

Does Group Identity Prevent Inefficient Investment in Outside Options?

An Experimental Investigation

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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, opportunistic behavior, other-regarding preferences, outside option, theory of the firm, transaction cost economics

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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 the inefficiency are *ex-post* (i.e., after AQRs are created) opportunistic behavior, explored in the transaction cost economics (Williamson, 1979, 1985; Klein, Crawford, and Alchian, 1978) and distortions in *ex-ante* (i.e., before AQRs are created) 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 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 which the inefficiency stems from the lack of relationship-specific

investment (underinvestment).¹ In the current paper, we focus on the other type of inefficiency and study how group identity affects *ex-post* opportunistic behavior. Inefficiency in our current setup stems from unproductive investment in an outside option (overinvestment).

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.²

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).³ 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.⁴

¹ Although the main focus of the incomplete contracting literature on *ex-ante* relation-specific investment is underinvestment, overinvestment can also play important roles in the choice of the optimal governance structure (see, for example, Hart, 2003; Schmitz, 2012; Hoppe, Kusterer, and Schmitz, 2013). Hoppe, Kusterer, and Schmitz (2013) experimentally study predictions based on Hart's (2003) theoretical framework, which compares two modes for provision of an infrastructure-based public service. In a public-private partnership (PPP), the two tasks of building the infrastructure and operating it are delegated to one private contractor, whereas, under traditional procurement (TP), these tasks are delegated to separate contractors. Hoppe, Kusterer, and Schmitz consider a parameterization in which PPP is preferable to TP where PPP resolves underinvestment on one kind of investment at the cost of overinvestment in the other kind, and find support for the theoretical prediction in their laboratory experiment. Their experiment does not incorporate group identity or other-regarding preferences.

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

³ 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).

⁴ 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.

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.⁵ 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 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).⁶

⁵For other examples of *ex-post* opportunistic behavior, see Holmström and Tirol (1991), Baker and Hubbard (2004), and Cai (2003).

⁶See Shelanski and Klein (1995) for a survey of studies testing this hypothesis empirically.

In reality, agents often behave in other-regarding ways (see Camerer, 2003 and Cooper and Kagel, 2010 for nice surveys), and, as a consequence, the seller might become worse off by investing in the outside option. If the seller invested to establish the outside option of X , the buyer may offer more than X because of his altruistic preferences towards the seller. Let $p_I \equiv X + Z$ denote the buyer's offer following the seller's investment, where $Z (\geq 0)$, a premium price on top of the outside option X , is a measure of the buyer's altruism following investment. 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. p_{NI} is a measure of the buyer's altruism in a situation following the seller's non-investment.

We derive our hypothesis based on the logic of 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 (see Appendix B for a more detailed summary). In particular, we conjecture that the buyer views the seller's choice of non-investment as a generous action. If the seller invests in the outside option and rejects any offers lower than the outside option, the buyer must offer at least $p = X$, reducing the buyer's maximum payoff from G to $G - X$. The seller's non-investment means that the seller chooses not to establish the outside option X and hence not to reduce the buyer's maximum payoff, even though the seller has an option to do so. In this sense, the seller's non-investment is generous to the buyer.

One of the two axioms of Revealed Altruism theory (Axiom R), applied to our setup, predicts that the seller's generous action of not investing in the outside option increases the buyer's altruistic preferences towards the seller. This implies that p_{NI} is greater than Z . If agents are self-regarding, the seller will be better off by investing because $p_I - p_{NI} = X + Z - p_{NI} > F$ holds since $Z = p_{NI} = 0$ under self-regarding preferences. In the presence of other-regarding preferences, however, $X > F$ does not necessarily imply $p_I - p_{NI} > F$ because p_{NI} can be greater than Z , and hence the seller will not necessarily be better off by investing. 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 p_{NI} to be significantly greater than Z in all treatments. Furthermore, the data show that, on average, the seller is worse off by investing when $X = 25$ and 35 .⁷

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.

⁷ The focus of Morita and Servátka (2014) is on the link between the seller's investment in outside option and the buyer's other-regarding preferences towards the seller in the absence of group identity.

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 anticipates 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). Based on this evidence, we postulate that the seller's non-investment increases the buyer's altruism more strongly in the presence of group identity than in its absence. This implies that group identity increases p_{NI} and shifts the distribution of p_{NI} to the right. Then, in the presence of group identity, the seller is more likely to anticipate that $p_I - p_{NI}$ is not large enough to recover the investment cost F , and hence the seller is less likely to invest. 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.⁸ 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

⁸ 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.

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, 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.⁹ Note that the

⁹ 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

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 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.

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).

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.¹⁰ 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 in the counterfactual case (i.e., asking the seller who invested to accept/reject an offer following non-investment or *vice versa*) would be quite unintuitive 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.

¹⁰ 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.

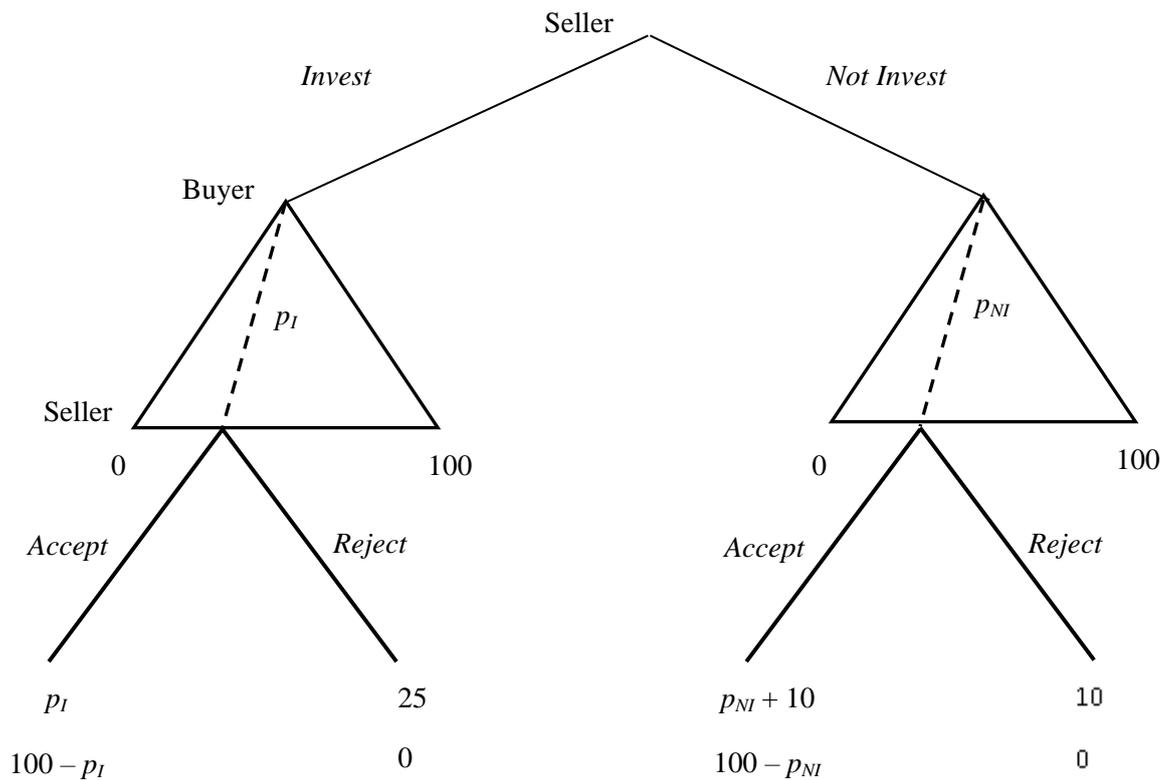


Figure 1. The game

In order to aid and verify subjects' understanding of this three-stage game, we included four control questions (provided in Appendix A 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.¹¹ 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.

¹¹ The data from the *Baseline* treatment have been previously reported in Morita and Servátka (2014) in the $X = 25$ treatment.

Table 1. Summary statistics

	<i>Same-Team</i>	<i>Different-Team</i>	<i>Baseline</i>
Treatment	(38 obs.)	(42 obs.)	(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 (8.0%)	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, because of the group identity between team members. 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 induced group identity on altruistic behavior within the team, i.e., in-group favoritism.¹² 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 assumption that group identity increases the offer following non-investment (p_{NI}). We test this assumption in the same way as we tested our hypothesis regarding the investment rate, i.e., we start by comparing p_{NI} 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 (presented graphically in Figure 2a) 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).

¹² Note that we are not assuming that in-group favoritism and out-group discrimination are additive.

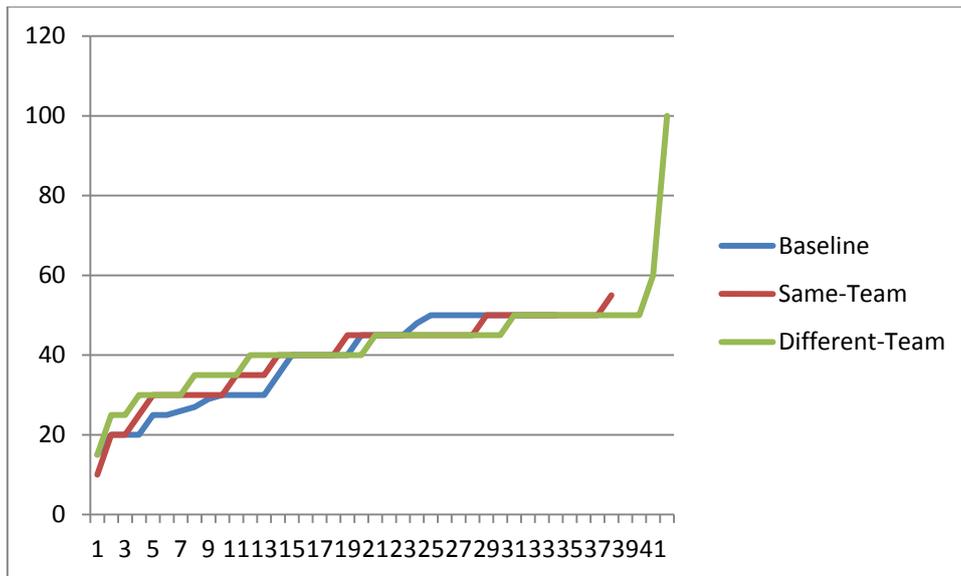


Figure 2a. Offers following non-investment

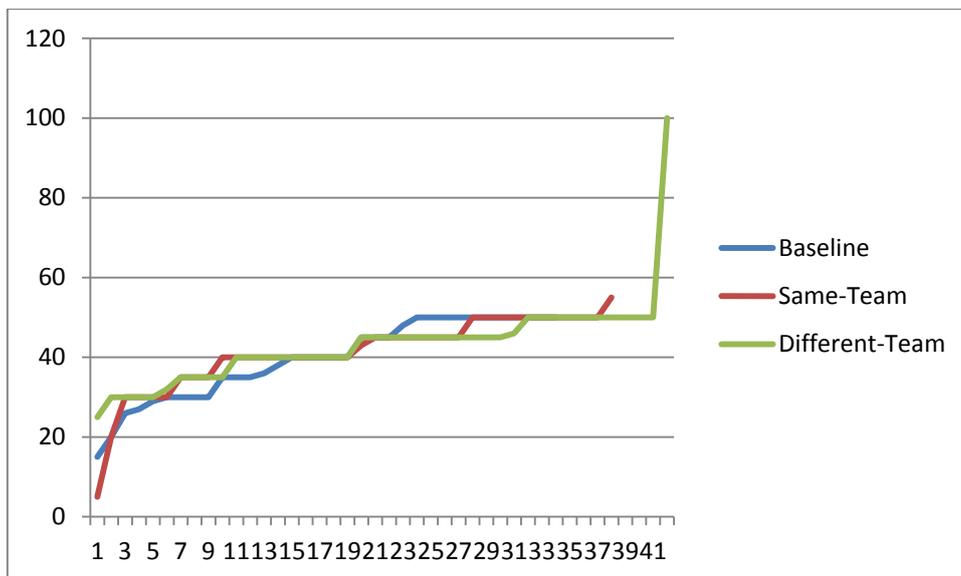


Figure 2b. Offers following investment

Our data also allow us to study the effect of group identity on the buyer's offer following investment (p_I). We find no statistical difference in p_I (graphically presented in Figure 2b) 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.¹³

In this ‘hold up game’, the seller does not invest if he and the buyer have self-regarding preferences, 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.¹⁴ 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.¹⁵

A possible cause of the difference between the present paper’s result and MS’ result is the different reaction to an act of commission than to an act of omission. In MS, the seller’s investment (an act of commission) is a generous action, whereas, in the present paper, the seller’s non-investment (an act of omission) is a generous action. Axiom S of Revealed Altruism theory states that an individual’s generous action increases another agent’s altruism more strongly when the generous action overturns the *status quo* (such action is then an act of commission) than when it upholds the *status quo* (an act of omission).¹⁶ In line with the spirit of this axiom, our findings suggest a possibility that group identity increases the effect of the seller’s generous action on the buyer’s altruism when the generous action is an act of commission, but group identity has no such effects when the generous action is an act of omission.

More generally, in the context of the theory of the firm, our findings 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

¹³ In MS, $F = \text{NZD } 10$ and $G = \text{NZD } 14$.

¹⁴ 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.

¹⁵ 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).

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). In the current experiment 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.

believe that further investigating this hypothesis in a variety of setups is a meaningful direction of future research because of the two implications it would yield 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 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).¹⁷ 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.¹⁸ 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.

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

¹⁷ Outside Japan, Toyota started an association with its U.S. suppliers in 1989 (Dyer and Hatch, 2006).

¹⁸ 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.

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.

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Appendix A

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

Appendix B

In this appendix, we present a detailed explanation on how the Revealed Altruism theory (Cox, Friedman, and Sadiraj, 2008) can be applied to our setup. The key elements of this non-parametric theory, which incorporates parametric models of inequality aversion (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000) or quasi-maximin preferences (Charness and Rabin, 2002) as special cases, 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 $X = 25$. 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 , meaning that investment in the outside option is less generous.

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 .¹⁹

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. 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 conjecture that the premium price Z is smaller than p_{NI} , the offer following non-investment.

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). Since investment could be considered an act of commission and non-investment an act of omission, 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.

¹⁹ The formal definitions of the two partial orderings and the two axioms can be found in Cox, Friedman, and Sadiraj (2008), sections 2- 4.