Negotiation under possible third party settlement

Sigbjørn Birkeland d.y.*

Norwegian School of Economics and Business Administration†

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Abstract

The effect of possible third party settlement on negotiation behaviour is studied in an economic experiment. The negotiation phase is preceded by a production phase that allows for different principles to guide the division of the joint production value. The production phase has a large effect on the negotiation outcome. The experimental result shows that a possible third party settlement lowers the dispute costs by reducing the number of rounds of alternating offers. Negotiators make first offers that are more strongly related to their production in the presence of a third party which reduces the number of rounds of negotiations. The distributional property of the settlements shifts toward more inequality in the presence of a third party.

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†Address: Department of Economics, Norwegian School of Economics and Business Administration, Helleveien 30, 5045 Bergen, Norway. E-mail sigbjorn.birkeland@nhh.no.
1 Introduction

Many decisions are reached in negotiations under the fall back of a third party settlement. Civil disputes can be brought to court, disputes arising under commercial contracts may be solved by arbitration proceedings, and conflicts between branch managers can be decided by a senior manager. The main question addressed in the paper is to what extent the possibility to submit the judgment to an impartial third party will affect the efficiency of reaching an agreement and the distributional properties of the outcome. The effects are studied in a laboratory experiment with first and second year business school students.

The negotiations studied in the paper are such that two parties must agree upon a division of a sum of money, where more for one party means less for the other party, or the total gains are reduced in a costly negotiation process that may go on until no money is left on the table. I compare negotiations with and without the option to unilaterally at every round submit the case to an impartial third party. There are three outcomes in the game: an agreement about a division of the money, a final third party settlement, or a perpetual disagreement. The game studied is based on the alternating offer bargaining protocol extended to include the outside option of using a third party to make a final decision. There are no restrictions on the decision imposed by the third party other than it has to be equal to the payoff net of costs, so no payoff can be added or withdrawn.

Experimental studies of sequential bargaining show that concerns for fairness influence bargaining behaviour (Ochs and Roth [17], Weg et al [20], De Bruyn and Bolton [7]). There is a tendency that players deviate in the direction of equal monetary payoffs when bargaining models with traditional preferences predict unequal monetary payoffs, for example in situations with different discount factors. Even in situations where one of the negotiators have all the bargaining power (dictator game) a third of the participants typically divide equally (Camerer [9]). Most bargaining experiments investigate variance of the bargaining protocol such as number of rounds and asymmetries of individual discount factors, while the monetary award that they are asked to divide is fixed and given by the experimenter. The strong tendency for an equal split in these bargaining contexts may be driven by the widely accepted norm of an equal sharing when no morally relevant characteristics of individuals differ. The influence of a possible third party settlement may be stronger in bargaining contexts where there are competing fairness principles to apply.

The experimental design therefore includes a real effort production phase before the negotiations take place. In the production phase all participants produce individually an output by copying text for ten minutes on the computer. The value of the output is determined by the number of correct words and a random high or low price given by the experimenter. The negotiators are asked to divide the sum of individual production values through sequential bargaining where discount factors are the same. In these situations there are different fair-
ness principles that may guide the individual in dividing the gain: proportional to effort levels, proportional to individual production value, or an equal share of the joint monetary payoff. In some situations, applications of all the fairness principles give the same outcome, for example in situations where both negotiators have produced the same number of words and are given the same price. The experimental results show that all agree on an equal split when there is complete symmetry between negotiators, which is not the case when there are differences between negotiators from production.

In a treatment where negotiations can be settled by a third party, the distributional property of the settlements shifts toward more inequality compared to pure negotiations. The presence of a third party mechanism also lowers the dispute costs by reducing the number of rounds of alternating offers. The reduction in the number of rounds of negotiations can be explained by negotiators making first offers that are more strongly related to their production in the presence of a third party. The introduction of a third party influences both the efficiency and distributional properties of a negotiation.

More details of the experimental design are presented in section two. Section three presents theoretical predictions based on standard bargaining models. The experimental results are presented in section four, and the relation to other literature is discussed in section five. Some concluding remarks are given in section six.

2 Experimental design

The experiment took place at the Norwegian School of Economics and Business Administration in October 2008. Students from the first and second year of the business administration classes were invited to participate in an experiment through invitation by email. The invitation explained that the experiment was voluntary, that they would receive NOK 100 (USD 14.5) for participating, and that they would possibly earn more money during the experiment. A total of 110 students volunteered for participating and they were randomly assigned to one of the six sessions. For the third party treatment six of the students were randomly selected to act as a third party. They were paid a fixed compensation of NOK 300. The 104 negotiators were paid an average of NOK 333 for an experiment that lasted on average an hour and half. The maximum payment any student received was NOK 600. There were 28 bargaining pairs in the pure negotiation treatment and 24 bargaining pairs in the third party treatment. Participants in each session were randomly seated in separate cubicles, and all interaction between participants was anonymous and made through a web-interface developed for the experiment.\footnote{The experiment was programmed in Python, and used MySQL database and Apache web server application. The experiment was run on laptop computers that communicate over a}
The experiment has three phases: a production phase, a pure distribution phase, and a negotiation phase. At the start of the experiment the participants are provided with the basic design of all three phases. Before the production phase all participants are told that they would earn money according to the number of correct words that they type, but that the payoff depends on the subsequent phases of the experiment. After the production that last for ten minutes, participants are told that they randomly were assigned one of two texts, and that participants who typed the text marked A receive NOK 1.5 per correct word, and those who typed text B receive NOK 0.75 per correct word. Individual production is rounded off to the nearest 50 correct words. Individual $i$’s production value $y_i$, is equal to $e_i p_k$, where the number of words typed is $e_i$, and the price is $p_k (k = 0.75, 1.5)$. The value of the joint production is equal to $Y = y_1 + y_2$.

In the distribution phase, participants are randomly matched in pairs and one participant is chosen to act as a dictator who decides on the division of the joint production value, $Y$, between the two. The participants acting as dictators are given full information about both participants’ production of words and the randomly assigned prices. Some individuals are matched with others who are assigned the same price and have produced the same number of words, some individuals are matched with another participant who has produced a different number of words or been assigned a different price. Each participant is involved in the total of four situations, two as a dictator and two as a passive receiver, all randomly matched pairs.\(^2\)

In the negotiation phase, participants are again randomly matched in pairs and they are instructed to bargain over a division of the joint production value, $Y$. The bargaining protocol is an alternating offer bargaining with an equal discount rate for both participants of four per cent per round. One of the participants in a pair is randomly assigned as a first mover who suggests an opening offer in the first round. Individual $i$ proposes an amount of payoff $x_i$ to himself and $Y - x_i$, to the other party in each round of negotiations. Before the first mover sends the initial offer, he is asked what he believes will be the outcome of the bargaining phase. The first mover receives a bonus of NOK 20 if the guess is within NOK 20 deviation from the actual agreement made.

In treatment I called negotiation, the second mover responds to an initial offer by either accepting it and the negotiation is closed without costs, or by giving a counter offer in a second round. The participant making the offer could revise it before it is transmitted. The first mover is then given the opportunity to offer in a third round from a joint production value that is reduced. The wireless local area network.

\(^2\)Participants in the role as third parties did not participate in the production or distribution phase in order not to bias their view. During the production and distribution phase they spent their time answering questions on four hypothetical cases that are similar in structure and information to the real cases that they meet later in the experiment.
negotiation is closed when one accepts an offer. All participants are given full information about the other participant’s production of words and the prices assigned to each participant. Every offer that is made during the negotiation is recorded in a table on the screen during the negotiations. Communication between parties is restricted to this minimal exchange of suggested divisions of the joint production value, and acceptance or rejection of the other’s offer. Nobody is informed about the outcome of other negotiations. The pairs of participants are rematched between each negotiation and all players take part in four negotiations.

In treatment II called third party, the bargaining protocol is changed such that there is one more option available during the alternating offers, which is to unilaterally break off the negotiation and request a third party settlement. The cost of the third party settlement is ten per cent of the joint value at the table in that round, and the cost is incurred equally by the bargainers. Before the third party decides the case, the participant who requests the third party settlement is asked what he thinks is the most likely outcome. Participants are paid a bonus of NOK 20 if the answer is within NOK 20 deviation from the actual decision made by the third party. Negotiators are not given information about any decisions made by the third party during the experiment. The third party has information on history of all offers made, production of words, and prices for both negotiators. There are no restrictions on the decision of the party except that it has to be equal to the sum of the gains net of costs.

After all choices are made, the participants are given three questions to answer on the computer. Payments in the experiment are determined by a random draw from the four situations in the distribution phase and the four situations in the negotiation phase that the participants have been involved in. They receive the money according to the final allocation net of costs in the situation that is drawn, plus NOK 20 for each of the expectations that is correct. If there is a third party settlement the negotiators are paid according to the third party decision net of costs. Participants are asked to complete a form with a code given on the screen and the payment is transferred to participants’ bank accounts. Matching of the receivable and the bank account details is done by the accounting department of the business school.

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3In principle, the negotiations could continue to the minimum offer of NOK 1 is reached or the participants could use excessively long time to decide in each round, never concluding the negotiation. From previous experience with experiments of this kind, we thought these events so unlikely that we did not inform the participants on how such situations would be handled. One negotiation sequence lasted for 26 rounds ending with an equal split of the remaining 0.36 per cent of the joint production. It took 22 minutes to complete this negotiation.

4In order to avoid any strategic behaviour with respect to final offers and the bonus payment, it is made explicit in the instructions that a negotiator will not receive the bonus in the case that this particular situation is drawn for payment.
3 Theoretical predictions

The negotiation protocol used in the experiment is based on an alternating offer model which has a unique subgame perfect equilibrium outcome (Rubinstein [18]). In the absence of a third party decision, the model requires the first player to offer $\delta/(1 + \delta)$ to the second player who should accept. Here $\delta$ is the common discount factor equal to 0.96. The first mover should then offer 0.49 to the other participant, who should accept and there is an agreement in the first round. The model is based on both players having standard preferences which are common knowledge. For small payoffs the utility function can be assumed to be linear in wealth representing risk neutrality. The production history does not enter the model which is based on given endowment to negotiate over.

The influence of a third party on the negotiations will depend upon the rules that govern the third party mechanism. Here, negotiators can unilaterally submit the case for a third party decisions at any round during the negotiations, and the third party will propose a settlement that is binding for both parties. A third party can implement any distribution of the contested amount, but cannot add or subtract resources. A third party may follow different rules: to strictly follow a principle, to compromise the final offers of the parties without deliberating about the fair outcome, to punish the most aggressive party, or to simply just arbitrarily divide the endowment. Among papers that study arbitrator behaviour empirically, mostly in labour disputes, Bazerman [3] finds that arbitrators consistently apply norms in the decisions across different cases, and that there is variation among arbitrators in which principle they apply, while Bloom [5] finds more evidence of compromising behaviour among arbitrators.

In the following discussion we assume that a third party will follow a principle of fairness based on the distributive properties of the outcome.\(^5\) This excludes the possibility that a third party would punish aggressive bargaining strategies.\(^6\) The fairness principles will be defined by the production phase of the game. We assume that a third party is motivated by one of three fairness principles, $m^n$ where $n = E, L, M$. The first principle is equality which is simply an equal split of the joint production value, $m^E = Y/2$. The second principle is a libertarian principle which gives each individual what she earns in the production $m^L = e_i p_i$, and the third principle is a meritocratic principle which allocates the joint production according to the relative effort in production such that individual $i$ gets $m^M = (e_i/(e_1 + e_2))Y$.

\(^5\)Many papers on arbitration assume that the arbitrator will compromise the final positions of the negotiators. Negotiators will tend to make large demands and no concessions in order to offset the compromise decision of the arbitrator. Such behaviour would predict increased dispute rate in negotiations under the shadow of arbitration.

\(^6\)Decisions that are based on procedural fairness rather than the distributive consequences are to some extent recognized in adjudication, for example, the willingness to find an amicable settlement is often a reason for a judge’s allocation of legal expenses between parties in court.
If we first assume that the parties know what principle the third party will use, the third party decision is an outside option. A rational negotiator with standard self interested preferences should submit the case for a third party decision when the payoff from a third party award net of costs is greater than the payoff that would be the outcome of a negotiation. If the third party is an egalitarian, the outside option will be an empty threat since the payoff will be lower than the payoff from the standard Rubinstein [18] bargaining solution due to the cost of using a third party. An egalitarian third party is interesting since it also follows from the symmetry of the negotiation phase of the game. The Nash bargaining solution would imply equality in a game with equal utility functions. Hence, if negotiators know that the third party is an egalitarian, there should be no difference between the treatments, all negotiations should end in the first round on an equal split of the money. In some of the situations in the experiment there is also no differences from the production phase, that is, the number of words produced and the price are the same for the negotiators. In these situations application of any of the three principles will lead to the same answer – an equal split. Comparisons between these situations and situations where there are differences from production would indicate if the production phase has an impact on the negotiation outcome.

If the third party is known to follow either a meritocratic or libertarian principle, the outcome will depend upon the application of these principles in the specific situation facing the negotiators in the experiment. In most situations where there is differences in the number of words produced or the prices assigned, the outcome will give more to one of the parties who could use this as a credible threat to get more payoff.\textsuperscript{7} The outside option will in those cases drive the outcome completely. Hence, if the third party follows a meritocratic or libertarian principle, there will be a difference between the treatments. The distribution of the payoff should be more unequal, reflecting the fact that self interested negotiators have a credible outside option threat. This shows that a third party could potentially influence the negotiation outcome even if there is no uncertainty about the third party behaviour.

The game is such that negotiators in principle could agree on any division of the payoff, so if both parties preferred a meritocratic solution, they should reach that agreements on their own and avoid the dispute costs. If that is the case then

\textsuperscript{7}In a number of situations where either the number of words produced or the price is the same, two of the principles will give the same answer. In the case where produced words are equal and prices different, equality and meritocratism instruct you to share equally. In the case where the price is the same and produced words differ, meritocratism and libertarianism will give the same answer. In situations where negotiators have produced a different number of words and they have been assigned a different price, application of the three principles would most likely give different answers, but not necessarily since proportionality in production can be the inverse of the relative prices, and hence libertarianism and equality instruct you to share equally.
the outcome of the negotiations without a third party should also be more unequal than predicted by standard preferences, and consequently both treatments should show the same level of inequality. Differences between treatments will therefore be driven by a combination of self interested preferences and a belief in a third party that are not an egalitarian.

If there is uncertainty about third party decision the negotiators may weight possible types of third parties and submit the case for a third party decision if the expected outcome net of cost is higher compared to the expected outcome from an agreement. The effect will be a smaller variation of the outcome around the mean of an equal division that follows from a consistent application of any of the principles.

The preceding discussion shows that rational negotiators should agree in the first round which implies that the outcome is Pareto efficient. In the third party treatment no use of third parties should be observed because it is a costly mechanism. Inefficiencies in negotiations could arise from a number of different sources: bounded rationality, incomplete information and the incorrect beliefs. The Rubinstein [18] solution relies on rationality in the sense that the parties should be able to do the backward deduction to solve the problem. It is well known that participants to experiments, for example the centipede game, fail in the use of backward deduction logic (Camerer [9]). Second, any uncertainty with respect to the other players preferences or motives could create more rounds of negotiations because negotiators use costly delays to signal to the other party information about their own reservation value (Ochs and Roth [17]). Incorrect beliefs about the third party behaviour, for example excessive optimism about the outcome of a third party award could cause the use of an expensive third party mechanism (Babcock and Loewenstein [2]).

4 Experimental results

The presences of a third party may affect the negotiation efficiency and the distributional properties of the settlements. The experimental results show that both the efficiency and the distributional properties are affected by the introduction of a third party. The 208 negotiations are summarized for the two treatments in Table 1 and in Figure 1.

Each point on the graph on the left in Figure 1 represents an agreement from the negotiation treatment with person A’s share of the total production value on the horizontal axis and person B’s share on the vertical axis. Each point on the graph on the right represents a settlement from the treatment with an option to submit the case to a third party, including 15 actual third party decisions. All points along the diagonal line from the upper left corner to lower right corner represent efficient settlements, i.e. settlements made without costs. All the points that are placed inside this efficiency frontier represent settlements
Table 1: Descriptive statistics by treatment for the first mover

<table>
<thead>
<tr>
<th></th>
<th>I: Negotiation</th>
<th>II: Third party</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average first offers</td>
<td>0.55</td>
<td>0.52</td>
</tr>
<tr>
<td>Rejection rate of first offers</td>
<td>0.45</td>
<td>0.19</td>
</tr>
<tr>
<td>Average settlements</td>
<td>0.50</td>
<td>0.51</td>
</tr>
<tr>
<td>Equal splits of settlements</td>
<td>0.56</td>
<td>0.34</td>
</tr>
<tr>
<td>n</td>
<td>112</td>
<td>96</td>
</tr>
</tbody>
</table>

where some of the joint production value is lost during negotiation or by the use of a third party. We observe that more settlements from the negotiation treatment are further away from the efficient frontier indicating differences in efficiency between the treatments.

The average first offers in the negotiation treatment of 0.55 in Table 1, which is higher than the predicted first mover advantage of 0.51. There are also substantial rejection rates of first offers leading to costly negotiations in both treatments, where the highest rejection rate is in the negotiation treatment. The average settlements are however close to an equal split of the money left on the table.
when they agree. 8 56 per cent of the agreements in the negotiation treatment are equal splits compared to 34 per cent of the settlements in the third party treatment. 9 Overall observations, more than half of the settlements are made with some kind of unequal splits, the most extreme being a 20–80 split.

4.1 Efficiency in reaching an agreement

Efficiency in reaching an agreement is measured as a relative loss of payoff due to costs associated with a shrinking endowment and actual use of a third party. Dispute costs, \( c \), are in the cases where no third party is used, equal to one minus the accumulated reduction in value from the discount factor (\( c = 1 - \delta^{n-1} \), where \( n \) is the number of rounds at the close of an agreement). In the case when a third party is used, dispute costs are also adjusted for the third party cost, \( \alpha \), of 10 per cent (\( c = 1 - \delta^{n-1}(1 - \alpha) \)). If the second mover accepts the initial offer in the first round there will be no negotiation costs. Table 2 shows that dispute costs are significantly reduced from eight per cent to three per cent in the third party treatment (\( p = 0.004 \), Wilcoxon rank-sum test). The main difference in dispute costs is a smaller loss of payoff from the number rounds that is used to reach a settlement. The average number of rounds in the third party treatment is 1.3, significantly reduced from 3.3 in the negotiation treatment (\( p < 0.001 \), Wilcoxon rank-sum test). In the negotiation treatment about 20 per cent of the negotiations go on for five rounds or more compared to none in the third party treatment.

<table>
<thead>
<tr>
<th></th>
<th>I: Negotiation</th>
<th>II: Third party</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rounds</td>
<td>average 3.29</td>
<td>1.33</td>
</tr>
<tr>
<td></td>
<td>std. dev. (4.41)</td>
<td>(0.75)</td>
</tr>
<tr>
<td>Dispute costs</td>
<td>average 0.08</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>std. dev. (0.13)</td>
<td>(0.05)</td>
</tr>
<tr>
<td>Inequality</td>
<td>average 0.11</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>std. dev. (0.13)</td>
<td>(0.19)</td>
</tr>
<tr>
<td>n</td>
<td>112</td>
<td>96</td>
</tr>
</tbody>
</table>

Table 2: Efficiency and inequality of settlements by treatment

8There is no significant differences in means of the share to the first mover between the two treatments (\( p = 0.418 \), two-sided t-test). Although an equal split is close to the theoretical prediction, a consistent application of any of the principles discussed in the previous section will give an average of 0.5 given the random selection of pairs in the experiment. The effect of a third party on the share that person one receives is a significant increase in the variance (\( p < 0.001 \), Levene’s test).

9To accommodate rounding to nearest NOK 5 and the small first mover advantage that follows from a theoretical solution, all agreements within the 47.5–52.5 split are characterized as equal splits.
The results show that there is a significant improvement in efficiency by making available an option to submit the case to a third party. This contrast previous experimental results which find an increase in dispute rates when a third party is introduced (Ashenfelter et al. [1], Bolton and Katok [6], Charness [11], Dickinson [12]). They typically find that dispute rates more than double when conventional arbitration is introduced. (There are some differences in experimental design between these papers that can possibly explain the different dispute rates that will be discussed in section five.)

4.2 The influence of first offers

The first offer is important for the negotiations since it sends a signal about the preferred outcome and the aggressiveness of the strategy that the party will employ. First offers could therefore have a strong impact on the efficiency of negotiations. The number of rounds that a negotiation takes to complete in the experiment is significantly correlated with the first offers ($p < 0.001$, Spearman rank-order correlation). The average shares that person one demands in the first round is 3.5 per cent lower for the third party treatment than for the negotiation treatment. This is a statistically significant difference in means ($p = 0.034$, two-sided t-test). The more modest demands in the first round when there is an option to submit the case for a third party, indicates that there is a difference in the negotiation strategies employed in these situations.

<table>
<thead>
<tr>
<th>I: Negotiation</th>
<th>II: Third party</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>-0.079</td>
</tr>
<tr>
<td></td>
<td>(0.363)</td>
</tr>
<tr>
<td>Price</td>
<td>0.047</td>
</tr>
<tr>
<td></td>
<td>(0.050)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.538**</td>
</tr>
<tr>
<td></td>
<td>(0.215)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.001</td>
</tr>
<tr>
<td>n</td>
<td>112</td>
</tr>
</tbody>
</table>

Table 3: Effect of relative production and price on first offers

In Table 3 the first offer from person one is explained by his relative production in the pair, and his relative price in the pair.\(^{10}\) The parameters are estimated by a regression with individual fixed effects. Production and price are significant explanatory variables in the third party treatment but not for the negotiation treatment, where the variables have no explanatory power. The introduction of a third party induces the parties to make first offers that are strongly related

\(^{10}\)The average production is 246 words. Production varies from 100 to 450 produced words.
to their relative production. Offers that are more strongly related to production will be closer to an equal split since the experiment is based on a random mixing of pairs, and thus explain the drop in average share that person one demands in the third party treatment.

Figure 2 shows that there is a strong correlation with what you expect will be the outcome from the negotiation and your first offer. In the negotiation treatment there are a number of observations where negotiators start out with a much higher first offer than they expect will be the outcome, which is not the case for the third party treatment. The presence of a third party induces negotiators to make first offers that are more in line with expectations.

Figure 2: First movers’ expected outcome and their first offer

When it is possible to submit the case to a third party people seem to give a more fair offer in the sense that it relates more to the parties relative production. There can be several reasons for why people use a different strategy when there is a third party option. One could be a possible audience effect where people want to be perceived as fair by the third party, even though in the case where they are anonymous for the third party. Another possibility is that they expect the third to reward a more modest bargaining strategy. The experimental design does not allow for differentiating between these hypotheses, but there is some indication that third parties are willing to punish an aggressive bargaining strategy from
questionnaire given to the third parties reported in a later section.

4.3 Distributional properties of the outcome

The distributional properties of the settlements are different in the two treatments. There is an increase in the inequality in the third party treatment, see Table 2. Inequality, \( e \), is measured as one minus the lowest share relative to the highest share of the money on the table at settlement \( (e = 1 - \frac{x_{\text{min}}}{x_{\text{max}}}) \). This measure will be zero for an equal split and one for a split where one receives everything. There is a significant increase in average inequality from 11 per cent in the negotiation treatment to 21 per cent in the third party treatment \( (p < 0.001, \text{ Wilcoxon rank-sum test}) \).

The efficiency increase from an option to use a third party is accompanied with an increase in the inequality of the distribution of gains. This is however not the case for 13 per cent of the negotiations where there are no differences in number of words produced or prices between the negotiators. In these situations all characteristics of both the production and negotiation phase are symmetric. The experimental results show that all of these 28 settlements are exact equal splits in both treatments. This indicates that the production phase of the experiment has a large influence on the negotiation outcome. Generally, the context of the negotiation seems to be important in understanding the outcome, which questions the often assumed context free universality of application of bargaining solutions.

<table>
<thead>
<tr>
<th></th>
<th>I: Negotiation</th>
<th>II: Third party</th>
<th>Dictator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>0.571***</td>
<td>0.696***</td>
<td>0.802***</td>
</tr>
<tr>
<td></td>
<td>(0.094)</td>
<td>(0.113)</td>
<td>(0.135)</td>
</tr>
<tr>
<td>Price</td>
<td>0.061***</td>
<td>0.048**</td>
<td>0.052***</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.019)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.149***</td>
<td>0.102</td>
<td>0.150*</td>
</tr>
<tr>
<td></td>
<td>(0.055)</td>
<td>(0.062)</td>
<td>(0.077)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.418</td>
<td>0.660</td>
<td>0.141</td>
</tr>
<tr>
<td>( n )</td>
<td>112</td>
<td>96</td>
<td>208</td>
</tr>
</tbody>
</table>

Table 4: Effect of relative production and price on share to person A

The production phase has explanatory power for the distributional properties of the negotiation outcome. In Table 4 the share that person A receives in the agreement is explained by his relative production in the pair, and his relative price in the pair. The effects are estimated by regressions with individual fixed effects. Production and price is significant explanatory variables in both regressions.

The coefficient for production would be equal to one if all agreement where made proportional to number of words produced by negotiators, that is if a
meritocratic principle is strictly applied. We see that the coefficient is higher in the third party treatment, which indicates that there are more agreements closer to the meritocratic principle in this treatment. However, a regression with an interaction term for production and treatment shows that the effect is not statistically significant. The effect of production is even higher in the dictator situations where the coefficient estimate is 0.8.

Before the opening offer the first mover is asked about the expected settlement. Participants’ average expected outcome is 0.5 for both treatments, but the inequality of the expected settlements is 17 per cent, significantly higher than the 11 per cent for the actual settlements in the negotiation treatment ($p < 0.001$, two-sided t-test). It seems that the more equal distribution in the negotiation treatment is not fully expected by the negotiators.

4.4 Third party behaviour

Overconfidence is probably one of the most common reasons for a failure to reach an agreement through negotiation (Babcock and Loewenstein [2]). In the experiment, the participant who requests the third party is asked about what he believes will be the decision of the third party. There are only 15 cases that are decided by a third party, and we should be cautious interpreting this data, but the average belief about the third party decision is not significantly different from what the third party actually decides. More than half of the participants’ guesses are within a ten per cent deviation from the third party decisions.

The hypothesis that the third party mechanically compromises the final offers is not supported in the data. The final offers seem to have little direct influence, only four cases are close to one of the parties final offers. There are seven cases of third party settlements outside of the final offers from the parties.

Seven of the third party decisions are settled close to an application of a meritocratic principle, and the other eight seem not to follow a strict interpretation of a principle. However, in the questionnaire all of the six participants who acted as third parties preferred the meritocratic principle, but four of them also answered that they would consider the strategy of the negotiators saying they would allocate less to negotiators that where demanding more than what would follow from application of a principle. Two arbitrators said that they would follow a rule that deducted all the dispute cost from the one who had demanded more than what they themselves perceived fair, reasoning that he was responsible for the dispute costs. All third parties considered their role as an impartial third party to find a fair solution, and only one mentioned that a third party mechanism may foster a faster decisions and improved efficiency. The deviation from a strict application of a principle in the data may be related to adjustments that are based on motives of punishment for aggressive bargaining strategies.
4.5 Answers to a post-experimental survey

The first question in the post-experimental survey contains a vignette describing a negotiation problem illustrated with three examples, similar to the actual cases that the participants have seen during the experiment. The experimental data shows that 66 per cent of the participants prefer the meritocratic principle, 30 per cent favour the libertarian principle, and only 4 per cent the egalitarian principle. However, these numbers seem to be biased by the actual experience during the experiment because the meritocratic principle is favoured by 77 per cent of those who participated in the third party treatment, and by 57 per cent of those who participated in the negotiation treatment. There is however no change in the number of participants who favour the egalitarian principle, so the change is in the number who prefer the libertarian principle. The larger support for the libertarian principle in the negotiation treatment may reflect the bargaining power that participants have acquired in the production phase.

The second survey question is related to whether they find it acceptable to use fairness or power in negotiations. The question is the same as used by Binmore et al. [4] who find that 35 per cent said that one ought to play fair. Here, 57 per cent of the negotiators in the pure negotiation treatment said that one ought to play fair and 69 per cent of the negotiators in the third party treatment. The rest said that is was acceptable to use one’s bargaining power. The experimental design is different from Binmore et al. [4], and the larger support for fair play is probably due to the context with a real effort production phase.

5 Related literature

This paper relates to several papers that study arbitration in an experimental setting (Ashenfelter et al. [1], Bolton and Katok [6], Charness [11], Dickinson [12]). They typically find that dispute rates more than double when conventional arbitration is introduced to negotiations.\textsuperscript{11}

An innovative part of Ashenfelter et al. [1] is the design where the arbitration decision is implemented as a computer random draw from a normal distribution with equal split of outcome as the mean. A pure negotiation treatment is compared with an arbitration treatment where the dispute rates are equal to the number of negotiations where no agreement is reached after a fixed time period has elapsed. In the pure bargaining treatment everything is lost after a certain time period, and this is compared to a forced arbitration settlement. The authors recognize that this experimental design implicitly raises the costs of no

\textsuperscript{11}The claim that arbitration as a fall back solution reduces the chances that bargainers find a solution on their own is often called the ‘chilling’ effect. This claim goes back to a discussion about introduction of compulsory arbitration in collective wage bargaining for certain occupations during the 1960s (Stevens [19]).
agreements compared to the treatment with forced arbitration since the likelihood of receiving zero from arbitration is very small. It is also the practice in these experiments to show to the negotiators previous decisions by the arbitrator in the form of draws from a normal distribution. This information has potentially little value since there is nothing about the background history of offers or possible entitlement claims that the arbitrator would consider before a decision is reached.

Bargaining experiments often show that there are systematic individual variations between participants with respect to the use of bargaining strategies, which correlate with disagreements. Charness [11] investigates the influence of social preferences in a bargaining experiment with screening of participants into two groups based on their generosity in a dictator game (giving more or less than 30 per cent). The sorting of participants reduce overall dispute costs, primarily due to a reduction when two generous types are paired together. Mixed pairs have the largest difficulty in reaching a settlement. It is necessary to inform participants about the other’s type in the bargaining situation to achieve the results in the experiment.

There are two key differences in the experimental design here, the third party settlement is not enforced upon negotiators that do not close before a deadline, but it is a choice for negotiators to call upon a third party at any time during the negotiation. This imply that a negotiator can if he believe that further negotiations would be costly, immediately submit the case to a third party and save negotiation costs. Second, the third party award is performed by fellow students and therefore expectations about a third party award may be easier to form compared to a randomized draw from a computer. In a context with a real effort production phase there are heterogeneous beliefs about what is the fair distribution (Cappelen et al. [10]). The option to submit a case to a third party would also be more like real life experience.

Negotiation contexts that facilitate the formation of different initial entitlements have been studied by Burrows and Loomes [8] and more recently by Gächter and Riedl [14]. Burrows and Loomes [8] demonstrate how people’s notions of fairness impact bargaining settlements, and they link the individual behaviour to preferences for a utilitarian, egalitarian, and a relative desert outcome (that reward the expenditure of effort). They compare a treatment where the initial endowments are randomly allocated by the drawing of a card with various quantities and values with a treatment where endowments are earned by participants in a task of finding words from a sheet of letters. They find a shift in agreements made from equal final payoffs with random endowments, to payoffs that split equally the gain from the negotiations but preserve the initial endowment differentials when endowments are earned. Gächter and Riedl [14] find strong effects of entitlements on bargaining behaviour in an experiment where participants know if they rank above or below the median answer to a general knowledge quiz. They find that most of the participants choose to split the endowment after a loss pro-
portional to the entitlements that are suggested to them by the experimenter before the loss occurs. Gächter and Riedl [15] in a more recent paper, find that proportionality is preferred in a questionnaire survey and that equality is more prevalent in actual negotiations, arguing that the latter might be a better focal point.

6 Concluding remarks

A large and increasing share of the economy is devoted to costs associated with transactions in the broad sense, and the efficiency of institutions that facilitate transactions are of great importance for economic performance (North [16]). Substantial resources are devoted to the formation and enforcement of contracts, and the resolution of disputes through arbitration, mediation and of course the entire system of judicial processes. It is important to have institutional arrangements that secure flexibility for people to negotiate their own solution, but at the same time secure efficient compromises in the case of bargaining impasses. Effective use of third party mechanisms requires that people have the information about how the third party decision affects them. Norms of fairness that are broadly shared will coordinate beliefs about third party settlements and support institutions that reduce transaction cost and improve economic performance.

The presences of a third party may affect the negotiation efficiency and the distributional properties of the settlement. The experimental results show that both the efficiency and the distribution of payoff are affected by the introduction of a third party. There is a significant reduction in dispute costs with the possible third party settlement. The introduction of a choice of a third party solution reduces dispute cost, primarily because it allows negotiators to cut short unfair treatment. An implication for the efficiency of institutional design is that the option to submit the case to a third party should be available through the entire negotiation process. This ensures negotiators to cut short unfair demands that would possibly lead to costly negotiations.

The more unequal distribution of settlements that results from the introduction of a possible third party settlement raises a normative question of whether it is acceptable to influence the settlements such that other allocations are implemented than would result from negotiations between the parties without interference. Although, third parties are chosen for their integrity in achieving a fair settlement or moderating behaviour, the principles that a third party apply can run counter to the principles of fairness that has a broader legitimacy in society. Dworkin [13] has argued that legal theory at the adjudicative stage, should require judges not only to serve values of efficiency and coordination, but to look to morality to decide what the law is. In this study the preferences of the third party matters for the distribution of the gain.

Throughout the paper it has been assumed that the parties have agreed on the
use of a specific third party mechanism. To agree on the use of such a mechanism
during contracting is a negotiation in itself. It would therefore be interesting for
further research to investigate how the commitment to use of a third party in
the contract phase influence the post contractual negotiation behaviour under
possible third party settlement.
References


