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Added surplus and lost bargaining power in long-term contracting

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ABSTRACT

The paper devises a laboratory experiment to determine when one party in a bargaining situation chooses to transfer bargaining power to the other party, and whether that choice can be profitable. In the bargaining game, two players bargain over the surplus allocation. The relationship lasts for several periods and one player, the first mover, must choose between governing the relationship with a single long-term contract or a sequence of short-term contracts. We focus on two aspects of the choice. First, a long-term contract may increase the surplus because it allows for long-term investments. Second, a long-term contract may, however, reduce bargaining power. We report results of an experiment designed to explore this trade-off. Participants played a sequential bargaining game whereby the first mover selects whether to be the recipient in a single-shot dictator game or a twice-repeated ultimatum game. We find that, in general, participants prefer to retain the bargaining power of the ultimatum games as opposed to engage in a dictator game played over a bigger endowment. This result suggests that diminished bargaining power can be a serious detriment to realizing long-term gains from trade.

1. Introduction

The paper examines bargaining behavior of two players engaged in a surplus-generating relationship that lasts for several periods. We consider an environment in which one player, the first mover, has the opportunity to decide whether to govern the relationship with a single long-term contract or a sequence of short-term contracts. Economic agents are often faced with such a problem. For instance, mobile phone users have the option to engage in “pay-as-you-go” or “pre-paid” plans or commit to a provider for several periods through a contract. Athletes may negotiate different sponsorship contracts over time or sign a lifetime endorsement contract.[1] When hiring academics for teaching positions, universities have the option of offering a series of one-year teaching contracts or a multiyear lecturer contract.

The contracting decision is especially important in procurement processes. Buyers often engage in multi-period relationships with vendors and must choose between long- and short-term contracts. When a firm signs a long-term contract for a building or design project, two things happen. On the positive side, the long-term relationship allows the linked parties to make relationship-specific investments that can increase the joint surplus they share. On the negative side, the long-term contract changes the nature of the bargaining game the parties face over any subsequent increases in that surplus. This alteration in the bargaining game can account for why, once the contract is signed, any changes in the output are more expensive than they would have been before the contract was signed. The contract transfers bargaining power to the vendor, who then receives a disproportionate share of any additional surplus.[2]

The purpose of this paper is to explore in the laboratory a stylized version of a setting in which a buyer decides whether to transfer bargaining power to a vendor. The experiment involves two players who bargain over a surplus. The first mover is player A and the other player is denoted B.[3] Player A initially makes a choice between a long-term contract or a sequence of two short-term contracts. At the time of player

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[1] For instance, in 2015 LeBron James signed a lifetime contract with Nike. Source: CBC Sports. Available at http://www.cbc.ca/sports/basketball/nba/lebron-james-lifetime-contract-nike-1.3354820. Accessed on June 6, 2017.

[2] This alteration can take many forms. For example, firms sometimes sign long-term exclusivity contracts with suppliers with a cost-saving goal, however, this could also lead to lower quality standards (e.g., long delivery times) as the suppliers may prioritize customers with outside options. Moreover, Bajari et al. (2014) find that adaptation costs account for up to 14 percent of the markups of winning bids in highway paving procurement auctions in California. Remarkably, these adaptation markups are significantly larger than those from ‘standard’ sources like private information and market power.

[3] Player A can be thought of as a procurer (or buyer) while player B would take the role of a vendor.

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Abstract

The paper devises a laboratory experiment to determine when one party in a bargaining situation chooses to transfer bargaining power to the other party, and whether that choice can be profitable. In the bargaining game, two players bargain over the surplus allocation. The relationship lasts for several periods and one player, the first mover, must choose between governing the relationship with a single long-term contract or a sequence of short-term contracts. We focus on two aspects of the choice. First, a long-term contract may increase the surplus because it allows for long-term investments. Second, a long-term contract may, however, reduce bargaining power. We report results of an experiment designed to explore this trade-off. Participants played a sequential bargaining game whereby the first mover selects whether to be the recipient in a single-shot dictator game or a twice-repeated ultimatum game. We find that, in general, participants prefer to retain the bargaining power of the ultimatum games as opposed to engage in a dictator game played over a bigger endowment. This result suggests that diminished bargaining power can be a serious detriment to realizing long-term gains from trade.

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The purpose of this paper is to explore in the laboratory a stylized version of a setting in which a buyer decides whether to transfer bargaining power to a vendor. The experiment involves two players who bargain over a surplus. The first mover is player A and the other player is denoted B.[3] Player A initially makes a choice between a long-term contract or a sequence of two short-term contracts. At the time of player A's choice, both players know how much surplus will be generated under the short-term and long-term contracts. Under the short-term contract the players will bargain over two consecutive \$20 surplus amounts using ultimatum bargaining with player B making the offer. Importantly, the second ultimatum game is only played if A accepts the first ultimatum offer. This setup simulates how a second-stage contract would not

[1] For instance, in 2015 LeBron James signed a lifetime contract with Nike. Source: CBC Sports. Available at `http://www.cbc.ca/sports/basketball/nba/lebron-james-lifetime-contract-nike-1.3354820`. Accessed on June 6, 2017.

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be reached, with parties walking away from the deal, if they meet a bargaining impasse in the first stage. The long-term contract avoids the possibility of not reaching the second stage, but it also involves a different level of surplus to be shared (ranging from \$30 to \$50) and, most importantly, it provides player A with less bargaining power. To capture the loss of bargaining power the ultimatum game is replaced by a dictator game, with player A acting as the receiver, and furthermore the dictator game might have a restricted action space.

The paper investigates whether the changes in bargaining power lead to welfare losses in the sense that player A forgoes additional surplus in order to retain bargaining power. The results are clear. Three quarters of subjects give up an additional \$10 surplus (i.e. an increase of 25% of the surplus to be shared) when obtaining it requires moving to a standard, unconstrained dictator game. Even when the dictator offers are constrained so that the recipient is guaranteed at least \$10 from the \$50 dictator endowment, half of the subjects still opt for the greater bargaining power provided by the two \$20 ultimatum games. The basic lesson of the paper, then, is that for a majority of subjects, the gains in surplus generated by a long-term contract are outweighed by the loss in bargaining power, and therefore those surplus gains go unrealized.

Because subjects forgo increases in the surplus in order to retain bargaining power, it becomes important to elaborate on how bargaining power is manipulated in the lab, and there are many ways this could be done. The key aspect of long-term contracts that must be captured by the experimental protocol is that changes in bargaining power come from changes in the rules of the game, and not just changes in the payoffs. This consideration precludes an approach in which one chooses a bargaining solution and uses it to compute payoffs directly, in which case subjects play a sequential game with known payoffs. Such an experiment would reduce to one testing whether subjects play subgame perfect equilibrium strategies, possibly confounded by social preferences, and many prior experiments have done this.

The more standard way to manipulate bargaining power in the lab is to change the number of subjects a player can bargain with at a single time, with the thinner side of the market having more bargaining power than the thicker side. Cabrales et al. (2011) take this approach in their study of how different degrees of bargaining power impact the design and selection of contracts in a hidden-information context. They find that when principals compete against each other to hire agents of unknown types, inefficiencies generated by the information asymmetries may disappear.[4] Such an approach here would lead to a game in which the long-term contract ties player A to a single partner for two periods, while the short-term contract allows player A to bargain with each of two potential partners in each of the two periods. Such a design would

[4]However, when agents compete to be hired, efficiency improves dramatically. Cabrales and Charness (2011) analyze an experiment in which a principal offers one of three possible contract menus to a team of two agents of unknown type, with both agents' participation needed for production. They observe that rejection of a contract menu offers depends on how discriminating the offers are, concluding that there is a trade-off between overall efficiency and the distribution of earnings in relation to the rejection payoffs.

dramatically increase A's bargaining power under the sequence of short-term contracts, making it unlikely that any subject in the role of player A would choose the long-term contract.

Many variations of the ultimatum game can be thought of as altering bargaining power between the proposer and the receiver.[5] One way recently explored in the literature is to manipulate bargaining power by varying the information set of both parties. For instance, Besancenot et al. (2013) design an experiment in which proposers know the size of the surplus to be shared, while receivers do not. Proposers must not only offer a split of the surplus, but must also send a non-verifiable message indicating the surplus to be shared. They find that 88.5% of proposers lie about the surplus size and, on average, under-report it by 20.5%. Chavanne and Ferreira (2017) modify this game by allowing for probabilistic revelation of the true surplus size. They find that a low revelation probability (25%) does not alter the proposer's behavior, however, in the high probability treatment (75% chance of revelation), offers increase and surplus deceit is almost fully eliminated. In the taxicab experiment of Anbarcı et al. (2015), receivers make accept/reject decisions based on non-bidding messages about the offers and not the offers themselves. This gives the opportunity to proposers to send messages that overstate the real offer to induce responders' acceptance. They find that probabilistic revelation (where receivers make decisions knowing both the message and the true offer) decreases the gap between offer and message. Note that these papers alter the nature of bargaining by exogenously offering an information advantage to the proposer.

Our study adds to the experimental literature by providing a new, theoretically-justified mechanism for manipulating bargaining power. Specifically, it has player A (the receiver) decide between a single dictator game where she has low bargaining power and a sequence of two ultimatum games where she has more bargaining power. This increase in bargaining power is subtle, considering that the ultimatum game still offers only very weak bargaining power, as the standard game-theoretic solution suggests that the receiver earns $0 in both the ultimatum and the unconstrained dictator games.[6] On the other hand, if players have beliefs consistent with the abundance of empirical evidence on ultimatum and dictator games, a receiver could expect to earn about 40% of the surplus in an ultimatum game and about half that in a dictator game, and these empirical beliefs are consistent with the notion that choosing the unconstrained dictator game corresponds to choosing less bargaining power.

The game as designed also has a gift exchange component. To understand how, consider player A's choice between playing the dictator game or the two ultimatum games. Choosing

[5] Refer to Güth and Kocher (2014) for a review of the literature around ultimatum game experiments.

[6] In some treatments the dictator's action space is restricted to make the minimal offer larger. Under the standard game-theoretic solution these restrictions strengthen the receiver's bargaining power, in which case player A would choose the long-term contract more often. To capture a bargaining power/efficiency trade-off in this eventuality, we include treatments in which the surplus in the long-term contract is smaller than the surplus in the short-term contracts.

the dictator game constitutes a gift to player B in that player A cedes the right to reject player B's offer, giving player B more freedom to take a larger share of the endowment. If player B is reciprocal, player B might make a higher offer to A in the dictator game than in the two ultimatum games. Moreover, if the dictator game is a gift from player A to player B, the size of the gift increases with the endowment received by player B, and decreases with the minimum allowable offer in the constrained dictator games.[7]

Subjects show some evidence of reciprocal behavior. Player B's dictator offers tend to be larger when the dictator game constitutes a larger "gift," either from the dictator game having a larger surplus or having fewer restrictions. However, under these same circumstances player A choosing the ultimatum games constitutes a more-negative "gift," and subject behavior shows no response to this negative gift. Regardless, the results suggest that the bargaining power obtained by player A crowds-out any reciprocity motivation that player A might have. In fact, player A's average payoff is higher with the sequence of two ultimatum games demonstrating that possible reciprocity beliefs are misplaced.

The paper relates to an established literature on contracting structures and efficiency. Klein et al. (1978) and Williamson (1983) conclude that long-term contracts may lead to more efficient investments by reducing the possibility of ex post opportunistic behavior or the holdup problem. Crawford (1988) shows that a sequence of short-term contracts distorts investment decisions only when the efficient investment plan involves mainly sunk costs and the relationship plays a consumption-smoothing role, with a general tendency to underinvest. Subsequent studies (Fudenberg et al., 1990; Rey and Salanie, 1990; Anderson and Devereux, 1991) further explore the ability of long-term contracts to increase the surplus to be shared, while others (Theilen, 2011) investigate the impact of bargaining power on the relationship. As mentioned above, Cabrales et al. (2011) and Cabrales and Charness (2011) use experiments to explore the effects of bargaining power on contract design, and our paper adds to the literature by using an experiment to explore the effects of bargaining power on the choice between long-term and short-term contracts.

The gift-exchange interpretation of the results contributes to a growing literature that studies contracting in the context of behavioral preferences. Theoretical treatments include those that consider the impact of other-regarding attitudes (MacLeod, 2007; Von Siemens, 2009) and those that consider the impact of reference points (Hart and Moore, 2008). Experimental studies mirror these. For example, Fehr et al. (2011) and Hoppe and Schmitz (2013) explore the role of social preferences in contract design, and Charness (2004), Fehr et al. (2011), and Erlei

[7]The game we use has some similarities to the trust game, in which player A is endowed with some amount and chooses some fraction of it to send to player B. That transfer is expanded by a multiplier, and player B then decides how much to return to player A. The difference between our game and a trust game is that in our game player A's "gift" to player B is a more favorable set of rules, while in the trust game player A's gift is a larger endowment.

and Reinhold (2012) examine the role of reference points.

2 Theory and Predictions

Two players, A and B, are in a surplus-generating relationship that lasts for n periods. Player A chooses whether to govern the relationship with a single long-term contract or a series of short-term contracts. This choice impacts the relationship in two ways.

First, it changes the total amount of surplus to be shared over the n periods. Let V_L denote the total surplus generated when the contract governs all n periods, and let V_S denote the per-period surplus when the relationship is governed by single-period contracts. In general $nV_S \neq V_L$, and one could easily envision reasons why the inequality might go either way. If a long-term contract allows one party to make long-term relationship-specific investments but the series of short-term contracts does not, one would expect $nV_S < V_L$. On the other hand, if the long-term contract allows one or both of the players to shirk in their effort decisions, one would expect $nV_S > V_L$ because renegotiation of short-term contracts allows for punishment of this shirking.

The second change instituted by the long-term contract is that it alters the bargaining power of the two parties. To capture this, let α_S denote player A's share of the surplus under a short-term contract, and let α_L similarly denote player A's share under a long-term contract. Likewise, let β_S and β_L denote player B's short-term and long-term shares, respectively, with $\alpha_S + \beta_S = \alpha_L + \beta_L = 1$. Again, the change in bargaining power could go in either direction. One possibility is that when A chooses a long-term contract, that contract encourages player B to inflate his costs to capture more of the long-term surplus. In this case $\alpha_S > \alpha_L$. Of course, the long-term contract might instead allow player A to inflate her costs at B's expense, in which case $\alpha_S < \alpha_L$.

The basic premise for the paper is that when player A chooses a long-term contract over a series of short-term ones, she institutes a trade-off between increased total surplus and reduced bargaining power, so that $nV_S < V_L$ but $\alpha_S > \alpha_L$. When player A chooses a long-term contract her payoff is $\alpha_L V_L$, and when she chooses a series of short-term contracts her total payoff is $n\alpha_S V_S$. Obviously, she chooses the long-term contract if and only if

$$\alpha_L V_L \geq n\alpha_S V_S.$$

In the experiment, the sequence of short term contracts is implemented using a sequence of two \$20 ultimatum games. Player A, who chooses between the two contracts, is the receiver in both ultimatum games, and player B is the proposer. The timing of the ultimatum games is as follows. Player B makes an offer $0 \leq x_1 \leq 20$ in the first ultimatum game, and player

A chooses whether to accept or reject. If she rejects, both players receive payoffs of zero and the game ends. If she accepts, their payoffs are locked in and they move on to the second ultimatum game, with player B making an offer $0 \leq x_2 \leq 20$ and A accepting or rejecting. If A rejects they both receive their payoffs from the first game but nothing else, that is, A receives x_1 and B receives $20 - x_1$. If A accepts they both receive the agreed-upon payments from both ultimatum games, that is, A receives $x_1 + x_2$ and B receives $40 - x_1 - x_2$.

The experiment implements the long-term contract scenario using a single *constrained dictator game* with player A acting as the receiver. This game is governed by two parameters: the total surplus to be shared (V_L) and the minimum allowable offer (m). Player B can choose any amount $x \in [m, V_L]$ to give to player A. The payoffs are then x for player A and $V_L - x$ for player B. Below we discuss three approaches that can be used to find solutions to this game.

2.1 Game theory

Assume players behave according to the standard theoretical paradigm with purely self-interested players and subgame perfection. Then, if the game reaches the ultimatum branch, Player A accepts any offer and B offers zero. For these selfish, backward-inducting players, then, the appropriate short-term bargaining power levels are $\alpha_S = 0$ and $\beta_S = 1$.

If the game reaches the dictator branch, then B gives the minimum allowable amount m to player A. In this case, the appropriate long-term bargaining power levels are $\alpha_L = \frac{m}{V_L}$ and $\beta_L = \frac{1-m}{V_L}$. If we consider a game where the long-term contract is represented by a standard dictator game, where $m = 0$, then the bargaining power levels of the short-term and long-term contracts are the same, i.e., $\alpha_S = \alpha_L = 0$ and $\beta_S = \beta_L = 1$. In this case, Player A is indifferent between the short-term and long-term contracts. For $m > 0$, Player A prefers the long-term contract.

The ultimatum and dictator games are so widely used in the experimental literature, however, precisely because the selfish subgame perfect equilibrium prediction fails. This motivates us to discuss a solution approach based on empirical beliefs.

2.2 Empirical beliefs

The literature shows that ultimatum game offers tend to be around 40% of the surplus (see Camerer (2003) for a review), so a more likely level of bargaining power for short-term contracts has $\alpha_S = 0.4$ and $\beta_S = 0.6$. Moreover, the experimental literature contains many studies with dictator games in which m is zero, and the average amount given is about 20% of the surplus. If this continues to hold for the experiment used here, an empirically likely level of bargaining power for long-term contracts has $\alpha_L = \max\left\{0.2, \frac{m}{V_L}\right\}$.

Whether player A should opt for the long-term contract or the sequence of short-term contracts depends on both the size of the long-term surplus, V_L, and her beliefs about bargaining power. In keeping with previous notation, suppose that player A believes that she will receive a share $\hat{\alpha}_S$ of the ultimatum game surplus and a share $\hat{\alpha}_L$ of the dictator game surplus when there is no minimum offer constraint. She chooses the sequence of short-term contracts if and only if

$$40\hat{\alpha}_S \geq \max\{m, \hat{\alpha}_L V_L\}.$$

This consideration leads to our first two hypotheses.

Hypothesis 1. Increases in the size of the long-term contract surplus V_L (weakly) increase the probability that player A chooses the long-term contract.

Hypothesis 2. Increases in the minimum allowable dictator offer m (weakly) increase the probability that player A chooses the long-term contract.

A third hypothesis arises from thinking about likely values of $\hat{\alpha}_S$ and $\hat{\alpha}_L$. If beliefs are consistent with laboratory behavior so that $\hat{\alpha}_S \approx 0.4$ and $\hat{\alpha}_L \approx 0.2$, then given that the ultimatum games have surpluses of \$20 each she should opt for the sequence of short-term contracts unless either $m \geq 16$ or $V_L \geq 80$. None of our experimental treatments have parameters this large, so under this rational expectations assumption she should always choose the short-term contract.[8] This leads to our final two hypotheses.

Hypothesis 3. Player A's average payoffs are higher with short-term contracts for all parameter values.

Hypothesis 4. Player A is more likely to choose the short-term contracts for all parameter values.

The predictions contained in these four hypotheses differ from those derived from standard game theory arguments in the previous subsection. There the size of the the long-term contract surplus V_L has no effect on the likelihood of choose the long-term contract, an increase in the minimum allowable dictator offer m weakly increases the likelihood of choosing the long-term

[8] While it would have been possible to run treatments where the dictator game surplus was more than 4 times the size of the single ultimatum game surplus, thereby making the choice of the dictator game "rational," finding that subjects choose the option with the larger joint payoff does not say as much about long-term contracting as it does about subjects' ability to predict behavior in ultimatum and dictator games. This is not the focus of our study, and besides, any choice of a dictator game with higher surplus would be impossible to distinguish from efficiency preferences. Instead, the treatments were chosen to uncover if gift exchange behavior is present in this environment.

contract, player A's average payoffs are the same under both contracts when $m = 0$ but higher under the long-term contract when $m > 0$, and A is (weakly) more likely to choose the long-term contract for all parameter values.

In the experiment we use three different values for the dictator-game surplus, $V_L = 30, 40, 50$, which simulates environments where nV_S is greater, equal, and smaller than V_L, respectively. We use three different values for the minimum allowable dictator offer ($m = 0, 2, 10$). As we consider different levels of bargaining power paired with a range of surpluses, our design offers variation that allows for an investigation of the surplus/bargaining power trade-off. For example, it allows us to examine preferences for high surplus/low bargaining power contracts, and also preferences for low surplus/high bargaining power contracts.

If play in the ultimatum and dictator games is consistent with behavior in other experiments, so that the receiver averages 40% of the ultimatum game surplus and 20% of the dictator game surplus, then player A's expected payoffs from the sequence of short-term contracts should average $16, and her average payoffs from the long-term contract should follow the pattern in Table 1.

Table 1: Expected player A payoffs from long-term contract, $\hat{\alpha}_L = 0.2$

	V_L		
	30	40	50
$m = 0$	6	8	10
$m = 2$	6	8	10
$m = 10$	10	10	10

2.3 Reciprocity beliefs

Reciprocity beliefs are possible because the game, as designed, has a gift exchange component. To see how, consider the ($m = 0$, $V_L = 40$) game in which player A chooses between two $20 ultimatum games and a standard $40 dictator game. Choosing the dictator game constitutes a gift to player B in that player A cedes the right to reject player B's offer, giving player B more freedom to take a larger share. If player B is reciprocal, player B might give A a larger share of the $40 in the dictator game than in the ultimatum games. The ($m = 0$, $V_L = 50$) game has a bigger gift, in that choosing the dictator game not only cedes complete control to player B but also increases the size of B's endowment. By the same token, the ($m = 2$, $V_L = 40$) game has a smaller gift than the ($m = 0$, $V_L = 40$) game because player A cedes less control to player B when choosing the constrained dictator game than when choosing the unconstrained dictator game. In general, the gift embodied in the dictator game choice is larger as m decreases (holding V_L constant), and as V_L increases (holding m constant).

It is possible to adapt our model to account for reciprocity. We restrict attention to the effects of player B's reciprocity on dictator offers only.[9] Let $\hat{\alpha}_L(m, V_L)$ denote player A's beliefs about the share player B will offer in a dictator game with minimum offer m and surplus V_L. The size of A's gift to B decreases in m and if smaller gifts lead to less reciprocity, $\hat{\alpha}_L$ is decreasing in m. Similarly, the size of A's gift to B increases in V_L and if larger gifts lead to greater reciprocity, $\hat{\alpha}_L$ is increasing in V_L. Player A chooses the sequence of short-term contracts if and only if

$$40\hat{\alpha}_S \geq \max\{m, \hat{\alpha}_L(m, V_L)V_L\}.$$

This analysis provides an additional motive for player A to choose the long-term contract: she might believe that her returns from giving gifts will exceed her returns from retaining bargaining power.

The function $\hat{\alpha}_L(m, V_L)$ is reminiscent of the emotional state function posited by Cox et al. (2007). In their model, a player's emotional state determines the marginal rate of substitution between own payoff and others' payoff, and the emotional state depends on both the size of the gift and the players' relative social status. They provide empirical evidence that supports their theory and find that other-regarding preferences may indeed depend on reciprocity. The function $\hat{\alpha}_L(m, V_L)$ can be thought of as a reduced-form representation where player A believes the size of the gift impacts player B's emotional state which in turn affects B's dictator offer to A.

The gift exchange theory predicts that as the size of the dictator-game surplus increases, the size of the gift entailed by choosing the dictator game increases, and so subjects should choose the dictator game with higher frequency. This behavior generates exactly the same pattern as Hypothesis 1. The gift exchange theory also predicts that as the minimum-allowable offer increases, the size of the dictator game "gift" shrinks (and $\hat{\alpha}_L$ decreases). As a result, on average, subjects should choose the dictator game with lower frequency. This pattern runs exactly opposite of Hypothesis 2. Since the above empirical approach was built entirely on the idea of perceived bargaining power, looking at how contract choices compare as the minimum-allowable offer changes provides a test of the gift-exchange model against the empirical bargaining power model. Moreover, note that if reciprocity is strong enough, it is possible for Player A's payoff to be larger under the long-term contract, which would contradict Hypothesis 3. As a result, under strong reciprocity beliefs, it is also possible that most players would prefer the long-term contract, hence contradicting Hypothesis 4.

[9] In section 4 we will show that ultimatum offers do not vary with m and V_L (see Table 15).

3 Experimental Design

A total of 268 subjects were recruited from the undergraduate student body at the University of Tennessee – Knoxville. The experiment was conducted in 12 sessions in the UT Experimental Economics Laboratory. The laboratory consisted of 24 networked computer workstations in separate cubicles. The experiment was implemented on the computers using custom-made software programmed in Java.[10] All experimental sessions lasted around 1 hour and participants' average earnings were $17.62.

Participants played four different types of games.[11] A game requires two players, A and B. At the start of the experiment, subjects were randomly assigned to the role of either player A or B, and remained in the assigned role throughout the experiment. In each game, participants were randomly matched with a different player of the opposite type. This was explained to participants. We also explained that neither player will ever learn with whom they were paired.

In each game, player A moves first by selecting one of two options. First, player A can be a recipient in a sequence of two ultimatum games. This option represents A's preference for a sequence of two short-term contracts. Alternatively, player A can be a recipient in one dictator game. This option represents A's preference for the long-term contract.

The two ultimatum games are played as described in the preceding section. The rules of the dictator game define our treatments. Dictator games differ in two dimensions: i) the endowment of the game, and ii) restrictions on player B's action space. In all treatments, player B's splitting choices are restricted to whole numbers. In our baseline treatment the endowment of the dictator game is $40 and no restrictions are placed on B's offers, i.e. the minimum allowable offer m is zero. Hence, our baseline treatment involves a standard dictator game over $40. We refer to this treatment as No-40, where the notation "No" indicates that no restrictions are placed on B's offer and the "40" indicates the size of the surplus.

Treatments No-30 and No-50 are identical to the baseline treatment except that the endowments are $30 and $50, respectively. These treatments capture the fact that long-term contracts may have lower or greater surplus when compared to a sequence of short-term contracts. Our next treatments involve a small increase in player A's bargaining power in the dictator game by restricting B's minimum allowable offer to $2, i.e. $m = 2$. Three treatments involve this restriction: Low-30, Low-40, and Low-50. The increase in bargaining power is "low" because, according to the empirical belief $\hat{\alpha}_L = 0.2$, the restriction $m = 2$ does not bind (see Table 1).

Completing the experimental design are three discrete dictator treatments: High-30, High-40, and High-50. In these treatments, dictator games are again played over $30, $40, and $50, however, B's offer is restricted to be either $10 or half of the total endowment, i.e. $15, $20, or

[10] Screen shots are available in the Appendix.

[11] This paper, however, focuses on three games. Refer to the appendix for a description of the fourth game.

\$25, respectively. These are our highest bargaining power treatments in which A is guaranteed a minimum of \$10 in the dictator game, i.e. $m = 10$.[12]

The structure and rules of the game were explained to all participants. The experimental software displayed a "smart game tree" and treatment information (the game endowments and action spaces) to both players at all times. The software highlighted the game node being played (and the corresponding decision maker) making it very easy for both players to follow the evolution of the game. The smart game tree allowed all participants to easily learn the stage of the game and their payoffs. For instance, if in the first move player A chose to play the ultimatum games, the dictator game branch would fade. If player A rejected B's first ultimatum offer, the zero payoffs would be shown to both players in the game tree using bold blue font (as opposed to the standard black font), the second branch of the ultimatum game would also fade, and, after allowing some time for both players to review all information, the experimental software would move to the next round.

Each subject played three games holding the dictator game constant at either \$30, \$40, or \$50, but varying the bargaining power between no bargaining power ($m = 0$), low bargaining power ($m = 2$), and high bargaining power ($m = 10$). The order of the games was randomized. Payoffs consisted of a \$7 show-up fee plus experimental earnings corresponding to the payoff of one randomly selected game, with each game having an equal chance of being selected. These rules were explained to participants prior to the beginning of the games. At the end of the experiment the computer screen summarized all payoff information. Finally, we asked one participant to draw a card that would determine the round for payment.

The 268 subjects led to 134 pairs of A-B players. As subjects played three games, the experiment had the potential to generate 402 (134×3) game-pair observations. However, our sample size is 396 because six observations were lost due to technical problems in the computer recording processes. Table 2 shows how the 396 observations are distributed throughout the treatment cells.

[12] The high bargaining power treatments differ from the corresponding low bargaining power treatments and the no bargaining power treatments in two ways - raising the minimum allowable offer m and making the dictator's choice set discrete. We combined the high minimum offer and the highly-restricted offer set in an attempt to make the long-term contract much less of a "gift," or, alternatively, the short-term contract more of a "gift" should the reciprocity motive dominate behavior.

Table 2: Number of observations in each treatment cell.

		30	40	50	All
No	($m = 0$)	45	44	44	133
Low	($m = 2$)	45	41	45	131
High	($m = 10$)	44	43	45	132
All		134	128	134	396

4 Results

We begin by presenting player A's behavior on the first choice. To examine the first two hypotheses, we compare A's first choice across the three endowments and across the three levels of bargaining power of the dictator game. We perform a series of three pairwise comparisons adjusting the P-values for multiple comparisons using Tukey's method. Table 3 shows A's first choice broken down by treatment cell. Overall, the dictator game was chosen 105 times out of the 396 first choice observations (27%, bottom right cell). Pooling across all game types, an increase of the endowment of the dictator game leads to an increase of the share of dictator game choices (last row). The increase from treatment 30 (18%) to treatment 50 (36%) is statistically significant ($p < 0.01$, Table 4).

Table 3: Fraction of As choosing dictator game

	30	40	50	All
No	0.16	0.25	0.25	0.22
	(7/45)	(11/44)	(11/44)	(29/133)
Low	0.11	0.24	0.33	0.23
	(5/45)	(10/41)	(15/45)	(30/131)
High	0.27	0.28	0.49	0.35
	(12/44)	(12/43)	(22/45)	(46/132)
All	0.18	0.26	0.36	0.27
	(24/134)	(33/128)	(48/134)	(105/396)

The (a/b) ratio in parentheses denotes the number of dictator choices (a) over the sample size (b), by treatment cell.

The last column of Table 3 shows A's first choice broken down by the amount of bargaining power that A holds in the dictator game. Pooling across endowments, an increase of A's

Table 4: Pairwise comparisons of proportions of As choosing dictator games, by endowment (last row of Table 3).

Comparison	Difference	Std. Err.	P-value*
40 vs 30	0.079	0.054	0.313
50 vs 40	0.100	0.054	0.152
50 vs 30	0.179	0.053	0.002

* P-values are adjusted for multiple comparisons using the Tukey's method. Number of comparisons: 3.

bargaining power in the dictator game leads to an increase of the share of subjects choosing the dictator game. The increase from treatment No (22%) to treatment High (35%) is statistically significant ($p < 0.05$, Table 5).

Table 5: Pairwise comparisons of proportions of As choosing dictator games, by bargaining power (last column of Table 3).

Comparison	Difference	Std. Err.	P-value*
Low vs No	0.011	0.054	0.978
High vs Low	0.119	0.054	0.071
High vs No	0.130	0.054	0.042

* P-values are adjusted for multiple comparisons using the Tukey's method. Number of comparisons: 3.

Table 3 also allows us to examine one dimension of our treatments (ie, endowment or bargaining power) holding the other dimension constant. Holding constant the action space for the dictator game, an increase of the endowment of the dictator game leads to an increase of the share of subjects choosing the dictator game. The increase of endowment from $30 to $50 leads to an increase of 0.22 in the dictator shares in the Low and High treatments ($p < 0.05$ and $p < 0.10$, respectively). The increase from 16% to 25% (from No-30 to No-50) is not statistically significant (refer to Table 6).

We also estimate linear probability models of A's game choice on endowment indicators. We cluster standard errors at the participant level. These regressions allow for hypothesis tests to be robust to unspecified heteroskedasticity and within-participant serial correlation. Results are reported in Table 7. The first column shows estimates obtained by pooling data across all game types. In the next three columns we restrict our sample to observations in the No, Low, and High treatments, respectively. Results are similar to the ones reported above, with all increases in proportions from 30 to 50 statistically significant, except for those in the no bargaining power treatment.

Table 6: Pairwise comparisons of proportions of As choosing dictator games, by endowment holding bargaining power constant (rows of Table 3).

	Comparison	Difference	Std. Err.	P-value*
No	40 vs 30	0.094	0.088	0.533
	50 vs 40	0.000	0.089	1.000
	50 vs 30	0.094	0.088	0.533
Low	40 vs 30	0.133	0.090	0.302
	50 vs 40	0.089	0.090	0.579
	50 vs 30	0.222	0.087	0.032
High	40 vs 30	0.006	0.101	0.998
	50 vs 40	0.210	0.100	0.096
	50 vs 30	0.216	0.100	0.081

* P-values are adjusted for multiple comparisons using the Tukey's method. Number of comparisons: 3.

Table 7: Regression of A's game choice (dictator=1) on endowment indicators

	All	No	Low	High
40	0.079	0.094	0.133	0.006
	(0.054)	(0.086)	(0.083)	(0.097)
50	0.179***	0.094	0.222**	0.216**
	(0.052)	(0.086)	(0.085)	(0.101)
Constant	0.179***	0.156***	0.111**	0.273***
	(0.036)	(0.055)	(0.047)	(0.068)
N	396	133	131	132

Standard errors clustered at the participant level are in parentheses. *** $p < 0.01$, ** $p < 0.05$.

We obtain evidence in support of Hypothesis 1. We observe the following relationship between player A's first choice and the surplus to be shared in the dictator game.

Result 1. Holding B's action space constant, the probability that player A chooses the dictator game (weakly) increases as the endowment of the dictator game increases from \$30 to \$50.

Holding constant the endowment of the dictator game, we find the puzzling pattern that dictator game choice frequency rises with the amount of bargaining power for two surplus levels but not for the third. The share of subjects who choose the dictator game when the endowment is \$30 more than doubles from 11% in treatment Low-30 to 27% in treatment High-30 (although this increase is not statistically significant). For the larger endowment of \$50, the share of subjects choosing the dictator game doubles from 25% in treatment No-50 to 49% in treatment High-50 ($p < 0.05$). In contrast, for the \$40 endowment we find little evidence that the proportion of subjects choosing the dictator game varies according to the bargaining power (refer to Table 8).

Table 8: Pairwise comparisons of proportions of As choosing dictator games, by bargaining power holding endowment constant (columns of Table 3).

	Comparison	Difference	Std. Err.	P-value*
	Low vs No	-0.044	0.080	0.845
30	High vs Low	0.162	0.081	0.117
	High vs No	0.117	0.081	0.319
	Low vs No	-0.006	0.096	0.998
40	High vs Low	0.035	0.097	0.930
	High vs No	0.029	0.095	0.950
	Low vs No	0.083	0.101	0.686
50	High vs Low	0.156	0.100	0.269
	High vs No	0.239	0.101	0.050

* P-values are adjusted for multiple comparisons using the Tukey's method. Number of comparisons: 3.

The regression model with cluster-robust standard errors and data pooled across all endowments (first column of Table 9) shows that the proportion of As that choose the dictator game is 0.13 larger in the high bargaining power treatment when compared to the No power baseline ($p < 0.05$). We also find a statistically significant difference between High and No when we restrict our sample to the \$50 dictator game treatments (last column of Table 9).

In general, we obtain evidence in support of Hypothesis 2. The following result describes A's behavior with respect to B's minimum allowable offer in the dictator game.

Result 2. Holding the endowment of the dictator game constant, the probability that player A chooses the dictator game (weakly) increases as B's minimum allowable offer in the dictator game increases from \$0 to \$10.

Table 9: Regression of A's game choice (dictator=1) on bargaining power indicators

	All	30	40	50
Low	0.011	-0.044	-0.006	0.083
	(0.052)	(0.071)	(0.093)	(0.105)
High	0.130**	0.117	0.029	0.239**
	(0.053)	(0.074)	(0.097)	(0.102)
Constant	0.218***	0.156***	0.250***	0.250***
	(0.036)	(0.055)	(0.067)	(0.067)
N	396	134	128	134

Standard errors clustered at the participant level are in parentheses. *** p < 0.01, ** p < 0.05.

Hypothesis 3 concerns player A's earnings across the two contract choices, and discussing those requires looking at player B's offers. Accordingly, we now move to player B's offer in the dictator game. Table 10 shows B's average offer in the dictator game in each treatment cell. Sample sizes are reported because we did not utilize the strategy method, and therefore the experiment only generated observations when player A actually chose the dictator game. The small sample sizes lead to low power statistical tests (refer to Tables 11 – 14), but the following broad patterns emerge.

Table 10: B's average offer in the dictator game

	30	40	50
No	3.43	8.64	11.00
	$n = 7$	$n = 11$	$n = 11$
Low	8.60	13.50	13.60
	$n = 5$	$n = 10$	$n = 15$
High	10.42	15.00	14.09
	$n = 12$	$n = 12$	$n = 22$

First, on average offers amounted to 28% of the endowment, which is higher than the usual amount for laboratory dictator games. Part of this may be due to the constraints on the dictator offers, as offers in the no bargaining power treatments are 11%, 22%, and 22% of the \$30, \$40, and \$50 endowments, respectively. Second, moving across the rows shows that offers increase when the endowment improves from \$30 to \$40. Offers, however, do not increase when the endowment rises from \$40 to \$50. While we cannot reject the null of no offer increase using pairwise tests, the regression model with cluster-robust standard errors indicate that, in general, offers in the \$50 games are higher than offers in the baseline \$30 games (refer to Table 13). Third, moving down the columns shows that even though the offer limit m does not bind the average, a small increase in receiver bargaining power from $m = 0$ (No) to $m = 2$ (Low) increases average offers by about \$5 for the \$30 and \$40 endowments and by \$2.60 for the \$50 endowment. Both the pairwise tests and the regression models indicate that, when the dictator game is played over \$30, offers in the high bargaining power treatment are higher than those in the no bargaining power treatment (refer to Tables 12 and 14). Finally, with the single exception of the No-30 treatment, offers are at least as high as those predicted in Table 1.

Table 11: Pairwise comparisons of B's offer in the dictator game, by endowment holding bargaining power constant (rows of Table 10).

	Comparison	Difference	Std. Err.	P-value*
No	40 vs 30	5.208	4.758	0.526
	50 vs 40	2.364	4.196	0.841
	50 vs 30	7.571	4.758	0.267
Low	40 vs 30	4.900	4.363	0.509
	50 vs 40	0.100	3.252	0.999
	50 vs 30	5.000	4.114	0.455
High	40 vs 30	4.583	2.249	0.115
	50 vs 40	-0.909	1.977	0.890
	50 vs 30	3.674	1.977	0.163

* P-values are adjusted for multiple comparisons using the Tukey's method. Number of comparisons: 3.

Table 12: Pairwise comparisons of B's offer in the dictator game, by bargaining power holding endowment constant (columns of Table 10).

	Comparison	Difference	Std. Err.	P-value*
30	Low vs No	5.171	1.946	0.038
	High vs Low	1.817	1.769	0.568
	High vs No	6.988	1.580	0.001
40	Low vs No	4.864	3.334	0.325
	High vs Low	1.500	3.267	0.891
	High vs No	6.364	3.185	0.130
50	Low vs No	2.600	3.529	0.743
	High vs Low	0.491	2.977	0.985
	High vs No	3.091	3.283	0.617

* P-values are adjusted for multiple comparisons using the Tukey's method. Number of comparisons: 3.

Table 13: Regression of B's offer in the dictator game on endowment indicators

	All	No	Low	High
40	4.424***	5.208	4.900	4.583***
	(1.348)	(3.523)	(2.939)	(1.549)
50	5.229***	7.571*	5.000	3.674**
	(1.429)	(3.816)	(3.295)	(1.530)
Constant	8.000***	3.429**	8.600***	10.417***
	(0.670)	(1.537)	(2.162)	(0.413)
N	105	29	30	46

Standard errors clustered at the participant level are in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 14: Regression of B's offer in the dictator game on bargaining power indicators

	All	30	40	50
Low	4.457**	5.171*	4.864	2.600
	(2.230)	(2.664)	(3.790)	(3.959)
High	5.094**	6.988***	6.364	3.091
	(2.100)	(1.722)	(3.825)	(3.890)
Constant	8.276***	3.429**	8.636**	11.000***
	(1.843)	(1.567)	(3.165)	(3.431)
N	105	24	33	48

Standard errors clustered at the participant level are in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 15 shows player B's average offers in the ultimatum games. These offers hover around 40% of the $20 endowment, which is consistent with behavior observed in other laboratory ultimatum game experiments. There is no significant variation across treatments.

Table 15: B's average offer in the ultimatum games

	first ultimatum			second ultimatum		
	30	40	50	30	40	50
No	8.71	8.45	8.39	7.64	8.10	7.47
Low	8.05	7.90	8.00	7.57	8.21	7.85
High	8.41	8.52	8.39	7.90	7.43	8.11

Table 16 summarizes information about the average payoffs of player A. We find evidence in favor of Hypothesis 3. Player A is better off choosing the ultimatum games as opposed to the dictator game in six of the nine treatments (the exceptions are Low-50, High-40, and High-50).[13] Because the experiment only generated data for dictator games when subjects actually chose the dictator games, statistical tests have low power due to small sample sizes. Every time we have the power to reject the null that player A's average payoff is different between the ultimatum and dictator games, though, the two-sided t-test favors the ultimatum games (No-30, No-40, and High-30).

Table 16: Player A's payoff

	Ultimatum			Dictator		
	30	40	50	30	40	50
No	15.24	14.27	14.42	3.43***	8.64**	11.00
Low	14.10	13.94	13.30	8.60	13.50	13.60
High	14.91	13.35	13.17	10.42**	15.00	14.09

Two-sided t-tests. H_0: payoff(Ultimatum)=payoff(Dictator)
*** P-value ≤ 0.01, ** P-value ≤ 0.05

We complement t-tests with regression tests where we use the entire sample and cluster standard errors at the participant level. The first column of Table 17 shows estimates of a regression of A's payoffs on a dummy variable for the dictator game. On average, subjects that chose the dictator game earn a payoff that is $2.36 lower than the ultimatum game average payoff of $14.14. The second column of Table 17 shows the coefficients of a model where the right hand side variables are interactions between the dictator game and our treatments. We find statistically significant effects indicating that payoffs of the dictator game are lower than those in the ultimatum games in treatments No-30, No-40, Low-30, and High-30. This leads to the following results.

Result 3. Player A's average payoff is (weakly) higher with the sequence of two ultimatum games.

Result 4. Player A chooses the sequence of two ultimatum games more often than the dictator game, though we cannot reject the null of equal proportions in treatment High-50. [14]

[13]One-sided tests for these three treatments do not reject the null H_0: payoff(Ultimatum) = payoff(Dictator) against the alternative H_A: payoff(Ultimatum) < payoff(Dictator).

[14] Table 18 reports the tests of the null H_0: Prop(Ultimatum)=Prop(Dictator), against the alternative H_a: Prop(Ultimatum)>Prop(Dictator).

Table 17: Regression models of A's payoff

	(1)	(2)
dictator	-2.360***	
	(0.812)	
dictator*No-30		-10.712***
		(1.534)
dictator*No-40		-3.141
		(3.362)
dictator*No-50		-5.505*
		(3.074)
dictator*Low-30		-5.541**
		(2.146)
dictator*Low-40		-0.641
		(1.965)
dictator*Low-50		-0.541
		(2.414)
dictator*High-30		-3.724***
		(0.549)
dictator*High-40		0.859
		(1.512)
dictator*High-50		-0.050
		(1.500)
Constant	14.141***	14.141***
	(0.381)	(0.384)
N	396	396

Standard errors clustered at the participant level are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

A major concern of this paper regards the trade-off implicit in the signing of long-term contracts. Entering into a long-term contract can increase the surplus to be shared by the two parties, but at the cost of reducing the bargaining power of one of those parties. The game subjects faced allows player A to choose between a long-term contract and a short-term contract, and treatments vary according to the size of the surplus in the long-term contract and the amount of bargaining power retained by player A in the long-term contract.

The clearest trade-off between efficiency and bargaining power arises in the No-50 treatment, where player A has the choice between retaining some bargaining power through the two \$20 ultimatum games or giving up all bargaining power but participating in a \$50 dictator game. In this treatment, 75% of the subjects chose the bargaining power (see Table 3), forgoing the additional surplus, suggesting that diminished bargaining power can be a serious detriment to realizing long-term gains from trade. Similar patterns emerge for the other \$50 constrained

Table 18: P-values of one-sided tests of the null H_0: Prop(Ultimatum)=Prop(Dictator)

	30	40	50
No	0.000	0.001	0.001
Low	0.000	0.001	0.013
High	0.001	0.002	0.441

* H_A: Prop(Ultimatum) >Prop(Dictator)

dictator treatments, with 67% of player As in the Low-50 and 51% of the player As in the High-50 treatment also choosing to forgo the additional surplus from the long-term contract.

The treatment High-30 allows consideration of the same issue but in the opposite direction. In this case player A has significant bargaining power in the constrained dictator game, because player B's only possible offers are $10 and $15. The issue arises as to whether player A elects to guarantee a payoff of at least $10 but at the expense of generating $10 less surplus. 27% of player As made this choice. This rate of surplus-avoidance is smaller than in the $50 surplus cases, but the lower rate is consistent with the fact that, according to Table 16, player A earns an average of $4.50 more playing the ultimatum games than the dictator game in this treatment.

5 Reciprocity

Thus far, the results show that when trading off bargaining power against added surplus to be shared, choices often favor bargaining power. Let us now examine what beliefs player A holds when making the original choice. As noted in Section 2, if player A forms beliefs according to standard, self-interested game theory, player A should choose the dictator game 100% of the time in the Low and High bargaining treatments. Subjects clearly did not behave this way. If, instead, player A forms beliefs consistent with typical play in laboratory ultimatum and dictator experiments, she should choose the ultimatum games 100% of the time. The answer seems to be somewhere in between and may be driven by beliefs about reciprocity.

The last row of Table 3 shows that player A chooses the dictator game more often when the surplus grows, a result consistent with both models. The last column of Table 3 shows that player A's contract choices are more consistent with the bargaining power model than the reciprocity-based one, with subjects more likely to choose the dictator game when the minimum-allowable offer is higher. This is evidence that, if reciprocity plays any role in contract choice, it is crowded-out by the demand for bargaining power. In fact, when the change in bargaining power is large (from Low to High), the change in behavior is also large and in the direction predicted by the bargaining power model. The frequency of dictator game choices increases from 23% in Low to 35% in High.

Despite this, there is evidence that reciprocity plays some role in behavior, and this can be found from player B's allocations in the dictator game. As Table 10 shows, offers are much smaller in the No-30 treatment than in any of the other treatments, and about half of the standard 20% benchmark. Choosing the dictator game in this treatment is a negative gift because it reduces the surplus, and it leads to negative reciprocity. As for the other treatments, offers do increase weakly as one moves from left to right in the first two rows of Table 10, but we are hesitant to overplay this because the increase could also simply reflect the larger endowment player B has available to share. In our High discrete offer space treatment, in which B can offer either \$10 or half of the endowment, we observe that players offer the fair split only 8% of the time in treatment High-30. That proportion grows to 27% in treatment High-50.[15] It must be said that, again, this might be an endowment effect as opposed to evidence of reciprocity.

Another test of reciprocity would come from looking at the columns of Table 10, with reciprocity predicting higher offers with movements up a column. Giving up the bargaining power associated with the right of refusal in the two ultimatum games constitutes a larger gift when the alternative is an unconstrained dictator game than when there is a minimum allowable offer. The evidence in Table 10 shows that offers increase with movements down the column, not movements up the column as reciprocity predicts. This is not a clean test, however, because movements down the column restrict the offers the dictator can actually make. Nevertheless, this provides further evidence suggesting that bargaining power may, in fact, crowd-out reciprocity.

It is also possible to look for gift exchange behavior when player A does not choose the dictator game. This time, though, if choosing the dictator game is a positive gift then choosing the ultimatum game is a negative gift, and so gift exchange would suggest lower offers as one moves to the right along a row in Table 15 and higher offers as one moves down a column. The reciprocity pattern does not seem to fit the data in Table 15. For instance, the large negative gift entailed in choosing the dictator game in No-30 does not correspond to a large positive gift from choosing the ultimatum game instead. The lack of response in the ultimatum offers may simply be driven by the fact that A can reject low offers, in which case this provides further evidence that bargaining power crowds out reciprocity.

A final opportunity for identifying if player A believes in reciprocity comes from A's rejection behavior in the ultimatum games. To see how this works, compare two treatments, No-40 and High-40. In the baseline game No-40 player A's initial choice involves either two \$20 ultimatum games or a single, unconstrained \$40 dictator game. In High-40 the unconstrained dictator game is replaced by a constrained one in which B can only offer \$10 or \$20. Choosing the dictator game in No-40 is more of a gift to player B than choosing the dictator game in High-

[15]The fair split accounts for 50% of offers in treatment High-40. Thus, the proportion of type B players choosing to be fair does not monotonically increase with the endowment of the dictator game (the gift).

40. Conversely, choosing the ultimatum games in High-40 is more of a gift than choosing the ultimatum games in No-40. If player A believes that choosing the ultimatum games in High-40 is, in fact, a gift to player B, then she would expect B to reciprocate with higher offers in those games. If she receives a low offer, she would be more likely to reject than if she had not given a gift, so we would expect to see higher ultimatum game rejection rates, conditional on the offer level, in High-40 than in No-40.

Table 19: A's rejection - Probit regressions

Dep. Variable: Rejection=1	(1)	(2)	(3)	(4)
Offer	-0.047***	-0.046***	-0.045***	-0.045***
	(0.008)	(0.008)	(0.007)	(0.008)
Second Ultimatum		0.031**	0.030**	0.030**
		(0.015)	(0.015)	(0.015)
High Bargaining			0.035	0.033
			(0.021)	(0.019)
No-50				-0.009
				(0.020)
Predicted Prob. of Rejection	0.063	0.061	0.059	0.059
N	553	553	553	553

Probit regression with a constant. Coefficients represent marginal effects.
Standard errors clustered at the session level in parenthesis.
*** P-value $\leq$ 0.01, ** P-value $\leq$ 0.05.

Table 19 shows the marginal effects from Probit regressions on A's ultimatum game rejection decisions. Column (1) conditions only on the amount being offered, and column (2) controls for the second ultimatum game. The results show that A is less likely to reject a higher offer, as expected, and also more likely to reject in the second round than in the first. Column (3) controls for A's initial gift of giving up the high bargaining power in the High-30, High-40, and High-50 treatments by using treatment dummy variables. This coefficient is positive, which is in line with a hypothesis that player A believes that choosing the ultimatum games constitutes a gift, but it is not statistically significant. Column (4) adds a dummy for the No-50 treatment, which represents the most negative "gift" player A can give to player B. Choosing the dictator game in No-50 gives B complete freedom to allocate the largest surplus available with no constraints whatsoever, while choosing the ultimatum games instead both reduces the surplus and gives A bargaining power. If A recognizes the ultimatum game as a negative "gift," she would follow up by being more lenient in rejecting offers and one would expect a negative coefficient on the No-50 dummy. The coefficient is negative, but far from significant. The addition of the No-50 dummy almost makes the High Bargaining treatment coefficient statistically significant, providing the closest evidence from this analysis that player A believes in a gift exchange paradigm.

An alternative way to investigate feelings of reciprocity is to examine player A's game choice following an accept/reject decision in the first ultimatum game. Recall that player A's partners are randomly re-matched after each game, therefore, reciprocity in this context is not individual-focused. Nevertheless, A's rejection of an inadequate offer may trigger session-focused negative reciprocity and may increase A's propensity to give a negative gift in the subsequent game.

The first row of Table 20 demonstrates that player A chooses the dictator game 57% of the time (sum of the proportions in the first row) when faced with a $30 surplus following an accept/reject decision. Interestingly, 43% of the subjects choose to play a dictator game over $30 after rejecting a previously made offer. This proportion is statistically significantly higher than the 14% of subjects that choose the $30 dictator game following an acceptance decision (p-value of 0.056 in a two-sided test). The propensity of choosing the dictator game more often after a rejection when the surplus to be shared between the players is low suggests that player A negatively reciprocates a low offer from player B.

On the other hand, when player A faces a $50 dictator game following an accept/reject decision, 37% of the time the dictator game is chosen after player A accepted a previous ultimatum offer, while only 33% of the time the $50 dictator game is chosen after a rejection. These proportions, however, are not statistically significantly different from each other. Nevertheless, the heightened "after accept" proportion provides some additional support to the hypothesis that our experimental subjects reciprocate actions.

Similar session-focused negative reciprocity is observed in the bargaining power data. The bottom three rows of Table 20 shows that pooling across endowments player A is more likely to choose the high bargaining power dictator game when the game follows a rejection as opposed to an acceptance decision (p-value of 0.027 in a two-sided test). This indicates that player A's preference for bargaining power increases after a low offer in the ultimatum game. In general, the behaviors shown in Table 20 also indicate that session-focused negative reciprocity is stronger than session-focused positive reciprocity.[16]

Table 20: A's prob. of choosing dictator after an accept/reject decision

	After Accept	After Reject
30	0.14	0.43*
40	0.19	0.25
50	0.37	0.33
No	0.23	0.25
Low	0.20	0.00
High	0.23	0.67**

Two-sided tests. H_0: Prop(after accept) = Prop(after reject). ** P-value ≤ 0.05, * P-value ≤ 0.10

The appeal of the gift exchange argument is that it provides an explanation for why subjects might choose the dictator game and lower bargaining power in the first place. If they think that player B will view the dictator game as a gift and then reciprocate, they might believe that their payoffs will be higher in the dictator game than in the sequence of ultimatum games. Table 16 shows that these beliefs are misplaced, however, and that player A ultimately earns more on average by choosing the ultimatum games.

6 Conclusion

This paper reports results of a bargaining experiment in which the first mover (e.g. a procurer) selects whether to be the recipient in a single-shot dictator game or in a sequence of two $20 ultimatum games. The second mover makes offers (and can be thought of, for example, as

[16] It is important to differentiate session focused reciprocity from experimental learning. In experiments where subjects make repeated decisions, it is possible for past results to influence future actions. Subjects may gain information that can help them make better decisions in the next rounds, and we often refer to this effect as "learning." We view session focused reciprocity as an additional margin of adjustment that is driven by factors such as gift exchange (positive reciprocity) or spite (negative reciprocity). The analysis of player A's first choice after an accept/reject decision offers an opportunity to test for these effects as both learning and session focused reciprocity could be driving behavior. To see why, note that the observations used in Table 20 contain a dynamic component coupled with a possible trigger for positive or negative session focused reciprocity. As an empirical test, we regress A's game choice indicator (dictator=1) on an indicator for "after reject" and experimental round indicators. We estimate two regressions, one for each of the samples that we found evidence for negative reciprocity in Table 10 (ie, "$30" and "High" treatments). The results are in line with those in Table 20. The coefficient of "after reject" is positive and statistically significant in both cases, with $p < 0.1$ for the $30 regression and $p < 0.05$ for the High regression (p-values based on cluster-robust standard errors). This is evidence that session focused reciprocity is robust to player A's experience in playing the game.

a vendor). Our treatments modify the dictator game in two dimensions. First we vary the endowment of the dictator game to amounts that are lower ($30), equal ($40), or higher ($50) than the total endowment of the ultimatum games. Second we vary the minimum-allowable offer in the dictator game from $0 to $2, and then to $10.

The game design allows us to study the first mover's decision between offering the other player a long-term contract (implemented through the dictator game) or a sequence of short-term contracts (implemented through the ultimatum games). This new experimental protocol permits an exploration of the the trade-off between added surplus and lost bargaining power in long-term surplus-generating relationships.

We find that 75% of the participants prefer to retain the bargaining power provided by the accept/reject decision in the sequence of ultimatum games as opposed to engage in a unconstrained dictator game played over the bigger endowment of $50. Moreover, even when the dictator's offer is restricted to a minimum of $10, the share of subjects selecting the dictator game over $50 increases to only 49%, a striking result considering that backward-inducting game theory predicts that the procurer would receive $0 in the sequence of ultimatum games. This result suggests that diminished bargaining power can be a serious detriment to realizing long-term gains from trade.

We also explore behavior through the lens of a theory of reciprocity. This is possible because the experiment, as designed, has a gift exchange component. The dictator game can be viewed as a gift from the procurer to the vendor because the procurer forgoes the right to reject the vendor's offer. The size of the gift is positively correlated with the endowment of the dictator game. The gift, however, decreases with the minimum-allowable offer imposed to the vendor in the dictator game. If the procurer has reciprocity beliefs, she may choose the dictator game more often when it constitutes a bigger gift in hope that the vendor reciprocates by offering a high share of the endowment.

Reciprocity can be an important aspect of contracting. As argued by MacLeod (2007), surplus-generating relationships are more efficient when the party with the bargaining power has some taste for honesty, and reciprocates good behavior. In our experiment, however, we find mixed evidence of reciprocity beliefs. Our aggregate data demonstrates that although participants choose the dictator game more often when its endowment increases, they select the dictator game more often when the minimum allowable offer increases (see Table 3). Also, in six out of nine treatments the procurer's average payoff is higher with the sequence of two ultimatum games. However, our small sample sizes deteriorate statistical power and only half of these differences are statistically significant (see Table 16). Nevertheless, the three treatments in which choosing the dictator game leads to average payoffs higher than those of the ultimatum games involve either significantly higher surplus to be shared ($50), or high bargaining power, or both.[17] Viewed in its totality, the results of our experiment suggest that feelings of reciprocity may be crowed-out by a preference for bargaining power. Hence, in our experiment, reciprocity is not able to prevent efficiency losses.

[17]Even when performing one-sided tests for these three treatments we cannot reject the null H_0: payoff(Ultimatum) = payoff(Dictator) against the alternative H_A: payoff(Ultimatum) $<$ payoff(Dictator). Refer to Table 16 for two-sided tests.

Appendix

A - Order Effects

We test the hypothesis that behavior in our experiment may be influenced by the order in which the games are played within the experimental session. Probit regressions of the choices of Table 3 on the respective treatment dummies and their interactions with order dummies indicate that choices are not influenced by order effects (i.e. the order dummy variables are not statistically significant). The same is true for similar OLS regressions of the offers of Tables 10 and 15, and for OLS regressions of the payoffs of Table 16. We use probit regressions to investigate order effects in the offer rejection models reported in Table 19. Surprisingly, we find a statistically significant coefficient for the third game dummy, indicating that the probability of rejection in the third game played is approximately 11% lower than that of the first game. This is true for models (1), (3), and (4) with 5% significance level. The remaining game order dummies are not statistically significant. We find this result to be puzzling.

B - Summary of Game 4

The fourth game subjects played involves a choice between the high bargaining power (or constraint) dictator game and two constraint ultimatum games. Specifically, the two ultimatum games are played over \$20, however, player B's ultimatum offers are restricted to \$5 or \$10. Note that the paper investigates the trade-off between surplus and bargaining power by fixing the short-term contract and varying characteristics (surplus and bargaining power) of the long-term contract. In game 4, bargaining power of the short-term contract is altered by the inclusion of offer restrictions. This alters the paper's baseline making it hard to compare and interpret behavior of this treatment to behavior of other treatments. For these reasons, the game is excluded from our main analysis.

Nevertheless, the game offers a few noteworthy results. First, like in the other games, the probability that Player A chooses the dictator branch in game 4 weakly increases with the endowment: 27% for \$30 games, 26% for \$40 games, and 44% for \$50 games. Second, holding constant the pie of the dictator game, these proportions are similar (and not statistically different) to those of our high bargaining power treatments; 27%, 28%, and 49% for the \$30, \$40, and \$50 games, respectively (see third row of Table 3). The difference between the share of subjects that choose the dictator game when restrictions are not imposed in the short-term contracts (our ‘High’ treatments), and the share of those who choose the dictator game when restrictions are imposed (game 4) is not statistically different. Therefore, the restrictions of the short-term contract do not change Player A’s contract preference. Third and finally, note that, under the offer restrictions of game 4, standard game theory predicts player A to be indifferent between the short-term and long-term contracts; player A receives the minimum offers in both games (ie, $5 in each ultimatum stage, which A accepts, and $10 in the dictator game). While the share of subjects favoring the short-term contract is close to 50% in the $50 treatment (which can be interpreted as evidence for the indifference between contracts), the sequence of the restricted ultimatum game is chosen more often than the restricted dictator game in treatments $30 and $40. This suggests that subjects believe that some bargaining power arise from the option to reject an offer, which corroborates the main theme of the paper: participants have a preference for bargaining power.

C - Instructions

Thank you for participating in this experiment.

This is an experiment in individual decision-making. The instructions are simple, and if you follow them carefully and make good decisions, you will have the opportunity to earn a considerable amount of money. You will be paid for your participation in cash at the end of the experiment. Your earnings for today's experiment will depend partly on your decisions and partly on the decisions of the player with whom you are matched.

It is important that you strictly follow the rules of this experiment. If you disobey the rules, you will be asked to leave the experiment.

If you have a question at any time during the experiment, please raise your hand and a monitor will come over to your desk and answer it in private.

Description of the Task

You will be participating in a simple experiment in which you will play 4 games. A game requires 2 players, one of whom will be called Red Player and the other Blue Player. At the start of the experiment, the computer will randomly assign you the role of either Red Player or Blue Player. You will remain in your assigned role throughout the experiment.

In each game, you will be randomly matched with a different Player of the opposite type. That is, if you are a Blue Player you will be matched with a different Red Player for each game. Please note that neither you, nor the person with whom you are matched, will ever learn with whom they were paired.

The Blue Player will move first by selecting one of two branches, Branch A or Branch B. If the Blue Player selects Branch A, the Red Player will be provided an endowment and will propose a way to split this endowment with the Blue Player. The Blue Player will then decide whether to accept or reject the offer. If the Blue Player accepts the offer, the Red Player will be provided a new endowment and the decision problem will be repeated. If the Blue Player rejects the offer, the game will end.

If the Blue Player selects Branch B, the Red Player will be provided an endowment of money and will propose a way to split this endowment with the Blue Player. Once the Red Player decides how to split the endowment, the game will end.

The terminal brackets contain the payoff information. The game will end at one of the four terminal brackets. The top number in each bracket gives the formula for calculating the payoff in \$s for the Blue Player. The bottom number in each bracket gives the formula for calculating the payoff in \$s for the Red Player.

Procedure for Playing the Game

The Blue Player will move first by selecting one of two branches, Branch A or Branch B. The procedure for playing the game that follows from each of these branches is detailed below.

Branch A

If the Blue Player selects Branch A, the Red Player will receive an endowment of money \$EA1 from the experimenters. Red Players will then have to decide how much of their endowment, if anything, to transfer to their Blue partner.

The Blue player then has to decide whether to Accept the offer of to Reject the offer.

If Blue accepts the offer:
- Blue gets the transfer
- Red gets their endowment (EA1) minus the transfer.

If Blue rejects the offer:
- Blue gets nothing
- Red gets nothing

If Blue rejects the offer, the game will end. If Blue accepts the offer, a second and final round will be played. At the start of the second round, the Red Player will receive a new endowment of money \$EA2 from the experimenters. They will then have to decide how much of this new endowment, if anything, to transfer to their Blue partner.

The Blue Player then has to decide whether to Accept or Reject this second offer.

If Blue accepts the second offer:
- Blue gets the initial and second transfer.
- Red gets their initial endowments (EA1 and EA2) minus the initial and second transfers.

If Blue rejects the offer:
- Blue gets the initial transfer.
- Red gets their initial endowment (EA1) minus the initial transfer.

Regardless of the decision made, the game will end after the Blue Player accepts or rejects the second transfer. Please note that the payoffs of each round are independent. Therefore, actions in the second round do not affect the payoffs from the first round.

Branch B

If the Blue Player selects Branch B, the Red Player will be given an initial endowment of money $EB. The Red Player will then have to decide how much of their endowment, if anything, to transfer to their Blue partner. Once the Red Player determines a transfer amount, payoffs are realized as follows:

- Blue gets the transfer
- Red gets the initial endowment minus the transfer

This will be the end of the game.

Important Note

Red Player's splitting choices must be whole numbers. In some games, Red Player's choice will be restricted. Red's possible proposals could be restricted to two specific amounts or to a subset of whole numbers. These restrictions are always imposed by the experimenters.

Please, take some time now to study the structure of the game. This same basic procedure will be followed for each of the four games.

Final Payoffs

You will only be paid your earnings for one of the four games you will play during today's session. After all four games have been completed, we will randomly select one of the games by selecting an index card that is numbered from 1 to 4. The number on the card which is selected will determine which game will determine your earnings for today's session.

Even though you will make four decisions, only one of these will end up affecting your earnings. You will not know in advance which decision will hold, but each decision has an equal chance of being selected.

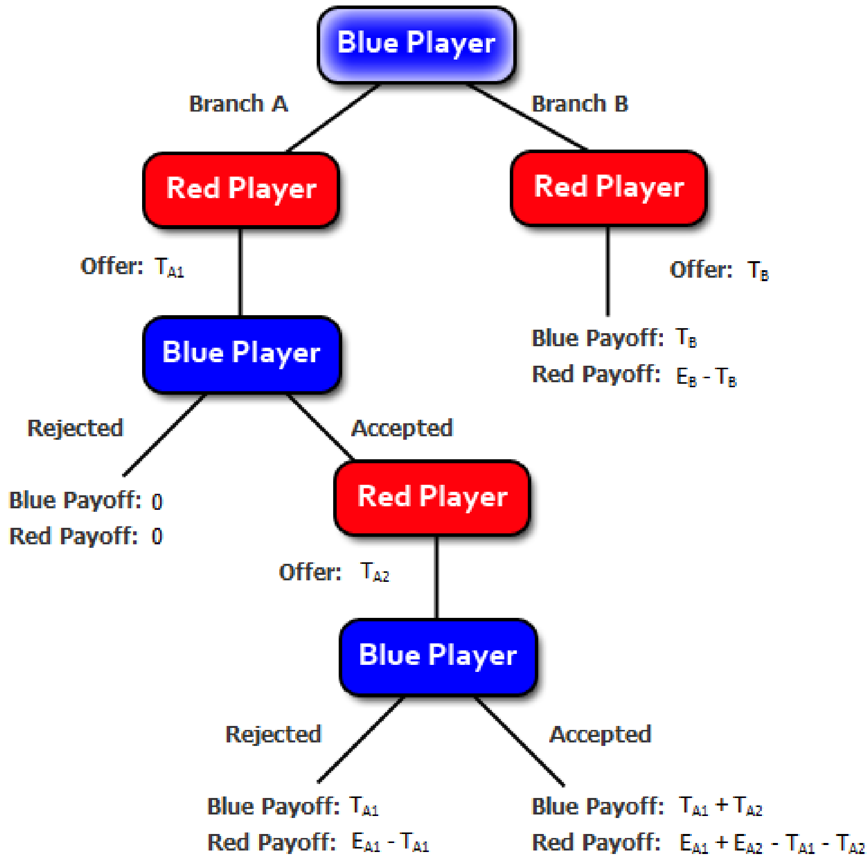

Figure 1: Game Tree.

D - Screen Shots

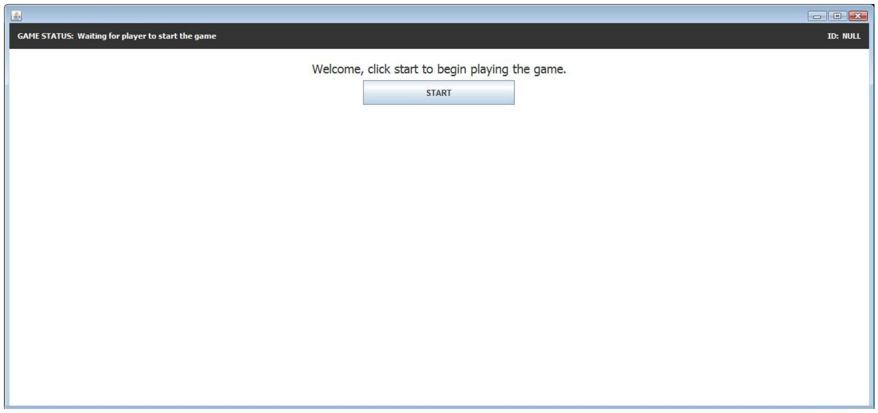

Figure 2: Welcome screen.

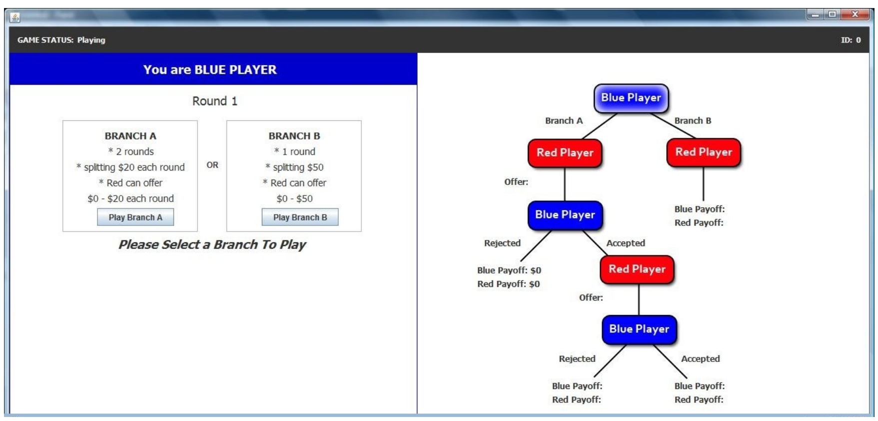

Figure 3: Random assignment of player type - Player A (Blue). Player A's original choice (Treatment No-50).

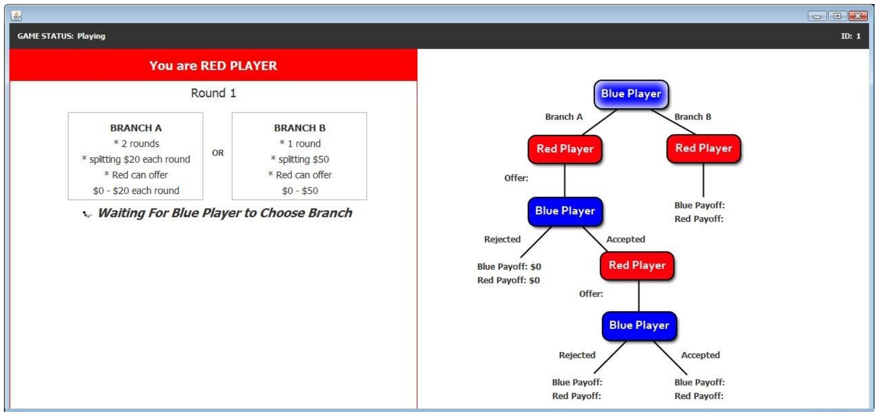

Figure 4: Random assignment of player type - Player B (Red).

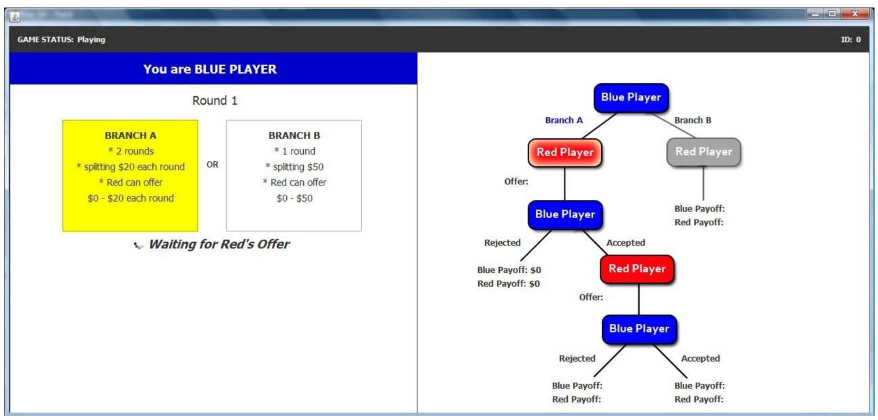

Figure 5: Waiting screen - Player A.

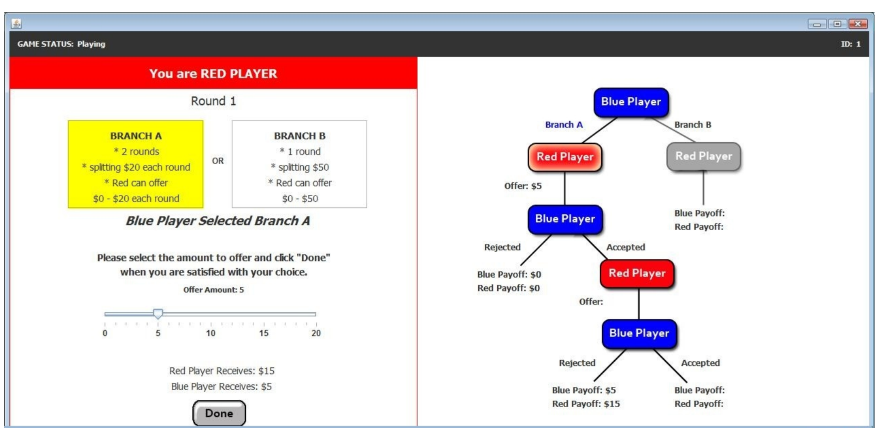

Figure 6: Player B's offer in the first ultimatum game.

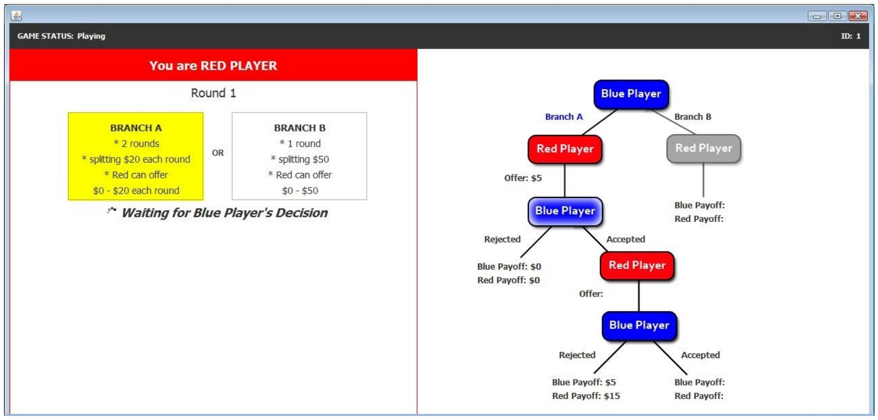

Figure 7: Player B is waiting for A's first accept/reject decision.

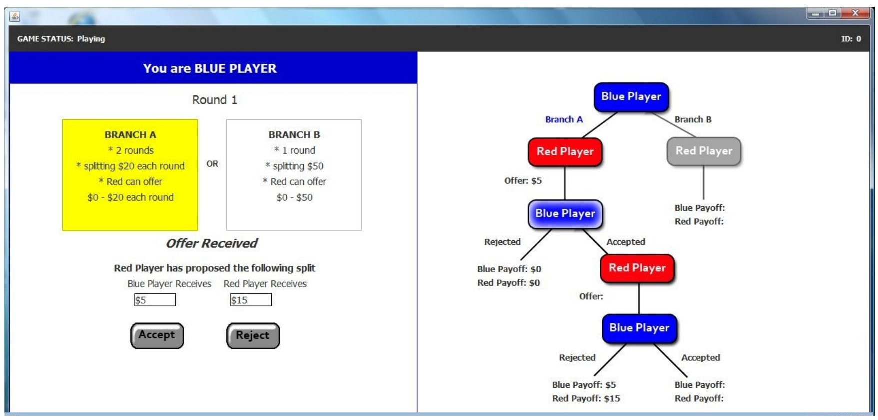

Figure 8: Player A's first accept/reject decision in first ultimatum.

Figure 9: Confirmation screen - Player A.

Figure 10: Waiting screen - Player A

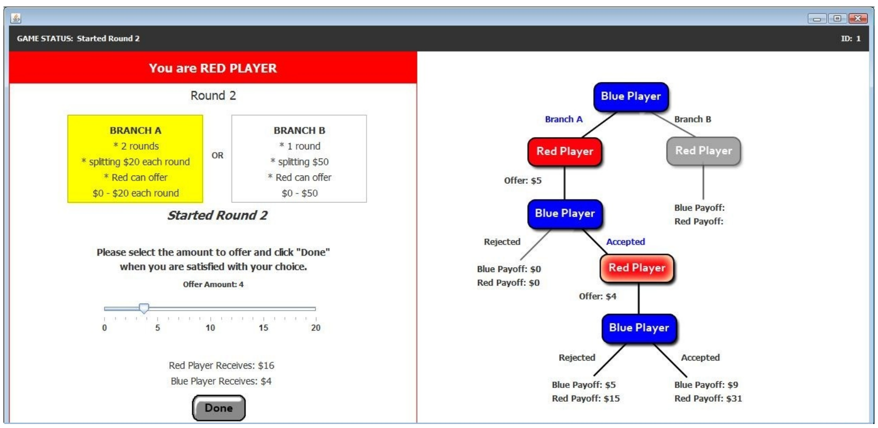

Figure 11: Player B's offer in the second ultimatum game.

Figure 12: Player B is waiting for A's second accept/reject decision.

Figure 13: Player A's second accept/reject decision in first ultimatum.

Figure 14: Confirmation screen - Player A.

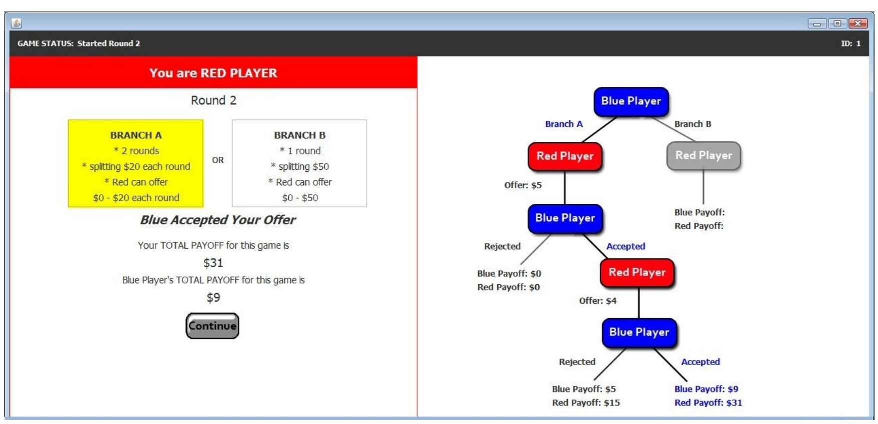

Figure 15: Confirmation screen - Player B.

Figure 16: Starting next treatment - Player A.

Figure 17: Starting next treatment - Player B.

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