Investment in Outside Options as Opportunistic Behavior: An Experimental Investigation

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An Experimental Investigation

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Abstract:

Ex-post opportunistic behavior, commonly present in bilateral trade relationships, is a key element of the transaction cost economics. Investment in outside options is a prime example of such opportunism and often leads to inefficiency, for example by exerting effort to search for alternative business partners even if it does not add trade value. We experimentally investigate 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. Our findings suggest that when the transaction cost economics approach is applied to the design of a governance structure, other regarding preferences, if relevant, should be taken into account.

JEL Classification: C91, L20

Keywords: altruism, experiment, opportunistic behavior, other-regarding preferences, outside option, disagreement payoff, rent seeking, theory of the firm

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1. Introduction

In bilateral trade relationships, a surplus to be shared between two parties often exists because the value of trade within the relationship exceeds the value of outside trading opportunities. The surplus, often referred to as appropriable quasi-rents, opens up possibilities for each party to engage in socially inefficient rent-seeking activities to increase its share of the pie. These inefficient activities are referred to as ex-post opportunistic behavior because they are over appropriable quasi-rents that have been already created. Ex-post opportunistic behavior is a key element of the transaction cost economics view of Williamson (1975, 1979, 1985) and Klein, Crawford, and Alchian (1978).[1]

The focus of our study is on investment in an outside option, which is an important example of ex-post opportunistic behavior as pointed out by Klein et al. (1978), and the effect it has on the split of appropriable quasi-rents.[2] 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.[3] We investigate the effect of investment in an outside option by experimentally testing conjectures based on agents' other-regarding preferences. 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 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

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[1] Ex-post opportunistic behavior leads to ex-post inefficiency. This is significantly different from ex-ante inefficiency, the focus of the property-right theory of the firm (Grossman and Hart, 1986; Hart and Moore, 1990; Hart, 1995). 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 ex-ante investment when contracts are incomplete, and the theory studies the roles of asset ownership in mitigating this ex-ante inefficiency. See Whinston (2003) and Gibbons (2005) for clear discussions on the differences between the transaction cost economics and the property-right theory of the firm. See also Shelanski and Klein (1995) on a survey of empirical research in transaction cost economics.

[2] We refer to outside option as the payoff received if the bargaining is unsuccessful; also referred to as the "disagreement payoff" in the literature.

[3] 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.

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 option of X if he invested, and receives 0 otherwise. The buyer receives 0 after rejection, regardless of the investment.[4]

Assuming self-regarding preferences, 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. 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.

The transaction cost economics approach to the theory of the firm postulates that this type of inefficient opportunistic behavior can be prevented by costly remedies such as vertical integration. Then, in our setup, vertical integration between the seller and the buyer, if it is an option, can improve efficiency by eliminating the socially inefficient investment F if the transaction cost for vertical integration is less than F.

In reality, however, agents often have fairness concerns and behave in other-regarding ways, and hence, say, an altruistic buyer may offer more than the outside option X. 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. The seller's anticipation of such a negative impact may then induce the seller not to invest in the outside option in contrast to the prediction of standard economic theory, implying that vertical integration may not be a necessary remedy to prevent the seller from taking the inefficient action.

The connection between other-regarding behavior and ex-post opportunistic behavior can therefore yield important implications for the design of a governance structure. This paper attempts

[4] One can also analyze a richer setup in which not only the seller but also the buyer has an option to invest in an outside option. We have chosen the current setup for the sake of simplicity of the experimental design. This setup captures the strategic incentives where one of the parties can invest in an unproductive activity in order to increase its bargaining power.

to take a step towards understanding of this link by experimentally investigating conjectures that arise in our setup. Our setup allows us to generate insights about considerations relevant for the transacting parties when deciding whether to engage in ex-post opportunistic behavior or whether to invoke costly remedies to prevent opportunism.

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. The seller's (opportunistic) investment thus reduces the degree of the buyer's altruism towards the seller, whereas the seller's (kind) non-investment increases it. This logic yields two conjectures regarding the size of the outside option. First, we conjecture that Z, which is a measure of the buyer's altruism following investment, 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. Second, we conjecture that p_{NI}, a measure of the buyer's altruism following non-investment, is increasing in X. This second 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.[5]

We design a laboratory experiment that allows us to test our conjectures regarding the size of the outside option in a basic setup (Experiment 1). In the experiment, we set the gain from trade G = 100 and implement three treatments in which we exogenously vary the outside option to be X = 25, 35, and 65. Within this setup, our conjectures regarding Z and p_{NI} yield the following testable hypotheses:

(H1) $Z^{25} > Z^{35} > Z^{65}$

(H2) $p_{NI}^{25} < p_{NI}^{35} < p_{NI}^{65}$

[5] The derivation of conjectures based on the logic of the Revealed Altruism theory (Cox, Friedman, and Sadiraj, 2008) is presented in Appendix A.

Our experimental results support the first hypothesis. Regarding the second hypothesis, our data support $p_{NI}^{25} < p_{NI}^{65}$ and $p_{NI}^{35} < p_{NI}^{65}$ but do not support $p_{NI}^{25} < p_{NI}^{35}$.

Our hypotheses and experimental design have a merit of simplicity to study the link between other-regarding behavior and investment in outside options as opportunistic behavior. However, they have the following limitations. First, the seller's investment in outside option does not fully convey the seller's opportunism towards the buyer because the seller does not choose the level of X in our setup. Hence a seller in the X = 65 treatment, say, can be held responsible for the act of investment in this high-valued outside option, but not for the size of the outside option itself. Second, the mere presence of the outside option induced by investment changes the bargaining environment. Thus, one cannot convincingly conclude the seller's opportunistic behavior negatively affects the buyer's other-regarding preferences as the observed effect could be triggered solely by the corresponding change in the environment.

In light of these limitations, we have undertaken Experiment 2 consisting of two new treatments. In the Choice treatment, if the seller chooses to invest in outside option, the seller also chooses the value of X from X = 25, 35, or 65. In the Random treatment, the seller makes no investment decision. Instead, the computer randomly chooses one of the following four options with equal probability: (i) no investment, (ii) investment resulting in X = 25, (iii) investment resulting in X = 35, or (iv) investment resulting in X = 65. In both treatments, the seller's cost of investment is fixed at F = 10 as in Experiment 1.

Buyer's offers following investment observed in Experiment 1 are replicated for all three outside options in the Choice treatment of Experiment 2, suggesting that buyers' behavior is not particularly sensitive to whether the size of the outside option is endogenously chosen by the seller or exogenously imposed by the design.[6] Experiment 2 data show that $Z^{25} > Z^{35} > Z^{65}$ holds in both treatments, where $Z^{25} > Z^{35} > Z^{65}$ in the Random treatment is driven by the change in the bargaining environment but not by the seller's opportunistic behavior. The comparison of premium prices between the Choice and Random treatments suggests that the buyer views the seller's investment as opportunistic when X = 65, but not when X = 25 or 35.

Our experiment is designed to study whether in the transaction cost approach to the theory of the firm it is important to take into account agents' other-regarding preferences. From this point of view, our experimental findings seem pertinent to buyer-seller relationships between one-person firms (e.g., the trucking industry example studied by Baker and Hubbard, 2004). In the contexts of larger firms, however, we believe our findings are also applicable to bilateral trade relationships

[6] Regarding replicability it is important to note that Experiment 2 was run in a different laboratory as one of the authors moved and the original lab no longer existed. The results are thus robust to two changes made simultaneously.

between managers representing different firms. As an example, consider sales of exhaust pipe by a sales manager of a steel manufacturing firm (firm S) to a procurement manager of an automobile manufacturer (firm A). Although the sales manager knows that firm S' exhaust pipe is best suited to firm A's automobiles, he may undertake sales activities to other automobile manufacturers to establish outside options for his sales negotiations with firm A's procurement manager. As long as each manager's performance is linked to his compensation, the procurement manager may view the establishment of outside options as the sales manager's opportunistic behavior and his choice of not establishing outside options as the sales manager's kind behavior. However, it is possible that if managers act on behalf of their firms rather than on their own, the effects we are studying could be muted.

As with any theory (or theory-testing experiments), our setup is an abstraction zooming in on the underlying mechanism that could be driving behavior of buyers and sellers in the described scenario. This approach enables us to study the interaction of opportunistic and other-regarding behavior while controlling for factors that affect behavior in the field in an uncontrolled manner and thus allow us to draw causal inferences about their potential importance in everyday business transactions.

Finally, note that our paper is not the first one to experimentally study the link between opportunistic behavior and other-regarding preferences and relate this link to the theory of the firm. Oosterbeek, Sloof, and Sonnemans (2011) (referred to OSS hereafter) study a similar link and relate it to the property rights approach to the theory of the firm. Their application to the theory of the firm is closely motivated by Baker and Hubbard's (2004) study of the business relationship between a truck driver and a dispatcher. Our contribution to the literature is complementary to OSS's contribution because we focus on the transaction cost economics approach, whereas OSS focus on the property rights approach (Grossman and Hart, 1986; Hart and Moore, 1990), to the theory of the firm. See Section 2 for similarities and differences between OSS and our paper.

2. Relationship to the literature

The present paper sheds a new light on the transaction cost economics approach to the theory of the firm by studying the link between investment in an outside option and other-regarding behavior. As mentioned above, our contribution to the literature is related to the contribution of OSS. OSS 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). The minimum amount M is assumed to be a weighted average of the value of productive investment and the value of rent-seeking investment, where the weight of the value of productive investment is interpreted representing the seller's bargaining power. OSS Find that incentive instruments like asset ownership or performance pay become less attractive when the scope for rent-seeking activities increases but that reciprocity mitigates the adverse effects of rent-seeking opportunities.

Investment in rent-seeking activity in OSS is analogous to investment in outside option in our study in the sense that it is opportunistic. OSS predict that an increase in the minimum amount M reduces the bonus that the buyer offers to the seller on top of M. This prediction is similar to our prediction that an increase in the outside option X decreases the buyer's premium price Z. The underlying logic, however, is quite different. In OSS, higher M is driven by the seller's higher investment in rent-seeking activity. OSS develop a prediction that the seller's higher investment, which is perceived as unkind by the buyer, results in reduction of the bonus that the buyer offers. In our setup, the seller's investment cost is fixed at F and the seller chooses whether or not to invest in outside option. We predict that as the level of outside option increases, the buyer views the seller's investment as increasingly more opportunistic, resulting in the reduction of the premium price that the buyer offers.

OSS relate their experimental findings to the property rights approach to the theory of the firm. The setup of OSS's model is closely related to Baker and Hubbard (2004), who consider the business relation between a truck and a dispatcher in which the driver chooses how much effort to expend in productive activities and how much effort to expend in rent-seeking activities. If the driver owns the truck, he has stronger incentives for both types of activities. Hence, truck ownership by the driver is only optimal if the additional productive incentives outweigh the extra rent-seeking incentives. Analogous to this logic, OSS posit that the seller's ownership of asset increases the seller's bargaining power and the marginal return of his rent-seeking activities. 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. These experimental findings suggest that the efficient ownership structure of asset (to be owned by the seller or by the buyer) in the presence of agents' reciprocity considerations may be different from the efficient ownership structure suggested by standard theory.[7]

The difference between OSS' application and our application to the theory of the firm parallels the difference between the property rights approach and the transaction cost economics approach to the theory of the firm. In OSS, the seller invests in productive activities and rent-seeking activities prior to the creation of appropriable quasi-rents, and the ownership structure affects the seller's incentives to invest in both types of activities. Agents' reciprocity considerations may significantly impact the efficient ownership structure in OSS setup. In our setup, the seller can invest in outside option in a situation where appropriable quasi-rents have been already created. Transaction cost economics postulates that ex-post opportunistic behavior such as the investment in outside option can be prevented by vertical integration. We argue that, in the presence of agents' other regarding preferences, the seller may refrain from investing in outside option to avoid negatively impacting the buyer, implying that vertical integration may not be a necessary remedy to the opportunistic behavior.

In bilateral trade relationships, relation-specific investment (analogous to productive investment in OSS) often creates appropriable quasi-rents to be shared between two parties. The surplus-sharing leads to the problem of inefficiency (the holdup problem) in a world of incomplete contracts. Several papers have previously studied the holdup problem from behavioral perspectives. These papers study agents' incentives to make relation-specific investments, focusing on the issues of communication between parties (Ellingsen and Johannesson, 2004; Charness and Dufwenberg, 2006), private information about alternative opportunities (Sloof, 2008), heterogeneous fairness preferences (von Siemens, 2009), the role of contracts (Hoppe and Schmitz, 2011), and the possibility of vengeance (Dufwenberg, Smith, and Van Essen, 2013).

Regarding the interaction between other-regarding preferences and opportunism, Dufwenberg et al. (2013) experimentally investigate a behavioral hypothesis that negative reciprocity can mitigate an agent's underinvestment in a holdup setup only when the investor holds the rights to control of the investment proceeds, and find supporting experimental evidence. In von Siemens' (2009) theoretical model, sellers have heterogeneous fairness preferences that are private information. Sellers' investments can then signal their preferences, thereby influence beliefs, and bargaining behavior.

[7] 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. The authors 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.

Consequently, individuals might choose high investments in order not to signal information that is unfavorable in the ensuing bargaining.

These previous studies of the holdup problem are related to our paper in the sense that they experimentally study investment inefficiency associated with appropriable-quasi rents. Their focus, however, differs from ours as all these previous papers focus on underinvestment in relation-specific investment that creates appropriable quasi-rents, which is an ex-ante inefficiency. In contrast, we focus on an ex-post inefficiency of investment in outside option that is opportunistic and, from the welfare perspective, wasteful. Our contribution is therefore complementary to these earlier papers as we study a different aspect of investment inefficiency.

Our paper bears 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 principal-agent game, an agent chooses a productive activity x, which is costly to him but beneficial to the principal. In the experiment, the cost for the agent is x, while the benefit to the principal is 2x. Before the agent chooses x, the principal decides whether or not to force a minimum requirement $\underline{x} > 0$, increasing the lower bound of the agent's choice set. FK 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 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.

The interaction between the buyer and the seller, described in Introduction, is reminiscent of the ultimatum game (Güth, Schmittberger, and Schwarze, 1982) with an outside option.[8] Several previous experimental studies explore behavior in ultimatum games, in which outside options are exogenously given (Sopher, 1993; Knez and Camerer, 1995; Eckel and Gilles, 2004). Eckel and Gilles (2004) systematically vary the outside option to the proposer and find that the amount kept by

[8] See also Camerer (2003), van Damme et al. (2014), and Güth and Kocher (2014) for excellent surveys of behavior observed in the ultimatum game.

the proposer increases with the size of the outside option available to him. This finding lends empirical support to the intuition that having an outside option increases the respective party's material payoff. [9] The fundamental difference between our Experiment 1 and the previous studies is that the presence of outside option is endogenously established by the seller's investment decision in our Experiment 1 while its size is exogenously varied by the experimental design. This set up allows us to study new hypotheses based on the postulation that the buyer views the seller's investment as opportunistic behavior whereas non-investment is viewed as kind. By exogenously varying the size of the outside option we are able to test our hypothesis (H2) that with the size of the outside option increasing, the buyer views non-investment as increasingly more kind. Furthermore, in Experiment 2 we compare the Choice and Random treatments, where the latter treatment is similar to the setup in the previous studies in the sense that the level of outside option is not chosen by subjects.

3. Experiment 1: The size of the outside option imposed by design

The objective of Experiment 1 is to investigate the link between investment in outside options and other-regarding behavior in a basic setting. 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. Since ex ante it is not clear whether and how the studied link between opportunism and other-regarding preferences depends on the actual size of X, including only two values of X, say 35 and 65, would not allow us to detect possible non-monotonicity in the above relationship.

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[9] Sopher (1993) uses a "random ultimatum game" to compare subject behavior in a treatment where both players have the same positive outside option to a treatment where only one player has a positive outside option. Surprisingly, he finds that it is the players with lower outside option who demand a larger share of the pie. Sopher's result is likely to be driven by the fact that the players simultaneously act both as proposers and receivers with the payoff-relevant scenario being determined randomly. Knez and Camerer (1995) also employ exogenous outside options to study social comparisons between two responders with different outside options in a situation when the responders receive proposals from a single respondent. Their data show that responders reject offers more frequently when they are offered less than the other responder.

Experiment 1 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 recruited using ORSEE (Greiner, 2015). The experiment involved an across-subjects design in which each subject only participated in a single session (and thus a single treatment) 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 B) 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, with the actual earnings rounded up; this was announced to subjects individually during the payment. 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.[10] 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 (in integer amounts) 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 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. Brandts and Charness (2011) survey the studies comparing the strategy method with the direct-response method and find that in a vast majority the

[10] Keeping the cost of investment fixed allows us to maintain the decision-making environment fixed across treatments and focus solely of the effect of the size of the outside option.

strategy method and the direct-response method induce similar results. 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. If, however, one expected the elicitation procedure to influence behavior in our setup, the strategy method is likely to yield weaker effects (unless coupled with a within-subject design which, however, is not the case here) as it elicits behavior in the "cold emotional state" (Brandts and Charness, 2000), making the current design a conservative test of our conjectures.

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.[11]

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

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. While the subjects were answering the control questions, the experimenter privately answered any questions and, if necessary, provided additional assistance and explanation until the subject calculated all answers correctly. (There were a few subjects who required multiple explanations until they answered the questions correctly; however, no subjects were excluded from participating). 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.

[11] 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.

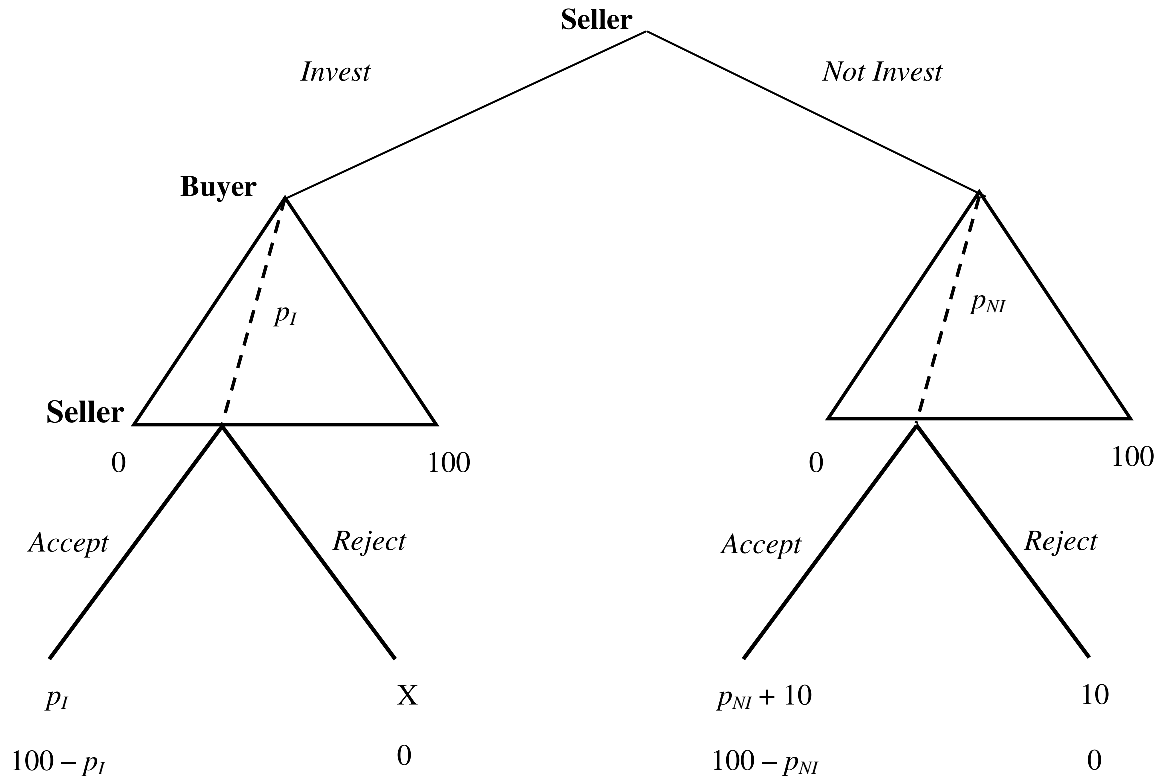

Figure 1. The game

4. Experiment 1 results

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.

Hypothesis 1 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).[12] 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).[13]

Result 1: The buyer's offer following the seller's investment minus the outside option is decreasing in the size of the outside option.

[12] 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.

[13] 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).

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	43.94	56.22
Median offer	40	45	65
Average premium price: $Z = p_I - X$	14.68	8.94	-8.78
Average accepted offer	44.00	45.78	64.11
Median accepted offer	45	45	66
Rejection rate	2/15 (13.3%)	2/20 (10%)	9/27 (33.3%)
Average rejected offer	28.00	39.00	46.11
Behavior following non-investment			
Average offer: p_{NI}	37.94	38.09	45.13
Median offer	40	40	50
Average accepted offer	37.83	40.08	28.00
Median accepted offer	40	40	28
Rejection rate	1/19 (5.3%)	2/15 (13.3%)	4/5 (80%)
Average rejected offer	20.00	12.50	16.25

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.

Table 2. Statistical tests for treatment differences

	Jonckheere-Terpstra Three Sample Tests	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)	(<0.001)	z = -2.48 (0.013)	z = -6.27 (0.000)	z = -6.43 (0.000)
Offers following non- investment (p_{NI})	(0.030)	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 second 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 overall support for this hypothesis (p-value = 0.030).[14]

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).

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).

Result 2: The buyer's offer following the seller's non-investment is weakly increasing in 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

[14] The Jonckheere-Terpstra test's alternative hypothesis is with all ordered pairs satisfying weak inequalities and at least one of them satisfying a strict inequality. Given the results from pair-wise comparisons we state Result 2 as weakly increasing.

evidence, however, is not as strong as with the premium price offered on top of the outside option. The finding by Cox, Servátka, and Vadovič (2017) that reciprocal responses to acts of commission are weaker than reciprocal responses to acts of omission, provides a plausible ex-post explanation for why this is the case. The distinction between acts of commission and acts of omission is based on whether the status quo is overturned or upheld by an agent's action (Cox et al., 2008). 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. [15]

The observed pattern of offers following investment of offering close to half and close to X is consistent with the "deal-me-out" bargaining outcome (Binmore, Shaked, and Sutton, 1989; Binmore, Proulx, Samuelson, and Swierzbinski, 1998). A testable implication of deal-me-out is whether offers are significantly higher following investment than non-investment when X = 65 but not when X = 25 and X = 35. We find that the offers following investment indeed are significantly higher than following non-investment when X = 65 (p-value = 0.032; Mann-Whitney ranksum test) and not when X = 25 (p-value = 0.549). However, we also find that the offers following investment indeed are significantly higher than following non-investment when X = 35 (p-value = 0.021), contrary to the deal-me-out prediction.

[15] To be exact, the Revealed Altruism theory developed by Cox et al. (2008) refers to the status quo opportunity set, which is the opportunity set available to the buyer in the absence of investment.

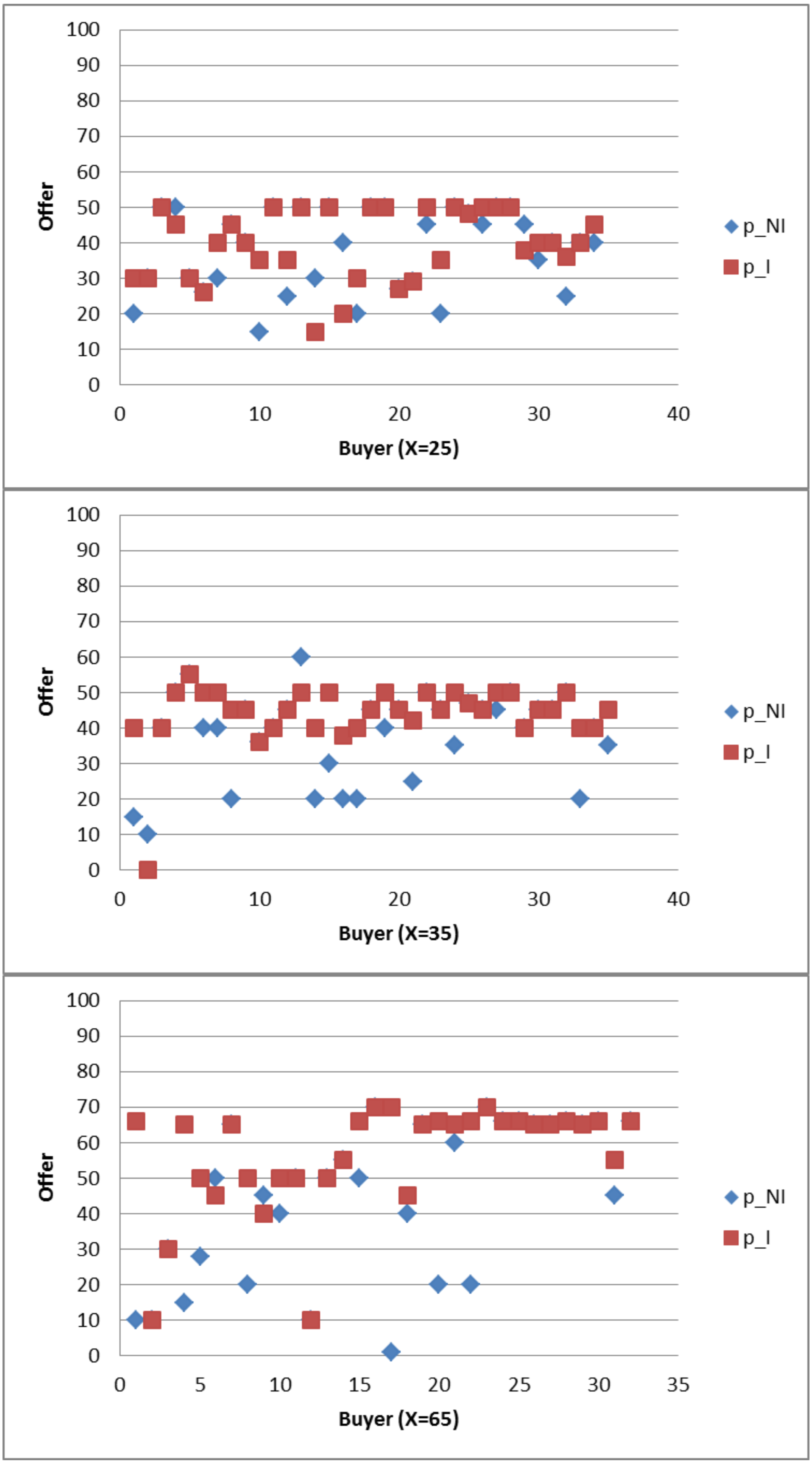

Figure 2. Within-subject comparisons of offers following investment and non-investment

We end this section by analyzing the seller's return from investment in outside option. The seller's maximum 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. Recall that the seller's maximum return from non-investment is p_{NI}. Let us define the maximum net return from investment, denoted by MNR, as MNR = max{X + Z, X} – F – p_{NI}. Standard economic theory assuming self-regarding preferences predicts that Z = p_{NI} = 0, and hence MNR = X – F.

Our experimental results, however, suggest that Z > 0 and p_{NI} > 0, implying that MNR = X – F – (p_{NI} – Z). Hence, MNR in the presence of other-regarding preferences is lower than MNR predicted by standard theory if p_{NI} > Z. 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). A lower MNR in the presence of other-regarding preferences suggests that the seller's incentive to invest in outside option is not as high as predicted by standard theory. The seller may still choose to invest due to his own other-regarding preferences and risk aversion, and in fact, we do observe a significant fraction of our subjects investing in outside option in the experiment. At the same time, another significant fraction of our subjects chose not to invest in outside option. If a seller chooses not to invest in outside option, costly remedies such as vertical integration to prevent the inefficient activity may not be necessary, meaning that when the transaction cost economics approach is applied to the design of a governance structure, agents' other regarding preferences, if relevant, should be considered.

5. Experiment 2: The size of the outside option selected by the seller vs. randomly selected by the computer

Experiment 2 addresses two limitations of Experiment 1: (i) When the outside option is fixed at X, the seller's investment does not fully convey the seller's opportunism towards the buyer because the seller does not choose the level of X. This means that the seller cannot be held responsible for the size of the outside option, but only for the act of investment itself. (ii) The presence of the outside option induced by investment changes the bargaining environment. The buyer's offers following investment observed in Experiment 1 could therefore be affected by the seller's opportunism and/or by the change in the environment.

Experiment 2 remedies these issues by introducing two additional treatments. In the Choice treatment, the seller decides not only whether to invest in outside option, but in the case of investment also chooses the size of X. The available outside options are consistent with those in

Experiment 1; i.e. X = 25, 35, or 65. To control for the change in the bargaining environment caused by investment, in the Random treatment the seller makes no investment decision. Instead, the computer randomly chooses between no investment, investment resulting in X = 25, investment resulting in X = 35, or investment resulting in X = 65, all with equal probability. In both treatments, the seller's cost of investment is fixed at F = 10 as in Experiment 1.

Experiment 2 took place in the MGSM Experimental Economics Laboratory at the Macquarie Graduate School of Management in Sydney. [16] All procedures and parameterizations were analogous to Experiment 1 with one notable exception resulting from the new experimental design. Due to the use of the strategy method, each buyer was now making four offers. To minimize confusion, the four scenarios were presented on one screen as a list to match the explanation in the instructions (provided in Appendix C), rather than in random order on multiple screens. Importantly, in the Random treatment the sellers were informed about the scenario selected by the computer (independently for each seller) and the buyers knew this procedure. The buyers, however, were not informed about which scenario was selected at the time of making their offers.

6. Experiment 2 results

Table 3 presents summary statistics of subject behavior in Experiment 2. The introduction of the Choice treatment is motivated by the fact that the seller's investment does not fully convey the seller's opportunism in the basic setup of Experiment 1. Since the seller does not choose the level of X, he is only responsible for the opportunistic act of investment but not for the size of the outside option itself. With the caveat that the two experiments were conducted in different laboratories, we compare the offers following investment in the three individual treatments of Experiment 1 (the upper panel of Table 1) with those observed in the Choice treatment in X = 25, 35, and 65 scenarios (the upper panel of Table 3, columns 2-4). According to the Mann-Whitney test, there are no statistically significant differences in any of the three cases (p-value = 0.121, 0.115, and 0.241 for X = 25, 35, and 65 pairwise comparisons, respectively), suggesting that buyers' behavior is not sensitive to whether the size of the outside option is endogenously chosen by the seller or exogenously imposed by the design. In other words, the seller's opportunism is likely conveyed by the act of investment itself; the effect of selecting the size of X is marginal.[17]

Note that offers following non-investment are conceptually different between our two experiments. The level of kindness of non-investment depends on the available unchosen alternatives.

[16] The exchange rate between the New Zealand dollar and the Australian dollar at the time of running Experiment 2 was 1 NZD = 0.92 AUD.

[17] Since Z is defined as p_I – X, the comparison of Zs yields the same statistical result as the comparison of offers.

These alternatives vary by design; while in Experiment 1 the seller decides between investing to create a fixed outside option X and not investing, in Experiment 2 the seller also chooses the size of the outside option, making the offers following non-investment not directly comparable in the two situations. We therefore do not offer such comparison here.

A within-experiment comparison of buyers' behavior in the Choice and Random treatments allows us to gauge the relative importance of the change in the bargaining environment stemming from investment vis-à-vis the opportunistic behavior of the seller. In relation to our hypothesis H1, Experiment 2 data show that $Z^{25} > Z^{35}$, $Z^{25} > Z^{65}$, and $Z^{35} > Z^{65}$ with all pairwise comparisons being highly statistically significant according to the Signed-Rank test (p-value < 0.001 for all three comparisons in Choice; p-value = 0.0056 for $Z^{25} > Z^{35}$ in Random and p-value < 0.001 for the remaining two comparisons). Since the comparisons are within subjects, we cannot use the Jonckheere-Terpstra test for ordered hypotheses.

Recall that in the Random treatment, the buyer does not perceive the investment as opportunistic because he knows that the decision is randomly determined by the computer and not by the seller. This implies that the observed relationship $Z^{25} > Z^{35} > Z^{65}$ is *not* driven by the seller's opportunistic behavior in the Random treatment but rather by the bargaining environment induced by investment. In contrast, the level of Z can be affected by the buyer's perception of the seller's opportunism in the Choice treatment. We therefore compare Zs in the Choice treatment (denoted by Z_C) and Z in Random treatment (denoted by Z_R). Our data show that Z_C and Z_R are not statistically different for X = 25 and 35 (p-value = 0.327 and 0.865, respectively; also reported in Table 4 as a comparison of offers between these two treatments), and that Z_C is significantly greater than Z_R for X = 65 (p-value = 0.022). This result suggests that the buyer views the seller's investment as opportunistic when X = 65, but not when X = 25 or 35. In the two latter cases the size of the offers seems to be driven mostly by the change in the bargaining environment rather than opportunism per se.

Table 3. Subject behavior in Experiment 2

	Non-investment	Invest in X = 25	Invest in X = 35	Invest in X = 65
		Choice treatment (n = 32)*		
Investment rate	1/32	1/32	3/32	28/32
Average offer: p_I	34.03	36.74	44.25	58.10
Median offer	30	35	40	66
Average premium price ($Z = p_I - X$)	n/a	11.74	9.26	-6.90
Average accepted offer	35	30	61.67	68.01
Median accepted offer	35	30	45	66
Rejection rate	0/1 (0%)	0/1 (0%)	0/3 (0%)	10/26 (=38%)
Average rejected offer	n/a	n/a	n/a	37.88
		Random treatment (n=34)		
Random investment rate	8/34	5/34	8/34	13/34
Average offer: p_{NI}	26.32	35.76	43.09	64.79
Median offer	22.5	35	40	70
Average premium price ($Z = p_I - X$)	n/a	10.76	8.09	-0.21
Average accepted offer	28.50	36.00	42.75	69.18
Median accepted offer	20	35	40	70
Rejection rate	2/8 (25%)	0/5 (0%)	0/8 (0%)	2/13 (%)
Average rejected offer	10.50	n/a	n/a	37

* One buyer participated twice so we have excluded the second observation. Thus for buyers, n = 31. We have but kept the paired seller's investment decision (invest in X = 65) that is still independent. For X = 65 the buyer 70 that was accepted by the seller. This acceptance is not included in the above summary as it is not independent of contamination.

Table 4. Statistical tests for the comparisons between the Choice and Random treatments

Scenario	$\mathbf{p_{NI}}$	**X = 25**	**X = 35**	**X = 65**
Mann-Whitney test	z = -2.2251 (0.024)	z = -0.980 (0.0327)	z = -0.170 (0.865)	z = 2.290 (0.022)

z-statistic for Mann-Whitney ranksum test; p-values in parentheses.

Result 3: The buyer views the seller's investment as opportunistic when the outside option is high.

One could also interpret the above result as the buyer viewing the seller's non-investment as kind when X = 65, but not when X = 25 or 35. This interpretation is consistent with our Experiment 1 finding that $p_{NI}^{25} < p_{NI}^{65}$ and $p_{NI}^{35} < p_{NI}^{65}$ but the lack of support for $p_{NI}^{25} < p_{NI}^{35}$.

The design of Experiment 2 does not, and is not meant to, permit a direct test of hypothesis H2. However, a within-experiment comparison of buyers' offers following non-investment sheds additional light on the kindness of non-investment. We find that such offers are statistically significantly higher in the Choice treatment than in the Random treatment (34.03 vs. 26.32; p-value = 0.024). As the buyers know that the seller could have invested in outside option (and chosen its size) but did not, this means that such non-investment is considered kind in the Choice treatment, but not in the Random treatment where the non-investment scenario happened to be randomly selected by the computer.

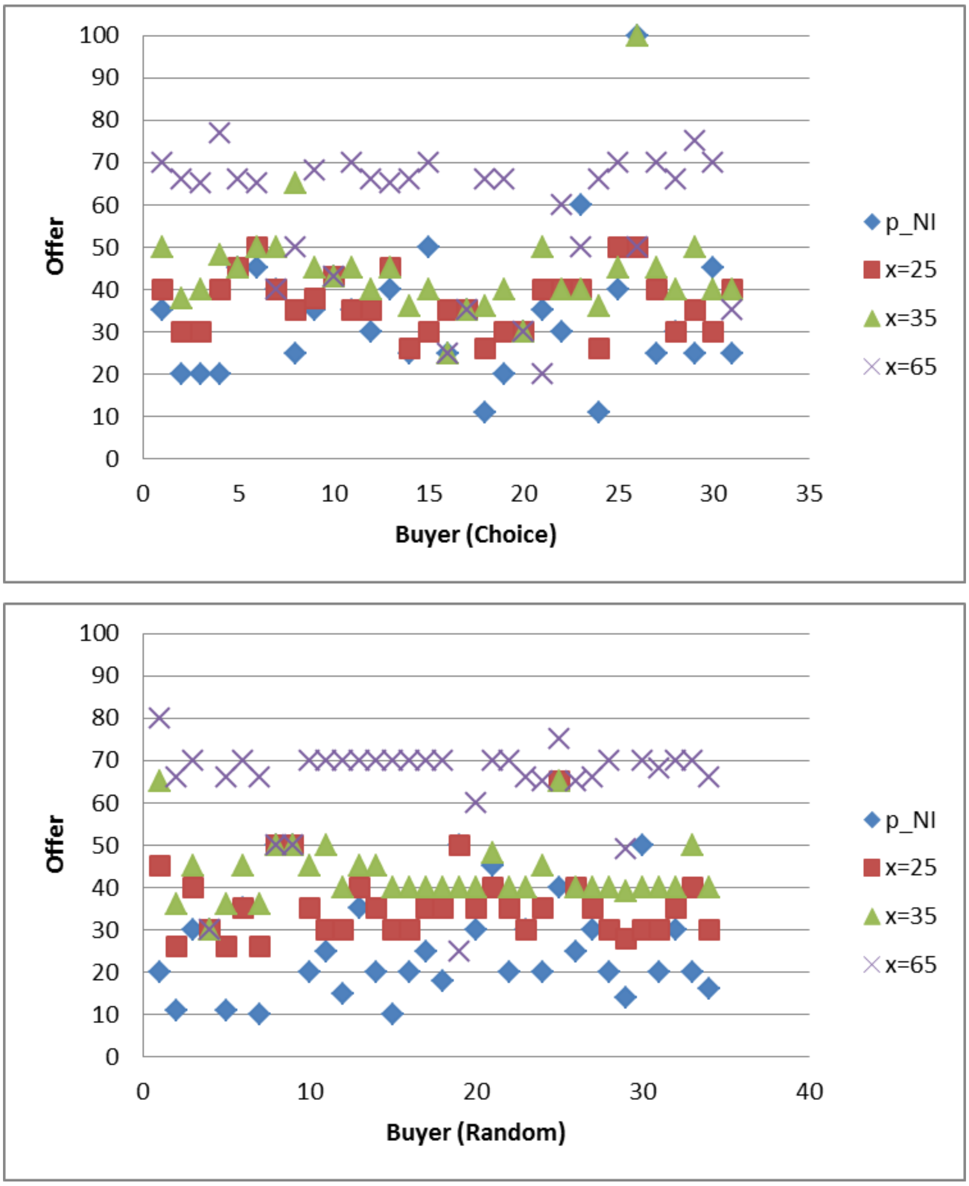

Figure 3. Within-subject comparisons of buyers' offers in Experiment 2

7. Summary and conclusions

An agent often invests in an outside option in bilateral trade relationships to improve his bargaining position. In our setup, 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. Investment in outside option is an example of ex-post opportunistic behavior. The transaction cost economics approach to the theory of the firm postulates that costly remedies such as vertical integration can prevent this type of inefficient activities.

In reality, agents often care for others to some degree rather than being completely self-regarding as standard theory assumes. When agents behave in other-regarding ways, an altruistic buyer may offer a premium price Z on top of the outside option X. Our experimental findings support our conjecture that Z decreases as X increases, where the result is driven not only by changes in the bargaining environment but also by the buyer's perception of the seller's investment being opportunistic when X is large. We also conjecture that, following the seller's non-investment decision, an altruistic buyer makes a positive offer $p_{NI} > 0$, and p_{NI} increases as the forgone outside option X increases. Our experimental findings support this conjecture when X is large, but do not when X is small.

The seller's return from investing in outside option in our experiment is lower than the amount predicted by standard theory, suggesting that the seller may refrain from investing in outside option. In fact, a significant fraction of our subjects chose not to invest in outside option. If a seller chooses not to invest in outside option, costly remedies such as vertical integration to prevent the inefficient activity may not be necessary. Our experimental findings therefore suggest that when the transaction cost economics approach is applied to the design of a governance structure, agents' other regarding preferences, if relevant, should be taken into account.

When one inspects the increase in average offers following investment across different outside options in both our experiments, this increase is not commensurate with the increase in the outside option. 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 leads to a smaller increase in the final payoff than predicted by the theories used for analyzing bargaining situations. In our experiments, the outside option is created by the seller's investment. 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. In contrast, in Anbarci and Feltovich's setup the disagreement payoffs are established by the design 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, providing further evidence that other-regarding preferences play an important role in bargaining scenarios with disagreement payoffs/outside options, that our experiments are also an example of.

We conclude the paper by pointing out several directions for future research. First, as discussed 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 integrating themselves into a single entity 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.[18] Second, regarding real-world applicability in the contexts of large firms, our experimental design is applicable to bilateral trade relationships between managers representing different firms as stated in Introduction. At the same time, it is important to note that some bilateral-trade decisions are made collectively by groups, such as the board or the senior management team rather than individually by a single manager. 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 or 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, it is important to test the robustness of experimental findings with respect to changes in the environment that one might encounter in everyday life, for example, removing common knowledge of the outside option or introducing an outside option (or a possibility of investment in outside option) also for the buyer. Fourth, while we mostly focused on other-regarding preferences, there could be other motivations present in subject behavior such as fear of rejection. Separating them out à la Forsythe, Horowitz, Savin, and Sefton (1994), Cox (2004), or Servátka (2009) will yield a deeper understanding of the transmission mechanism through which the experienced opportunism affects behavior. Fifth, carefully designed field experiments to address our research questions would strengthen relevance of the present paper's findings to actual firms and businesses.

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[18] See, for example, Morita and Servátka (2013, 2016) who experimentally investigate relationships between identity and firm boundaries under similar strategic interactions.

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Appendix A: Theoretical Framework

This supplementary section derives conjectures based on the logic of the Revealed Altruism theory (Cox et al., 2008). We analyze the interaction between a seller and a buyer presented in 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 (≥ 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. The Revealed Altruism theory (Cox et al., 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 choses 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 receiving the outside option 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*. [19]

The 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.[20] 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. 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 first conjecture.

Our second 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 more altruistic. Since F_X = [0, 100 – X] becomes increasingly less generous as X increases,

[19] The formal definitions of the two partial orderings and the two axioms can be found in Cox et al. (2008), sections 2- 4.
[20] 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 et al. (2017) for a detailed discussion of implications of Axiom S.

we postulate that the higher the foregone outside option, the more generous non-investment is.[21] This, in turn, will make the buyer's preferences more altruistic, meaning that he will offer a higher p_{NI} as X increases.

[21] 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.

Appendix B: EXPERIMENT 1 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? …………..

Appendix B

EXPERIMENT 2 INSTRUCTIONS (Choice Treatment)

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 and the Size of the Outside Option
The First Mover decides whether or not to invest his/her 10 tokens to create an outside option for himself/herself. The outside option will become relevant in case (s)he rejects the Second Mover's offer that will be made in the next stage. In the case of investment, the First Mover chooses the size of the outside option to be 25, 35, or 65 tokens.

- If the First Mover invests, then his/her outside option is 25, 35, or 65 tokens, depending on the size (s)he has chosen.
- 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 <u>for all four possible</u> First Mover's decisions:

- If the First Mover has not invested and his/her outside option is 0 tokens.
- If the First Mover has invested and chose the 25 tokens outside option.
- If the First Mover has invested and chose the 35 tokens outside option.
- If the First Mover has invested and chose the 65 tokens outside option.

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 chosen outside option 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, chooses an outside option of 25 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, chooses an outside option of 65 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? …………..

3. If the First Mover invests his/her 10 tokens, chooses an outside option of 35 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? …………..

4. If the First Mover invests his/her 10 tokens, chooses an outside option of 65 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? …………..

5. 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? …………..

6. 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? …………..

EXPERIMENT 2 INSTRUCTIONS (Random Treatment)

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 Investment Decision and the Size of the Outside Option Selected Randomly by the Computer
The computer randomly decides whether or not the First Mover's 10 tokens will be invested to create an outside option for the First Mover. The outside option will become relevant in case the First Mover rejects the Second Mover's offer that will be made in the next stage. In the case of investment, the computer randomly selects the size of the outside option to be 25, 35, or 65 tokens.

- If the computer's invests, then the First Mover's outside option is 25, 35, or 65 tokens, depending on the randomly selected size. Each of the three outside options has a 25% chance to be selected.
- If the computer does not invest (which occurs with the remaining 25% chance), then the First Mover's outside option is 0 tokens. (However, the First Mover gets to keep the 10 tokens.)

Note that the First Mover has no decision to make in Stage 1.

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 computer's investment decision. Hence each Second Mover makes a decision for all of the four possible computer's decisions:

- If the computer has not invested and the First Mover's outside option is 0 tokens.
- If the computer has invested and the First Mover's outside option is 25 tokens.
- If the computer has invested and the First Mover's outside option is 35 tokens.
- If the computer has invested and the First Mover's outside option is 65 tokens.

Note that the computer's random 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 randomly selected outside option if the computer invested at Stage 1, and receives 0 tokens if the computer did not invest at Stage 1 (in which case the First Mover 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 computer invests the First Mover's 10 tokens, an outside option of 25 is randomly selected 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 computer invests the First Mover's 10 tokens, an outside option of 65 is randomly selected 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? …………..

3. If the computer invests the First Mover's 10 tokens, an outside option of 35 is randomly selected 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? …………..

4. If the computer invests the First Mover's 10 tokens, an outside option of 65 is randomly selected 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? …………..

5. If the computer does not invest the First Mover’s 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? …………..

6. If the computer does not invest the First Mover’s 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? …………..