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Fairness, escalation, deference, and spite: strategies used in labor-management bargaining experiments with outside options

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Abstract

We review two recent cases of labor-management bargaining when outside options are in play and notice that structurally similar negotiations end differently. We hypothesize that behavioral factors are important and conduct an experiment. We find conflict is common when one side has an outside option despite relatively generous offers. We also find that firms who search for outside options, but do not take them, make more generous counteroffers than non-searching firms and that, overall, searching triggers concessions from unions unless the union has previously been hung out to dry by a firm who accepted an outside option.

JEL classification: C72; C91; J52
Keywords: Bargaining; Outside option; Experiment; Deference; Spite

1. Introduction

On January 20, 1999, Volvo Trucks North America announced plans to expand their existing production facility in Dublin, Virginia. The Volvo expansion was partially funded by the State of Virginia which offered US$54.2 million in incentives. As part of the agreement, Volvo Trucks was given 6 years to hire an additional 1277 workers. To hire new workers, Volvo had to negotiate with the United Auto Workers (UAW). Negotiations with the UAW did not go well; the workers rejected the first 6-year contract offer on

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January 13, 1999. The contract called for new laborers to be hired at significantly reduced wages (70% of the former starting wage) and to wait 10 months before receiving health insurance benefits.[1]

On January 27, 1999, Volvo Trucks made a counteroffer to the union. Volvo's management decreased the waiting time for health insurance, but also adjusted the contract in other areas to cover the increased insurance costs. Volvo Trucks issued an ultimatum with this second contract; the company said that if the contract was rejected it would move its operations out of Virginia. The UAW had 2 days to decide.[2]

On January 29, 2000, the union accepted Volvo Trucks' 6-year contract. The threat of moving the plant may have caused the union to reconsider its previously immutable stance.[3] The plant manager of the Dublin facility later mentioned that the firm had seriously considered moving the plant to Mexico during the dispute. The manager mentioned that he had visited two plants in Mexico to investigate alternatives.[4]

On July 13, 2000, 400 union workers went on strike at the Wayne Division of Dresser Industries, which manufactures gas station fuel pumps.[5] Dresser Industries is a division of Halliburton, an oil field services multinational conglomerate. Initially, Halliburton openly explored the possibility of moving operations as part of a major restructuring of Dresser Industries which had been underway since Halliburton bought Dresser 2 years earlier, but simultaneously entered into negotiations with the local UAW. The union offered concessions on early retirement benefits that were subsequently rejected by the firm. The firm then made a counteroffer which was rejected because of concerns about reductions in pension requirements, health insurance cuts and job consolidations. The UAW Local 354 decided to strike because they had been working without a contract since June of 2000 and negotiations for a new contract had made no progress since May.[6] This impasse in negotiations prompted Dresser Industries to expand the search for alternatives that included moving all operations to Mexico.[7]

On October 13, 2000, a spokeswoman from Halliburton said that the company decided to close the Salisbury plant. A company official cited the length of the dispute and "economic conditions" in the gas station fuel pump market as reasons for closing the plant. UAW officials objected, saying that the company had offered "ridiculous proposals" that forced them to reject the last proposal on August 18, 2000.[8]

[1] "Volvo must hire 1277 new workers before Virginia gives it US$25 million." The Roanoke Times and World News. 20 January, 1999: A1.

[2] "Volvo Pushes Pact; If Contract Isn't OK'd, Company Says, It Might Move Plant." The Roanoke Times and World News. 27 January, 1999: A5.

[3] "Union at Volvo Plant Approves Six-Year Contract." The Roanoke Times and World News. 29 January, 1999: B4.

[4] "Volvo Plant Manager Says Threats to Move Plant Were Real." The Roanoke Times and World News. 11 August, 1999: NRV12.

[5] We thank Peter Matthews for pointing out this example.

[6] "About 400 Employees on Strike at Fuel Pump Plant." The Associated Press State and Local Wire. 13 July, 2000: Business News.

[7] "World Market Turmoil Erasing 300 MD Jobs." The Baltimore Sun. 4 April, 1998: 12C.

[8] "Factory in Labor Dispute May Shut; Dresser Threatens to Move Shore Plant That Employs 548". The Baltimore Sun. 13 October, 2000: 1C.

As these two examples illustrate, outside options are used as leverage in bargaining, but, ex ante, the effect of an outside option seems hard to predict. In the first case, Volvo's threat to move production to Mexico seems to have caused the union to concede. However, the second situation ended very differently. In this case, Halliburton's threat to move production (also to Mexico) seems to have been met with spite instead of deference. In the end, the firm decided to close the plant because negotiations had reached an impasse.

An accurate theory of the influence of outside options on labor-management bargaining must account for our two examples. In particular, such a theory must recognize that: (1) firms use outside options to extract concessions from workers and (2) the firm's use of an outside option may cause conflict. One way to identify the elements necessary for each outcome to obtain would be to examine a number of case studies. Such an analysis would identify the structural elements (e.g. local unemployment rates and employment costs) that determine the bargaining power of the negotiating parties. Clearly these elements would be important predictors; however, such a structural analysis could not identify potentially important behavioral elements. For example, it may be important to know whether the firm searching for other opportunities makes union members more spiteful or more conciliatory.

In Table 1 we list many (but not all) of the structural factors that should have affected the course of negotiations in our two examples. The important thing to note is that the two situations are similar and, therefore, given the different outcomes, behavioral elements may have mattered.

Both plants are located in the mid-Atlantic region which controls for many cultural factors. Both examples are drawn from the automotive industry and both workforces were represented by the UAW which controls for the relative strength of national unions. The hourly wages paid to union employees during negotiations are comparable (slightly higher at Haliburton) and the outside options of the workers (i.e. the average production wage in the closest Metropolitan Statistical Area—MSA) are almost identical. The largest differ-

t1.1 Table 1
t1.2 Comparing the structural components of labor negotiations (Volvo vs. Haliburton)

t1.3		Volvo trucks N.A.	Dresser industries, Haliburton
t1.4	Location	Dublin, VA	Salisbury, MD
t1.5	Union representation	UAW	UAW
t1.6	Plant size (#jobs)	approximately 2000	more than 500
t1.7	Metropolitan statistical area	Roanoke, VA	Dover, DE
t1.8	Mean hourly wage during negotiations	US$17.07	US$19.23
t1.9	Mean (median) production hourly	US$12.54	US$12.23
t1.10	Wage for the MSA in 2000	(US$11.30)	(US$11.44)
t1.11	Unemployment rate in the MSA during negotiations	2.0%	4.2%
t1.12	Employer costs per hour worked (ECEC)	US$23.91	US$23.91
t1.13	Location of threatened move	Mexico	Mexico

t1.14 Sources: The Roanoke Times and World News, The Baltimore Sun, Bureau of Labor Statistics, UAW Local 2069 newsletter.

ence between the two cases is the local unemployment rate which, during negotiations, was 2% near Dublin, Virginia and 4.2% near Salisbury, Maryland. However, in both cases, the local unemployment rate was less than or equal to the national average indicating unemployment was not especially severe in either location. Lastly, both plants are located in the Northeast region for the purposes of calculating the Employer Cost per hour worked for Employee Compensation (ECEC), which indicates employment costs are also comparable.

Despite the similarities in these negotiations evidenced by Table 1, ex ante, one might expect Volvo employees to be more stubborn because their bargaining position seems slightly stronger than that of the Haliburton employees. Using a standard measure of worker bargaining power, the *cost of job loss* (Bowles and Schor, 1987), which depends on the difference between the wage inside the firm and a worker's next best alternative (i.e. the wage in the local MSA) and the expected duration of unemployment (proxied here by the local unemployment rate), we see that Haliburton workers have more to lose in terms of employment rents and should expect to be unemployed longer. Despite this difference, Haliburton negotiations ended in impasse, while the Volvo employees, who appear to have been in a stronger position, deferred to management demands.

In this paper we focus on the behavioral elements that may help explain the counter-intuitive results we see in these two examples. To this end, we develop a model of sequential bargaining based on the two examples discussed above and operationalize this model in an experimental lab. By bringing this interaction to the lab, we hope to uncover important behavioral regularities that may help explain why some situations in which outside options are available lead to concessions while others lead to conflict.

2. Our experiment and behavioral hypotheses

Imagine a situation where a firm and a union negotiate over the division of the surplus from production. Here *surplus* is defined as the net proceeds from production with all costs subtracted except for worker compensation. Further imagine that the surplus is initially US$10, but because of negotiation costs and the cost of exploring outside options the surplus shrinks between offers. The union begins negotiations by offering a wage agreement that allocates w to the firm and $10 - w$ to the union.

Once the initial offer is on the table, the firm has three options, *Accept* the offer, *Reject* the offer and make a counteroffer, or reject the offer and *Search* for an outside option. If the firm accepts the offer, negotiations end. If the firm rejects the offer, the surplus shrinks by US$1 due to costs associated with a delayed settlement. If, after rejecting the initial offer, the firm chooses to immediately make a counteroffer, the two will divide US$9. In this case the offer will allocate y to the union and $9 - y$ to the firm. If instead the firm decides to search for an outside option, there is a further US$1 cost associated with the costs of conducting the search.

Our game differs from previous experiments because the outside option is determined randomly. In previous experiments (e.g. Binmore et al., 1989; Knez and Camerer, 1995) the value of the outside option was fixed and known by both parties. In the current experiment when firms decide to search, nature determines the value of the outside option, x.

Nature chooses a value randomly from a rectangular distribution on the interval [US$1, US$8] with expected value equal to US$4.50. We justify this difference by noticing that in many cases, firms need to search for options and estimate their values. Because of political uncertainties or macroeconomic instabilities, firms often do not know the true value of the "move production" option for example, but they do typically have a good sense of the upper and lower bounds.

Once a firm has decided to search and nature has chosen a value for the outside option, the firm can either accept the outside option or reject it. If accepted, the firm receives x and the union is "hung out to dry", meaning it receives US$0. If the firm rejects the outside option it returns to the bargaining table and makes a final ultimatum offer, z, to the union to divide the remaining surplus, US$8 (US$10 minus the cost of delay and minus the cost of searching).

Fig. 1 illustrates our game. Because our game models sequential bargaining with a shrinking surplus, we can use Fig. 1 to find any subgame perfect equilibria. Starting on the right, the firm anticipates that the union will accept any positive offer in the final subgame because rejecting results in a payoff of US$0. This implies the firm need not offer more than the smallest unit of account, US$0.01. To keep things from getting too messy, we assume that players accept when indifferent which means the firm can demand the entire surplus in this subgame. Given this, if the firm rejects an outside option it should expect to receive US$8 in the subgame that follows. Moving back through the extensive form one

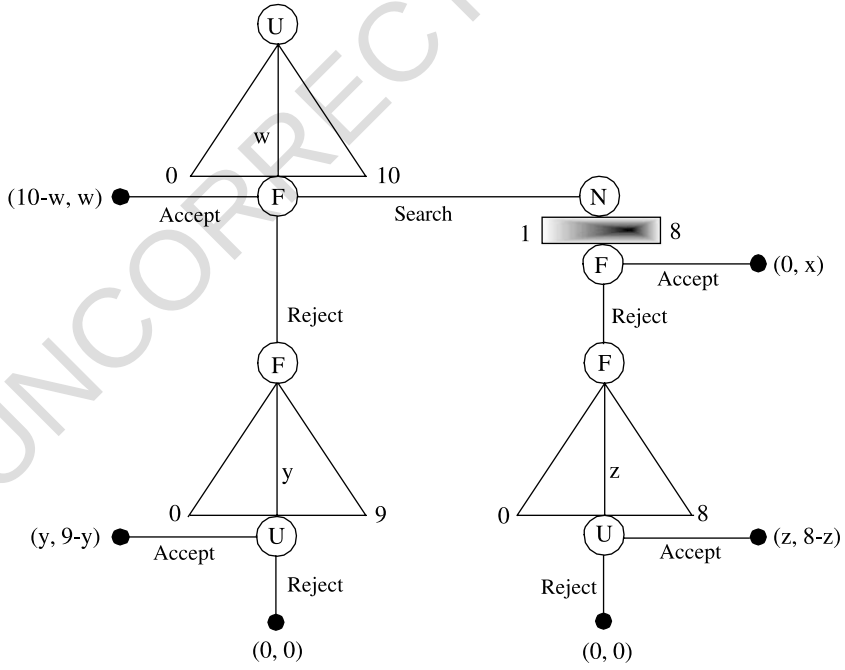

Fig. 1. The extensive form game.

step, the firm should never accept an outside option less than US$8 because it knows it can receive US$8 in the subsequent subgame. Hence, at the firm's first decision node, it should expect to receive US$8 from searching.

The final subgame on the left side of the extensive form is identical to the final subgame on the right except that the surplus has a value of US$9 instead of US$8. The firm should therefore anticipate receiving US$9 if it decides to make an immediate counteroffer. By this logic, rejecting and making a counteroffer dominates searching, so we should never witness searching as part of a subgame perfect equilibrium.

Presumably the union can anticipate the reactions of the firm and therefore knows the firm will reject any offers less than US$9. Hence, the subgame perfect equilibrium is unique and obtains when the union offers $w = 9$ and accepts all counteroffers. Further, the firm rejects any $w < 9$, accepts outside options only if $x = 8$, and demands the whole surplus in either ultimatum subgame.

We implemented this game as an experiment and conducted four sessions with 62 participants.[9] Each session, which never lasted more than 90 min, was carried out as follows. Participants were recruited by email from the student population at Middlebury College and noneconomics majors were encouraged to participate (two-thirds of the participants were noneconomists). As they arrived, participants were given US$5 for showing up and then were seated in a large lecture hall. One experimenter read the instructions aloud as the participants followed along. We divided people into two groups based on their participant numbers; even numbers were firms and odds were unions. The unions were then taken to another lecture hall.

Each session lasted four rounds and each round consisted of one play of the extensive form game in Fig. 1. To control for reputation building and to make the experiment as close to a series of one-shot encounters as possible, the participants were informed that each union would never negotiate with the same firm twice. At the start of a round, unions were given an offer form on which they wrote their initial offers, w. When all the offers were completed, an experimenter ferried them to the other room. Another experimenter stayed with the unions to prevent talking. Firms decided to either accept the offer, reject and make a counteroffer, or reject and search for an outside option. If a firm accepted the round was over. If a firm rejected and made a counteroffer, y, the counter was written on the offer form. If a firm decided to search, he or she was given an eight-sided die to roll. After rolling the die the firm recorded the outside option value on the offer sheet and then decided to accept or reject the outside option. If a firm rejected the outside option, he or she then made a counteroffer, z. Firm responses were ferried back to the unions who either recorded their earnings for the round, saw that the firm had taken the outside option, or decided whether to accept the firm's counteroffer or not. After the unions had made their decisions, the offer sheets went one final time to the firm room so that firms could see the outcome of any counteroffers they had made.

This process was repeated four times. After the fourth round players were asked to fill out a brief survey which included mostly demographic questions. When everyone had finished the survey, participants were paid one at a time. Each participant was paid

[9] The instructions for the experiment are available at http://community.middlebury.edu/~jcarpent/.

randomly for two of the four negotiations. The average participant earnings were US$15.29 including the US$5 show-up fee.

There are three questions we wish to ask: Does subgame perfection predict outcomes? Do firms react in some systematic way to searching? And, do unions react when firms search? When examining the first question we will base an alternative null hypothesis on a robust result identified by many previous studies. Specifically, many bargaining experiments (see Roth, 1995) have shown that there is a tendency towards an equal split of any surplus.

Hypothesis 1. Subgame Perfection versus an Equal Split—H1(null): for the union, $w=9$ and any counteroffers are accepted; for the firm, $w \geq 9$ and $x=8$ accepted, $prob(w<9$ *rejected*$)=1$, $y,z=0$. H1(equal split): for the union, $w=5$, $prob(y<4.5, z<4$ *rejected*$)>0$; for the firm, $w \geq 5$ accepted, $y=4.5$, $z=4$, no x accepted.

Notice, the alternative null hypothesis claims proposers always offer half and reject offers for less than half with positive probability. Further, firms never accept outside options because doing so would leave the union with nothing and that would be unfair.

We are also interested in how firms react to the outside option. Although we have no reason to believe, a priori, firms will choose to search given the theoretical prediction; in case they do, theory predicts that firms accept $x=8$, reject all other options, and the decision to search has no effect on z. There are two interesting alternatives concerning the effect of searching on z. First, one may hypothesize that searching and not accepting the outside option will make firms return to the bargaining table more aggressively than had they not searched.[10] Second, one might also reason that firms who are unsuccessful at finding a profitable alternative return with a more conciliatory posture towards the union.[11] Combining these we have,

Hypothesis 2. Firm Reactions to the Outside Option—H2(null): only $x=8$ will be accepted and z does not depend on x or whether the firm has searched. H2(aggressive): $z/8<y/9$. H2(conciliatory): $z/8>y/9$.

Finally, we would like to know how unions react to firms who have searched for outside options. Again, the null hypothesis, based on subgame perfection is that the likelihood of a rejection is independent of the subgame because no positive offers should ever be rejected. We identify two alternatives. First, firms searching may signal to unions that they are "hard" bargainers and therefore unions should act with deference.[12] Second, searching firms may anger unions who know they may be hung out to dry if the firm

[10] We base this hypothesis on the frustration-aggression hypothesis which, in this case, implies firms, frustrated with low outside options, become aggressive in the final subgame. This theory was first developed by Dollard et al. (1939) and has been elaborated on in Berkowitz (1962, 1993), and Schellenberg (1996).

[11] This alternative is based on a theory of concession discussed in Heger Boyle and Lawler (1991) that implies that, by searching firms destroy union trust and returning with a high counteroffer reestablishes trust.

[12] We might expect unions to react with deference because giving firms the ability to search increases the status of the firm's role in bargaining and evidence indicates that those with low status defer to those with high status (see Ball et al., 2001; Tyler, 2001; Fiske, 1991, and the discussion in Deutsch, 1973).

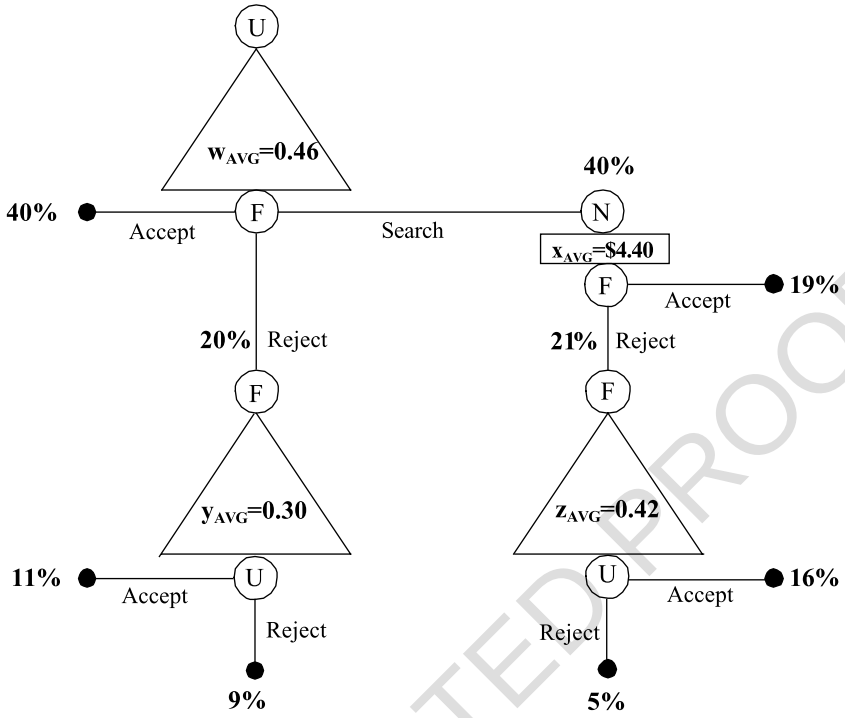

Fig. 2. Summary statistics.

accepts an outside option. If this is the case, unions may act spitefully towards firms who search by being more likely to reject offers.[13] Summarizing, we get,

Hypothesis 3. Union Reactions to Firms that Search—H3(null): *prob*(*reject y*) = *prob*(*reject z*) = 0. H3(deference): *prob*(*reject y*) > *prob*(*reject z*). H3(spite): *prob*(*reject y*) < *prob*(*reject z*).

3. Experimental results

We begin our analysis by summarizing play in our game. Fig. 2 presents the extensive form game annotated with average offers at each stage (as a fraction of the relevant surplus), the average dollar value of the outside option, and the percentage of all bargains that made it to each decision/end node. The first thing to notice is that only 40% of initial offers were accepted despite the fact that, on average, unions offered 46% of the US$10 surplus. Compared to other sequential bargaining experiments that do not include outside

[13] There is a lot of evidence that spite causes rejections in bargaining games (Roth, 1995; Camerer and Thaler, 1995; Pillutla and Murnighan, 1996. Also, the frustration-aggression theory mentioned in footnote 9 would support this hypothesis. Being left out of the process may cause unions to feel frustration that is translated into aggression by rejecting firm offers when the firm returns to bargaining.

options, this acceptance rate is low. For example, Ochs and Roth (1989) report an average acceptance rate for the first three periods of the 10 periods of 83%; Neelin et al. (1988) report an acceptance rate of 78%; and Gueth and Tietz (1988) report that 73% of initial offers are accepted. While it is hard to directly compare our results to these other studies because of differences in the games and protocols, the Gueth and Tietz paper is particularly interesting because in one treatment the rate of decay of the surplus is the same as in the current experiment, while the acceptance rate is much higher (compare 0.73 to 0.40).

The results of previous one-sided outside option experiments are mixed. Kahn and Murnighan (1993) show that breakdowns happen less frequently when one player has an outside option.[14] However, Knez and Camerer (1995) find the opposite result. In their two-person experiment the rate of conflict approaches 50% while offers are comparable to those in the current experiment. In sum, the first noticeable result is that the outside option in the current experiment, like Knez and Camerer, generates comparatively more first round rejections, especially given the relative generosity of the average offer.

Recall that according to the theoretical prediction, searching is dominated by rejecting and making a counteroffer. Despite this, two-thirds of the firms that rejected initial offers decided to search. However, it does not appear that firms decided to search for any particular reason having to do with the structure of the game. One might expect firms to search to punish greedy unions, but this does not appear to be the case. A simple probit analysis of the decision of firms to search or directly make a counteroffer based on the size of the initial union proposal reveals no significant correlation ($p = 0.23$).

Approximately the same number of interactions ended at each of the two ultimatum subgames (half those firms that searched took the outside option). On the left, there was a general tendency for firms to reduce their counteroffers regardless of the size of the union's initial offer.[15] On the right, relative counteroffers were higher, 42% of the available surplus on average, and they are correlated with union's initial offers. Interestingly, the Spearman correlation is significant ($p = 0.01$) but negative ($\rho = -0.49$), indicating that the higher the firm's initial offer from the union, the lower the counteroffer returned by the firm after a failed search. At this point we cannot say much about the likelihood that a union accepts or rejects a counteroffer in the last stage because, while rejection rates are noticeably lower on the right side of the game (compare 24% to 45%), counteroffers are also higher. We will return to this point when we test hypothesis 3 below.

Fig. 3 presents histograms of offers at each stage of the game in terms of the fraction of the available surplus offered. Fig. 3 also presents a histogram of all the outside options. In all the illustrations, dark bars represent offers (or realized options) and light bars represent rejected offers (or rejected options). Starting with the union's opening offer, we see that most offers were for half the surplus (63%) and there were also a substantial number of *super-fair* offers for more than half the surplus (13%). The striking observation is that 54% of offers for half the pie or more are rejected by firms. It is hard to say, however, why such high offers are rejected. One explanation might be that firms were using the subgame

[14] Comparing across treatments, the breakdown rate is 29% when there is no outside option and only 8% when the option is added.

[15] The Spearman rank-order correlation between initial offers and counteroffers has the opposite sign of what is expected, $\rho = -0.26$, but the correlation is not significant, $p = 0.21$.

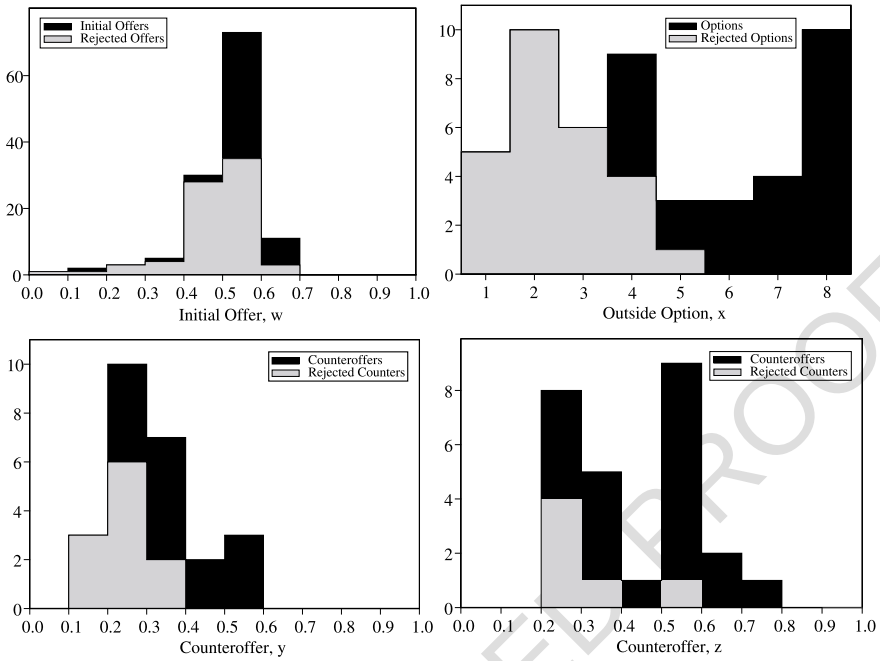

Fig. 3. Offers and rejections.

perfect strategy which requires them to reject any offer below US$9. However, while other sequential bargaining experiments show some movement towards the theoretical prediction (Binmore et al., 1985; Harrison and McCabe, 1992), others show no such movement (Gueth and Tietz, 1988, 1990; Carpenter, 2002), and one experiment (Neelin et al., 1988), which does show such movement, offers an explanation that has nothing to do with the backward induction required by subgame perfection.[16] Alternatively, we might conclude that the outside option is causing these rejections, especially, given the frequency at which firms choose to search when rejecting an initial offer.

We see that counteroffers are distributed differently depending on whether the firm searched or not.[17] The modal counteroffer on the left was US$2 while there are two noticeable modes on the right, US$2 and US$4. Without formally testing, we see circumstantial evidence favoring H2(conciliatory). Lastly, the types of offers that are rejected appear to be similar with respect to whether the firm searched or not.

The last panel in Fig. 3 illustrates the outside options that were realized in the experiment and those realized options that were rejected. This panel is interesting, not because the results are surprising, but because they give us some insight into the expectations held by firms about how much they would receive in the subgame following

[16] Proposers simply offer the entire second stage surplus at stage one and this behavior overlaps with the subgame perfect prediction in two-stage games only.

[17] The central tendencies are different, $z = -3.75$, $p < 0.01$ and a Kolmogorov–Smirnov test of whether values of y are distributed lower is significant at the 10% level.

the search option. Firms tended to accept outside options that were US$4 or greater and reject lower outside options. Why? One explanation is that firms did not expect to get more than US$4 in the final ultimatum subgame, i.e. they expected to share the final surplus equally. This is also supported by the high frequency of equal splits offered in the final subgame.

We also note two final statistics concerning the realized outside options. First, the size of a rejected outside option does not appear to affect how much a firm offers in the final subgame (Spearman's $\rho = -0.23$, $p = 0.25$). Second, unions do not seem to consider the size of the rejected outside option when deciding whether to accept a firm's counteroffer or not ($\rho = -0.22$, $p = 0.26$).[18]

Before we formally test the hypotheses, we can summarize our results to this point. Initial union offers are distributed similarly to offers in ultimatum games and other sequential bargaining games (see Roth, 1995). However, contrary to these experiments many equal splits and super-fair offers are rejected in the current experiment. Of the firms that reject offers, a majority decide to search for an outside option instead of directly making a counteroffer, despite the inefficiency of searching. Firms collectively reveal their expectations about what they will receive when rejecting an outside option. Most outside options of US$4 or more are accepted, while lower options are always rejected. This indicates firms expect to receive at least four dollars if they return to negotiations. Finally, firms tend to offer more after a failed search than when they do not search.

Considering Hypothesis 1, which predicts players will either behave according to the subgame perfect prediction or offer equal splits, union offers an average of US$4.65, which is significantly less than the US$9 prediction ($z = -9.86$, $p < 0.01$), but is also less than the US$5 alternative hypothesis ($z = -3.46$, $p < 0.01$). Clearly, unions did not accept all counteroffers. The mean rejected counteroffer on the left is US$1.95, and on the right it is US$2.58. Because all initial offers are less than US$9, the rejection rate for firms should be 100%, but it is not. All outside options of value US$8 were accepted, but so were options which were considerably lower. The average accepted option was US$6.50, which is significantly lower than US$8 ($z = -3.64$, $p < 0.01$). The counteroffers of the firm were also significantly greater than zero (for y, $z = 4.40$, $p < 0.01$; for z, $z = 4.48$, $p < 0.01$). Hence, H1(null) can be rejected; neither unions nor firms behave according to subgame perfection.

As stated in the previous paragraph, union offers are also significantly less than half. However, providing some support for the equal split hypothesis, unions routinely reject low offers. Firms, on the other hand, rejected offers for half the initial surplus and more, which is unfair, and they also unfairly accepted outside options. Lastly, firms' counteroffers were significantly different from half the available surplus in both ultimatum subgames (for y, $z = -4.17$, $p < 0.01$; for z, $z = -2.54$, $p < 0.02$). Hence, we also reject the equal split hypothesis.

In our survey we also asked participants about their perceptions of what was "fair". Unions reported, on average, that the fair amount for the firm to receive was US$4.82

[18] Further, adding the value of the rejected outside option to the regressions reported in Tables 2 and 3 (discussed below) does not improve the estimate in any of the specifications (i.e. the regressor is never remotely significant and the other coefficients do not change substantially).

Table 2
Firm counteroffers

	(1)	(2)	(3)
Union offer, w	−0.01 (0.02)	−0.02 (0.02)	−0.01 (0.02)
Search (1 if firm searches)	0.13*** (0.04)	0.16*** (0.04)	0.16*** (0.04)
Previously accept (1 if firm ever accepted an option)	–	−0.08* (0.04)	−0.07 (0.05)
Rejected before (1 if ever had a counter rejected)	–	−0.09** (0.04)	−0.09** (0.04)
Female	–	–	−0.07 (0.06)
Economist (1 if econ major)	–	–	−0.004 (0.04)
Family income	–	–	−4.16e−06* (2.25e−06)
Intercept	0.36*** (0.07)	0.41*** (0.07)	0.42*** (0.08)
R^2	0.19	0.31	0.39
N	51	51	51

Dependent variable = counteroffer as a fraction of the current surplus.
All regressions include individual random effects.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

while firms said the fair union allocation was US$4.21. There are two things to note about these responses. First, neither role thought it was fair for the other to receive more than half the initial surplus. Most interestingly, unions did not think it was fair that firms should receive more than half (one-sided test $t = -0.95$, $p = 0.82$) despite having an outside option. Second, while neither role was willing to concede more than half, fairness perceptions do appear to have been endogenous to the interaction. That is, union perceptions of what firms should get are significantly higher than what firms report unions should get ($t = 2.31$, $p = 0.02$).[19]

Hypothesis 2 concerns the impact of searching on firms' counter-proposals. We will use Table 2, which presents a regression analysis of counteroffers, to assess Hypothesis 2. Despite the pairing protocol we used to control for reputation-building, we add individual random effects to our regressions to account for individual heterogeneity and for any learning. The null hypothesis states that searching should have no effect on counteroffers because, in theory, the firm will demand the entire surplus if the game reaches either final subgame. Eq. (1) of Table 2 allows us to reject the null hypothesis. Eq. (1) demonstrates that counteroffers decrease with the union's initial offer, but not significantly, and increase significantly if the firm searches. Eq. (1) also allows us to reject H2(aggressive), but not H2(conciliatory).[20] Firms that search and do not accept the outside option return to bargaining and make significantly higher offers.

[19] These results are similar to those of Binmore et al. (1998) who report that participant judgements of what is fair depend on the size of an outside option.

[20] We also tested whether frustration and aggression explain counteroffers on the right side only. While the sign of $\partial z/\partial option$ is negative in all specifications, the magnitudes are generally small (the largest being −0.05) and the coefficients are never remotely significant.

Table 3
Union responses

	(1)	(2)	(3)
Relative offer, $y/9$, $z/8$	12.89** (5.91)	11.97** (5.79)	10.90*** (3.54)
Search (1 if firm searches)	− 0.64 (0.94)	0.87 (0.91)	1.09 (0.84)
Search × Hung Out to Dry	–	− 2.83** (1.36)	− 2.67** (1.14)
Female	–	–	2.08** (0.88)
Economist (1 if econ major)	–	–	0.87 (0.67)
Family income	–	–	2.48e − 06
			(3.36e − 06)
Intercept	− 3.24** (1.61)	− 3.07** (1.51)	− 4.25*** (1.40)
Wald χ^2	5.19	6.17	11.99
p-value	0.07	0.10	0.06
N	51	51	51

Dependent variable = 1 if accept counteroffer.
All regressions are probits and include individual random effects.
*Significant at 10%.
**Significant at 5%.
***Significant at 1%.

Eqs. (2) and (3) show that H2(conciliatory) is robust to the inclusion of other possible explanations and demographics. In Eq. (2) we add the variable Previously Accept, which takes the value one for firms who have ever searched and accepted an option. Apparently, having previously conducted a successful search emboldens firms to make higher demands. Similarly, having been rejected before (Rejected Before is one if the firm had ever made a counteroffer and had it rejected) seems to cause firms to spitefully escalate their demands in the future. Adding demographic variables on sex, major and family income does not dilute the effect of searching on counteroffers. After these additions, being rejected before still triggers escalation, but the effect of having previously searched and accepted an option is no longer significant. Our demographics show that women and economists offer less, but not significantly less, and that firms from wealthier families offer significantly less.[21] While the coefficient on the family income term appears small, because income is measured in thousands of dollars the effect is not negligible. A one-standard deviation increase in our income regressor (US$76,885) reduces the counteroffer (in relative terms) by 0.32. In sum, we reject the null hypothesis about firm reactions to searching, reject the alternative explanation that firms tend to return to negotiations more aggressively, but cannot reject the hypothesis that firms who search return to negotiations ready to make concessions.

Hypothesis 3 was formulated with our case studies in mind and tests the response of unions to firms who search for outside options. Table 3 presents a probit analysis of union decisions to accept or reject firm counteroffers.[22] At first glance, i.e. Fig. 2, it appeared that H3(deference) was the more plausible explanation of unions' reactions to firms' searches. However, Eq. (1) of Table 3 does not support this explanation. In this regression, searching

[21] In some specifications (e.g. adding firm age and race which themselves are not significant) the Female variable is significant, but the economics major variable is never significant.
[22] Again, we include individual random-effects.

reduces the probability that unions will accept an offer, controlling for the offer size, but the effect is not significant. To further explore the reasons why unions reject counteroffers, we add the variable Hung Out to Dry. This variable takes the value of 1 if the union has ever been in a negotiation where the firm accepted the outside option. Interacting the variable Hung Out to Dry with whether the current firm searched or not assesses the effect of being on the right side of the game again after having been there before and gotten screwed. We see that having been hung out to dry significantly reduces the likelihood that the union will accept offers following an unsuccessful search. In addition, those unions who either end up on the left (i.e. the firm does not search) or have not been hung out to dry are more likely to accept firm counter-proposals.[23]

Eq. (3) of Table 3 adds the same demographic variables as in Table 2. Interestingly, we see that controlling for game variables and other demographics, women are significantly more likely to accept counteroffers. In addition, the spite demonstrated by unions who have been hung out to dry before is robust to the addition of these other explanatory variables. Given these results, neither of our alternative hypotheses, H3(deference) nor H3(spite), is supported by this analysis. Instead, guided by the analysis, we can offer a new alternative which states that, in general, unions are more likely to accept firm counteroffers that follow a search, but if the union has ever gotten screwed in a search before, they react with spite and this spite overwhelms any deference.

4. Conclusion

Participants in the union role of our outside option bargaining game tended to make fair offers initially and reject low counteroffers. Participants in the firm role of our game were just as likely to reject offers to split the surplus equally as they were to accept them. When making counteroffers, firms reacted aggressively if they did not search for an outside option, and conciliatory if they had searched and were unsatisfied with the result.

We think our results add to the evidence that decision-makers are motivated by social preferences (e.g. altruism, fairness, reciprocity). Specifically, the negative reciprocity (i.e. spiteful rejections) we see in our experiment is consistent with may other bargaining experiments (see Roth, 1995). However, we do not see much positive reciprocity in our data. As mentioned above (Table 2), we find no significant relationship between the generosity of a union's opening offer and the size of the firm's counteroffer. The fact that the outside option in our game is associated with so much conflict might partially explain the lack of positive reciprocity in our results and may further illustrate how structural changes to the bargaining landscape, such as the addition of an outside option, might affect the climate of future negotiations.

Although we do not suggest that our experiment has identified the key determinants of how negotiations proceeded in the two cases we began this paper with, our results are consistent with a behavioral hypothesis about what happened. In one of our two examples Volvo Trucks threatened to move production to Mexico if the union rejected a final, ultimatum offer. Apparently, this threat was credible in the minds of union representatives

[23] That is, the coefficient on Search is positive in Eq. (2) but not significant.

who, in deference, accepted the offer. In a similar situation, Halliburton threatened to move operations out of Maryland, but instead of deferring, the union reacted spitefully and rejected the ultimatum. Our experiment suggests that the UAW may have reacted spitefully because Halliburton had recently fired 8100 employees at other Dresser facilities also represented by the UAW.[24] In this sense, Halliburton had hung out to dry the UAW in recent negotiations, which as our experiment shows, may have triggered spite on the part of the union.

We can summarize our deference versus spite result by stating the following conclusion: initial threats to take an outside option cause bargaining partners to defer, but a history of being hung out to dry generates spite and often leads to impasse. Although the impact of this factor will not always decide the outcome of high-stake negotiations in the real world, in situations that look similar from a structural point of view, this sort of behavioral response may play an important role in explaining the outcome of bargaining.

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