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ARBITRATOR BEHAVIOR IN PUBLIC SECTOR WAGE DISPUTES

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ABSTRACT

This study analyzes a new set of data on the decisions of conventional arbitrators. The main goal is to draw inferences about the extent to which conventional arbitration decisions are fashioned as mechanical compromises of the parties' final offers, without reference to the exogenous facts involved in different disputes. The results of the analysis are remarkably clear: conventional arbitrators tend to split-the-difference between the parties' final offers with virtually no evidence of additional systematic reference to the facts of the cases. However, since there is a substantial amount of unexplained variance in the arbitration decisions, this evidence of mechanical compromise behavior should be viewed as characterizing the overall operation of conventional arbitration mechanisms and not the behavior of individual arbitrators in any particular case. Indeed, the results are consistent with the view that individual arbitrators pay close attention to the facts of the cases, but that there is considerable variation in the structure of different arbitrators' preference functions.

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I. Introduction

Arbitration is a rapidly-growing method for resolving disputes. It is used widely in the U.S. and other countries to resolve private disputes arising under commercial contracts and collective bargaining agreements, to resolve civil disputes congesting court systems, and to set wages and other terms of new contracts in repeat bargaining situations. Despite the wide range of settings in which it is applied, and the numerous forms that it can take, the central feature of virtually all arbitration mechanisms is that they involve a third party, i.e., an arbitrator or a panel of arbitrators, hearing and deciding how a dispute is to be resolved. Arbitration awards are generally binding, either by law or by ex ante agreement of the disputants.

One of the most important characteristics of arbitration mechanisms is that they may be designed in different ways. Indeed, one of the key dimensions along which arbitration mechanisms differ involves the extent to which they constrain an arbitrator's behavior. For example, under conventional arbitration, an arbitrator is simply asked to render a decision that represents his or her best judgment of a fair settlement. The settlement may, but does not have to be, a compromise between the parties' final offers. In contrast, under final-offer arbitration, each party is required to submit to the arbitrator a single final-offer and the arbitrator is constrained to render a decision that consists of one or the other of those final offers, without compromise. Final-offer arbitration is intended to induce concessionary behavior on the part of risk-averse bargainers, each of whom perceives a tradeoff between the probability of "winning" the arbitration and the size of the payoff they receive if they win (Stevens, 1966).

Conventional arbitration mechanisms have been objected to on a variety of grounds, the most serious of which is that they "chill" the negotiation process

that precedes arbitration. This argument is rooted in the belief that conventional arbitration awards systematically tend to be compromises between the parties' final positions, thereby providing an incentive for the parties to avoid pre-arbitration concessions. This assertion is difficult to evaluate. On the one hand, it might be the case that arbitrators often make decisions by reaching a mechanical compromise between the parties' final offers, without paying much attention to the merits of the case (although perhaps with a bit of random noise). This might be an optimal strategy for arbitrators who want to project an image of fairness so they are hired again by the parties. In addition, since it is almost certainly easier and less time-consuming than weighing the facts in a dispute, mechanical compromise (of which splitting-the-difference is a special case) is also one way in which arbitrators can engage in shirking. Finally, mechanical compromise might be an optimal decision-making rule for arbitrators if the final offers themselves convey useful information about the nature of efficient settlements. Indeed, if final offers do contain useful information that arbitrators are particularly skilled at extracting, mechanical compromise behavior is not a legitimate complaint against conventional arbitration. Nonetheless, it seems unlikely in practice that an arbitrator could determine whether a pair of final offers contained useful information without at least some reference to exogenous data on the facts of a case. In this situation, arbitration decisions will not be simple mechanical compromises of the parties' final offers, but rather, they will be functions of both the offers and the facts.

On the other hand, it is also possible that the parties' final bargaining positions are determined by their expectations about an arbitration award. In other words, if bargainers A and B expect an arbitrator to render a settlement

that is relatively favorable to bargainer A, their negotiations will almost certainly take place over settlements that tend to be favorable to A, provided that arbitration is compulsory if they fail to resolve their dispute voluntarily. Thus, arbitration decisions may appear to be mechanical compromises of the parties' final positions, but only because the parties aligned themselves around the arbitrator's preferred settlement point (see Farber, 1981; and Ashenfelter, 1985).

The purpose of this study is to analyze arbitrator decision-making under conventional arbitration. The main goal is to try to draw inferences about the extent to which conventional arbitration decisions are mechanical compromises of the parties' final offers. This will be done mainly by estimating several simple models of arbitrator behavior that have proven useful in recent empirical studies. These models will be fit to a new set of data on arbitrators' decisions in a series of hypothetical arbitration cases.

The following section will set out the empirical models of arbitrator behavior that have formed the basis for empirical work in this area. Section III will discuss the conclusions that can be drawn from previous attempts to implement these models. Section IV will describe the experimental design used to generate a new data set on the behavior of conventional arbitrators. Section V will present and discuss the results of fitting alternative empirical models to these new data. Section VI will discuss and summarize the main conclusions of the paper.

II. Empirical Models of Arbitrator Behavior

The purpose of this section is to outline several general models of arbitrator behavior under final-offer and conventional arbitration.[1] The fundamental premise of these models is that, under both systems of arbitration, arbitrators form a notion of a preferred wage settlement in one of two ways: just from the facts of the case (X) or from both the facts of the case and the employer and union final positions (w^e and w^u). Thus, in the first regime the arbitrator's settlement (i.e., the percent wage increase, w^a) is given by

$$(1a) \qquad w^a = X\beta + \epsilon$$

where β is a vector of weights and ϵ is a random error that captures the effect of unobserved variations in economic environments and differences in arbitrators' assessments of those circumstances. Like previous studies, this study will assume ϵ to be normally distributed with zero mean and standard deviation σ. In the second regime the arbitrator's preferred settlement ($\tilde{w}^a$) is

$$(1b) \qquad \tilde{w}^a = \gamma w^a + (1-\gamma)[(w^e+w^u)/2]$$
$$= \gamma X\beta + (1-\gamma)[(w^e+w^u)/2] + \gamma\epsilon$$

where $0 \leqslant \gamma < 1$.

Under final-offer arbitration, it is assumed that the arbitrator picks the employer's offer when

$$(2a) \qquad \alpha(w^a-w^e) \leqslant (w^u-w^a)$$

if the first regime holds or when

$$(2b) \qquad \alpha(\tilde{w}^a-w^e) \leqslant (w^u-\tilde{w}^a)$$

if the second regime holds, where $w^u > w^e$, and where $\alpha \neq 1$ implies asymmetric treatment of employer and union deviations from the preferred settlement.

Substituting for w^a and $\tilde{w}^a$ in (2a) and (2b) and rearranging terms leads

to expressions (P_1 and P_2) for the probability that the employer's final offer is selected under each regime.

(3a) $$P_1 = N([\alpha/(1+\alpha)\sigma]w^e + [1/(1+\alpha)\sigma]w^u - X\beta/\sigma)$$

(3b) $$P_2 = N([\delta_1/\gamma\sigma]w^e + [\delta_2/\gamma\sigma]w^u - X\beta/\sigma)$$

where $\delta_1 = \{\alpha/(1+\alpha) - (1-\gamma)/2\}$, $\delta_2 = \{1/(1+\alpha) - (1-\gamma)/2\}$, and $N(\cdot)$ is the cumulative distribution function for a standard normal variate.

For regime 1, observe (1) that $[1-P_1]$ is an expression for the probability the union's final offer is selected, (2) that the probability expressions (P_1 and $[1-P_1]$) are simple probit functions whose parameters can be easily estimated by the method of maximum likelihood from appropriate data drawn from a series of final-offer arbitration cases, and (3) that both α and σ are identified from the coefficients of w^e and w^u, implying that β is also identified. For regime 2, observe (1) that the probability expressions P_2 and $[1-P_2]$ are also probit functions although γ and α are not separately identified, (2) that the sum of the coefficients of w^e and w^u is an estimate of σ, implying that β is identified, and (3) that even though α is not identified, the hypothesis $\alpha = 1$ can be tested from the difference between the coefficients of w^e and w^u (i.e., the difference is zero under H_0: $\alpha = 1$). Finally, observe that the reduced-form probit models suggested by regimes 1 and 2 are identical, even though the interpetation of the coefficients does depend on the regime.

Under conventional arbitration, the theoretical model is conceptually simpler because the arbitrator's preferred settlement is, by definition, either w^a or $\tilde{w}^a$, depending on the regime that arbitrators use to make decisions. However, the corresponding empirical models are not always equally straightforward. In particular, if arbitrator decisions just depend on the

facts of the cases, then equation (1a) can be estimated directly by ordinary least squares. On the other hand, if arbitrator decisions depend on both the facts and the final offers, it would seem natural to estimate equation (1b) directly, also using ordinary least squares. However, that regression ignores the potential simultaneity of the average final offer and the arbitrator's expected decision. In addition, it is not usually possible to fit that regression since w^e and w^u are generally not explicit in actual conventional arbitration decisions. Thus, the term $(1-\gamma)[(w^e + w^u)/2]$ will become part of the error structure under regime 2. Unfortunately, since w^e and w^u are probably correlated with X, their omission from an ordinary least squares regression will bias the estimates of β if regime 2 holds.

Two other properties of these alternative models of arbitrator behavior are also worth noting. First, if the decisions of conventional arbitrators are generated by model (1a), it would be unnecessary for the parties' to formulate and express final positions. Insofar as final offers are an important institutional feature of the arbitration process, model (1a) may be too simple a representation of arbitrator behavior. Second, if arbitrator decisions are rendered according to model (1b), optimal final offers will always be both divergent and extreme and all bargaining cases will end up in arbitration. However, as a practical matter, the fraction of bargaining cases that end up in arbitration tends to be less than one-third. In addition, although final offers under conventional arbitration are sometimes extreme, they are typically not more than a few percentage points apart (see Bloom and Cavanagh, 1987, esp. Table 1). Thus, equation (1b) may also be too simple a representation of arbitrator behavior. We will examine this possibility empirically by estimating a more complex model in which the weight that arbitrators place on the final

offers (i.e., $1 - \gamma$), depends on the distance between them. These estimates will help us to determine whether arbitrators treat final offers that are further apart as less informative.

III. Previous Literature

A. Review

The main implications of the models discussed and presented in the previous sections are (1) that simple regressions of conventional arbitration decisions on the facts of the cases and the parties' final offers may lead to incorrect inferences about the true weight that arbitrators place on the parties' final offers (i.e., because of simultaneity bias associated with the effect that expected arbitration decisions may have on the final offers); and (2) regressions that include the facts of the case but omit the parties' final offers (because they are unavailable) may lead to biased estimates of the weights the arbitrators attach to the facts. These problems seriously hinder our ability to test important hypotheses about the nature of arbitrator behavior using data derived from actual conventional arbitration systems.

To date, two alternative approaches have been adopted to circumvent the inherent problems involved in analyzing the behavior of conventional arbitrators. The first approach, due to Ashenfelter and Bloom (1984), takes advantage of a novel feature of the arbitration system operating in New Jersey. Under that system, unresolved pay disputes between (unions of) municipal police officers and their public employers must be settled by arbitration. However, the form of arbitration is only conventional if both parties agree to it. In the absence of such an agreement, the dispute is settled by final-offer arbitration. Thus, the New Jersey system is a unique laboratory in which to

mechanical compromise behavior. The presence of some perverse correlation between the mode of arbitration chosen by the parties (i.e., final offer or conventional) and the random component of arbitrator behavior would have a similar effect.

Overall, the Ashenfelter-Bloom model does not provide a particularly strong test of the mechanical compromise hypothesis. Nor does it provide unambiguous results with regard to this issue. For example, the hypothesis is not rejected in the simple specifications reported, but it is rejected in the richer specifications. However, the great strength of this model is that it tests the mechanical compromise hypothesis using data derived from an operating arbitration system.

Like the Ashenfelter-Bloom study, the Bazerman-Farber approach to testing for mechanical compromise behavior under conventional arbitration also has several problems. First, the twenty-five hypothetical arbitration scenarios sent to actual arbitrators were constructed so that the final offers were orthogonal to the "facts" of the cases. This feature of the scenarios has no analog in actual arbitration where final offers are endowed with information content via their link to the facts of a case. This is unfortunate since it is the information content of the final offers that makes it potentially sensible for the arbitrators to give them weight (see Gibbons 1987 for an interesting model of this communication process). The failure to provide arbitrators with any decision-making criteria is also unfortunate.

Second, according to Bazerman and Farber, the conventional arbitration decision was equal to one or the other of the parties' final offers in 386 out of their 1522 cases (25.4 percent). This result stands in strong contrast to actual arbitration systems in which arbitration awards infrequently lie on the

bounds of the parties' final positions. This boundary problem undoubtedly resulted from arbitrator confusion as to what to do in cases in which the facts suggested a settlement that lay far away from the offers (which happened because of the "pathological" relationship between the facts and the final offers). Although Bazerman and Farber ignore this information in their empirical analysis (as explained below), it represents strong evidence that arbitrators are influenced by the parties' final offers.

Third, Bazerman and Farber report 196 cases (12.9 percent) in which arbitrators' decisions were either greater than the union's final offer or less than the employer's final offer. These cases might be interpreted as evidence that arbitrators are not influenced by the parties' final offers. However, almost all of these cases reflect scenarios in which the "facts" and "final offers" are grossly inconsistent (e.g., the final offers probably looked like typos to the arbitrators). Insofar as arbitration awards rarely lie outside the bounds of the parties' final positions in real-world arbitration, their inordinate prevalence in the Bazerman-Farber data raises serious questions about the external validity of their experiment.

Fourth, Bazerman and Farber try to handle their "extreme" data points by estimating a model that treats as censored all observations that lie on or outside the bounds of the final offers. In other words, all of the Bazerman-Farber results about mechanical compromise behavior are based only on a non-random subset of their cases in which arbitrators were either not strongly influenced by the parties' final offers or did not have good reason to ignore the offers entirely.

Overall, the fact that the arbitrator decisions were identical to one or the other of the parties' final offers in roughly one-fourth of the cases is

prima facie evidence that arbitrators do pay considerable attention to the parties' final offers, even when they contain literally no information. This finding could be explained in (one or more of) the following three ways. First, arbitrators may not be particularly skilled at identifying cases in which final offers have no information content. Second, arbitrators may engage in mechanical compromise behavior in order to appear fair, but they failed to realize that they had no such incentives in the Bazerman-Farber simulations. Third, the self-selected arbitrators who participated in Bazerman and Farber's study were simply lazy and failed to reveal information about their likely behavior in actual arbitration cases. Nonetheless, because the final offers are exogenously fixed, one conclusion of the Bazerman-Farber study is clear: the evidence of mechanical compromise behavior is not generated by bargainers positioning themselves around the expected arbitration award.

IV. Experimental Design

Although Bazerman and Faber's study has flaws in both its design and its analysis, the basic idea of conducting an "experiment" to learn about arbitrator behavior is quite clever and fundamentally sound. Thus, it seems reasonable to repeat the experiment that they conducted in a way that overcomes as many of the problems they faced as possible. This task was begun in early 1984 by sending a new set of hypothetical arbitration cases to roughly the same population of arbitrators (i.e., members of the National Academy of Arbitrators).

Four cases were prepared for this experiment. These cases were all based on the records of actual bargaining disputes that were arbitrated under the New Jersey Arbitration Law during the years 1980 to 1983. Police officer wages were either the sole or overriding issue in dispute in all of these

cases. All of the arbitrators in the sample were provided with the following information: (1) general background information on the public employer and the public employee union; (2) information on the bargaining history that led to the arbitration; (3) the final positions of each party and a description of the arguments advanced in support of those positions (or against the other side's position); and (4) statistical exhibits supporting the positions of one or both parties. Arbitrators were asked to examine the information describing the bargaining dispute, to consider that information in light of New Jersey's Arbitration Law, and to render a conventional arbitration award ordering the implementation of whatever salary (or salary increase) they thought to be most reasonable. Arbitrators were also provided with a two-page description of the New Jersey Arbitration Law that included a list of the substantive items they were supposed to weigh in their deliberations (e.g., comparability, ability-to-pay, cost-of-living, financial health of the municipality, etc.). Data on police officer salaries in 6 New Jersey communities and 4 non-New Jersey communities from 1979 to 1983 were provided as background information for the arbitrators. Finally, arbitrators were provided with a decision form asking them to record their decision and to outline the basis for it. This form also requested information about the professional background and experience of each arbitrator and asked for an evaluation of the arbitration exercise.

In the process of preparing the four abridged arbitration cases, a curious feature of the link between facts and final offers was discovered. In particular, it was observed in the actual arbitration cases that the arguments used to advance a particular position were never so narrowly specified so as to imply a unique final position. In other words, it seemed clear that the

arguments could be used to support a range of final positions in the vicinity of the final position actually advanced. This feature of adversaryism in interest arbitration was exploited in the experimental design by sending different arbitrators cases that were identical in all respects except for the final positions of the parties (see Table I). Since knowing which of the four cases an arbitrator was being asked to decide completely summarizes the facts of the case, any variations in the conventional arbitration decisions that are positively correlated with variations in the final offers may be interpreted as evidence of mechanical compromise behavior.

Unlike the Bazerman-Farber study in which all members of the National Academy of Arbitrators were asked to arbitrate 25 hypothetical cases each, the present design asked each arbitrator to consider just two cases (one conventional arbitration case and one final-offer arbitration case, although the final offer cases are not analyzed here). In addition, arbitration cases were only sent to arbitrators who were not members of New Jersey's panel of interest arbitrators (some of whom might have had considerably more information about the New Jersey municipalities, such as the actual final offers). Of the 527 arbitration exercises mailed out, responses were received to 186. Of these, 131 responses did not include arbitration decisions, either because they indicated (1) that the arbitrator was deceased, (2) that the arbitrator did not have the time to participate in the study, (3) that the arbitrator would not participate in the study without pay, (4) that the arbitrator did not feel competent to resolve wage disputes because of lack of experience with them, or (5) that for a variety of reasons, the arbitrator did not think the study could reveal useful information about arbitrator behavior. Overall, the 55 arbitrators who did respond tended to be statistically similar to those who

participated in the Bazerman and Farber study: they are generally above the average of all National Academy members in terms of both overall arbitration experience and interest arbitration experience (i.e., the respondents have an average of 22 years of arbitration experience and roughly 6 percent of their cases involve disputes of interest). Since interest arbitration presently accounts for only 5 percent of all arbitration cases (only 2 percent before the early 1970's), it is not surprising that many arbitrators chose not to respond to the exercise for lack of expertise.

It is difficult to gauge the potential biases that are introduced into the study by the self-selection of arbitrators. However, the importance of the results presented herein does not depend critically on the sample of included arbitrators being representative of the population of all labor arbitrators. In other words, the mere fact that a segment of the nation's top practicing arbitrators are participants in this study would seem to dictate that the results be taken seriously. Also difficult to evaluate, but probably worth reporting, are the arbitrator's evaluations of the exercises. In answer to the question: "To what extent do you feel that these exercises capture the key features of actual arbitration cases?" the distribution of arbitrator responses was as follows: "Not at all," 6 percent; "To Some Extent," 16 percent; "Reasonably Well," 59 percent; "Very Well," 14 percent; and "Almost Entirely," 5 percent. In addition, the average evaluation score and the response rate varied little across the four city scenarios.

V. Estimation Results

The purpose of this section is to determine whether the arbitrator responses to the arbitration cases described above permit us to make inferences about whether regime 1 or regime 2 is more likely to be the true model generating conventional arbitration decisions.

Table I reports the average percent wage increase awarded by arbitrators for each of the 12 sets of semi-distinct cases circulated (i.e., for each of the 3 pairs of final offers associated with the bargaining disputes in the 4 cities under consideration). The striking feature of this table is that the average arbitration award increases when the average of the employer and union final offers increases, in each of the four cities. Although few of the differences are statistically significant, mainly because of small cell sizes, this pattern of results does suggest the main result that the regression estimates below will confirm: that the decisions of arbitrators are influenced by the parties' final offers.

Table II reports least squares estimates of the parameters of the two models of conventional arbitrator behavior set out in Section II. The first model corresponds to equation (1a) and represents a regression of conventional arbitration decisions on the facts of the case (i.e., on a vector of city dummy variables). The second models correspond to equation (1b) and represent regressions of conventional arbitration decisions on both the facts and the final offers in each case. The first of the estimated forms of equation (1b) is simply a reduced-form regression in which the facts and final offers are entered as right-hand side variables. The next two columns report estimates of the structural parameters of equation (1b) (i.e., β, σ and γ); these estimates are computed from regressions in which the weights associated with the facts and the final offers are not scaled by the estimate(s) of γ.

Table II indicates that the average arbitration award in the 55 cases being analyzed was 6.72 percent with a standard deviation of 1.82 percent. When the arbitration awards are regressed on a vector of city dummy variables, the standard deviation of the residuals drops to 1.52 percent. In addition, the coefficient estimates for the city dummy variables indicate significant differences among arbitration decisions in the different cities ($F[5,51] = 8.88$, compared to a critical value of 2.41 for a test constructed at the 5 percent level). Since there were literally no differences in the facts presented for individual cities, these dummy variables may be viewed as completely characterizing those facts. Thus, under the maintained hypothesis that conventional arbitrators' render decisions without reference to the parties' final offers, the estimates of equation (1a) suggest that arbitrators are able to discern differences between the cases that they reflect in their decisions.

It is, of course, possible that the significance attributed to the facts results from omission of the final offers from the regression. In other words, since the offers are correlated with the underlying facts of the case by design, misspecifying the regression by omitting the offers might result in the coefficients of the city dummies picking up their own effect plus some of the effect of the offers. The first column of estimates of equation (1b), which simply adds in the average of the parties' final offers as a regressor, is informative about this possibility. Indeed, there are three noteworthy features of these estimates. First, the city dummies are no longer significant in this equation, either singly or jointly. In addition, the coefficients of the city dummies all become quite small in magnitude when the average final offer enters the equation. Second, the average final offer explains

significantly more of the total variation in the arbitration decisions than do the facts of the cases.[2] Third, the coefficient on the mean of the final offers (i.e., .880) is significantly greater than zero, but not significantly different from one. Thus, a clear winner seems to emerge when the facts and the final offers are permitted to "fight it out" in the regression. Nevertheless, it is worth noting that there is still a considerable amount of random variation in the decisions of the arbitrators even after the inclusion of both the facts and the final offers (e.g., the standard error of the regression is 1.4 percent).

The first column of structural coefficients reports parameter estimates that are not scaled by γ. Note that the point estimates of the structural constant and the city coefficients are reasonably large in magnitude, although none are significantly different from zero. Thus, the data seem to contain little information about the arbitrators' underlying preferences viz-a-viz the facts of the cases. Alternatively, the data may be indicating that there is considerable variation in the structure of different arbitrators' preference functions. In addition, since none of the intercepts are significantly different from zero and since the estimate of $1-\gamma$ (the weight on the final offers) is not significantly different from one, it appears that the relationship between the arbitration decisions and the average of the final offers is well-described by a 45 degree line that goes through the origin. In other words, it appears that arbitrators tend to engage in mechanical compromise behavior that can literally be described as "splitting-the-difference."

The final column of estimates in Table II differs from the preceding column in that it does not constrain the weights attached to employer final offers and union final offers to be equal. As with the previous model, none of the coefficients of the facts are significantly different from zero. In addition,

it is most remarkable that the estimated weights associated with the union and employer final offers are extremely close in magnitude and estimated with almost identical precision. Thus, the simpler model in which arbitrators weigh the final offers symmetrically appears to provide a very satisfactory fit to the data.

Because of the built-in correlation between the facts and final offers in this experiment, these results do not demonstrate that arbitrator decisions are completely independent of case facts. However, they do indicate that arbitrators pay little systematic attention to the case facts beyond the information they extract from the final offers. If one views the final offers in this experiment as representing some function of the facts plus random noise, the results in Table II indicate that the arbitration decisions do vary positively with the noise. This result can be further verified by fitting separate regressions of the arbitration decisions on the average of the final offers for each city. Although there are relatively few observations per city, these models provide the fullest possible set of controls for the case facts and provide a very strong test of whether arbitrators respond to the "noise component" of the parties' final offers.

Table III reports the results of these city-specific regressions. It is worth noting that the regression lines for Camden, Mahwah, and North Bergen are all well-approximated by a 45-degree line that passes through the origin. In contrast, the estimated line for Mount Olive is flatter, although the slope is significantly greater than zero. Overall, this pattern of results indicates that arbitrator decisions tend to split the difference between the parties final offers, albeit with a good deal of unexplained variation (as indicated by the relatively low values of R-squared).

Finally, following Bazerman and Farber, one additional model was estimated in which the weights associated with the facts (i.e., γ) was itself modeled as a linear function of the difference between the union and employer final offers. This is a reasonable model to estimate to test whether arbitrators look more closely at the facts of a case when the final offers are far apart. However, unlike the results reported by Bazerman and Farber, the estimates of this model provide no evidence that γ varies with the difference between the parties' final offers.

VI. Discussion and Conclusion

The growing reliance on conventional arbitration mechanisms for resolving pay disputes arising in labor-management relations has been accompanied by numerous debates over the nature and operation of such mechanisms. A basic point in contention is whether or not conventional arbitrators make decisions by mechanically compromising between the disputants' final offers. If this is indeed the way arbitrators tend to make decisions, then conventional arbitration may provide disincentives for bargainers to engage in concessionary behavior in the negotiation process that precedes arbitration. As a result, conventional arbitration will tend to increase the fraction of disputes that are settled by a third-party. This contradicts a fundamental tenet of the American system of industrial relations -- the principle of voluntarism -- according to which it is desirable for bargaining outcomes to be determined by the individual parties to the greatest extent possible. It seems especially worthwhile to research the extent of mechanical compromise behavior in view of (1) the popular perception of labor relations practitioners that conventional arbitrators often do "split-the-difference;" and (2) the growing use of final-offer arbitration,

which creates a whole new set of theoretical and practical difficulties just to prevent arbitrators from compromising between the parties' final positions.

Unlike previous studies that apply sophisticated econometric techniques to relatively weak data (and report finding little evidence of compromise behavior), this study seeks to generate somewhat richer data and to apply a simple econometric technique. Ultimately, it is impossible to determine the extent to which conclusions drawn from these data generalize to behavior in an actual arbitration system. Nonetheless, the fact is that all of the arbitrators who provided decisions for this study are members of the National Academy of Arbitrators, an organization of the most experienced arbitrators in North America. In addition, 78 percent of the participating arbitrators indicated that the arbitration exercises captured the main features of interest arbitration "reasonably well" or better. Finally, since all of the arbitration awards analyzed were accompanied by a one paragraph arbitration decision in which arbitrators almost always justified their decision in terms of the facts of the case, it is hard to argue that arbitrators decided these cases in a substantially different manner than they would decide an actual case (i.e., that because they were not being paid to arbitrate the experimental cases and presumably had no incentive to be asked to arbitrate such cases again, they took the easy way out by splitting-the-difference). Indeed, the variability of arbitrator decisions in the experimental data analyzed in this study is similar in magnitude to estimates of cross-arbitrator variability derived from actual arbitration decisions in New Jersey (see Ashenfelter and Bloom, 1984, esp. Table 3). Nonetheless, the fact that the arbitrators had no financial incentives to respond carefully to the cases they decided must surely be viewed as a potentially important limitation of this study.

Taken at face value, the results of this study are remarkably clear: conventional arbitrators tend to split-the-difference between the parties' final offers with little additional systematic reference to the facts of the cases. However, because of the substantial amount of unexplained variance in arbitration awards, this characterization of arbitrator behavior should not be regarded as applying to any particular case. Rather, it reflects a systematic tendency of arbitrators across some population of cases. Indeed, of the 55 decisions analyzed in this study, only 8 were exactly equal to the average of the parties' final offers.

The results of this study do not necessarily imply that arbitrators ignore the facts in the cases they hear. Indeed, the nature of the written arbitration decisions analyzed in this study supports the view that arbitrators do pay attention to the facts. Thus, the statistical results seem to be indicating that arbitrators do not share a common preference function. In other words, arbitrators do give weight to the facts, but different arbitrators do it so differently that the weight tends to show up as random noise. This conclusion is supported by estimates of significant inter-arbitrator differences in behavior presented in Ashenfelter and Bloom (1984) and Bazerman (1985), and in research on Iowa's system of tri-offer arbitration discussed in Ashenfelter (1985 and 1987).

The results of this study provide evidence that arbitration decisions are not invariant to the individual who is hired to be the arbitrator. In the context of public adjudication or under a grievance arbitration mechanism, this conclusion might be disturbing since the notion of justice seems to require such an invariance property -- at least at a particular point in time. Wage arbitration is, however, fundamentally different from the adjudication of

these other types of disputes since their is no absolute standard for a "fair" wage. Moreover, the randomness introduced into the system by inter-arbitrator differences may have additional benefits insofar as uncertainty about the individual who will arbitrate a dispute will provide risk-averse bargainers with an incentive to settle their dispute both voluntarily and expeditiously (see Bloom and Cavanagh, 1986).

The estimates presented in this study suggest that the standard deviation of the underlying distribution of arbitral preferences, controlling for the facts of a case, is 11.75 percent. Put another way, if arbitrators were asked to decide the cases in this study without having any knowledge of the parties' final offers, roughly two-thirds of the awards would be in the range -8.5 percent to 15.0 percent, and one-third of the awards would lie outside that range. Perhaps arbitration systems provide arbitrators with knowledge of the parties' final positions to lower this grossly high variance. Alternatively, it might be that arbitrators would be able to lower the variance themselves by studying the facts of the cases more closely in situations in which final offers were not available. One might even conjecture that final-offer arbitration is just the type of mechanism that can induce arbitrators to extract relatively more information from the exogenous facts of a case.

The results of this study are consistent with the view that conventional arbitrators use the parties' final offers to provide information as to the range of settlements that bargainers are likely to view as acceptable. Since this task could probably be accomplished more inexpensively by averaging the parties final offers and adding on some noise using a computer's random number generator, the findings of this study raise important questions about arbitration's raison d'etre. Undoubtedly, the answer to this question has

something to do with the superior ability of a human arbitrator to fine tune arbitration decisions, to endow them with legitimacy in the eyes of disputants, and to induce bargainers to reveal true reflections of their underlying preferences. But this is surely an incomplete answer to a question that seems most worthy of deeper consideration.

Footnotes

1. Although the focus of this paper is on conventional arbitration, models of arbitrator behavior under final-offer arbitration are also reviewed in this section since they can play an important role in identifying the parameters of conventional arbitrator behavior.

2. The R^2 from a regression that just includes the average of the final offers is .447.

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Table I

Pairs of Employer and Union Final Offers
and Average Arbitration Awards, by City

	City											
	Camden			Mount Olive			Mahwah			North Bergen		
	w^e	w^u	N	w^e	w^n	N	w^e	w^u	N	w^e	w^u	N
Pair 1	6.0	8.0	3	7.4	9.8	4	8.0	10.0	3	0.0	14.0	3
(Avg. Award)		(6.33)			(7.68)			(8.93)			(6.97)	
Pair 2	4.0	8.0	4	6.8	9.2	5	6.0	10.0	6	3.5	9.0	5
(Avg. Award)		(6.00)			(7.60)			(7.50)			(5.70)	
Pair 3	2.0	10.0	3	6.0	8.4	6	7.0	9.0	7	0.0	9.0	6
(Avg. Award)		(4.93)			(7.18)			(7.60)			(4.30)	

w^e = employer's final offer in percent

w^u = union's final offer in percent

N = number of observations with each pair of final offers
(total number of observations equals 55)

Table II

Ordinary Least Squares Estimates of Equation (1a) and Alternative Specifications of Equation (1b)*

Parameter/ RHS Variable	Descriptive Statistics	(1a)	(1b) Reduced-Form Coefficients	(1b) Structural Coefficients: Constrained	(1b) Structural Coefficients: Unconstrained
Constant	6.724	5.371 (.406)	.387 (1.645)	3.225 (11.401)	2.823 (15.782)
Camden Dummy**		.408 (.629)	-.154 (.609)	-1.283 (4.069)	-1.092 (5.656)
Mt. Olive Dummy**		2.082 (.564)	.163 (.808)	1.358 (5.920)	1.681 (7.668)
Mahwah Dummy**		2.441 (.556)	.216 (.880)	1.800 (5.981)	2.109 (7.431)
$(w^e+w^u)/2$			.880 (.283)	.880 (.283)	
w^u					.435 (.173)
w^e					.446 (.174)
σ	1.822	1.519	1.404	11.74	11.92
R^2		.343	.450		

*Estimated standard errors are reported in parentheses below coefficient estimates. The standard errors of the structural estimates of the constant and the coefficients of the city dummies in equations (1b) were computed from the asymptotic distribution of the ratio of two coefficients (e.g., the regression constant ($\gamma\beta_0$) and the estimate of γ implied by the regression coefficient on $(w^e+w^u)/2$).

**North Bergen is the reference category for the city dummies.

Table III

City-Specific Ordinary Least Squares Estimates of Equation (1b)*

PARAMETER/ RHS VARIABLE	CITY: CAMDEN	MOUNT OLIVE	MAHWAH	NORTH BERGEN
CONSTANT	0.800 (5.121)	4.526 (1.077)	-3.482 (5.028)	-0.155 (3.603)
$(w^e+w^u)/2$	0.791 (0.811)	0.373 (0.137)	1.380 (.613)	0.976 (0.626)
R-squared	.11	.36	.27	.17
Number of observations	10	15	16	14

* Estimated standard errors are reported in parentheses below coefficient estimates.