Does fact-finding promote settlement? Theory and a test

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ABSTRACT

Nonbinding recommendations, such as provided by fact-finders, are shown to significantly increase voluntary settlements in bargaining. Theoretically, it is unclear whether recommendations will increase settlement rates. A recommendation may reduce outcome uncertainty, thereby "chilling" bargaining and increasing dispute rates. On the other hand, a recommendation may give the parties a focal point around which an agreement is made. Which of these effects dominates is a question that we consider using theory and data from controlled bargaining experiments. The data show the dominance of a focal point effect for suggestions, highlighting their potential role in improving dispute settlement procedures.

I. INTRODUCTION

Dispute resolution is of interest in a variety of bargaining environments, from labor relations to insurance. Commonly used forms of dispute resolution include mediation and arbitration. A mediator does not impose a binding settlement; an arbitrator imposes a settlement that is typically binding and nonappealable. Fact-finding falls somewhere in between these two, given that a fact-finder issues a formal but nonbinding recommendation that may guide and/or pressure disputants as to what a mandated settlement might look like. Mediators behave more as facilitators, whereas fact-finders base recommendations on their research of a dispute. As such, their recommendations may foreshadow an eventual arbitrated settlement. Hebdon (2001), for example, reports that a chief aim of the public policy change in New York state in 1991 was to "give more weight to the fact-finder recommendations" (p. 74). Here we ask whether nonbinding recommendations, such as those issued by fact-finders, significantly affect dispute rates and/or bargaining outcomes. We offer a simple theoretical extension from existing research as well as empirical data generated in a controlled laboratory bargaining environment to explore relevant issues. (1)

Farber and Katz (1979) studied bargainer incentives under conventional arbitration and show that uncertainty about the arbitrator's notion of a fair settlement is a key variable that increases the bargainers' contract zone (i.e., the region of outcomes mutually preferred to the disputants' reservation values or threat points). (2) To the extent that fact-finding decreases uncertainty, their results suggest that fact-finding is counterproductive toward good-faith bargaining because decreased uncertainty also decreases the size of the contract zone. (3) An alternative view of fact-finding is that the formal recommendation creates a focal point for the disputants, a settlement that suggests itself as a likely and reasonable outcome of the bargaining process, and therefore makes agreement more likely. (4) Which of these effects may dominate is the key subject of this article.

We model fact-finding as an intermediate step in negotiations prior to resolving disputes through binding arbitration. (5) Though fact-finding in the United States is most common in public sector labor disputes, it is also used elsewhere. In 2002, the American Arbitration Association announced its new fact-finding service, which is available for dispute resolution as well as for other arenas where independent investigation or conclusions are desirable. Also, fact-finding is a type of nonbinding alternative dispute resolution procedure encouraged by the Alternative Dispute Resolution Act of 1998 as a way of helping reduce some of the backlog of cases in federal courts. In the public sector, formal fact-finding is often the terminal dispute resolution procedure. For example, primary and secondary schoolteachers in Indiana, police and firefighters in Idaho, and state employees in Wisconsin and New Jersey must all undergo mandatory fact-finding for labor disputes. Other jurisdictions allow for legislative review and/or final resolution after fact-finding by a legislative body, as with police and firefighters in Kansas, New Hampshire, and Florida among others (see Lund and Maranto 1996 for a complete listing). When legislative review or binding arbitration follows fact-finding, this nonbinding procedure provides an intermediate step in the dispute resolution process. (6) Our focus is on the nonbinding intermediate step in dispute resolution, and this has general relevance beyond a specific procedure like fact-finding.

The key research question is whether bargaining efficiency could be improved where there already exists a nonbinding or binding dispute settlement procedure. Fact-finding and arbitration are merely convenient labels to describe nonbinding recommendations (or suggestions) and binding settlement procedures, respectively. To use both types of procedures might be considered innovative, but such procedures already exist in the states (already noted) where fact-finding is followed by legislated settlement. Moreover, intermediate nonbinding procedures are even more common if one is not constrained by the term "fact-finder." For example, mediation is often an intermediate step when binding arbitration is used in labor disputes, and nonbinding suggestions are one tool that may be used by the mediator (see Wall et al. 2001). Also, Spurr (2000) notes that pretrial (or court-annexed) mediation and nonbinding arbitration programs are already widely used by the U.S. court system, and so several institutions similar to those studied in this article are already in place. (7)

In our framework, fact-finders issue an unbiased nonbinding recommendation for settlement. The final stage arbitrator forms his or her own notion of a fair settlement and crafts a final binding settlement as a (common knowledge) weighted average of his or her own notion and the fact-finder recommendation. This framework allows us to consider scenarios in which an arbitrator or final decision maker places little or much weight on the recommendation, and we model the effects of such weighting on the bargainers' contract zone--the region of outcomes that both bargainers both prefer to an arbitrated outcome. Because the nonbinding recommendation is given some consideration by the arbitrator, it is clear in our framework that fact-finding is not simply a delay tactic imposed on the bargaining.

We find that contrary to the chilling effect of reduced uncertainty discussed by Farber and Katz (1979), fact-finding reduces the likelihood of dispute. That is, our experimental subjects negotiate their own settlements more frequently when a fact-finding break is included than they do when disputes are resolved by binding arbitration but no fact-finding. This lends support to our focal point hypothesis--that the fact-finder's recommendation makes a particular outcome salient and gives the parties some basis for agreement. A skeptic might argue that fact-finding facilitates agreement only because it reduces the uncertainty surrounding the arbitrated outcome--such skeptics are in disagreement with the Farber and Katz hypothesis that increased uncertainty will reduce disputes. However, the data support Farber and Katz in that smaller contract zones due to reduced uncertainty increase disputes, ceteris paribus. As such, the overall lower dispute rates with fact-finding are the result of a strong focal point effect that dominates the effect of reduced uncertainty. Additional support for the focal point hypothesis is found by examining extreme recommendations; our evidence suggests that even when a noninfluential fact-finder makes an extreme recommendation, it is likely that negotiated settlement will be near the recommendation.

II. THEORY

The model extends Farber and Katz (1979) to include two bargaining stages, with a break in bargaining for a fact-finding process. As in their model, we consider two parties A and B

bargaining over a fixed amount of money--the "pie" ($1, say). Party A plays the role of the buyer or the firm in labor negotiations. Party B is the seller or the union in labor negotiations.

Each player's utility depends on the fraction of the dollar she receives, as well as her risk preferences, parameterized by c_a and c_b. In particular,

$U_B = [1 - \exp(yc_b)]/(1 - \exp(c_b))$ and $U_A = [1 - \exp(zc_a)]/(1 - \exp(c_a))$

where y is the amount player B receives, and z is the amount that player A receives. For both players these utility functions display positive marginal utilities with respect to the size of the pie, $U(0) = 0$, $U(1) = 1$, and risk preferences are defined solely by $-c_i$ for i = a, b, the Arrow-Pratt measure of absolute risk aversion (see Farber and Katz 1979). As such, player i is risk-averse (loving) when $c_i < (>) 0$. Notice that we may see y < 1 - z if the players agree on a non-Nash equilibrium division of the dollar. (8)

Bargaining proceeds as follows: Each disputant is free to make any offer she likes to the other disputant at any time. Bargaining continues until agreement is reached or the disputants reach an impasse in the first stage of bargaining, at which point a fact-finder makes a (nonbinding) recommendation to the parties about a fair settlement. After some second interval, if the parties have not yet reached agreement, an arbitrator resolves the dispute by issuing a binding settlement. This binding settlement is modeled as a weighted average of the arbitrator's notion of a fair outcome and the fact-finder recommendation, and the weights are common knowledge.

In particular, the arbitrator settles the dispute as follows:

(1) $y = \gamma R + (1 - \gamma)D$

where y is the amount the arbitrator awards to player B, R is the fact-finder's recommendation about what player B should receive, γ is the weight the arbitrator puts on the factfinder's recommendation, and D is the arbitrator's estimate of what a fair settlement for player B would be. We assume that D is a normally distributed random variable, with mean y_d and variance σ^2. The players may have different beliefs about the arbitrator, however, so that player B (A) expects to receive y_{bd} (z_{ad}) with variance σ_b (σ^2_a). The weight y ranges between zero and one; when y = 0, the fact-finder recommendation is completely ignored by the arbitrator, and if $\gamma = 1$ all uncertainty about the game's arbitrated outcome is resolved once the fact-finder makes a recommendation. In this case, the fact-finder is equivalent to the arbitrator. The more interesting cases occur when γ is strictly between zero and one, which is assumed from here on.

As we will show, γ greater than zero implies that uncertainty about the arbitrated outcome is reduced, and so the contract zone is smaller. Whether smaller contract zones increase or reduce settlement rates is an empirical question. In addition, the recommendation R has a second effect, irrespective of the size of γ. Because of its unique nature, R may serve as a focal point of bargaining and become the basis around which the parties craft a settlement. (9) This suggests that the presence of the recommendation and its unique nature

should lead to a higher settlement rate, independent of whether or not uncertainty is reduced by the recommendation.

The Contract Zone after Fact-Finding

There are two stages of bargaining: before the fact-finder makes his recommendation (ex ante) and after the fact-finder's recommendation is known but before the arbitrator's final decision (ex post). Straightforward calculations yield the following ex post certainty equivalents (the least player B would accept to avoid arbitration, y_{bS}, and the most player A would give up to avoid arbitration, y_{aS})

$$y_{bS} = \gamma R + (1 - \gamma)y_{bd} + (1/2) \times c_b [(1 - \gamma)^2] [\sigma^2_b]$$

$$y_{aS} = \gamma R + (1 - \gamma)y_{ad} + (1/2) \times c_a [(1 - \gamma)^2] [\sigma^2_a]$$

Notice that ex-post uncertainty is reduced by the fact-finder's recommendation, because both players know that γR makes up part of the arbitrated settlement. In fact, as γ approaches one, uncertainty disappears once the fact-finder's recommendation is known.

As before, $y_{aS} \neq y_{bS}$ is possible, because the parties may have different ideas about arbitrator preferences. For example, if both players are optimistic, then they each expect to obtain more than the arbitrator is actually willing to give them. In this case, we would see $y_{bd} > y > y_{as}$, which (depending on risk attitudes) could lead to $y_{bS} > y > y_{aS}$.

Equation (2) gives the ex post contract zone, Δ_{ffep}.

$$(2) \quad \Delta_{ffep} = y_{aS} - y_{bS} = (1 - \gamma)(y_{ad} - y_{bd}) - (1/2) \times (1 - \gamma)(c_b[\sigma^2_b] + c_a[\sigma^2_a])$$

There are two determinants of the contract zone: the bargainers' beliefs about the arbitrator (given by $y_{ad} - y_{bd}$, σ^2_a and σ^2_b), and the bargainer's attitudes toward risk (given by c_a and c_b). Farber and Katz (1979) demonstrate the contract zone without a fact-finder (equivalent to $\gamma = 0$) is given by $\Delta = y_{ad} - y_{bd} - (1/2) \times (c_b[\sigma^2_b] + c_a[\sigma^2_a])$. The presence of a fact-finder, given risk-averse bargainers, makes the ex post contract zone smaller than the no fact-finder contract zone, as the effect of bargainer beliefs about the arbitrator and of risk aversion are reduced by $1 - \gamma$ and $[(1 - \gamma)^2]$, respectively. This result is intuitive, because the fact-finder gives the parties some knowledge of what the arbitrator's decision will be.

Furthermore, the more weight the arbitrator puts on the fact-finder's recommendation (i.e., the larger γ is), the more the size of the contract zone is reduced after the fact-finder's recommendation. In particular,

$[DELTA] - [[DELTA].sub.ffep] = [gamma]([y.sub.ad] - [y.sub.bd]) - (1/2) x [gamma] x (2 - [gamma])([c.sub.b][[sigma].sup.2.sub.b] [c.sub.a][[sigma].sup.2.sub.a]).$

If the parties have the same beliefs about the arbitrator (i.e., [y.sub.bd] = [y.sub.ad] and [[sigma].sup.2.sub.a] = [[sigma].sup.2.sub.b] = [[sigma].sup.2]), we may write this difference as [DELTA] - [[DELTA].sub.ffep] = [gamma](2 - [gamma])[[sigma].sup.2]([c.sub.b] + [c.sup.a])/2, which is positive (negative) as the parties are jointly risk-averse (loving). The presence of a fact-finder reduces the size of the ex post contract zone, given joint risk-aversion ([c.sub.a] + [c.sub.b] < 0). (10)

The Contract Zone before Fact-Finding

We next examine the ex ante contract zone, [[DELTA].sub.ffea], and see how it compares to [[DELTA].sub.ffep] and [DELTA]. Suppose that, as suggested in Hebdon (2001), the fact-finder comes from the same pool of candidates as the arbitrator, but their decisions are independent. We may then also model the uncertainty about the fact-finder recommendation, R, as a draw from the same normal distribution as is used for the arbitrator settlement choices; mean = [y.sub.ad] and variance = [[sigma].sup.2.sub.a] for bargainer A, and mean = [y.sub.bd] and variance = [[sigma].sup.2.sub.b] for bargainer B, to allow for asymmetric beliefs. Straightforward calculation yields the following certainty equivalents:

[y.sub.bS] = [y.sub.bd] + (1/2)[c.sub.b][[sigma].sup.2.sub.b]{[[gamma].sup.2] + [(1 - [gamma]).sup.2]}

[y.sub.aS] = [y.sub.ad] + (1/2)[c.sub.a][[sigma].sup.2.sub.a]{[[gamma].sup.2] + [(1 - [gamma]).sup.2]}.

As before, we know that player A would be willing to give up [y.sub.aS] to avoid bargaining, so that the contract zone is given by [y.sub.aS] - [y.sub.bS] Thus, we see that

(3) [[DELTA].sub.ffea] = ([y.sub.ad] - [y.sub.bd]) - (1/2) x ([c.sub.b][[sigma].sup.2.sub.b] + [c.sub.a][[sigma].sup.2.sub.a]) x ([[gamma].sup.2] + [[1 - [gamma]].sup.2]).

By comparing the ex ante and ex post contract zones, we find

(4) [[DELTA].sub.ffea] - [[DELTA].sub.ffep] = [gamma]([y.sub.ad] - [y.sub.bd]) - (1/2) x [[gamma].sup.2] x ([c.sub.b][[sigma].sup.2.sub.b] + [c.sub.a][[sigma].sup.2.sub.a]),

which depends both on the parties' beliefs about the fact-finder ([y.sub.ad] - [y.sub.bd]) and on their degree of risk aversion ([c.sub.b], [c.sub.a]). Assuming identical beliefs about the distribution of fact-finder preferences (i.e., [y.sub.bd] = [y.sub.ad] and [[sigma].sup.2.sub.a] = [[sigma].sup.2.sub.b] = [[sigma].sup.2], equation (4) reduces to

[[DELTA].sub.ffea] - [[DELTA].sub.ffep] = -[[gamma].sup.2][[sigma].sup.2]([c.sub.b] + [c.sub.a])/2,

which is positive (negative) as the parties are jointly risk-averse (loving). That is, the ex ante contract zone is larger (smaller) as the parties are jointly risk-averse (loving). Assuming risk aversion, as seems reasonable, we see that the added uncertainty makes the contract zone larger before the fact-finder recommendation than after. This occurs as bargainers in the ex ante case still mitigate some of the risk of an imposed settlement by virtue of multiple settlement draws--one draw is a nonbinding suggestion, but bargainers know that the final settlement is still based on both draws.

Comparing the ex ante contract zone with the no fact-finder contract zone, we see that

$\Delta - \Delta_{ffea} = (1/2) * (\gamma^2 + [1 - \gamma^2] - 1) \times (c_b \sigma^2_b + c_a \sigma^2_a) = \gamma \times (\gamma - 1) \times (c_b \sigma^2_b + c_a \sigma^2_a)$.

Assuming identical beliefs about the arbitrator, this difference becomes

$\Delta - \Delta_{ffea} = \sigma^2 \times \gamma \times (\gamma - 1) (c_b + c_a)$,

which (because $\gamma - 1$ is negative) is positive (negative) as the parties are jointly risk-averse (risk-loving). As noted, if parties are jointly risk-averse, fact-finding reduces the contract zone even before the recommendation. The recommendation (if reached) shrinks the contract zone even further.

Figure 1 summarizes the relationship between Δ, Δ_{ffea}, and Δ_{ffep} as functions of γ for the identical expectations case assuming joint risk aversion ($c_a + c_b < 0$). In addition to the relative sizes of the contract zones we see that the ex ante contract zone is symmetric, with the least uncertainty, and hence the smallest contract zone, at $\gamma = 1/2$. (11) This is quite intuitive as the bargainers have the most diversified ex ante portfolio in terms of expected outcomes when $\gamma = 1/2$, because neither the arbitrator nor the fact-finder draw is more heavily weighted.

FIGURE 1
Contract Zones as a Function of γ
Assuming Joint Risk Aversion (i.e., $c_a + c_b < 0$)
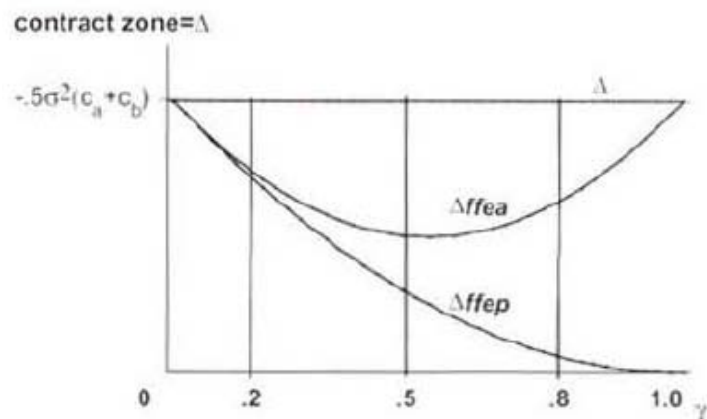
III. THE EXPERIMENTAL ENVIRONMENT

The experimental environment uses a computer interface to randomly and anonymously match subjects--disputant A (the buyer) and disputant B (the seller)--with the same counterpart for 20 three-minute rounds, with subjects bargaining over the value of a variable, x. (12) A subject's counterpart is kept anonymous but fixed for the duration of the experiment--a "partners" protocol for subject matching. Disputant A is given a payoff sheet that shows cash experimental earnings increasing as x decreases, whereas disputant B's payoffs increase in x. Each subject is aware that counterpart earnings move opposite his or her own earnings, but the subjects are unaware of the level of counterpart payoffs for different values of x. Thus, subjects are aware that their own gain is their counterpart's loss, but payoff levels are private information to simulate the real-world asymmetry that exists in assessing the value your bargaining counterpart places on the object of negotiations. Given this, our environment is one in which the exact size of the contract zone is uncertain. (13) The disputants bargain in each round over a $2.00 pie which (unknown to the disputants) would be equally split at x = 500. Payoffs for disputant A decrease by one-half cent for each one-unit increase in x. For disputant B, payoffs increase by one-half cent for each one-unit increase in x.

Communication is not allowed during the experiment other than the numeric messages transmitted through the subjects' computer terminals. Disputants are free to exchange numeric offers any way they desire. There is no stipulation that offers must improve on previous offers or wait for counteroffers. The standing (most recent) offer of either disputant is displayed at the top of the offer queue, and either disputant can accept a counterpart's standing offer.

Subjects proceed at their own pace through on-screen instructions that explain in detail all aspects of the experimental bargaining environment. Sample bargaining screens are displayed to the subjects in the general instructions to highlight these important details (instructions available from the authors on request).

There are four distinct treatments (five rounds of each) that the subjects face across their 20 bargaining rounds. (14) In one treatment subjects are allowed to bargain for the entire three-minute round, and should they reach the end of the round without agreeing on the size of x, payoffs to both disputants are zero. We call this treatment NA (no arbitration), and it serves as a useful benchmark for treatments in which fact-finding and/or arbitration is utilized at impasse.

In the CA (conventional arbitration) treatment without fact-finding, impasse is handled at the end of the bargaining round by making a draw from a N(500,60) distribution of potential arbitrator settlements (see Ashenfelter et al. 1992 for a use and justification of the form of controlling the arbitrator decision-making process for experimental purposes). The draw determines the x-settlement and therefore the payoff of the disputants in that round. Subjects are given information in the CA-specific instructions as to what likely settlements would be should they invoke the computerized arbitrator ("decision maker" to the subjects). Specifically, subjects are shown a table of 100 numbers drawn from the arbitrator distribution. Additionally, the subjects are shown a graph of the arbitrator distribution along with summary statistics describing its central tendencies. Although the table of 100 numbers provides subjects with data that they might gather them in the field, there is concern that the subjects might not process the data

similarly (see Dickinson 2004; Babcock and Olson 1992; Farber and Bazerman 1987). The additional graph and summary statistics are meant to increase the likelihood that subjects have a common perception of the arbitrator settlement distribution as the theory assumes. (15)

We also include two fact-finding (FF) treatments, which vary the amount of weight that the end-of-the-round arbitrator places on the fact-finder recommendation (referred to as the computer suggestion to the subjects). Similar to our theoretical framework, fact-finder recommendations are drawn from the same N(500,60) distribution used to generate arbitrator settlement draws. At the end of 1.5 minutes of the 3-minute bargaining round, the round is interrupted and subjects are shown a recommendation from the computerized fact-finder. Subjects are aware that the suggestion is not binding but will be incorporated into an end-of-round final settlement should negotiations fail for the remainder of the round. Bargaining then resumes for the final 1.5 minutes of the round as usual. In one treatment, FF(20%), a 20% weight is placed on the recommendation and an 80% weight on the computer's own draw from the arbitrator settlement distribution. The final treatment, FF(80%), proceeds similarly except with an 80% weight on the fact-finding recommendation and a 20% weight on the computerized arbitrator. The process is explained thoroughly and with numeric examples in the on-screen instructions prior to a set of FF treatment rounds, and the weight to be placed on any fact-finder recommendation should negotiations fail is common knowledge prior to negotiations.

It should be noted that although real-world negotiations are usually face to face, we have described anonymous, no-communication experiments. Our reasoning is that face-to-face communication would imply a loss of control over the bargaining environment.

"Uncontrolled aspects of social interaction" (Roth 1995) are a concern in such face-to-face negotiations because they cannot be as easily quantified as other demographic variables. As such, we have chosen to remove these potentially confounding factors from the experimental environment. (16) The external validity of experimental data may also be a concern. There is, however, some support for the use of simple lab negotiation data toward a broader purpose of understanding naturally occurring bargaining environments, as noted in Bolton and Katok (1998) and Roth et al. (1988), for example, when such experiments involve economically motivated subjects. Finally, given the partners protocol we use, some may argue that subject-pairs may learn together and possibly make agreements based on such learning or coordination and not based on the treatments we examine. The possibility of such learning makes any significant treatment effects in our data even more noteworthy, because they occur in spite of learning with one's bargaining partner.

Testable Hypothesis' in the Experimental Environment

Farber and Katz (1979) suggest that reduced uncertainty makes sincere bargaining more difficult and would likely increase dispute rates. (17) Because the fact-finder reduces uncertainty about the arbitrated outcome, negotiated settlements should occur less frequently after the fact-finder's recommendation is known than before. Additionally, because the presence of a fact-finder reduces even the size of the ex ante contract zone, negotiated settlements should be less

frequent when conventional arbitration includes a fact-finding break than when it does not. These two predictions suggest that the proportion of negotiated outcomes should be smaller for rounds that include a fact-finding break and that where a fact-finding break is included most agreements should occur before the fact-finder recommendation. In effect, fact-finding reduces the likelihood of settlement.

On the other hand, the literature on focal points (see especially Schelling 1957) suggests that the recommendation gives the parties a point of reference in coordinating their actions and that negotiated outcomes should be near the recommendation, if one is received. Though focal points may exist prior to the recommendation, our claim is that the recommended outcome is more salient than other (possibly preexisting) focal points. If the recommendation does indeed enhance salience, then we expect to see a higher settlement rate under fact-finding treatments than under those that end in conventional arbitration without fact-finding.

The parameters for the three treatments involving arbitration (FF(20%), FF(80%), and CA) are highlighted in Figure 1. The level of detail in subject instructions about the fact-finder distribution of recommendations (and arbitration settlement distribution) are meant to create the identical expectations that we assume in Figure 1. This provides us with the following testable hypotheses, both of which are based on the assumption of joint risk aversion. (18)

HYPOTHESIS 1 (Uncertainty). Disputes will occur more frequently with fact-finding than without it (i.e., "chilled" negotiations). Bargaining is most chilled after the fact-finding recommendation is issued, so that within the FF treatments, most agreements will be reached before the recommendation.

HYPOTHESIS 2 (Focal Point). The issuance of a nonbinding recommendation creates a salient outcome for bargaining, thus decreasing the likelihood of dispute, and increasing the likelihood of settlement near the recommendation, independent of the weight the recommendation receives.

As is apparent in Figure 1, the uncertainty hypothesis is a statement reflecting the size of the contract zone, because the hypothesis is based on the result that less uncertainty reduces the size of the contract zone and, according to the arguments in Farber and Katz (1979), decreases the likelihood of settlement. The focal point hypothesis notes the value of fact-finding in making the recommendation salient, in which case agreement is more likely independent of the weight the arbitrator places on the recommendation. If disputes are less likely under fact-finding but depend on the weight placed on the recommendation or occur most often before the fact-finder recommendation, then this would be evidence that both the size of the contract zone and the presence of a focal point are important.

IV. RESULTS

We report results from 104 university student subjects who participated in this 20-round experimental bargaining environment. Total observation at the bargaining pair level are N = 1,038 (52 pairs at 20 rounds each, minus 2 rounds of data removed due to computer file errors

during the experiment). The experiments lasted an average of about 1 hour and 20 minutes, with subject earnings averaging $19.17 (a high of $30.75 and a low of $7.50). Monetary incentives were therefore quite significant relative to the opportunity cost of most students' time.

Summary statistics from the experiments are shown in Tables 1, 2, and 3. Dispute rates can be seen to vary substantially by dispute resolution mechanism, and disputes are least likely when subjects earn nothing if they fail to agree (Table 1). Among the procedures ending in binding arbitration, disputes are least likely under fact-finding and most likely under conventional arbitration with no fact-finding. This lends support to the focal point hypothesis outlined in the previous section. However, when comparing FF(20%) and FF(80%), we see in Table 1 that disputes are more likely under FF(80%), which supports the uncertainty hypothesis (the smaller contract zone under FF(80%) when compared to that under FF(20%) leads to a larger dispute rate).

TABLE 1
Design and Summary Statistics

Treatment	NA	CA	FF(20%)	FF(80%)
Length (procedure at impasse)	3 minutes (no agreement yields zero payoff)	3 minutes (random draw from $N(500,60)$ determines x settlement)	1.5 minutes, then suggestion, R, drawn from $N(500,60)$. 1.5 more minutes bargaining. (random arbitrator draw, D, of x from $N(500,60)$. Final settlement is $x = 0.2R + 0.8D$)	1.5 minutes, then suggestion, R, drawn from $N(500,60)$. 1.5 more minutes bargaining. (random arbitrator draw, D, of x from $N(500,60)$. Final settlement is $x = 0.8R + 0.2D$)
Rounds	5	5	5	5
Observations	260	260	258*	260
Average % dispute rate	16	40	29	33
Average negotiated x value	489.0	504.3	497.7	484.5
(SD)	(96.2)	(128.8)	(97.3)	(98.6)

*This treatment yields two fewer observations due to a minor error in the computer program, which failed to write data to the output file in one of the FF(20%) rounds for each of two bargaining pairs. Data from these pairs is therefore excluded from Table 4 analysis.

In Table 2, we see that there were slightly more males than females in our subject pool. Interestingly, the gender composition of the bargaining pairs appears to affect dispute rates in the fact-finding treatments. Though we have no a priori hypothesis as to why males and females respond distinctly to a recommendation, we explore the possibility of gender effects in our statistical analysis later.

TABLE 2
Dispute Rates by Gender Composition of the Bargaining Pair

Pair Composition	Total Number of Pairs	Percentage of Rounds Ending in Disputes (by Treatment)			
		NA	CA	FF(20%)	FF(80%)
2 males	$N = 17$	14.1	41.2	35.7	45.9
1 female (buyer)	$N = 13$	12.3	29.2	27.7	24.6
1 female (seller)	$N = 10$	20.0	46.0	30.0	36.0
2 females	$N = 12$	18.3	46.7	20.0	21.7

Note: Total sample: 57 male, and 47 female subjects.

TABLE 3
Summary Statistics: Fact-Finding Treatments

	Total Disputed Rounds (%)	Number of Agreements before Recommendation	Number of Agreements after Recommendation
$\gamma = 0.8$ (260 obs)	86 (33%)	115 (44%)	59 (23%)
$\gamma = 0.2$ (258 obs)	75 (29%)	106 (41%)	77 (30%)

Table 3 shows that among voluntary settlements in the FF treatments, agreement was more likely prior to the recommendation than after. To further examine the focal point hypothesis, we examine only the subsample of rounds in which the parties received a recommendation and subsequently agreed, and we look to see how far the agreed-on value of x was from the recommendation (Figures 2-5). If the fact-finder recommendation is a focal point of bargaining, then we expect that most agreements will occur at or near the recommendation. Figures 2 and 3 show the distance between the negotiated outcome and the factfinder recommendation for the [gamma] = 0.2 and [gamma] = 0.8 FF treatments. It is clear that a large proportion of agreements occur within one standard deviation of the fact-finder's recommendation. In fact, for [gamma] = 0.2, 69% all agreements (53 out of 77 observations) are within 60 points of the fact-finder's recommendation. For [gamma] = 0.8, 64% of all agreements (38 out of 59 observations) are within 60 points of the fact-finder's recommendation.

FIGURE 2
Agreement Proximity to Recommendation; Gamma = 0.2 All Observations ($n = 77$)
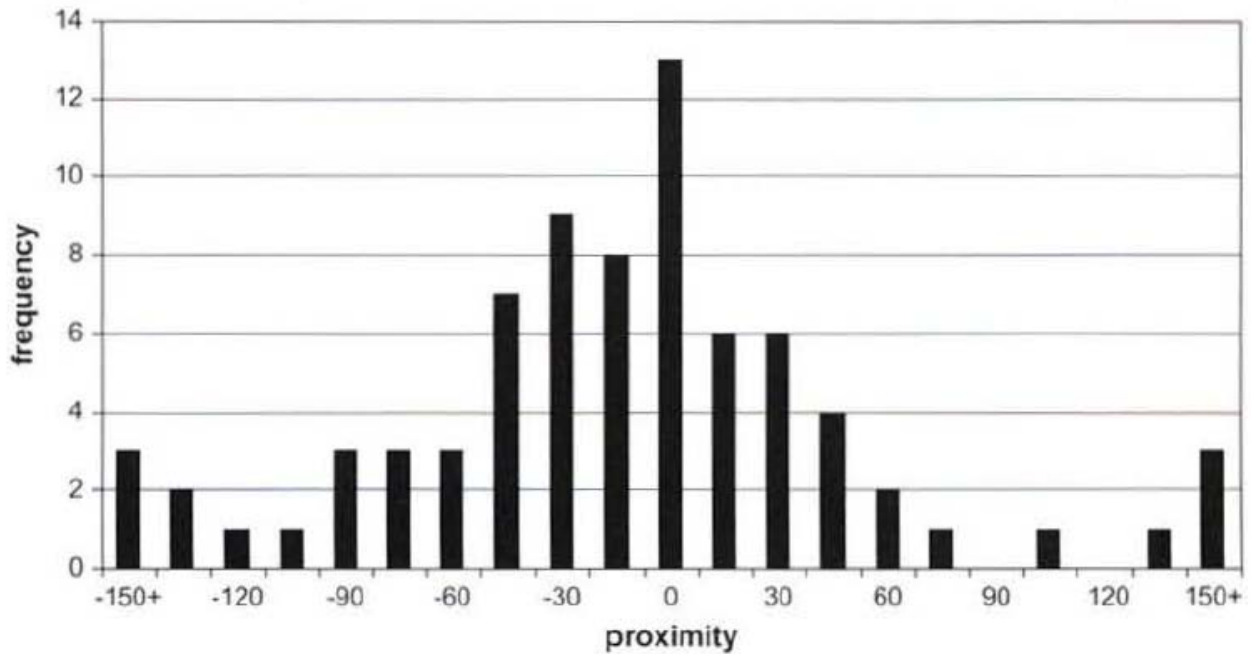
FIGURE 3
Agreement Proximity to Recommendation; Gamma = 0.8 All Observations ($n = 59$)
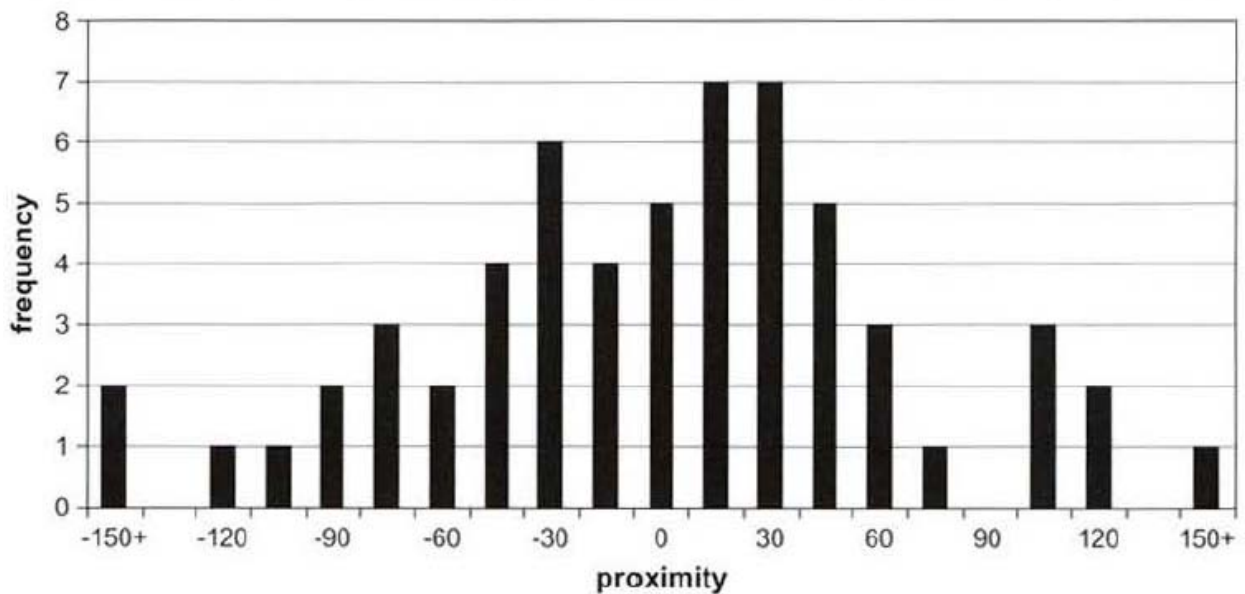
This support for the focal point hypothesis could be refuted by noting that most agreements in fact-finder rounds occurred before the recommendation was given (see discussion to follow) and were close to the center of the range of possible negotiated outcomes. Because we cannot rule out the possibility that the middle of the agreement range, the expected recommendation,

or the expected arbitrator settlement choice are all focal points, especially before the recommendation is made, our first figures offer only limited support of our focal point hypothesis regarding explicit fact-finder suggestions.

To further test the focal point hypothesis, we examine agreements made after an unusually small (or large) recommendation. Specifically, we examine the proximity of negotiated settlements to fact-finder recommendations that are at least 60 points (one standard deviation) away from the expected arbitrator decision. Figures 4 and 5 present these results for [gamma] = 0.2 and [gamma] = 0.8 respectively. Not surprisingly, when the recommendation is unusually high (or low), agreements tended to be further away from the recommendation. That said, it is interesting to note that when [gamma] = 0.8, over half of all agreements (11 out of 21 observations) are less than 60 points from these extreme recommendations (see Figure 5). Notice that these agreements cannot equal the expected arbitration decision (x = 500), which is at least 60 points away. When [gamma] = 0.2, just over one-third (9 of 24 observations) of agreements are less than 60 points from extreme fact-finder recommendations. As the focal point hypothesis suggests, extreme recommendations appear to pull negotiated settlements towards the recommendation, even when the fact-finder is known to be less influential.

FIGURE 4

Agreement Proximity to Recommendation;
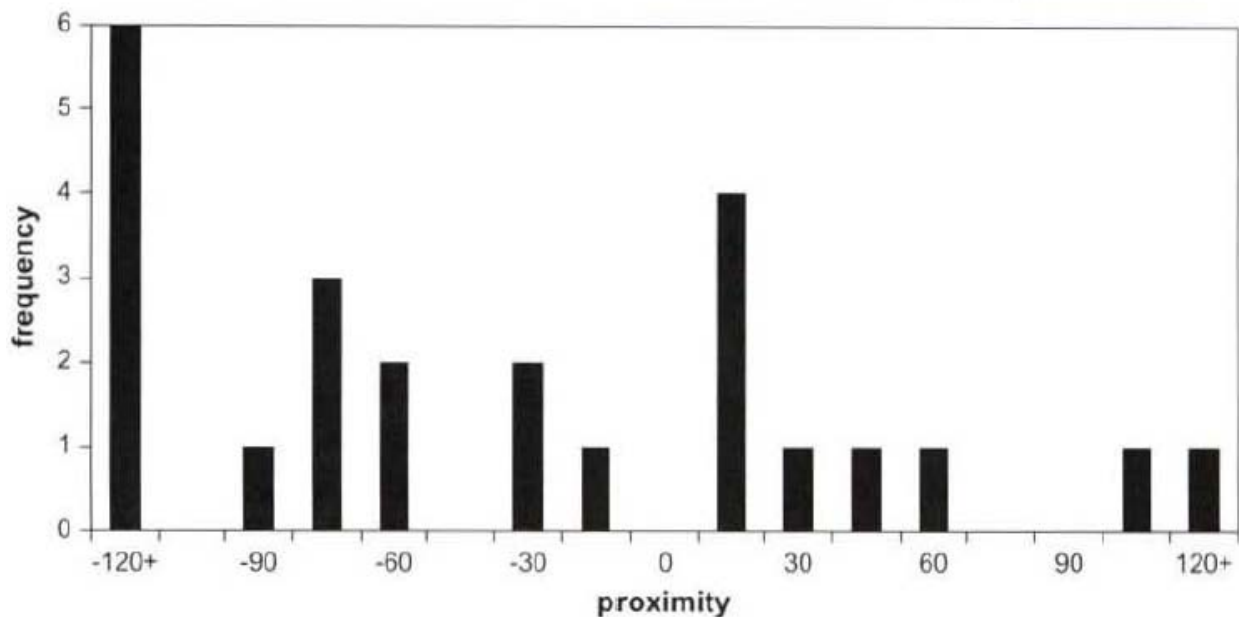Gamma = 0.2, Recommendations Greater than 560 or Less than 440 (*n* = 24)

FIGURE 5

Agreement Proximity to Recommendation;
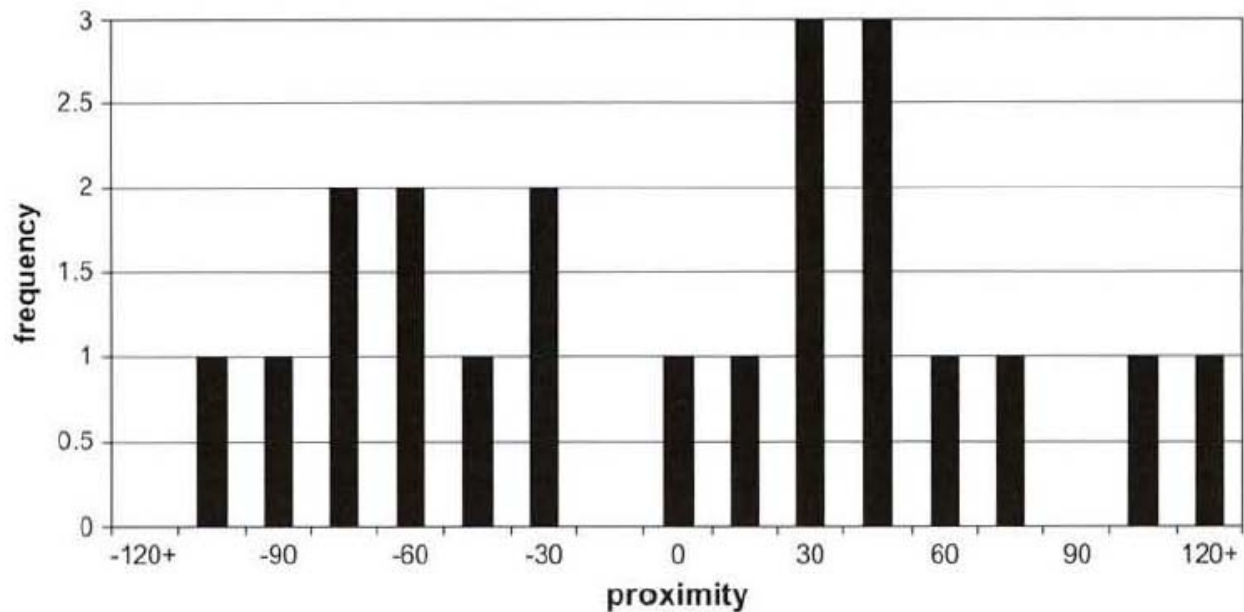Gamma = 0.8, Recommendations Greater than 560 or Less than 440 ($n = 21$)

Table 4 presents the results of a random effects probit estimation of treatment and pair-specific variables on a dummy variable indicating whether a pair disputed (i.e., did not settle voluntarily) or not. (19) The random effects estimation controls for the pair-specific heterogeneity in the dispute propensity of our sample by assuming that the pair-specific constant terms in the regression equation are randomly distributed across all bargaining pairs. That is, we assume that our sampled pairs were drawn from a large population of bargaining pairs. The results in Table 4 show three distinct estimations: The first column is a treatment effects only estimation, the second column includes gender composition variables that are interacted with the treatment, and the third column includes additional pair-specific and descriptive variables as regressors. None of these additional variables are statistically significant, and so their results are omitted for space considerations. (20) The marginal effects of the variables and their p-values are reported in Table 4.

TABLE 4
Random Effects Probit Estimation of Dispute Rates

Independent Variable	1 Marginal Effects (*p*-Value)	2 Marginal Effects (*p*-Value)	3 Marginal Effects (*p*-Value)
Constant term	−0.345 (0.00)***	−0.345 (0.00)***	−0.392 (0.00)***
CA	0.265 (0.00)***	0.300 (0.00)***	0.338 (0.00)***
FF(20%)	0.155 (0.00)***	0.241 (0.00)***	0.287 (0.00)***
FF(80%)	0.182 (0.00)***	0.300 (0.00)***	0.310 (0.00)***
1 female * CA	—	−0.077 (0.28)	−0.074 (0.36)
2 females * CA	—	−0.003 (0.98)	−0.004 (0.98)
1 female * FF(20%)	—	−0.091 (0.31)	−0.103 (0.27)
2 females * FF(20%)	—	−0.189 (0.11)	−0.163 (0.19)
1 female * FF(80%)	—	−0.138 (0.07)*	−0.136 (0.14)
2 females * FF(80%)	—	−0.234 (0.02)**	−0.221 (0.03)**
Additional explanatory variables	—	—	all insignificant
% Correctly predicted	70.9%	70.9%	72.3%
Chi-squared	79.41 (0.00)***	78.32 (0.00)***	11.78 (0.00)***
Log-likelihood	−541.91	−535.81	−528.55

Notes: Dependent variable *Dispute* = 1, 0.
$N = 1,000$ observations (50 pairs * 20 rounds per pair).***, **, * indicate significance at the $p = 0.01$, $p = 0.05$, and $p = 0.10$ level, respectively.

From Table 4 we highlight the following results. First, the probability of dispute increases by about 27 percentage points under CA versus destruction of the pie in the (baseline) NA treatment. The use of a nonbinding suggestion in the FF treatments increases the probability of disputes by a lesser amount than does the CA treatment. This is evidence in support of the focal point Hypothesis 2. As noted, the fact that FF(80%) increases the likelihood of dispute relative to FF(20%) is evidence in favor of the uncertainty hypothesis because disputes are more likely when the ex post contract zone is smallest. (21) These results suggest that although reduced uncertainty may chill negotiations as suggested by Farber and Katz (compare FF(80%) to FF(20%)), the focal point value of a nonbinding suggestion outweighs this effect (compare CA to both FF treatments). (22)

When gender interaction variables are included (column 2) we find some suggestive results of how gender composition may influence the effectiveness of nonbinding suggestions. Specifically, females appear less likely to dispute when recommendations are heavily weighted (see column 2, adding the coefficients of the FF treatments and the gender interaction dummy variables). When the bargaining pair includes one or two females, the fact-finder recommendation decreases the probability of dispute by 14 and 24 percentage points, respectively, relative to an all male bargaining pair under FF(80%). This is a noteworthy result, and its magnitude suggests that dispute rates fall to close to that of NA when the bargaining pair is all female. This contrasts markedly to dispute rates in FF(80%) for an all-male pair, which are roughly the same as in CA with no recommendation (column 2 of Table 4). Such a result is likely due to innate gender differences in bargaining, because gender is completely anonymous in the

experimental design. Column 3 includes the addition of pair-specific variables that are all insignificant determinants of the probability of dispute. In all cases, the probit models correctly predict just over 70% of the actual outcomes.

We can summarize the comparison between arbitration with and without fact-finding by saying that a fact-finding stage appears to reduce the likelihood of dispute relative to arbitration with no fact-finding, and this effect is more pronounced with female disputants. This implies that focal points are important. However, the comparison between the two FF treatments and our analysis of pre- and post-recommendation settlement rates implies that the size of the contract zone is also likely an important determinant of dispute rates, though to a lesser extent than the recommendation focal point. In essence, we find support for both the uncertainty and focal-point hypotheses, but the focal point effect clearly dominates in our data.

Although not a part of our formal model, timing of settlements can also be considered in our data set. For a formal treatment of timing effects, see Crampton (1992) and Roth et al (1988). Here, we examine the subset of factfinder rounds to see if most agreements occurred before or after the recommendation in our data. Our results appear in Table 3 and in Figure 6. Of the 260 total FF(80%) rounds, agreement occurred most often before the recommendation was issued (n = 115). In fact, if the parties went beyond the recommendation, they were less likely to agree (n = 59) than to disagree (n = 86). The parties remained most likely to agree before the recommendation in FF(20%) (n = 106). However, they were marginally more likely to agree after the recommendation (n = 77) than to disagree (n = 75). These results are consistent with the uncertainty hypothesis. When most of the uncertainty regarding the arbitrator's decision is resolved ([gamma] = 0.8), disputants have little incentive to agree and more frequently wait for the arbitrator's decision. If the recommendation resolves little of the uncertainty regarding the arbitrator's decision ([gamma] = 0.2), incentives to sincerely bargain are higher and parties are more likely to agree than to invoke arbitration.

We can further examine the timing of settlements by focusing on Figure 6, which shows the cumulative settlement frequencies, separated by treatment, for negotiated (not arbitrated) settlements. We measure the time of settlement within the three-minute round on the horizontal axis and note the point at which a recommendation is issued in the FF treatments. From Figure 6 we can see that there are significant deadline effects in negotiations (see Roth et al. 1988) as is evidenced by the upward spikes in the cumulative settlement distributions at the end of the three-minute bargaining round. The issuance of a fact-finding recommendation creates an additional deadline effect just prior to the recommendation, as well as the end-of-round deadline effect. Overall, we see that negotiations are "chilled" until an 11th hour settlement most significantly in NA, and the earliest settlements are most likely under CA.

FIGURE 6
Cumulative Settlement Frequencies
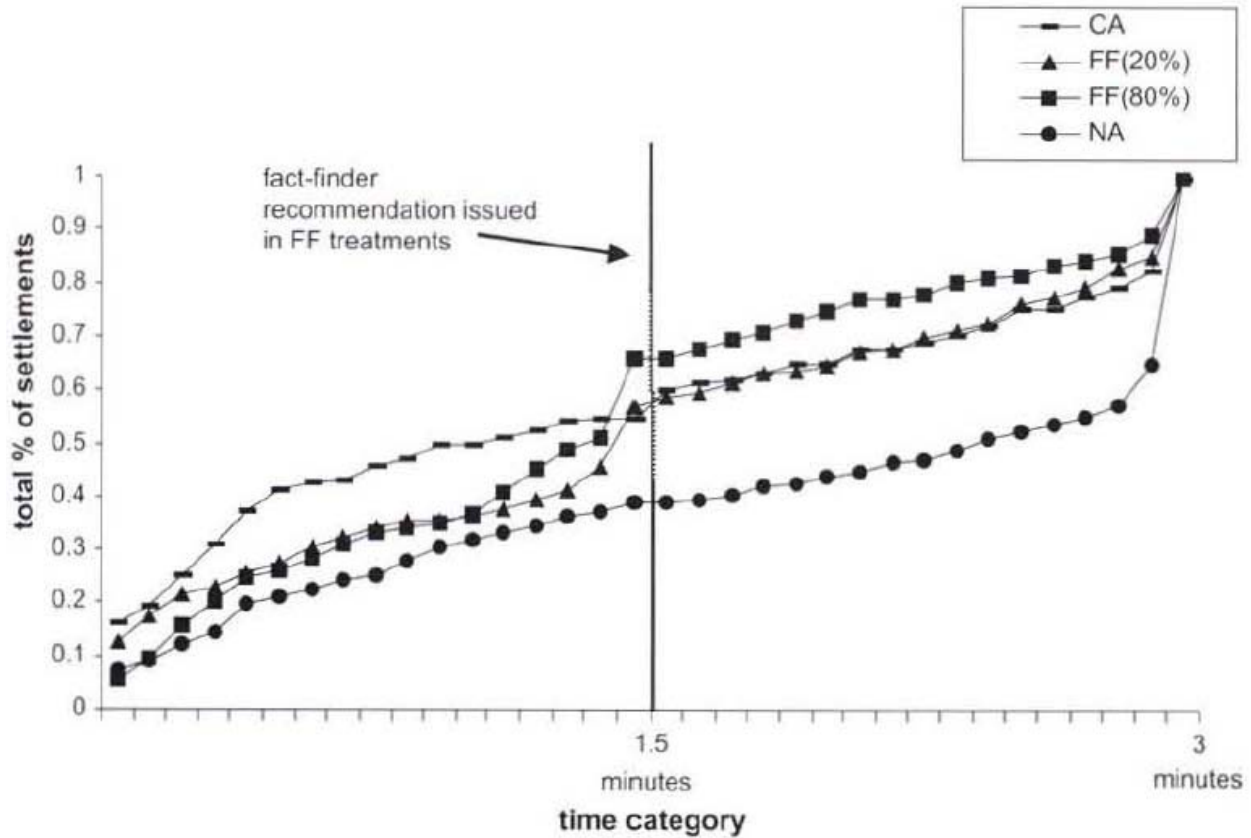
When a fact-finder recommendation is used, a more heavily weighted recommendation induces quicker settlements. Though quickest settlements are most likely under CA, in the later stages of bargaining but prior to the deadline effect the heavily weighted fact-finder induces the highest percentage of negotiated settlements. However, we cannot conclude that the size of the contract zone drives the timing of negotiated settlements, because our model is silent with respect to precise settlement timing (see Figure 1). We should also note that although the pattern of settlement frequencies in Figure 6 is suggestive of important treatment effects, the only statistically significant differences are between NA and the other dispute resolution mechanisms. (23)

V. CONCLUSION

The purpose of this article has been to explore the role that nonbinding suggestions play in dispute resolution. We show that the presence of a fact-finder as an intermediate step before binding arbitration decreases the uncertainty regarding a potential arbitrated settlement and therefore decreases the size of the contract zone. Farber and Katz (1979) suggest that reduced uncertainty (as would be created by a fact-finding process) chills negotiations and may be

counterproductive to voluntarily negotiated settlements, but Schelling (1957) suggests that the creation of a salient focal point for negotiations would do just the opposite. Whether or not factfinding increases voluntary settlement rates is tantamount to asking whether the creation of a focal point or the chilling of bargaining due to reduced uncertainty will dominate. To examine this question, we generate data from a controlled laboratory experiment.

Our main result shows that fact-finding increases the rate of negotiated settlements relative to the use of binding arbitration without fact-finding. Though there is some evidence that placing more weight on the recommendation may chill negotiations (i.e., the uncertainty hypothesis), this effect is dominated by the significance of nonbinding recommendations as a focal point for bargaining. This important result is also more general given that it applies whether the final-stage decision maker is an arbitrator, a state legislative body, or a court of law, and the result also has implications beyond formal fact-finding. Specifically, any bargaining environment including a nonbinding suggestion prior to a mandated outcome is likely to promote more voluntary settlements. In some sense, this is also evidence in support of widely used mediation as a step prior to arbitration, though our results suggest that the formal or explicit recommendation is the important ingredient leading to settlement.

Public policy interests imply giving serious consideration to the use of formal recommendations in dispute resolution procedures. Given that fact-finding involves a (time-consuming) formal hearing over matters in dispute, its main attraction over arbitration is not the promise of great time and cost savings. (24) Its ability to promote higher voluntary settlement rates is fact-finding's most valuable asset. More important, the key advantage of fact-finding--the focal point recommendation--may be integrated into less formal dispute resolution procedures, such as mediation, which are known to be quick and low-cost among ADR procedures. In doing this, policy makers can likely craft a dispute resolution procedure that produces higher settlement rates and does so at lower cost than alternative procedures.

We also find that the disputants' gender may be an important determinant in identifying the potential success of nonbinding recommendations. Female disputants were even more likely to achieve a voluntary settlement under factfinding than were all-male pairs. Also, though a more heavily weighted fact-finder recommendation, on average, was less effective in reducing disputes than a less heavily weighted recommendation, this is not necessarily the case with female disputants. Male disputants, on the other hand, may actually dispute more when heavily weighted recommendations are used than when recommendations are not used at all. Such a result suggests the need for further research to examine whether there are systematic gender differences in how disputants respond to the size of the bargaining contract zone.

As arbitration continues to be viewed as a viable alternative to litigation, these results suggest that an intermediate step that includes a recommended settlement is likely to be effective in increasing voluntary settlement rates. Though outcome uncertainty still appears to be a necessary ingredient in promoting goodfaith or sincere negotiations, the value of a focal point for negotiations is evident in our results. Voluntary settlements are usually considered preferred to mandated settlements, so the generation of credible focal points may be a useful way to improve any existing method of alternative dispute resolution.

ABBREVIATIONS

ADR: Alternative Dispute Resolution

CA: Conventional Arbitration

FF: Fact-Finding Suggestion

NA: No Arbitration

NOTES

(1.) Ashenfelter et al. (1992) examine incentives under "tri-offer" arbitration, where an arbitrator is constrained to choose as a settlement either one of the disputant's final offers or the recommendation of a fact-finder. We examine a fundamentally different issue by considering arbitrators who place positive fixed weight on the fact-finder recommendation in determining an otherwise unconstrained final settlement. Hebdon (2001) highlights that there are currently no theoretical models of fact-finding.

(2.) Conventional arbitration refers to the set of arbitration rules that allow the arbitrator to craft any settlement seen as appropriate. This is in contrast to what is referred to as final-offer arbitration, where the arbitrator is constrained to choose one of the disputants' final offers as the binding settlement. For an analysis of final offer arbitration, see Farber (1980). For an early article relating uncertainty to settlement rates, and for the development of the rules for final offer arbitration, see Stevens (1966).

(3.) Researchers are not unanimous in the belief that a larger contract zone makes negotiated settlements more likely; e.g., Crawford (1982) and Farber and Bazerman (1987). However, there is a fair amount of theoretical and empirical research showing that larger (smaller) contract zones generate more (less) efficient bargaining; for example, Tracy (1986, 1987); Crampton (1992); Ashenfelter et al. (1992); Babcock et al. (1995); and Farber et al. (1990). Our position is that larger contract zones lead to lower dispute rates, on average, but this need not imply that certain individuals may base behavior on such factors as the portion of the contract zone that a proposed settlement would give to the disputant. A more thorough analysis of such items would be beneficial to this literature.

(4.) There is a large body of literature on focal points in game theory. The seminal works on focal points in bargaining environments are Schelling (1957, 1960). For theoretical treatments of focal points (also known as salience) in coordination games, see Sugden (1995), Bacharach (1993), and Janssen (2001).

(5.) Given our particular framework, our results are not completely comparable with empirical results from statutes that settle public sector disputes with fact-finding or arbitration (as opposed to fact-finding followed by arbitration should fact-finding fail).

(6.) For example, the 1960s Taylor Law for public sector employees in New York State includes formal fact-finding in dispute resolution, with the fact-finder recommendation being presented at final resolution of the dispute should the recommendation itself not produce a settlement (see Pegnetter 1971). The final-step procedure is legislation not arbitration, but the point is that this binding legislated decision is possibly influenced by the recommendation phase. Karper (1994) notes that public sector fact-finding includes examples in which the fact-finder is influential and noninfluential. McKelvey (1969) noted that fact-finding may be used to economize on legislators" time (i.e., influential fact-finding). However, McKelvey also predicted that legislative bodies in New York would largely ignore recommendations as they grew in sophistication, and Karper (1994) finds evidence that this did occur in at least some government sectors (e.g., noninfluential fact-finding). Hebdon (2001) reports general success of fact-finding in New York through the 1990s.

(7.) Additional examples include the use of probation officer recommendations as an intermediate step prior to the sentencing phase in criminal cases, a social worker report in a juvenile case, and the use of a judge-appointed special master, such as in the Microsoft antitrust case. We thank Caryn Beck-Dudley for the final example.

(8.) Nash equilibrium requires that there be no money left on the table once bargaining is complete. Our experimental environment allows only Nash equilibrium division of the pie.

(9.) Several studies have noted the presence of focal points in bargaining experiments (Binmore et al. 1991; Ashenfelter et al. 1992), but to our knowledge, none have examined the influence of particular focal points on settlement rates.

(10.) The case of net risk neutrality, where $c_a + c_b = 0$, yields the following ex post contract zone: $(1 - \gamma)(y_{ad} - y_{bd})$. In the absence of net risk aversion, net pessimism of beliefs about y_d is needed to create a positive contract, and the introduction of the fact-finder would still shrink the contract zone.

(11.) Note that in the identical expectations case $d\Delta_{ffea}/d\gamma = (1 - 2\gamma)\sigma^2(c_b + c_a)$, which is zero at $\gamma = 1/2$.

(12.) The experimental environment is motivated by the design of Ashenfelter et al. (1992) and is an extension of the bargaining with arbitration application used in Dickinson (2004).

(13.) Additionally, subjects may not make offers outside of their bargaining range. Disputant A is instructed to bargain for x between 200 and 700, and disputant B for x between 300 and 800. The theoretical predictions are silent as to the effects of this detail, but it is meant to improve the validity of the data because real-world bargainers would likely not have full information on their counterpart's target range. Furthermore, asymmetric ranges should help avoid the 50-50 split focal point (an issue mentioned in Ashenfelter et al. 1992, though they deal with it in a different way).

(14.) Subjects were unaware that five rounds of each treatment would be completed, which helps control for strategic play across multiple rounds. Also the specific ordering of the

treatments varied for different bargaining pairs (although each treatment consisted of five consecutive rounds)--this was to control for potential ordering effects.

(15.) Even when bargainer expectations are not identical, it can be shown that for given expectations, the presence of a fact-finder reduces the size of the contract zone. However, accounting for differing expectations in practice is problematic. To focus on the effects of fact-finding (instead of differences in expectations) on settlement rates, the experimental setup is designed to help generate identical expectations about arbitrator behavior.

(16.) Repeated bargaining with the same individual implies that we have created a dynamic experiment to test a static theory. Experimental economists frequently use repetition of the environment to improve the chances of generating high-quality experimental data, as subjects may typically require some learning of the environment, with the understanding that the data analysis must correct for potential nonindependence of outcomes across rounds. We chose this repeated bargaining partners protocol to help minimize an additional source of learning implicit in many bargaining experiments: learning about one's bargaining counterpart.

(17.) Some might argue that a high weight on the fact-finder recommendation "forces" agreement (Crawford 1979). This implies that instead of chilling bargaining, a smaller contract zone "warms" it, and we would expect to see more voluntary settlements the higher the weight on the fact-finder recommendation. As noted before, the experimental design allows us to examine this possibility, and the data do not support this hypothesis.

(18.) We consider joint risk aversion a reasonable assumption in general. Although we elicit risk preference data from our experimental subjects that support the assumption of risk aversion (i.e., subjects responding to an end-of-the-experiment hypothetical question were indifferent, on average, between \$10 with certainty and a 50-50 gamble over \$0 and \$30), this question created considerable confusion among the subjects and is omitted from the data analysis. However, Holt and Laury (2002) find that subjects responding to nonhypothetical lottery questions are typically risk-averse, even over "normal" laboratory payoffs.

(19.) Random effects probit appears to be the appropriate modeling of the data because the correlation of the error terms within a subject-pair but across rounds is statistically significant ($p = 0.00$). Even so, all the main results in Table 4 are robust to estimation by ordinary least squares or a binary probit model (with no random effects).

(20.) Full results are available from the authors on request. The extra variables in the estimation of column 3 of Table 4 are descriptors of the pair's college major composition, religious composition, employment status, history of trial or arbitration experience, history of union affiliation, round of the experiment, and cumulative rounds of dispute within the experiment. Data from two pairs with a missing observation each are omitted from the Table 4 analysis.

(21.) Though it is true that FF(80%) increases the likelihood of disputes by more than does FF(20%), the difference may not be precisely measured. A Wald test on the restriction of the coefficient of FF(80%) equaling the coefficient on FF(20%) fails to reject the null hypothesis of equality ($p = 0.33$). Therefore, there is only weak support that reduced uncertainty increases

dispute rates in our experiments, but the evidence leans in favor of the uncertainty hypothesis of Farber and Katz as opposed to the alternative view that reduced uncertainty facilitates agreement.

(22.) The uncertainty results are consistent with previous studies (e.g., Ashenfelter et al. 1992; Babcock and Taylor 1996) that show lower dispute rates when the variance of arbitrator draws is higher (i.e., larger contract zone).

(23.) Results from a Kolmogorov-Smirnov nonparametric full distribution test fail to reject the null hypothesis that the distributions of CA, FF(20%), and FF(80%) are significantly distinct from one another. The unit of observation for generating the cumulative distribution functions for this test is the settlement data from Figure 6 (i.e., number of settlements across all bargaining pairs at a given point in the round for a given treatment divided by the total number of settlements for that treatment). This test assumes that the distributions are mutually independent, which may not be the case, but the results are consistent with the estimation results of a bivariate probit equation that looks at the probability of settlement early versus late contingent on not disputing. None of the marginal effects estimates of the treatment effects on the probability of early settlement were statistically significant. Results are available on request.

(24.) Due to the numerous variations in the actual practice of arbitration and fact-finding, it is difficult to compare costs of each procedure. The level of formality in fact-finding is more similar to arbitration than mediation, for example, and for this reason we conclude that time and money costs may not be that different in arbitration and fact-finding. Of course, if fact-finding does not lead to settlement, and arbitration or legislative hearings follow, then fact-finding obviously adds a costly step to the entire sequence of dispute resolution procedures.

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