for future experimental research on firms' governance structures and resulting behavior. Third, carefully designed field experiments to address our research questions would strengthen real-world relevance of the present paper's findings.

References

Anbarci, N. and N. Feltovich. 2013. "How sensitive are bargaining outcomes to changes in disagreement payoffs?" *Experimental Economics* 16 (4), 560-596.

Baker, G. and T. Hubbard. 2004. "Contractibility and asset ownership: on-board computers and governance in U.S. trucking," *Quarterly Journal of Economics* 119, 1443–1479.

Brandts, J. and G. Charness. 2000. "Hot and cold decisions and reciprocity in experiments with sequential games," *Experimental Economics*, 2(3), 227-238.

Brandts, J., W. Güth, and A. Stiehler. 2006. "I want YOU! An experiment studying motivational effects when assigning distributive power," *Labour Economics* 13, 1–17.

- Cai, H. 2003. "A theory of joint asset ownership," *Rand Journal of Economics*, 34, 62-76.
- Camerer, C. 2003. *Behavioral Game Theory: Experiments in Strategic Interaction*, Princeton University Press.
- Cooper, D. J. and J. H. Kagel. 2010. "Other regarding preferences: A selective survey of experimental results." In *Handbook of experimental economics* (eds Roth A., Kagel J. H.). Princeton, NJ: Princeton University Press.
- Cox, J. C., D. Friedman, and V. Sadiraj. 2008. "Revealed altruism." *Econometrica*, 76, 31-69.
- Cox, J. C., M. Servátka, and R. Vadovič. 2010. "Saliency of outside options in the lost wallet game," *Experimental Economics*, 13(1), 66-74.
- Cox, J. C., M. Servátka, and R. Vadovič. 2014. "Status quo effects in fairness games: Reciprocal responses to acts of commission vs. acts of omission," University of Canterbury working paper.
- Dufwenberg, M. and U. Gneezy. 2000. "Measuring beliefs in an experimental lost wallet game," *Games and Economic Behavior*, 30, 163-82.
- Falk, A. and M. Kosfeld. 2006. "The hidden Costs of Control," *American Economic Review*, 96(5), 1611-1630.
- Gibbons, R. 2005. "Four Formal(izable) Theories of the Firm?" *Journal of Economic Behavior and Organization*, 58(2), 200-245.
- Greiner, B. 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.
- Holmstrom, B. and J. Tirole. 1991. "Transfer Pricing and Organizational Form," *Journal of Law, Economics, and Organization*, 7, 201-228.
- Klein, B., R. G. Crawford, and A. A. Alchian. 1978. "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process." *Journal of Law and Economics*, 21(2), 297-326.
- Oosterbeek, H., J. Sonnemans, and S. van Velzen. 2003. "The Need for Marriage Contracts: An Experimental Study." *Journal of Population Economics*, 16, 431-453.
- Oosterbeek, H., R. Sloof, and J. Sonnemans. 2011. "Rent-seeking Versus Productive Activities in a Multi-task Experiment," *European Economic Review* 55, 630-643.
- Selten, R. 1967. Die Strategiemethode zur Erforschung des eingeschränkt rationale Verhaltens im Rahmen eines Oligopol-experiments," in H. Sauer mann (ed.), *Beiträge zur experimentellen Wirtschaftsforschung*, Tübingen: Mohr, 136-168.
- Shelanski, H. A. and P. G. Klein. 1995. "Empirical Research in Transaction Cost Economics: A Review and Assessment." *Journal of Law, Economics, and Organization*, 11(2): 335-361.
- Whinston, M. 2003. On the transaction cost determinants of vertical integration. *Journal of Law, Economics, and Organization* 19, 1-23.
- Williamson, O. 1979. "Transaction-Cost Economics: The Governance of Contractual Relations." *Journal of Law and Economics*, 22(2): 233-261.
- Williamson, O. 1985. *The Economic Institutions of Capitalism*. Free Press.

Appendix: INSTRUCTIONS (*Treatment X = 25*)

No Talking Allowed

Thank you for coming. The purpose of this session is to study how people make decisions in a particular situation. From now until the end of the session, unauthorized communication of any nature with other participants is prohibited. If you violate this rule we will have to exclude you from the experiment and from all payments. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Earnings

Every participant will get \$5 as a show up fee and, in addition, have the opportunity to earn money in the experiment. Your final experimental earnings will depend on your decisions and on the decisions of others. The earnings will be denoted in experimental currency referred to as *tokens*. Upon completion of the experiment, all tokens will be exchanged into dollars using the following exchange rate: 1 token = \$0.30. Notice that the more tokens you earn, the more dollars you will receive. All the money will be paid to you in cash at the end of the experiment.

Anonymity

You will be randomly paired with another person. No one will learn the identity of the person (s)he is paired with. Because your decision is private, we ask that you do not tell anyone your decision or your earnings either during or after the experiment.

Pairing and Roles

Within each pair, one person is going to be randomly assigned to be the First Mover and the other person to be the Second Mover. 100 tokens are made available to be split between the First and the Second Mover. The 100 tokens are split only if the First Mover accepts the Second Mover's offer but the 100 tokens disappear if the First Mover rejects. The First Mover starts the experiment with 10 tokens. The Second Mover starts the experiment with 0 tokens. The decisions are divided into three stages:

Stage 1: The First Mover's Investment Decision

The First Mover decides whether or not to invest his/her 10 tokens in order to create an outside option of 25 tokens for himself/herself in case (s)he rejects the Second Mover's offer which will be made in the next stage.

- If the First Mover invests, then his/her outside option is 25 tokens.
- If the First Mover does not invest, then his/her outside option is 0 tokens. (However, the First Mover gets to keep the 10 tokens.)

Stage 2: The Second Mover's Offer

The Second Mover decides how much out of 100 tokens to offer to the First Mover. The Second Mover keeps the remainder only if the First Mover accepts the offer.

The Second Mover is not yet notified of the First Mover's investment decision. Hence each Second Mover makes a decision for both of the two possible First Mover's decisions:

- If the First Mover has invested and his/her outside option is 25 tokens.
- If the First Mover has not invested and his/her outside option is 0 tokens.

Note that the First Mover's decision will determine which decision of the Second Mover will be relevant. Therefore, please think about your decisions carefully.

Stage 3: The First Mover's Acceptance/Rejection

The First Mover learns about the offer, and either accepts it or rejects it.

- If the First Mover accepts the Second Mover's offer, the 100 tokens is split according to the offer. The outside option is irrelevant in this case.
- If the First Mover rejects the Second Mover's offer, the Second Mover receives 0 tokens. The First Mover receives the outside option of 25 tokens if (s)he invested at Stage 1, and receives 0 tokens if (s)he did not invest at Stage 1 (in which case (s)he keeps the original 10 tokens).

Payment of Experimental Earnings

Once all participants have made their decisions, you will be shown a summary of your payoffs. Then you will be asked one by one to approach the experimenter in the room in the back of the lab for the payment of your experimental earnings. Are there any questions?

Practice Questions

Please answer the following questions:

1. If the First Mover invests his/her 10 tokens and the Second Mover offers 40 tokens which is accepted by the First Mover, what are the First Mover's final earnings?
What are the Second Mover's final earnings?
2. If the First Mover invests his/her 10 tokens and the Second Mover offers 40 which is rejected by the First Mover, what are the First Mover's final earnings?
What are the Second Mover's final earnings?
3. If the First Mover does not invest his/her 10 tokens and the Second Mover offers 40 tokens which is accepted by the First Mover, what are the First Mover's final earnings (including the starting 10 tokens)?
What are the Second Mover's final earnings?
4. If the First Mover does not invest his/her 10 tokens and the Second Mover offers 40 which is rejected by the First Mover, what are the First Mover's final earnings? (including the starting 10 tokens)
What are the Second Mover's final earnings?

Does Group Identity Prevent Inefficient Investment in Outside Options?

An Experimental Investigation

Hodaka Morita

School of Economics, UNSW Business School

University of New South Wales

h.morita@unsw.edu.au

Maroš Servátka

New Zealand Experimental Economics Laboratory

Department of Economics and Finance, University of Canterbury

maros.servatka@canterbury.ac.nz

November 1, 2014

Abstract: We study whether group identity helps mitigate inefficiencies associated with appropriable quasi-rents, which are often created by relationship-specific investments in bilateral trade relationships. Based on previous findings that group identity strengthens other-regarding preferences, we conjecture that group identity reduces agents' incentives to undertake *ex-post* opportunistic behavior such as investment in an outside option. Our experimental results, however, do not support this conjecture, and contrast with our previous experimental findings that group identity mitigates the hold-up problem associated with distortion in relation-specific investment. We discuss a possible cause of the difference, and its implications for the theory of the firm.

JEL Classification: C91, D20, L20

Keywords: altruism, appropriable quasi-rents, experiment, relation-specific investment, group identity, integration, opportunistic behavior, other-regarding preferences, outside option, theory of the firm, transaction cost economics

Acknowledgements: We are particularly grateful to Daniel Woods for excellent research assistance and to Richard Holden and Mike Waldman for helpful comments and suggestions. Hodaka Morita gratefully acknowledges financial support from the UNSW Business School and the Australian Research Council and Maroš Servátka from the College of Business and Economics, University of Canterbury.

1. Introduction

In bilateral trade relationships, relation-specific investment often creates appropriable quasi-rents (AQRs hereafter), where the value of trade within the relationship exceeds the value of outside trading opportunities. AQRs open up possibilities for socially inefficient actions (or opportunistic behavior) when contracts are incomplete. How can this inefficiency be resolved or mitigated? In the theory of the firm literature, integration between two parties has been studied intensively as a remedy for the problem (see Whinston, 2003 and Gibbons, 2005 for excellent discussions of this literature).

In our exploration of this important research question in the economic study of organizations, we focus on group identity, a central concept in social psychology, and test whether it could serve as a contributing factor in mitigating inefficiencies resulting from the existence of AQRs. According to the social identity theory, categorization of individuals as group members leads them to display in-group favoritism (Turner, 1975; Tajfel, 1978; Tajfel and Turner, 1979). Under integration, parties classify themselves as members of the same organization and share common goals, leadership, values, and practices. Organizational identification is often strengthened through the manipulation of symbols, traditions, and corporate culture in general (Ashforth and Mael, 1989, Camerer and Malmendier, 2007). Organizational identification is a specific form of social (or group) identification, which decreases the level of opportunism between members and facilitates better coordination and communication (Turner, 1982, 1984; Ashforth and Mael, 1989; Kogut and Zander, 1996).

We study the role of group identity, which is present when two parties are integrated within the same organizational boundary, in resolving or mitigating the problem of inefficiency associated with AQRs. Two main sources of inefficiency associated with AQRs are *ex-post* opportunistic behavior, explored in the transaction cost economics (Williamson, 1979, 1985; Klein, Crawford, and Alchian, 1978) and distortions in *ex-ante* investments, which are the main focus of the property-rights theory (Grossman and Hart, 1986; Hart and Moore, 1990). In the property-rights theory, AQRs created by relation-specific investments are shared between two parties through efficient bargaining. The surplus-sharing leads to inefficiency in relation-specific investments when contracts are incomplete, and the theory studies the roles of asset ownership in mitigating this *ex-ante* inefficiency. In contrast, the transaction cost economics focuses on *ex-post* inefficiency, where AQRs open up possibilities for *ex-post* opportunistic behavior, which can be prevented by vertical integration or contracts.

In Morita and Servátka (2013, henceforth ‘MS’), we experimentally investigate how group identity affects distortions in *ex-ante* investments, and find that group identity is capable of mitigating the hold-up problem. In the current paper, we focus on the other type of inefficiency and study how group identity affects *ex-post* opportunistic behavior.

As we point out in MS, one of the key contributions of the property-rights theory was that it gave a unified account of the costs and benefits of integration (Holmström and Roberts, 1998; Gibbons, 2005). In reality, however, incentives for relation-specific investment are provided by a variety of means, of which ownership is but one, as argued by Holmström and Roberts (1998). The present paper and MS together contribute to the theory of the firm literature by studying group identity, which is present under integration, as a factor that can influence incentives for *ex-ante*, relation-specific investment and *ex-post* opportunistic behavior.¹

The existing economics literature provides evidence that group membership can affect people's choices in both non-strategic and strategic environments (e.g., Akerlof and Kranton, 2000, 2002, 2005, 2008; Basu, 2005, 2010; Benabou and Tirole, 2011; Chen and Chen, 2011).² Crucial for our deliberations, Chen and Li's (2009) experiment shows that induced group identity affects other-regarding preferences – the underlying mechanism on which our conjecture that group identity mitigates the inefficiencies related to the existence of AQRs hinges. Our contribution to this literature is derived from applying the idea of group identity to the theory of the firm and especially from focusing on the importance of group identity in a particular strategic environment of haggling over AQRs. To the best of our knowledge, there is no previous experimental research, apart from MS, that studies the effects of group identity on inefficiencies associated with relation-specific investment.³

2. Theoretical framework and hypothesis

Investment in an outside option is an important example of *ex-post* opportunistic behavior, as pointed out, for instance, by Klein et al. (1978), who argue that in bilateral trade between a printing press company and a publisher, the publisher may decide to invest in the outside option by holding its own standby press facilities in order to increase its bargaining position against the printing press company.⁴ We incorporate the opportunistic behavior of investing in an outside option into the following simple interaction between a seller and a buyer. A potential gain from trade between the seller and the buyer, denoted by G , is available, where G is interpreted as AQRs. The agents interact

¹ See Section 2 of MS for a brief summary of the theory of the firm literature.

² For a review of the experimental economics literature on group identity, see MS. A detailed review of the social psychology literature on group identity can be found in Charness, Rigotti, and Rustichini (2007), Chen and Li (2009), and McDermott (2009).

³ In parallel to our research agenda, Boulu-Reshef (2013) discusses how the literature on identity can enhance the notion of social context in the theory of the firm literature. She then proposes an approach to improve our understanding of the relationships between the questions that are related to the firm and those that are related to identity. In this interesting conceptual paper, no experimental results or economic theoretical frameworks are presented.

⁴For other examples of *ex-post* opportunistic behavior, see Holmström and Tirol (1991), Baker and Hubbard (2004), and Cai (2003).

in three stages. In Stage 1, before the buyer makes a price offer, the seller decides whether to invest in an outside option at the cost F in case he later rejects the buyer's offer. If the seller invests, then his outside option is X , where $G > X > F$. If the seller does not invest, then his outside option is 0. In Stage 2, the buyer makes a take-it-or-leave-it offer p to the seller to divide the gain G . The buyer gets to keep the remainder $G - p$ only if the seller accepts the offer. In Stage 3, the seller learns about the offer and decides whether to accept or reject it. If the seller accepts the offer, he receives p and his outside option becomes irrelevant in this case. If the seller rejects the offer, he receives the outside option of X if he invested in Stage 1, and receives 0 otherwise. The buyer receives 0 regardless of the seller's investment.

The standard economic theory assuming self-regarding preferences predicts that the seller will invest in the outside option. To see this, suppose that the seller did not invest in Stage 1. The buyer would then offer $p = 0$, which would be accepted by the seller under the tie-breaking assumption that the seller behaves in favor of the buyer when the seller is indifferent between accepting and rejecting the offer. Similarly, if the seller invested in Stage 1, the buyer offers $p = X$. Anticipating this, the seller will invest in the outside option in Stage 1 because $X > F$. The seller's investment is opportunistic in the sense that it increases the seller's payoff from 0 to X by effectively reducing the buyer's payoff from G to $G - X$. The investment is inefficient because it adds no value to the seller's trade with the buyer, yet the buyer incurs the cost of investment, thereby reducing the total surplus. A key assumption in the transaction cost economics is that such inefficient, opportunistic behavior can be prevented or mitigated by vertical integration (with resulting bureaucratic costs). And a key hypothesis in the transaction cost economics is that larger returns from opportunistic behavior make integration more likely (see Klein et al., 1978; Whinston, 2003; Gibbons, 2005).⁵

In reality, agents often behave in other-regarding ways (see Camerer, 2003 and Cooper and Kagel, 2010 for nice surveys). The seller's investment in the outside option will have a negative impact on the buyer's other-regarding behavior if the buyer views the investment as opportunistic behavior. Consequently, the seller might become worse off by investing in the outside option.

To see this possibility, let us start from a benchmark case in which the seller has no option to invest in the outside option. To split the gain G , an altruistic or inequality-averse buyer would offer a strictly positive price, even if the seller accepts any non-negative offer $p \geq 0$. The seller may in fact, however, reject low-price offers because of his own inequality aversion. This would work in the direction of further increasing the buyer's offer, because, by doing so, the buyer can reduce the

⁵ See Shelanski and Klein (1995) for a survey of studies testing this hypothesis empirically.

probability of rejection. Let us now introduce a possibility for the seller to invest in the outside option. If the seller invested to establish the outside option of X , the buyer may offer more than X for reasons analogous to the reasons for a strictly positive price offered in the benchmark case. Let $p_I \equiv X + Z$ denote the buyer's offer following the seller's investment, where $Z (\geq 0)$ is a premium price on top of the outside option X resulting from the buyer's altruistic preferences. Similarly, if the seller did not invest, the buyer may offer more than zero. Let $p_{NI} (\geq 0)$ denote the buyer's offer following the seller's non-investment.

A self-regarding seller will be better off by investing if $p_I - p_{NI} = X + Z - p_{NI} > F$. In the presence of other-regarding preferences, however, $X > F$ does not necessarily imply $p_I - p_{NI} > F$. In fact, in Morita and Servátka (2014), we experimentally investigate this setup with $G = 100$, $F = 10$, and $X = 25, 35$, and 65 , and find that, on average, the seller is worse off by investing when $X = 25$ and 35 .

We postulate that group identity strengthens agents' other-regarding preferences, which in turn reduces their incentives to undertake *ex-post* opportunistic behavior. In our setup, this conjecture is translated into the following hypothesis.

Hypothesis: Inefficient investment in an outside option is less likely under group identity and more likely in the absence of group identity.

The logic behind this hypothesis is as follows. When the seller decides whether or not to invest, he does not know the values of $p_I \equiv X + Z$ and p_{NI} that the buyer will offer following investment and non-investment, respectively. Let us assume that the seller knows that p_I and p_{NI} are distributed according to certain distribution functions. Previous research shows that group identity strengthens agents' altruistic preferences towards group members (see, for example, Chen and Li, 2009). In our setup, this implies that group identity increases the buyer's altruism, and hence it increases p_{NI} and shifts the distribution of p_{NI} to the right. Regarding p_I , we postulate that investment in the outside option weakens the effect of group identity on the buyer's offer because the buyer views the seller's investment as opportunistic behavior. Group identity may still increase p_I and shift its distribution to the right, but we assume that the increment is less than it is in the case of p_{NI} . Then, in the presence of group identity, $p_I - p_{NI} < F$ is more likely to hold, which in turn implies that the seller is less likely to invest in the outside option. We test our hypothesis as well as the underlying assumptions in the following experiment.

3. Experiment design and procedures

The experiment took place in the New Zealand Experimental Economics Laboratory (NZEEL) at the University of Canterbury, with 228 undergraduate students serving as subjects. The participants were selected randomly from the NZEEL database using the ORSEE recruitment system (Greiner, 2004). An experimental session lasted 60 minutes on average, including the initial instruction period and the payment to subjects. The subjects earned an average of NZD 14.69 (New Zealand dollars) from the game, a NZD 5 show up fee, and, on average, NZD 3.54 for correctly answered questions about trivia in the *Same-Team* and *Different-Team* treatments.

In order to create strong group identity, we followed the procedure successfully introduced in MS.⁶ Upon entering the laboratory, all subjects were randomly divided into the Orange and Yellow teams, based on the color of the paper they drew from a large manila envelope. The subjects were then seated in cubicles, in the respective color rows. They were free to choose any seat within their rows. The experimenters then handed subjects their team-color t-shirts, representing team uniforms, and asked everyone to put them on. The subjects were also told they could keep their t-shirts after the experiment was over. Next, the teams were asked to stand up and verify that all their teammates were wearing the same color t-shirt.

Our experiment included three treatments in total: the *Same-Team* and *Different-Team* treatments were based on the pairing of subjects; in the *Baseline* treatment, there were no teams and therefore no group identity. The treatments were implemented in an across-subjects design in which each subject participates in one treatment only. Each of the first two treatments consisted of two tasks: (1) answering two questions about trivia; and (2) playing the one-shot bargaining game. In the *Baseline* treatment, subjects only played the bargaining game.

The two tasks were implemented as follows. The subjects were first given instructions to complete Task 1, which involved answering two questions about trivia. The instructions were projected on a screen and read aloud. Prior to answering the questions, the subjects were given the opportunity to communicate via online chat (programmed and conducted with z-Tree; Fischbacher,

⁶ Most of the experimental research in psychology that focuses on testing various aspects of social identity theory (Billig and Tajfel, 1973; Tajfel and Turner, 1979) employs the so-called minimal group paradigm of inducing a group identity in a laboratory setting. A minimal group consists of people who share only one social category and who have no social interaction. There are four criteria for a group to be minimal: 1. Random assignment based on a trivial criterion; 2. No social interaction; 3. Anonymous membership; and 4. No interdependence of interests (i.e., the decision task requires no link between the decision-maker's payoffs and his choices). The criterion for categorizing subjects into groups is therefore often trivial, such as a preference for Klee's or Kandinski's paintings or a tendency to overestimate or underestimate the number of dots on a screen. The minimal group paradigm was introduced by Tajfel, Billig, Bundy, and Flament (1971), who observed that categorization alone was sufficient to generate in-group favoritism. Two competing explanations, social categorization (Tajfel and Turner, 1986) and expectations of generalized reciprocity among in-group members (Yamagishi, Jin and Kiyonari, 1999; Yamagishi and Kiyonari, 2000), have emerged as potential mechanisms causing in-group favoritism. Most economic experiments violate the fourth criterion.

2007) for five minutes with their own team members about providing and receiving help with the questions. That is, in both *Same-Team* and *Different-Team* treatments, a person in the Orange Team could chat with all remaining subjects in the Orange Team and a person in the Yellow Team could chat with all remaining subjects in the Yellow Team. After the chat was over, all subjects individually submitted their answers. The purpose of this task was to strengthen group identity (see Yamagashi and Kiyonari, 2000; Eckel and Grossman, 2005; Chen and Li, 2009; and Chen and Chen, 2011). Since in the *Baseline* treatment there were no teams, we decided not to include this task either because it could create a sort of group identity among the subjects participating in the same session. Note that the objective of the current design was to create a sufficiently strong group identity to test our research question, not to separate out the effects of wearing the same color t-shirts on subject behavior. This other question is explored in detail in MS.

Our experimental design thus included three key features to induce group identity: categorization of subjects into either the Yellow Team or Orange Team, usage of t-shirts representing team uniforms, and cooperation to achieve the same goal – answering questions about trivia. As discussed in MS, these are important means through which group identity is created and strengthened when two parties are integrated within the same organizational boundary.⁷ Note that the conjecture that we tested in the experiment hinged crucially on a strong identification with the team. Therefore, we did not follow the minimal group paradigm but rather strove to create a group identity that was sufficiently strong to answer our research question.

In the instructions for Task 1, subjects were told they would be paid NZD 3 for each correct answer, but would not find out the results until the end of the experiment. This was done to control for the level of created group identity that could vary in the event that an individual received poor advice from a team member. Once all subjects answered both questions, the experimenters collected their answer sheets.

Next, neutrally framed instructions for Task 2 were handed out, projected on a screen, and read aloud. In the *Same-Team* treatment, subjects were informed that each person from the Yellow Team would be randomly paired with another person from the Yellow Team and each person from the Orange Team with another from the Orange Team. In the *Different-Team* treatment, subjects were informed that each person from the Yellow Team would be randomly and anonymously paired

⁷ Social psychology research shows that symbols, such as uniforms, reinforce group identity and enhance cooperation among in-group members by differentiating them from out-group members. Uniforms provide a clear way of identifying group boundaries and thus allow for achieving the benefits of cooperation without the risk of excessive costs by limiting altruistic behavior towards in-group members. Social psychologists describe an in-group as a bounded community of mutual and depersonalized expectations of cooperation. Such expectations motivate adherence to in-group norms and promote behavior that ensures that one is recognized as an in-group member (Brewer, 1981, 1999).

with a person from the Orange Team. When the decision-making part of Task 2 started, subjects were reminded about their pairing – either with another member of their own team or with someone from the other team, depending on the treatment. Recall that in the *Baseline* treatment, there were no teams. In all treatments, it was emphasized that no participant would learn the identity of the paired person and that the experimenters would keep track of all decisions using ID numbers.

In the instructions, the subjects were informed that their earnings would be denoted in experimental currency referred to as *tokens*, and at the end of the experiment exchanged into dollars using the following exchange rate: 1 token = NZD 0.30. The instructions explained that within each pair, one person was going to be randomly assigned to be the seller (referred to as the ‘First Mover’ in the instructions) and the other person to be the buyer (the ‘Second Mover’). The seller started the experiment with an endowment of 10 tokens and the buyer with 0 tokens.

The decisions were divided into three stages. In Stage 1, the seller had to decide whether to invest his 10 tokens in order to create an outside option of X tokens for himself in case he later rejects the buyer’s offer made in Stage 2. If the seller invested, then his outside option was 25 tokens. If the seller did not invest, then his outside option was 0 tokens, but he got to keep the initial 10 tokens. In Stage 2, 100 tokens were made available to be split between the pair. The buyer decided how much out of the 100 tokens to offer to the seller. The buyer got to keep the remainder only if the seller accepted the offer.

We used the strategy method (Selten, 1967) to elicit buyers’ behavior. Therefore, the buyer was not notified of the seller’s investment decision until the end of the experiment and made an offer for both of the two possible scenarios, i.e., one if the seller had invested and his outside option was 25 tokens and the other if the seller had not invested and his outside option was 0 tokens.⁸ The two scenarios were presented to each buyer by the software in a random order. In Stage 3, the seller learned about the offer (either following investment or non-investment, depending on his own Stage 1 decision) and decided whether to accept it or reject it. If the seller accepted the buyer’s offer, the 100 tokens were split according to the offer and the seller’s outside option was irrelevant in this case. If the seller rejected the buyer’s offer, the buyer received 0 tokens. The seller received the outside option of X tokens if he had invested in Stage 1, and received 0 tokens if he had not invested. Note that, this way, both subjects made exactly two decisions. Asking the seller to accept/reject an offer under investment if he had not previously invested (or *vice versa*) would be quite unintuitive

⁸ This does not mean that the buyer’s decisions were hypothetical, but rather that the payoff relevance was determined by the decision of the seller. Brandts and Charness (2011) survey the studies comparing the strategy with the direct-response method and find that in a vast majority of the surveyed experiments, the strategy method induces results similar to those induced by the direct-response method. The advantage of the strategy method is that it also allows for obtaining decisions at nodes that are not reached in the actual course of play.

and could possibly lead to confusion. Also, asking the seller to provide a full strategy would be burdensome and time consuming and could potentially dilute his attention to the decision that truly mattered for his payoffs.

The parameterization of the game is presented in Figure 1. This game tree was *not* shown to the subjects.

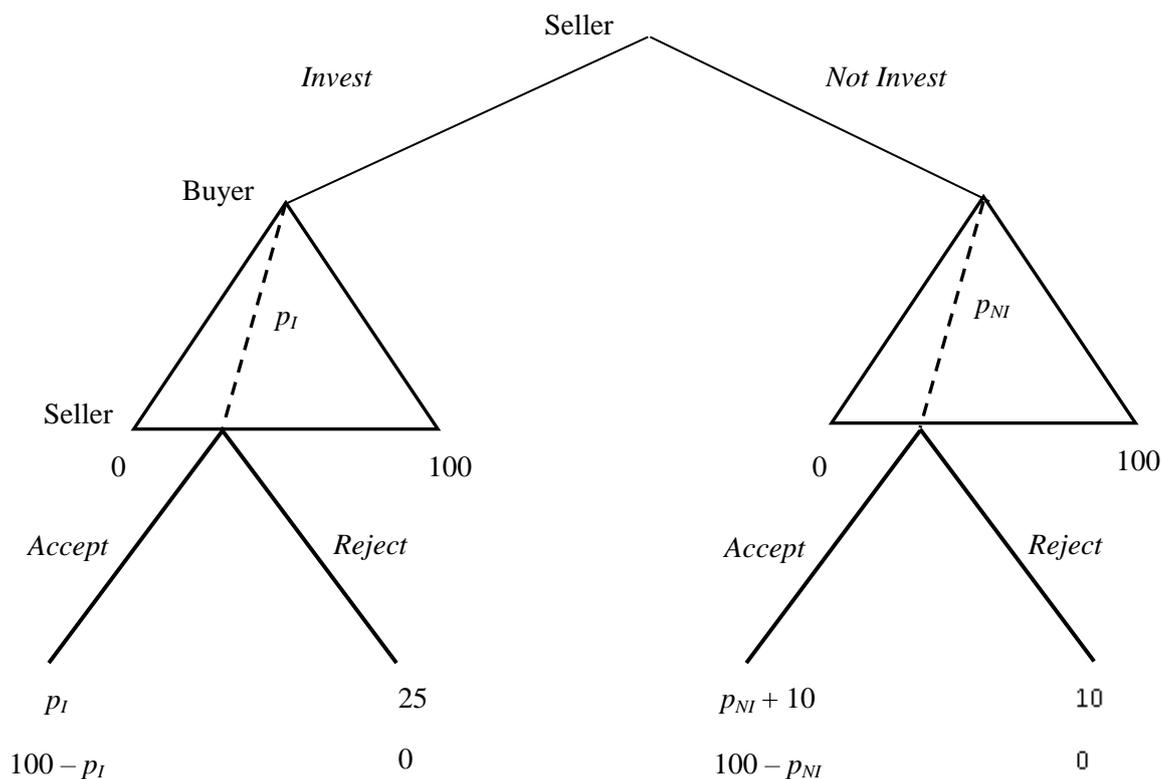


Figure 1. The game

In order to minimize confusion in the minds of subjects in this three-stage game, we opted to include four control questions (provided in the Appendix along with subject instructions and questions about trivia), which all participants had to answer correctly before proceeding to the decision-making part. While the subjects were answering the control questions, the experimenters privately answered any questions and, if necessary, provided additional assistance and explanation until the subject calculated all answers correctly. Then, the four scenarios were reviewed publicly by the experimenter and correct answers were projected on the screen. During the decision-making part, the buyers had on their screens a calculator that would display their as well as their paired seller's payoffs following acceptance and rejection for any offer they decided to input. At the end of the

session, the subjects were asked to complete a short, post-experiment questionnaire. Upon completion, all subjects were privately paid their earnings for the session.

4. Results

Table 1 presents summary statistics of subject behavior in the *Same-Team*, *Different-Team*, and *Baseline* treatments.⁹ Since we used the strategy method to elicit the behavior of buyers, but not of sellers, we provide a detailed explanation of how the statistics were calculated. We use the *Same-Team* treatment, presented in the first column, as an example. Thirty-eight subject pairs participated in this treatment. Seventeen out of thirty-eight sellers actually invested, yielding an investment rate of 44.7%. The thirty-eight buyers offered, on average, 41.13 tokens, contingent upon their paired seller's investment. The average premium price, Z , is equal to $41.13 - X = 16.13$. The seventeen sellers who actually invested in Stage 1 learned about their paired buyers' offers following investment, and fourteen of them accepted their respective offers, resulting in an average accepted offer of 41.29 tokens. Three of the seventeen sellers rejected their respective offers, resulting in a rejection rate of 17.6% and a rejected average offer of 20.00 tokens.

The buyers offered, on average, 39.87 tokens contingent upon non-investment (again, averaged over all thirty-eight of them due to the strategy method). Twenty-one sellers who chose not to invest in Stage 1 learned about their paired buyers' offers following non-investment, and twenty of them accepted their respective offers, resulting in an average accepted offer of 42.50 tokens. One of the twenty-one sellers rejected his/her paired buyer's offer of 45 tokens, resulting in a rejection rate of 4.8%. The distributions of offers following investment and non-investment are presented graphically in Figures 2a and 2b, respectively.

⁹ The data from the *Baseline* treatment have been previously reported in Morita and Servátka (2014) in the $X = 25$ treatment.

Table 1. Summary statistics

Treatment	<i>Same-Team</i> (38 obs.)	<i>Different-Team</i> (42 obs.)	<i>Baseline</i> (34 obs.)
Investment rate	17/38 (44.7%)	17/42 (40.5%)	15/34 (44.1%)
Behavior following investment			
Average offer: p_I	41.13 (st. dev. = 9.67)	43.29 (st. dev. = 11.31)	39.68 (st. dev. = 9.91)
Median offer	41.50	45	40
Average premium price: $Z = p_I - X$	16.13	18.29	14.68
Average accepted offer	41.29 (st. dev. = 7.65)	49.69 (st. dev. = 13.96)	44.00 (st. dev. = 5.96)
Median accepted offer	41.50	47.50	45
Rejection rate	3/17 (17.6%)	1/17 (5.9%)	2/15 (13.3%)
Average rejected offer	20.00 (st. dev. = 15.00)	35.00 (st. dev. = n/a)	28.00 (st. dev. = 1.41)
Behavior following non-investment			
Average offer: p_{NI}	39.87 (st. dev. = 10.36)	42.74 (st. dev. = 12.60)	37.94 (st. dev. = 11.29)
Median offer	45	45	40
Average accepted offer	42.50 (st. dev. = 7.52)	39.09 (st. dev. = 9.34)	37.83 (st. dev. = 12.09)
Median accepted offer	45	42.50	40
Rejection rate	1/21 (4.8%)	2/25 (8%)	1/19 (5.3%)
Average rejected offer	45.00 (st. dev. = n/a)	30.00 (st. dev. = 0.00)	20.00 (st. dev. = n/a)

The average offer is averaged over the decisions of all buyers due to the strategy method. The average accepted offer following investment (non-investment) is averaged only over the accepted offers by the sellers who actually chose to invest (not to invest). The average rejected offer is calculated analogously.

Our main hypothesis states that investment in the outside option is less likely if agents are on the same team than if they are on different teams. To test the hypothesis, we compare the investment rate of sellers in the *Same-Team* treatment with the investment rate in the *Different-Team* treatment. (The latter treatment serves as an analog of an everyday situation in which two separate entities with different identities interact.) The two-sided Fisher's exact test reported in the first row of Table 2 reveals that the investment rate in the *Same-Team* treatment is no different than in the *Different-Team* treatment ($p = 0.821$), suggesting that group identity does not mitigate the inefficiency related to investment in the outside option.

We also conduct a comparison of the investment rate in the *Baseline* treatment with the investment rate in the *Same-Team* treatment that allows us to separate out the incremental impact of group identity on altruistic behavior within the team.¹⁰ Just as before, the Fisher's exact test finds no difference in the investment rates between the two treatments ($p = 1.000$), providing further evidence that group identity does not increase altruistic behavior in the current setting. Finally, we also compare investment rates in the *Baseline* treatment and in the *Different-Team* treatment to identify discrimination, if any, against members of the other team. The Fisher's exact test once again reveals that there is no difference in investment rates ($p = 0.817$), confirming that there is no out-group discrimination either.

Our main hypothesis hinges on the assumptions that group identity increases the offer following non-investment (p_{NI}) and that investment in an outside option weakens the effect of group identity on the buyer's offer. We test these two assumptions in the same way as we tested our hypothesis regarding the investment rate, i.e., we start by comparing p_{NI} and p_I in the *Same-Team* and *Different-Team* treatments and then proceed to identifying the incremental impact of group identity and out-group discrimination by comparing the offers in the *Same-Team* and *Different-Team* treatments, respectively, to the *Baseline* treatment.

In line with our previous results, the Mann-Whitney tests, reported in the second row of Table 2, find no difference in buyers' offers following non-investment between the *Same-Team* and *Different-Team* treatments ($p = 0.593$), the *Baseline* and the *Same-Team* treatments ($p = 0.506$), or the *Baseline* and the *Different-Team* treatments ($p = 0.239$). These results are robust to using accepted offers only (the respective p-values are 0.274, 0.324, and 0.956).

¹⁰ Note that we are not assuming that in-group favoritism and out-group discrimination are additive.

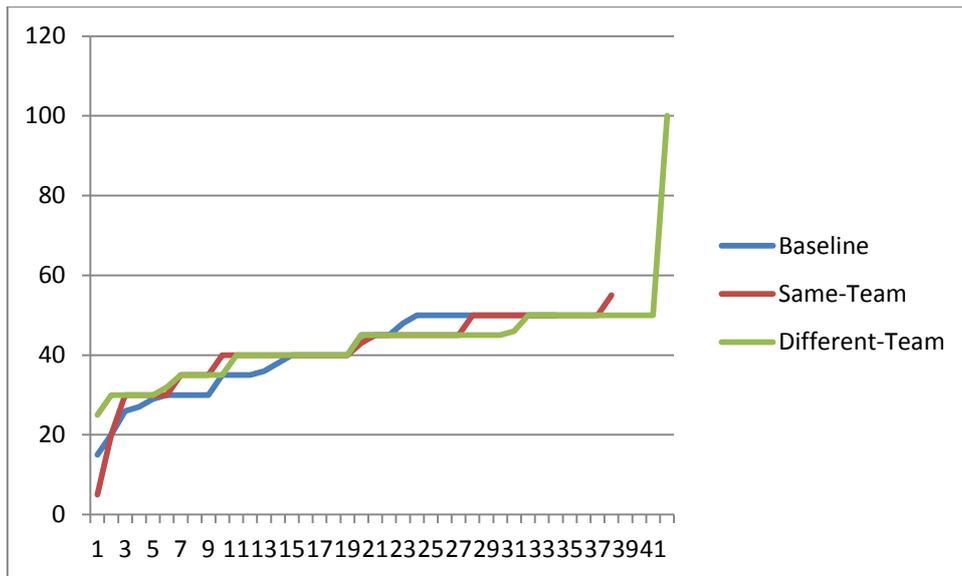


Figure 2a. Offers following investment

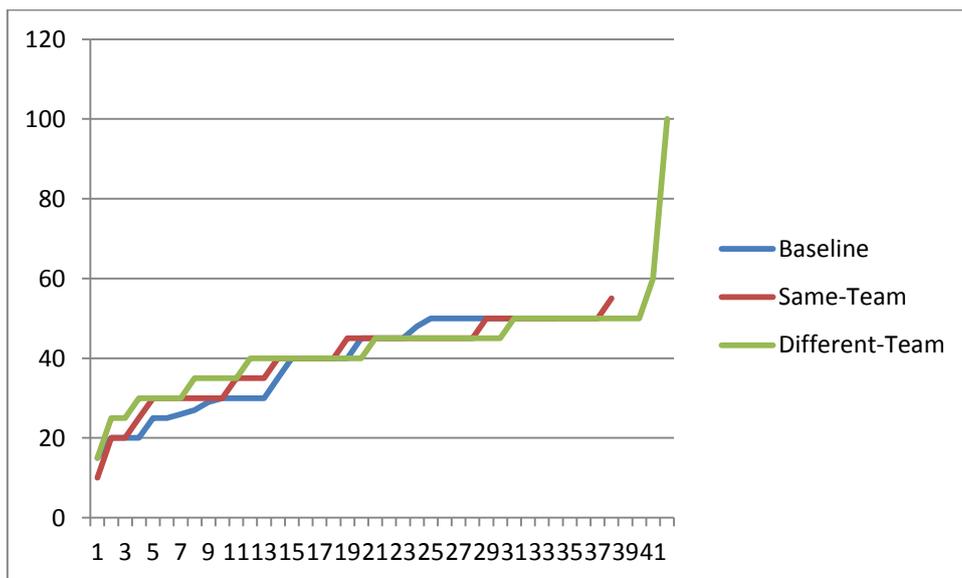


Figure 2b. Offers following non-investment

Similarly, there is no statistical difference in buyers' offers following investment between the *Same-Team* and *Different-Team* treatments ($p = 0.802$), although we do find that accepted offers in the *Different-Team* treatment are higher than in the *Same-Team* treatment ($p = 0.041$), suggesting that following sellers' investment, the buyers whose offers were relevant responded by offering more (as only one offer out of 35 was rejected). We note, however, that the number of compared accepted

offers following investment is rather low (14 in the *Same-Team* treatment and 16 in the *Different-Team* treatment). Finally, we observe no statistical differences in buyers' offers following investment between the *Baseline* treatment and the *Same-Team* treatment ($p = 0.479$; this is robust to using accepted offers only as $p = 0.426$) or between the *Baseline* and the *Different-Team* treatments ($p = 0.383$ for all offers and $p = 0.191$ for accepted offers), confirming no impact of group identity in our setting.

Table 2. Statistical tests for treatment differences

	<i>Same-Team v. Different-Team</i>	<i>Baseline v. Same-Team</i>	<i>Baseline v. Different-Team</i>
Investment rate *	(0.821)	(1.000)	(0.817)
Offers following non- investment (p_{NI})	$z = 0.54$ (0.593) $z = -1.10$ (0.274) ^{ao}	$z = 0.67$ (0.506) $z = 0.99$ (0.324) ^{ao}	$z = 1.18$ (0.239) $z = -0.06$ (0.956) ^{ao}
Offers following investment (p_I)	$z = 0.25$ (0.802) $z = 2.05$ (0.041) ^{ao}	$z = 0.71$ (0.479) $z = -0.78$ (0.426) ^{ao}	$z = 0.87$ (0.383) $z = 1.31$ (0.191) ^{ao}

* Fisher's exact test; z-statistic for Mann-Whitney ranksum test; p-values in parentheses. ^{ao} test performed on accepted offers only.

5. Impacts of group identity: *Ex-ante* relation-specific investments vs. *ex-post* opportunistic behavior

We postulate that group identity strengthens agents' other-regarding preferences, which in turn reduces their incentives to undertake *ex-post* opportunistic behavior. Our experimental results, however, do not support our hypothesis that inefficient investment in the outside option is less likely under group identity and more likely in the absence of group identity.

This is in contrast to the findings presented in MS. In that paper, we postulate that group identity strengthens agents' other-regarding preferences, which helps mitigate distortion in *ex-ante* relation-specific investments. In the MS experiment, the seller decides whether or not to invest F . If no investment is made, the game ends. If the seller invests, G ($> F$) is made available to be split between the seller and the buyer. The buyer then makes a take-it-or-leave-it offer of p to split G . The

seller can receive p by accepting the offer, in which case the buyer receives $G - p$. If the seller rejects the offer, G disappears and neither party receives any money.¹¹

In this ‘hold up game’, the seller does not invest if he and the buyer care only about their own monetary payoff, leading to inefficiency (because investment is the joint-surplus maximizing decision given $G - F > 0$). The seller may, however, choose to invest in the presence of other-regarding preferences. In order to create group identity, we follow the procedure explained in Section 2 of the present paper.¹² We hypothesize that the seller is more likely to invest in the *Same-Team* treatment because the induced group identity between the seller and the buyer strengthens his altruistic preferences, giving the seller, in turn, higher incentives to invest. Findings from our MS experiment support this hypothesis and, at the same time, they demonstrate that the procedure used in both papers is capable of inducing a strong group identity.¹³

Our findings in the present paper and in MS together yield a hypothesis that group identity could be effective in inducing agents to make *ex-ante* efficient, relation-specific investments, but ineffective in preventing agents from taking *ex-post* opportunistic actions. This hypothesis yields two implications for the theory of the firm. The first implication is based on the idea that group identity is created when two parties are integrated within the same organizational boundary. Regarding *ex-ante* efficient, relation-specific investments (a focus of the property-rights theory), the hypothesis suggests that group identity is a mechanism, complementary to other mechanisms such as property rights, through which integration helps mitigate distortion in such *ex-ante* investments. In contrast, regarding *ex-post* opportunistic behavior (a focus of the transaction cost economics), it suggests that group identity does not play a major role in preventing *ex-post* opportunism through mergers.

The second implication is based on the idea that a merger between agents is not the only way how to create group identity between them. For example, Toyota Motor Corporation formed an association, called *Kyoho-kai*, of its first-tier suppliers with three purposes: (i) information exchange between the member firms and Toyota; (ii) mutual development and training among the member firms; and (iii) socialization (Dyer and Nobeoka, 2000). Toyota has succeeded in creating a dense

¹¹ In MS, $F = \text{NZD } 10$ and $G = \text{NZD } 14$.

¹² Apart from the obvious differences in the games used in the two experiments, there are a couple of minor differences in the associated experimental procedures, which, however, are unlikely to have caused the different results: (i) in MS, the subjects were paid NZD 2 per correct answer in Task 1, whereas in the current paper it was NZD 3. This change was introduced in order to increase the average subject earnings due to the change in laboratory policy regarding the target average payment, which has increased from NZD 14-16 to NZD 16-18 per hour; (ii) in MS, the payoffs were in NZD, whereas in the current paper we used tokens with a set exchange rate into NZD; and (iii) the MS experiment was hand-run and buyers’ behavior was elicited using the direct-response method, whereas the current experiment was computerized and buyers’ behavior was elicited using the strategy method.

¹³ In MS, we find that being on the same team as opposed to being on different teams increases the investment rate from 25.9% to 43.8% and the buyer’s average offer from NZD 8.74 to NZD 10.38. Both treatment differences are statistically significant ($p = 0.036$ and 0.012 , respectively).

network with a strong identity and cooperative knowledge-sharing routines (Wilhelm and Kohlbacher, 2011). Such associations exist at all eleven Japanese automobile manufacturers except for Honda (Sako, 1996).¹⁴ The hypothesis therefore implies that creating group identity between agents without merging them can be a way, alternative to mergers, to mitigate distortions in *ex-ante* efficient, relation-specific investment. In contrast, such a method would not work for *ex-post* opportunistic behavior.¹⁵

Creating and strengthening group identity in everyday-life contexts requires significant costs, and hence it is important to identify the kinds of inefficiency that group identity can and cannot resolve or mitigate. We therefore believe that exploration of the aforementioned hypothesis through a variety of experimental setups is a meaningful avenue for future research.

In the remainder of this section, we discuss a possible cause of the difference between the present paper's result and the result in MS based on Revealed Altruism theory (Cox, Friedman, and Sadiraj, 2008), which has been quite successful in predicting outcomes in various experimental settings testing for the presence and nature of other-regarding behavior. Cox, Friedman, and Sadiraj consider two-player extensive form games of complete information in which the seller makes a more or less generous choice for the buyer. In their theory, the seller's choice is viewed as more (less) generous one if the choice increases (decreases) the buyer's maximum possible payoff.

The theory's first axiom (Axiom R) states that more generous choices by sellers induce more altruistic preferences in buyers. In the MS setup, the seller's investment is a generous choice, because it increases the buyer's maximum possible payoff from 0 to G . Hence, the seller's investment increases the buyer's altruistic preferences. In the present paper's setup, if the seller invests in the outside option, the buyer might think that he must offer at least $p = X$, anticipating that any offer $p < X$ will be rejected by the seller. If we assume that the seller rejects anything less than his outside option, the seller's investment is then a less generous choice, because it decreases the buyer's *de facto* maximum possible payoff from G to $G - X$. The seller's non-investment, on the other hand, is a more generous choice, which increases the buyer's altruistic preferences.

The other axiom of the Revealed Altruism theory, Axiom S, states that the effect of Axiom R is stronger when a decision of an agent overturns the *status quo* (an act of commission) than when the decision upholds the *status quo* (an act of omission).¹⁶ Since investment could be considered an

¹⁴ Outside Japan, Toyota started an association with its U.S. suppliers in 1989 (Dyer and Hatch, 2004).

¹⁵ Dyer and Ouchi (1993) find that the Japanese suppliers are willing to invest in customized equipment and customer-specific human capital, and locate their plants quite close to the manufacturer (see also Nishiguchi, 1994 and Dyer, 1996 for related findings). These findings are consistent with the implication that creating group identity between agents mitigates distortion in *ex-ante* efficient, relation-specific investment.

¹⁶ The *status quo* refers to the original budget set available to the buyer before the seller's decision. For details, see Cox, Friedman, and Sadiraj (2008) and Cox, Servátka, and Vadovič (2014).

act of commission and non-investment an act of omission,¹⁷ Axiom S tells us that the seller's investment in MS increases the buyer's altruistic preferences more strongly than the seller's non-investment in the present paper does. Then, if the effect of group identity and the effect of the seller's generous choice are complementary in increasing the buyer's altruistic preferences, group identity affects the seller's investment decision more strongly in the MS setup than in the present paper's setup. This suggests that the effect of group identity may not be strong enough in making a difference in the seller's incentives to invest in the outside option in the present paper, providing a possible explanation for the difference between the present paper's result and the MS result.

6. Summary and conclusion

Inefficiency associated with AQRs is a critical element of the theory of the firm, where two main sources of the inefficiency are *ex-post* opportunistic behavior and distortions in *ex-ante* investments. This paper studies investment in an outside option as an important example of *ex-post* opportunistic behavior. Based on previous experimental findings that group identity strengthens agents' altruistic preferences towards group members, we conjecture that group identity reduces agents' incentives to invest in an outside option. Our experimental findings, however, do not support our conjecture in the implemented setting.

This is in contrast to the findings presented in MS. In that paper, our experimental findings show that group identity strengthens agents' other-regarding preferences, which mitigates distortions in *ex-ante*, relation-specific investments. Following the Revealed Altruism theory, we have discussed a possible cause of the difference based on the idea that the seller's more generous choice is an act of commission in MS's setup, whereas it is an act of omission in the present paper's setup. Our findings in the present paper and MS together yield a hypothesis that group identity could be effective in inducing agents to make *ex-ante* efficient, relation-specific investments, but ineffective in preventing agents from taking *ex-post* opportunistic actions. We discuss two new implications for the theory of the firm that arise from the hypothesis, making us believe that further exploration of this hypothesis is a promising avenue for future research.

¹⁷ The *status quo* is implied by the wording in subject instructions that state that the seller decides whether or not to invest his/her endowment of 10 tokens.

References

- Akerlof, George A. and Rachel E. Kranton.** 2000. "Economics and Identity." *Quarterly Journal of Economics*, Vol. 115, pp. 715–753.
- Akerlof, George A. and Rachel E. Kranton.** 2002. "Identity and Schooling: Some Lessons for the Economics of Education." *Journal of Economic Literature*, Vol. 40, pp. 1167–1201.
- Akerlof, George A. and Rachel E. Kranton.** 2005. "Identity and the Economics of Organizations." *Journal of Economic Perspective*, Vol. 19, pp. 9–32.
- Akerlof, George A. and Rachel E. Kranton.** 2008. "Identity, Supervision, and Work Groups." *American Economic Review Papers and Proceedings*, Vol. 98, pp. 212-17.
- Ashforth, Blake E. and Fred Mael.** 1989. "Social Identity Theory and the Organization." *Academy of Management Review*, Vol. 14, pp. 20–39.
- Baker, George P. and Thomas N. Hubbard.** 2004. "Contractibility and Asset Ownership: On-Board Computers and Governance in U.S. Trucking." *Quarterly Journal of Economics*, Vol. 119, pp. 1443–1479.
- Basu, Kaushik.** 2005. "Racial Conflict and the Malignancy of Identity." *Journal of Economic Inequality*, Vol. 3, pp. 221–241.
- Basu, Kaushik.** 2010. "Altruism, Other-Regarding Behavior and Identity: The Moral Basis of Prosperity and Oppression." *Economics and Philosophy*, Vol. 26, pp. 189-216.
- Benabou, Ronald and Jean Tirole.** 2011. "Identity, Morals and Taboos: Beliefs as Assets." *Quarterly Journal of Economics*, Vol. 126, pp. 805–855.
- Billig, Michael and Henri Tajfel.** 1973. "Social Categorization and Similarity in Intergroup Behavior." *European Journal of Social Psychology*, Vol. 3, pp. 27-52.
- Boulu-Reshef, Béatrice** (2013) "Economics of the Firm and Economics of Identity: Why and How their Main Questions Overlap," *Journal of Institutional Economics*, Vol. 9(3), pp. 363-379.
- Brandts, Jordi and Gary Charness.** 2011. "The Strategy versus the Direct-response Method: A First Survey of Experimental Comparisons." *Experimental Economics*, Vol. 14, pp. 375-398.
- Brewer, Marion.** 1981. "Ethnocentrism and Its Role in Intergroup Trust." In Brewer, Marilyn B., and Barry E. Collins. eds., *Scientific Inquiry in the Social Sciences*, pp. 214–231. San Francisco: Jossey-Bass.
- Brewer, Marion.** 1999. "The Psychology of Prejudice: Ingroup Love or Outgroup Hate?" *Journal of Social Issues*, Vol. 55, pp. 429–444.
- Cai, Hongbin.** 2003. "A Theory of Joint Asset Ownership." *Rand Journal of Economics*, Vol. 34, pp. 62-76.

- Camerer, Colin.** 2003. *Behavioral Game Theory: Experiments in Strategic Interaction*. Princeton University Press.
- Camerer, Colin F. and Ulrike Malmendier.** 2007. "Behavioral Organizational Economics." In Peter Diamond and Hannu Vartiainen. eds., *Behavioral Economics and Its Applications*. Princeton and Oxford: Princeton University Press.
- Charness, Gary, Luca Rigotti, and Aldo Rustichini.** 2007. "Individual Behavior and Group Membership." *American Economic Review*, Vol. 97, pp. 1340-1352.
- Chen, Roy and Yan Chen.** 2011. "The Potential of Social Identity for Equilibrium Selection." *American Economic Review*, Vol. 101, pp. 2562-2589.
- Chen, Yan and Sherry Xin Li.** 2009. "Group Identity and Social Preferences." *American Economic Review*, Vol. 99, pp. 431-457.
- Cooper, David J. and John H. Kagel.** 2010. "Other Regarding Preferences: A Selective Survey of Experimental Results." In Kagel, John H., and Alvin E. Roth. eds., *Handbook of Experimental Economics*. Princeton, NJ: Princeton University Press.
- Cox, James C., Daniel Friedman, and Vjollca Sadiraj.** 2008. "Revealed Altruism." *Econometrica*, Vol. 76, pp. 31-69.
- Cox, James C., Maroš Servátka, and Radovan Vadovič.** 2014. Status Quo Effects in Fairness Games: Reciprocal Responses to Acts of Commission vs. Acts of Omission," working paper.
- Dyer, Jeffrey H.** 1996. "Does Governance Matter?" *Organization Science*, Vol. 7, pp. 649-666.
- Dyer, Jeffrey H. and Nile W. Hatch.** 2006. "Relation-Specific Capabilities and Barriers to Knowledge Transfers: Creating Advantage through Network Relationships." *Strategic Management Journal*, Vol. 27, pp. 701-719.
- Dyer, Jeffrey H. and Kentaro Nobeoka.** 2000. "Creating and Managing a High-Performance Knowledge-Sharing Network: The Toyota Case." *Strategic Management Journal*, Vol. 27, pp. 701-719.
- Dyer, Jeffrey H. and William G. Ouchi.** 1993. "Japanese-Style Partnerships: Giving Companies a Competitive Edge." *Sloan Management Review*, Vol. 35, pp. 51-63
- Eckel, Catherine C., and Philip J. Grossman.** 2005. "Managing Diversity by Creating Team Identity." *Journal of Economic Behavior & Organization*, Vol. 58, pp. 371-392.
- Fischbacher, Urs.** 2007. "z-Tree: Zurich Toolbox for Ready-made Economic Experiments." *Experimental Economics*, Vol. 10, pp. 171-178.
- Gibbons, Robert.** 2005. "Four Formal(izable) Theories of the Firm?" *Journal of Economic Behavior and Organization*, Vol. 58, pp. 200-245.

- Greiner, Ben.** 2004. "An Online Recruitment System for Economic Experiments." In: Kurt Kremer and Volker Macho. eds., *Forschung und wissenschaftliches Rechnen*. GWDG Bericht 63, Göttingen: Ges. für Wiss. Datenverarbeitung, pp. 79-93.
- Grossman, Sanford and Oliver Hart.** 1986. "The Costs and Benefits of Ownership: A theory of Vertical and Lateral Integration." *Journal of Political Economy*, Vol. 94, pp. 691-719.
- Hart, Oliver and John Moore.** 1990. "Property Rights and the Nature of the Firm." *Journal of Political Economy*, Vol. 98, pp. 1119-1158.
- Holmström, Bengt and John Roberts.** 1998. "The Boundaries of the Firm Revisited." *Journal of Economic Perspectives*, Vol. 12, pp. 73-94.
- Holmström, Bengt and Jean Tirole.** 1991. "Transfer Pricing and Organizational Form," *Journal of Law, Economics, and Organization*, Vol. 7, pp. 201-228.
- Klein, Benjamin, Robert G. Crawford, and Armen A. Alchian.** 1978. "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process." *Journal of Law and Economics*, Vol. 21, pp. 297-326.
- Kogut, Bruce and Udo Zander.** 1996. "What Firms Do? Coordination, Identity, and Learning." *Organization Science*, Vol. 7, pp. 502-518.
- McDermott, Rose.** 2009. "Psychological Research in Identity: Definition, Measurement and Experimentation." In Abdelal, Rawi. eds., *Measuring Identity: A Guide for Social Science Research*. Cambridge University Press.
- Morita, Hodaka and Maroš Servátka** (2013) "Group Identity and Relation-Specific Investment: An Experimental Investigation," *European Economic Review*, Vol. 58, pp. 95-109.
- Morita, Hodaka and Maroš Servátka** (2014) "Investment in Outside Options as an Opportunistic Behavior: An Experimental Investigation." Mimeo.
- Nishiguchi, Toshihiro.** 1994. *Strategic Industrial Sourcing: The Japanese Advantage*. Oxford University Press, Oxford.
- Sako, Mari.** 1996. "Suppliers' Associations in the Japanese Automobile Industry: Collective Action for Technology Diffusion." *Cambridge Journal of Economics*, Vol. 20, pp. 651-671.
- Selten, Reinhard.** 1967. Die Strategiemethode zur Erforschung des eingeschränkt rationale Verhaltens im Rahmen eines Oligopol-experiments." in H. Sauerermann eds., *Beiträge zur experimentellen Wirtschaftsforschung*, Tübingen: Mohr, pp. 136-168.
- Shelanski, Howard A. and Peter G. Klein.** 1995. "Empirical Research in Transaction Cost Economics: A Review and Assessment." *Journal of Law, Economics, and Organization*, Vol. 11, pp. 335-361.

- Tajfel, Henri.** 1978. "Interindividual Behavior and Intergroup Behavior." In Henri Tajfel. eds., *Differentiation Between Social Groups: Studies in the Social Psychology of Intergroup Relations*, Academic Press, London, pp. 27–60.
- Tajfel, Henri, Michael G. Billig, Robert P. Bundy, and Claude Flament.** 1971. "Social Categorization and Inter-Group Behavior." *European Journal of Social Psychology*, Vol. 1, pp. 149–178.
- Tajfel, Henri, and John Turner.** 1979. "An Integrative Theory of Intergroup Conflict." In Stephen Worchel and William Austin. eds., *The Social Psychology of Intergroup Relations*, Monterey, CA: Brooks/Cole.
- Tajfel, Henri and John C. Turner.** 1986. "The Social Identity Theory of Intergroup Behavior." In William G. Austin and Stephen Worchel. eds., *Psychology of Intergroup Relations*, 2d ed, pp. 7–24, Chicago: Nelson-Hall.
- Turner, John C.** 1975. "Social Comparison and Social Identity: Some Prospects for Intergroup Behavior." *European Journal of Social Psychology* Vol. 5, pp. 5–34.
- Turner, John C.** 1982. "Toward a Cognitive Redefinition of the Social Group." In Henri Tajfel. eds., *Social identity and intergroup behavior*, Cambridge University Press, Cambridge, England, pp. 15–40.
- Turner, John C.** 1984. "Social Identification and Psychological Group Formation." In Henri Tajfel. eds., *The Social Dimension: European Developments in Social Psychology*, Vol. 2. , Cambridge University Press, Cambridge, pp. 518–538.
- Williamson, Oliver.** 1979. "Transaction-Cost Economics: The Governance of Contractual Relations." *Journal of Law and Economics*, Vol. 22, pp. 233-261.
- Williamson, Oliver.** 1985. *The Economic Institutions of Capitalism*. Free Press.
- Wilhelm, Mariam M. and Florian Kohlbacher.** 2011. "Co-Opetition and Knowledge Co-Creation in Japanese Supplier-Networks: The Case of Toyota." *Asian Business & Management*, Vol. 10, pp. 66-86.
- Whinston, Michael D.** 2003. "On the Transaction Cost Determinants of Vertical Integration." *Journal of Law, Economics, and Organization*, Vol. 19, pp. 1–23.
- Yamagishi, Toshio, Nobuhito Jin, and Toko Kiyonari.** 1999. "Bounded Generalized Reciprocity: Ingroup Boasting and Ingroup Favoritism." *Advances in Group Processes*, Vol. 16, pp. 161-197.
- Yamagishi, Toshio, and Toko Kiyonari.** 2000. "The Group as the Container of Generalized Reciprocity." *Social Psychology Quarterly*, Vol. 63, pp. 116–132.

Appendix

GENERAL INSTRUCTIONS [All treatments]

No Talking Allowed

Thank you for coming. The purpose of this session is to study how people make decisions in a particular situation. From now until the end of the session, unauthorized communication of any nature with other participants is prohibited. If you violate this rule we will have to exclude you from the experiment and from all payments. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Two Tasks

Every participant will get \$5 as a show up fee and, in addition, have the opportunity to earn money in the experiment. You will be asked to participate in two tasks. The instructions for Task 2 will be given to you after finishing Task 1. Your earnings from both tasks will be paid to you in cash at the end of the experiment.

Two Teams

You have been divided randomly into two teams, called the Yellow Team and the Orange Team. People from both teams are wearing their respective team uniforms: The Yellow Team is wearing yellow t-shirts and the Orange Team is wearing orange t-shirts.

TASK 1 INSTRUCTIONS [All treatments]

Task 1 Earnings

Below you have received two trivia questions. For each correct answer, you will be rewarded with \$3. Meanwhile, you can use a computerized team chat program to get help from or offer help to other members on your own team. Except for the following restrictions, you can type whatever you want in the lower box of the chat program. Messages will be shared *only* among all the members from your own team. You will not be able to see the messages exchanged within the other team. People on the other team will not see the messages exchanged within your own team either. You will learn the correct answers and your earnings from Task 1 at the end of today's session.

Restrictions on Messages

1. Please do not identify yourself or send any information that could be used to identify you (e.g. age, race, professional background, etc.).
2. Please refrain from using obscene or offensive language.

When asked by the experimenter, please click "Continue" to proceed to the chat program. You will be given 5 minutes to communicate with your team members. Are there any questions?

TASK 1 DECISIONS [All treatments]

Please answer the following two trivia questions. For each correct answer, you will be rewarded with \$3. You can also use a team chat program to get help from or offer help to other members on your own team.

Trivia 1:

YOUR ANSWER:

Trivia 2:

YOUR ANSWER:

TASK 2 INSTRUCTIONS [Same-Team treatment]

Task 2 Earnings

Your Task 2 earnings will depend on your decisions and on the decisions of others. The earnings will be denoted in experimental currency referred to as *tokens*. Upon completion of the experiment, all tokens will be exchanged into dollars using the following exchange rate: 1 token = \$0.30. Notice that the more tokens you earn, the more dollars you will receive. All the money will be paid to you in cash at the end of the experiment.

Anonymity

Each person from the Yellow Team will be randomly paired with another person from the Yellow Team. Each person from the Orange Team will be randomly paired with another person from the Orange Team. No one will learn the identity of the person (s)he is paired with. Because your decision is private, we ask that you do not tell anyone your decision or your earnings either during or after the experiment.

Pairing and Roles

Within each pair, one person is going to be randomly assigned to be the First Mover and the other person to be the Second Mover. 100 tokens are made available to be split between the First and the Second Mover. The 100 tokens are split only if the First Mover accepts the Second Mover's offer but the 100 tokens disappear if the First Mover rejects. The First Mover starts the experiment with 10 tokens. The Second Mover starts the experiment with 0 tokens. The decisions are divided into three stages:

Stage 1: The First Mover's Investment Decision

The First Mover decides whether or not to invest his/her 10 tokens in order to create an outside option of 25 tokens for himself/herself in case (s)he rejects the Second Mover's offer which will be made in the next stage.

- If the First Mover invests, then his/her outside option is 25 tokens.
- If the First Mover does not invest, then his/her outside option is 0 tokens. (However, the First Mover gets to keep the 10 tokens.)

Stage 2: The Second Mover's Offer

The Second Mover decides how much out of 100 tokens to offer to the First Mover. The Second Mover keeps the remainder only if the First Mover accepts the offer.

The Second Mover is not yet notified of the First Mover's investment decision. Hence each Second Mover makes a decision for both of the two possible First Mover's decisions:

- If the First Mover has invested and his/her outside option is 25 tokens.
- If the First Mover has not invested and his/her outside option is 0 tokens.

Note that the First Mover's decision will determine which decision of the Second Mover will be relevant. Therefore, please think about your decisions carefully.

Stage 3: The First Mover's Acceptance/Rejection

The First Mover learns about the offer, and either accepts it or rejects it.

- If the First Mover accepts the Second Mover's offer, the 100 tokens is split according to the offer. The outside option is irrelevant in this case.
- If the First Mover rejects the Second Mover's offer, the Second Mover receives 0 tokens. The First Mover receives the outside option of 25 tokens if (s)he invested at Stage 1, and receives 0 tokens if (s)he did not invest at Stage 1 (in which case (s)he keeps the original 10 tokens).

Payment of Experimental Earnings

Once all participants have made their decisions, you will be shown a summary of your payoffs from Task 2. Then you will be asked one by one to approach the experimenter in the room in the back of the lab for the payment of your experimental earnings from both tasks. Are there any questions?

TRIVIA BANK *[for all seven sessions]*

1. What is Oktoberfest intended to celebrate? A: The wedding day of the future King Louis I of Bavaria
2. Hudson Bay is a large inland sea in which country? A: Canada
3. What country was the 1986 Soccer World Cup held at? A: Mexico
4. What is the name of the three bones that make up a human finger? A: Phalanges
5. Which art movement, founded in a Zurich café during World War I and consolidated at a meeting held in Paris in 1920, was led by Tristan Tzara? A: Dadaism
6. During the Cold War, what Eastern European alliance was the equivalent of NATO? A: Warsaw Pact
7. What does the "E" stand for in UNESCO? A: Educational (United Nations Educational, Scientific and Cultural Organization)
8. In the southern hemisphere, the winds associated with a cyclone, a region of low pressure, blow in which direction? A: Clockwise
9. In the northern hemisphere, the winds associated with a cyclone, a region of low pressure, blow in which direction? A: Anti-clockwise
10. What is the name of the index of average daily prices on the New York Stock Exchange? A: Dow Jones
11. What determines the sex of crocodile embryos? A: Temperature
12. What elemental event rejuvenates a prairie by causing more plants to grow taller, flower and produce seed? A: Fire.
13. Who was the first female to register 30 top ten hits? A: Madonna.
14. What is Europe's most mountainous (in % of total area) country? A: Switzerland