



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.

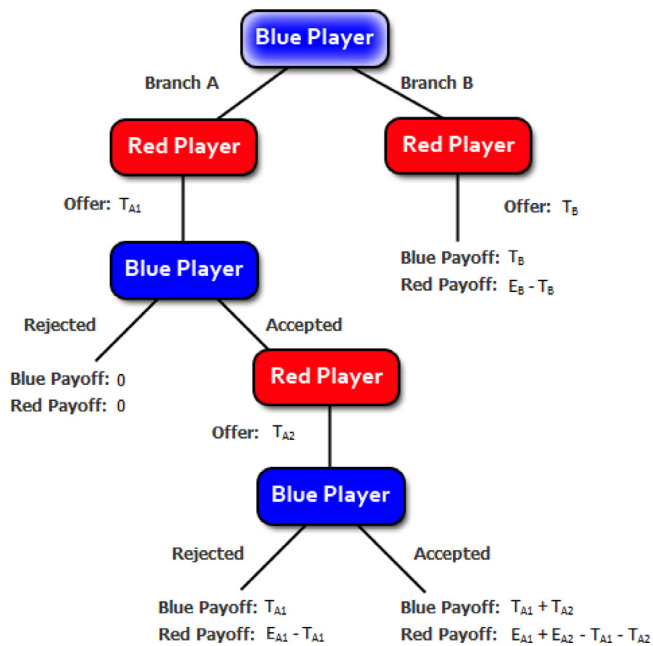


Fig. 1. Game tree.

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 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 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 [Anbarciyet 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

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.

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.

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