To Settle or Not To Settle: A Review of the Literature on Arbitration in the Laboratory

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1. Introduction

Dispute resolution mechanisms are important safety nets for negotiation; if disagreement results in the complete loss of a potential surplus, any sort of agreement that allocates the surplus is necessarily a better outcome. Litigation as a dispute resolution mechanism is both costly and lengthy, and considering the appellate aspect of the American and other legal systems, decisions from litigation may not be final. Arbitration is a simple concept which requires minimal time and resource, thus it represents an improvement over litigation in terms of dispute resolution.

Despite arbitration's advantages over litigation, there are questions surrounding the successful implementation and potential pitfalls of arbitration. We not only expect arbitration to divide resources fairly between the parties, but we expect it to encourage pre-arbitration settlement. In other words, the best method of arbitration is never resorted to. This goal derives from the well known result by Crawford (1979) that voluntary settlements are superior to mandated settlements for a variety of reasons. Given these two objectives of arbitration, certain questions come to mind about the process. What method of arbitration best encourages agreement (i.e. given an arbitrator's fair notion of a settlement, how best to translate that notion into a decision about splitting the surplus)? What causes bargainer disagreement in the first place? Does the use of arbitration beget a reliance on more arbitration in the future?

Beginning in the early 1980s and continuing through the present, there has been a concerted effort by economists to answer these questions using data from laboratory experiments. While there are contradictions and disagreements throughout the thirty years of literature, our understanding of the most common arbitration processes has

developed into a relatively clear picture. By addressing the three questions posed above (and covering some other aspects of arbitration), we develop that picture and how it came into being what it is today.

2. Types of Arbitration

2.1 Conventional and Final Offer Arbitration

All types of arbitration decisions are based on a third party rendering a judgment as to a fair settlement between the two disagreeing parties. In the simplest form of arbitration, conventional arbitration (CA), if the parties fail to reach an agreement, the arbitrator's judgment will simply be imposed. Along with CA, final offer arbitration (FOA) is the most commonly studied type of arbitration. First proposed by Stevens (1966) as an arbitration method that might encourage pre-arbitration settlement, FOA requires both parties to submit final offers to the arbitrator. One offer is picked as the settlement. A presumption in all of the literature reviewed is that the arbitrator will choose the final offer closest to his or her notion of a fair settlement. FOA arose out of a criticism of CA; that by providing the safety net of an arbitrator's decision, rather than a total loss at the end of the process, bargainers felt little pressure to relax their demands during negotiation. This has been called the chilling effect of arbitration, and in all of the literature reviewed, it is a firm conclusion that introducing arbitration in general reduces settlement rates.

Theory predicts that arbitration should never be used as long as it has positive cost. Given that cost, there exists a range of settlements that are preferential to

arbitration: $[\mu - c_w, \mu + c_f]$[1], where μ is the mean of the distribution of the arbitrator's

notion of a fair settlement (and therefore the expected decision of a CA arbitrator) and c_i

is the cost of arbitration to the bargaining parties (worker and firm in this example). This

region is commonly called the contract zone. When this contract zone exists, parties

should theoretically settle 100% of the time.

In the case of FOA, the expected value of arbitration, and thus contract zone,

depends on the optimal offers for both parties. Farmer & Pecorino (1998) assume a

uniform distribution of the arbitrator's notion of a fair award and show that in that case,

the optimum offers under FOA are the extremes of the distribution. The probability of

either offer being chosen is the probability that the random draw from a uniform

distribution is greater (or lesser) than its mean. So the contract zone in this case is exactly

the same as in CA.[2] Note that uniformity of the distribution is not required to generate

the existence of a contract zone in FOA, however it simplifies the explanation. Farber

(1980) and Brams & Merrill (1983) demonstrate that final offers under FOA do indeed

diverge in a more general case.

Whether or not the size of the contract zone is positively correlated with

agreement rates is an issue of debate. Arguments can be made both ways: a larger zone

increases the number of possible agreements that both parties prefer to arbitration, but

within that area, each party is seeking to maximize gain, so a smaller area may limit

disagreement. Deck & Farmer (2003) addresses this issue by running a lab experiment

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[1] The two parties in the negotiation take opposite utilities from a given value of the settlement. One party
wishes to raise the value while the other wishes to decrease it.
[2] Farber & Bazerman (1989) conclude that the contract zone in CA is larger than in FOA. However, they
assume that in CA, the final award is a weighted average of the arbitrator's notion of a fair award and the
last offers submitted by the parties to each other during negotiation.   Since then, the common theoretical
assumption and the practical lab assumption is not to weight the parties last offers in CA.

on CA and FOA. For both CA and FOA, they have treatments with the four possible combinations of high and low variance on the arbitrator award as well as large and small surpluses to be divided. Each one of these different scenarios has a different contract zone size. By ranking the settlement rates for these treatments within each session and calculating the correlation between that ranking and the contract zone size, they are able to conclude that the size is positively correlated with agreement.

Early lab experiments that suggested that FOA encourages more pre-arbitration settlement than CA (Notz & Starke [1978], Starke & Notz [1981] and Neale & Bazerman [1983]) have since been criticized. Notz & Starke (1978) and Starke & Notz (1981) based their conclusions on analyses of self-reported bargainer aspirations at the end of each negotiating period because very few bargaining pairs reached agreement (in the case of their 1978 paper, only 3.3% of pairs). Ashenfelter et al (1992) point out that in the Notz & Starke (1978), Starke & Notz (1981) and Neale & Bazerman (1983) studies, subjects were given no background for generating expectations about the arbitration award; subjects were simply told that if no agreement were reached, and arbitrator would make a binding decision as to the outcome.

Ashenfelter et al (1992) goes on to test CA and FOA in a more precisely controlled setting. They model arbitrator behavior as a random draw from a distribution and provide bargainers with information from past arbitrator decisions in the same scenario (a list of random draws from the same distribution). Their results strongly reject the hypothesis that FOA has a higher settlement rate than CA, and suggest that it has a significantly lower rate of settlement. Dickinson (2004, 2005), Deck & Farmer (2003, 2007) and Deck, Farmer & Zeng (2007b) echo the conclusion that FOA does no better

than CA at discouraging disagreement. The Dickinson (2004, 2005) results put the average settlement rate under no arbitration between 75% and 80%, under CA between 45% and 52% and under FOA between 37% and 44%. The Ashenfelter results suggest much higher rates of settlement, but the same relative performance: 96% under no arbitration, 72% under CA and 62% under FOA.

Additionally to the credit of CA, Kritikos (2006)[3] finds that FOA pushes parties to an equal split of the pie in 80% of cases, which he claims is an unnatural distortion of the bargaining process. Equal splits are about as likely in CA as they are with no arbitration, which is less than half of the time.

Deck & Farmer (2007) and Deck, Farmer & Zeng (2007b) also show that this result is robust to the scenario in which the parties are uncertain of the final value of the quantity bargained over (e.g. bargaining over a baseball player's contract for the forthcoming season). The latter paper reports an agreement rate of 43% for CA and 31% for FOA when the value of the total surplus is uncertain.

These authors note that the uncertainty scenario produces a bargaining environment that favors the firm (using the example of wage negotiations) in FOA. The convolution of the distributions for all possible surplus values has a median below its mean because the distributions all overlap on the left tail (as the distributions all range from zero to some value greater than zero). Since the range of acceptable settlements in FOA (CA) is centered on the median (mean) of the surplus distribution, this environment theoretically favors the firm.

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[3] It should be noted that the results in Kritikos (2006) also find that FOA induces more agreement than CA, but there are substantial difference in between his methodology and the common methodology in the papers cited above. He introduces human arbitrators with full knowledge of the complete negotiation history of the parties to choose final offers, which may certainly influence outcomes of arbitration and through that, bargainer behavior.

2.2 Alternative Forms of Arbitration

While CA and FOA are the most commonly tested types of arbitration, a number of alternative techniques have been reported on. These include tri offer arbitration (TRI), combined arbitration (CombA), double offer arbitration (DOA), amended final offer arbitration (AFOA) and automated negotiation (AN).

Ashenfelter et al (1992) introduce tri-offer arbitration as a way of adjusting FOA such that an arbitrator is not limited to one of the parties' final offers. An independent fourth party fact finder makes a judgment as to what a fair settlement is, and then the arbitrator must choose from the offers made by the parties or the fact-finder's recommendation. Parties to the negotiations are made aware of this recommendation during the course of bargaining, and the recommendation is drawn from the same distribution as the arbitrator award. The decision rule employed is similar to FOA in that whichever offer is closest to the arbitrator's notion of a fair settlement is chosen. They find that under TRI, agreement rates are significantly lesser than in FOA and weakly greater than in CA. Thus it does not represent an improvement over common forms of arbitration.

Dickinson (2004, 2005) tests the combined arbitration and double offer arbitration procedures in an attempt to improve upon pre-arbitration settlement rates. In the cases of both CombA and DOA, the theoretically optimum final offers for the bargaining parties in arbitration converge (recall that in FOA, final offers diverge and that CA doesn't involve final offers). Therefore, with identical expectations from arbitration and a positive cost of arbitration, the parties can settle at the exact point of offer convergence and avoid the arbitration cos.

Brams & Merrill (1986) first proposed CombA as a hybrid arbitration mechanism. When the arbitrator's notion of a fair award lies in between the parties' final offers, the FOA decision rule is used. Otherwise, the CA decision rule is used. First proposed by Zeng, Nakamura & Ibarakibolton (1996), double offer arbitration requires both parties to submit two offers which they are told should be their demanded settlement (the first offer) and their expectation of the aribtrator's desired settlement (their second offer). The difference between the first and second offers is averaged by some weight α with the difference between their second offer and the arbitrator's notion of a fair settlement. Whichever party's weighted average is lower wins the arbitration and receives his or her first offer. As long as α is chosen such that the difference between the second offers and the arbitrator's fair award is given greater weight than the difference between the first and second offers, the secondary offers will converge to the median of the distribution on the arbitrator's notion of a fair settlement. Under the rules of the procedure, this convergence of second offers results in automatic settlement.

Empirically, these convergent predictions do not pan out. In the case of CombA, settlement rates are significantly lower than under CA and indistinguishable from rates under FOA. Dickinson's (2004) proposed explanation for this is disputant optimism and nearsightedness; i.e. optimism favorably alters their perception of the arbitrator award distribution they are faced with and they fail to anticipate the same type of optimism on their opponent's behalf. Under these conditions and the assumption that average offers are the same across all types of arbitration (an assumption not supported by theory, but rather by the empirical evidence), he demonstrates that theoretically, CombA should have the lowest agreement rate, followed by FOA and then CA. This is nominally in line with

the results from the lab experiment (although as mentioned earlier, CombA and FOA insignificantly different). Optimism is covered in greater detail in section 3.

The DOA results are similar. It only produces agreement at the same rate as CA, and a slightly better rate than FOA. Furthermore, when DOA is used to decide a dispute, the outcomes are far more extreme than in CA and FOA because the first offer is awarded rather than the second offer. Deck, Farmer & Zeng (2007a) explain that these first offers are more extreme than the offers made in FOA because in FOA, a single offer serves two purposes: to get closer to the arbitrator's chosen value and to earn a good settlement for a party. The two offers allow the parties to split these two purposes up somewhat; without this constraint, the offer designed to earn a settlement is pushed to an extreme.

A final note about DOA is that Dickinson (2005) finds it not habit forming within the context of Bolton & Katok (1998). They show that use of CA retards bargainer learning, and Dickinson (2005) finds that DOA specifically, does not.. This is explained in greater detail in section 4.

Logic about the two competing functions of the final offer is the basis of Zeng's (2003) proposal of amended final offer arbitration. This mechanism works by limiting the function of the final offer to determining who wins the settlement. The amount of the settlement depends on the loser's offer. This structure produces convergent final offers in arbitration at the expected value of the arbitrator's distribution on the fair settlement, thereby giving the bargainers an ex ante knowledge of the outcome of arbitration and rendering it pointless. In AFOA the arbitrator will choose the party whose offer is closest to his or her notion of a fair award and award that party the fair award plus the difference

between that fair award and the other party's final offer. In this way, AFOA is similar to a second price auction.

Deck, Farmer & Zeng (2007a) tests the theoretical predictions of AFOA. They find that AFOA generates greater pre-arbitration settlement than FOA (93% versus 75%), that final offers during arbitration were clustered around the expected value of the arbitrator's award in AFOA and that the variance of final offers in AFOA was lower than that of FOA. The authors note that the final offers in FOA, while more extreme than in AFOA are far from the predicted values of the extremes of the award distribution. This is a common result to all papers testing FOA in the lab, and would seem to be the result of risk aversion. However, why the average offer in FOA is 56% of the pie rather than 100% (the theoretical prediction) cannot be fully explained by risk aversion.

Deck, Farmer & Zeng (2007b) extends this comparison of AFOA with FOA to the situation in which the entire value of the surplus is uncertain, and includes CA in the analysis. The results here indicate again that AFOA produces a substantially higher agreement rate than FOA, but only a weakly higher rate than CA.

Automated negotiation comes not from a theoretical attempt to fix a pitfall of common arbitration systems, but rather from online dispute resolution websites already using the procedure commercially. For a fee, parties in dispute over pricing can use AN without ever meeting face to face. As described by Gabuthy, Jacquemet & Marchand (2008), users of AN submit their offers to the online website which in turn does one of three things: if the offers are equal or overlap, the case is settled at the seller's offered price. If the offers diverge, but remain within a factor of δ of each other (i.e. $(1 + \delta)p_b \geq p_s$ where p_b is the buyer's offered price and p_s is the seller's offered price), then the case

is settled at the average of the two offers. If the offers diverge by a greater factor, an agreement is not reached. The theoretical predictions for this model are that it will reduce agreement rates. For low values of δ, negotiations under AN are essentially the same as negotiations without the threat of arbitration because the range of offers affected by δ is negligible. For higher values of δ, arbitration provides such a safety net that the threat of arbitration ending without a settlement is not credible.

The hypothesis tested by Gabuthy, Jacquemet & Marchand (2008) is whether or not the value of the compatibility factor is significant in determining whether or not the parties reach agreement (essentially testing how the agreement rate in AN differs from the rate without arbitration). They find that a higher compatibility factor makes bargainers more aggressive in their offers (specifically they find that it makes buyer more aggressive) and that it does not significantly affect the chances of a settlement. Some of their experimental treatments were designed to create higher conflict situations, and in these treatments, the compatibility factor was marginally significant in increasing the likelihood of settlement. Overall, this does not appear to be an improvement, but as the authors don't compare AN directly to CA or FOA, it is uncertain.

3. Causes of Disagreement

3.1 Optimism

In any case of bargaining in which arbitration has positive cost, bargainers are risk neutral (or averse) and have unbiased expectations of the arbitration award, the two parties are expected to settle. Clear from the previous section is that this does not empirically pan out. One explanation for this phenomenon is that bargainers do not have

unbiased expectations of the arbitrator's award. More specifically, bargainers are overly optimistic about the award they expect to receive from arbitration. It is a simple theoretical leap from optimism to disagreement. If a party is overly confident about the award that he or she will receive from the arbitrator, this will affect the settlement level at which they are indifferent between settlement and arbitration, and therefore reduce the size of the contract zone.

Neale & Bazerman (1983) found evidence of optimistic expectations among bargainers playing a bargaining game under the threat of FOA. By definition, 50% of final offers will be chosen by the arbitrator, but when participants in an experiment were asked, after submitting their final offers, what the probability was that their offer would be chosen, the average response was 68%.

Even if such divergent expectations exist, it still needs to be shown that they cause disagreement. Farber & Bazerman (1989) begin to tackle this issue with a straightforward proposition: overly optimistic expectations reduce the size of the contract zone, so if disagreement increases as the contract zone shrinks, this is evidence that divergent expectations are a possible cause of disagreement. To test this, they estimate contract zone sizes for a FOA negotiation and a CA negotiation with varying parameters of risk aversion and award distribution variance.

As mentioned earlier, assuming a uniform distribution and the common forms of CA and FOA, the two arbitration mechanisms create identical contract zones. To avoid this, Farber & Bazerman (1989) model arbitrator awards using a normal distribution and uses of form of CA in which the final decision is a weighted average of the arbitrator's notion of a fair award and the mean of the parties' last offers made during bargaining. As a

result, the contract zone under CA is larger than under FOA, robust to all but the most extreme specifications of the model.

Based on that result and the accepted wisdom and research of the time that settlement rates were much higher under FOA than CA, they conclude that due to this apparent negative correlation between contract zone size and settlement rates, bargainer optimism is an unlikely source of disagreement. As described earlier, modern research indicates that CA produces settlement rate similar to or above those produced by FOA. Furthermore, a main conclusion from Deck & Farmer (2003) and Farber, Neale & Bazerman (1990) is that contract zone size is positively correlated with settlement rates. Applying Farber & Bazerman's (1989) logic to those facts implies that disputant optimism could in fact be driving disagreement.

Dickinson (2004) provides a test for disputant optimism in his study of CombA (mentioned earlier). Theory predicts, based on unbiased expectations of arbitrator awards and normally distributed awards that CombA should have a higher agreement rate than CA. However, assuming sufficiently optimistic bargainer expectations, theory predicts the opposite; it predicts CombA to have the lowest agreement rate and CA to have the highest. The results of his lab experiment are exactly that: 40% agreement in CombA, 43% agreement in FOA and 51% agreement in CA (with the difference between CA and CombA significant at 1%).

Based on results from a lab experiment first reported by Dickinson (2003), Dickinson (2005) performs a more explicit test of optimism in bargaining. Prior to each round of FOA bargaining, expectations of arbitrator behavior were elicited from each subject. The gap between the expectations of each subject in any bargaining pair is a measure of

optimism (or in rare cases, pessimism) within that pair. Dickinson finds that as pairwise optimism increases by one standard deviation in the distribution of settlements, the likelihood of settlement decreases by 4.2%. Additionally, he finds that final offers are significantly increased by pairwise optimism, leading to more extreme decisions in FOA.

The increases in final offer levels observed in empirical studies are not as substantial as predicted by theory, and Dickinson suggests that risk aversion may be the cause of the gap between theory and practice. Theory predicts an exponential increase in final offer divergence with optimism, however, the curve that best fits the experimental data exhibits a decreasing marginal effect to optimism. Risk aversion would imply a parametric shift of the exponential curve, not a change in functional form.

3.2 Asymmetric Information

The majority of experimental and theoretical papers on arbitration use symmetric models of bargaining to simplify calculations and lab protocols. Distributions are symmetric, payoff schemes are identical and bargainers have similar knowledge about the distribution of possible awards. There are many reasons to believe that actual arbitration scenarios and even lab scenarios may not be so truly symmetric. Regarding the distribution of possible awards, certain parties may be much more familiar with arbitration in general or a specific arbitrator being used. Even in the lab, when subjects are given a list of past decisions by the arbitrator, some participants are likely to make better sense of the numbers than others. Some may realize they are being faced with a normal or uniform distribution in a certain range while others may not extrapolate anything. Therefore, it is worth considering differences in expectations of arbitrator behavior as a cause of disagreement.

A model in which disagreement results from asymmetric information about arbitrator behavior is proposed by Farmer & Pecorino (1998) and then tested in the lab by Pecorino & Van Boening (2001). They develop an arbitration procedure in which differently informed bargainers are given an opportunity to renegotiate after submitting potentially binding bids and being made aware of the other party's bid. The idea behind this structure is that the uninformed party can learn from the informed party's bid and use that information to make a mutually acceptable offer.

Procedurally, the uninformed party (call it party A) makes an initial offer to the informed party (call it party B). Party B knows which of two award distributions the two are negotiating over, selected with probabilities p and (1-p). One distribution has a greater mean than the other. Party A is aware of p, the probability of receiving the distribution with higher mean, but nothing else. If Party B does not accept the initial offer, the two parties submit final offers to an arbitrator. In the control, the case is then decided as if it were an FOA decision, but in the treatment group, once party A is made aware of party B's final offer, he or she has an opportunity to make another offer. If this offer is rejected, the arbitrator chooses once of the previously made final offers.

Theoretically, the uninformed party can use information gleaned from the informed party's decision to accept or reject their initial offer and the final offer that they submit for arbitration. The authors show that without an opportunity to renegotiate, the chance of going to arbitration is just p, the probability of the distribution with higher mean being selected. With renegotiation, the probability of going to arbitration is $p\Phi < p$. Where $0 < \Phi < 1$ is the probability that the renegotiation offer is rejected. Therefore, theory predicts

that allowing renegotiation after an information exchange necessarily reduces the frequency of arbitration.

Their results show that when the period of renegotiation is added, the agreement rate jumps from 27% to 54%. The fact that there is an extra bargaining opportunity surely explains some of this result, but a full doubling of the agreement rate is indicative of a successful transfer of information about the distribution of awards from party B to party A. That this information exchange improves the rate at which parties avoid agreement is evidence, although certainly not concrete, that asymmetric information could be a contributing factor to disagreement.

4. The Narcotic Effect of Arbitration

Critics of arbitration have suggested that the use of arbitration is addictive; in other words, they worry that by using arbitration once, bargainers will learn to rely on arbitration rather than negotiation. Given that one of the goals of arbitration is to encourage agreement, this criticism ought not to be taken lightly. In the ideal case arbitration should discourage its use in the future.

Butler & Ehrenberg (1981) demonstrate using New York state police and firefighter data that arbitration can be negative state dependent (discourages its future use), and Currie (1989) uses British Columbia teacher negotiation data to show that it can be positive state dependent (addictive). As pointed out by Currie & Farber (1992), there are plausible explanations for both positive and negative state dependency. The use of arbitration reduces uncertainty about the process and a breakdown in negotiations might foster ill-will between parties: two factors that could create positive state dependency.

Failure to settle could also indicate the bargaining strength of a party and inspire conciliatory behavior in the future: negative state dependence.

Currie & Farber (1992) are the first to attack this issue experimentally. To test for state dependence, they perform a simple pie splitting negotiation game with the threat of arbitration imposed on the treatment group, and no threat of arbitration imposed on the control. Each pair bargains for 20 rounds and the rounds are broken down into groups of five. Rounds that go to arbitration are assigned a value 1 and rounds that do not are assigned a value 0: e.g. {1,0,0,1,1} is a set of five negotiations. Their hypothesis is that given a certain sum of the values within each set (the number of total disagreements), the arrangements of the five values should occur with equal likelihood. If for example, {0,0,1,1,1} were to appear more frequently than expected, it would be evidence of a narcotic effect.

Their results fail to reject the null hypothesis of no state dependence in either direction for the lab experiment. They also used a similar method to test additional field data from British Columbia teacher negotiations, and find weak evidence of positive state dependence. However, they attribute this result to factors outside the scope of the lab experiment and conclude that arbitration "per se" (as used in a context free laboratory game) is non-addictive.

Bolton & Katok (1998) reevaluates this problem with a different take on how a narcotic effect of arbitration could express itself in the data. They point out that studies such as Currie & Farber (1992) ignore the possibility of there being an overall learning curve to arbitration under which rounds near the beginning of an experiment have a higher incidence of arbitration than rounds near the end of an experiment. Essentially,

they criticize Currie & Farber (1992) for splitting their data up into four supposedly independent series of five negotiations when in fact it was one session with twenty negotiations.

As such, the lab experiment performed by Bolton & Katok (1998) consists of a control group bargaining under no arbitration and a treatment bargaining under CA for a twelve round period. They find that within each group, early round dispute rates are significantly higher than late round rates, indicating a genuine learning curve over the course of the experiment. The difference in learning between the no arbitration and CA groups is statistically significant: the dispute rate for the group without arbitration falls 63% throughout the experiment but only 40% for the CA group. They repeat the experiment with four additional types of arbitration, and except for the case in which the use an arbitrator biased in the direction of one of the bargainers, the results corroborate the original findings. So while arbitration's narcotic effect may not lead to state dependency, it could possibly be slowing down the rate at which bargainers learn not to use arbitration.

As mentioned earlier, Dickinson (2005) tests the mechanism of double offer arbitration to see if it exhibits this tendency to retard bargainer learning. He finds that it does not. So while dispute rates are no better under DOA than CA, and DOA induces more extreme outcomes, it certainly has the advantage of being less narcotic than other forms of arbitration.

5. Miscellaneous Research

5.1 Cross Cultural Bargaining

As arbitration has gained popularity as a mechanism to resolve international disputes, there has been research done to determine if outcomes are different within and between different cultural groups. Deck, Farmer & Zeng (2009) uses FOA to test bargaining differences between American and Japanese subjects. Prior to each session, subjects were made aware of whom they playing: either another player of the same culture of one of the other. When they were told that they were playing against a subject of the other culture, they were shown live video of the lab in the other country to reassure them that they were indeed negotiating with a different cultural group.

Their results demonstrate that when negotiating within a cultural group, American and Japanese subjects act similarly. Americans demand on average 56% of the pie from other Americans and Japanese demand on average 58% from other Japanese. These differences are not statistically significant. Japanese subjects demand on average 60.5% of the pie from American subjects, which is not statistically different from what they offer other Japanese bargainers. However, Americans demand on average 67% of the pie from Japanese opponents, which is significantly greater than their offer to fellow Americans. These higher demands translate into increased agreement rates in the inter-cultural treatments. While the settlement rate of intra-Japanese negotiations was only 64%, the settlement rate for inter-cultural treatments was 82%, indicating that the more aggressive strategy of the American bargainers may be effective against Japanese subjects. Intra-American treatments had an average settlement rate of 70%, but the high

variance between bargaining pairs renders that figure statistically indifferent from either of the other means.

Deck, Farmer & Zeng (2009) is the only attempt to put subjects from different cultures into identical, simultaneous and equally remunerative arbitration games with each other. Given the organizational difficulties that such an effort must entail, this is not surprising; however, there is certainly room for attempts to document negotiations between wider arrays of cultures.

5.2 Fact Finding Investments & Bid Privacy

At first glance, the issues of fact finding investments and bid privacy may not belong together, but Deck and Farmer (2009) address both topics and demonstrate that they are quite similar. In true applications of arbitration, it is common practice for parties to a dispute to submit documents supporting and pleading their case prior to the arbitrator making a decision.

Deck and Farmer (2009) model this as bargainers spending money to influence the distribution from which the arbitrator's notion of a fair award is drawn. They start with a situation of forced FOA (where in the case that the bids overlap, the case is settled), but players are then given an opportunity to spend money to shift the distribution of the fair award in their direction. When this investment opportunity is given varies: either before or after the bargainers submit their bids. They also vary whether or not the investments and bids (whichever comes first) are private or public information. As such, they have a total of four cases. In case 1, subjects choose how much to invest, are then made aware of their opponent's investment and are then asked to submit final offers. In case 2, players place final offers, are then made aware of their opponent's final offer and are then

asked to make an investment. In case 3, players place final offer bids and then make investments, while case 4 is simply the reverse of that.

Interestingly, of the four cases, three have the exact same theoretically predicted bids and investments. The case in which public investments are made before bidding and both private cases retain the original bid predictions from common FOA with a uniformly distributed award: the most extreme bids possible. The investment predictions in these three cases are the same as well; the bargainers will pay to shift the distribution until the marginal benefit from shifting the distribution equals the marginal cost of investment. When players submit public bids followed by investments, the theoretical predictions are different: bargainers make non-extreme bids and spend less on investments. For these reasons, the public, bidding-first mechanism is a theoretical improvement over the others.

The results confirm the theoretical outcome that investments are lower and bids are less extreme when public, rather than private bids are made before investments. However, the theory that investing publicly before bidding is the same as bidding privately before investing runs against the empirical findings. The public, investment first case creates a reduction in investment expenditures and bid extremity just like the public, bid-first case. Furthermore, the authors find that bargainers seem to moderate whichever action is public; if they are asked to invest publicly, investments are less then predicted, and if asked to bid publicly, bids are less extreme than predicted.

This is an effective demonstration of the power of making bids or investments in arbitration procedures publicly salient. In addition to giving both parties additional information to work off of, publicly visible bids may provide enforcement against strategies that might foster ill will and harm future negotiations. As a side note, the

authors chose not to test the scenario in which private investments were made before bids, on the grounds that it was theoretically identical to the other private case. Given the surprising results of the experiment, it might be worthwhile to add this test to corroborate the fact that salience of bids is the true causal factors in the difference of outcome.

6. Conclusion

Arbitration by nature lends itself to testing in the laboratory. Although true examples of arbitration involve corporations, unions, buyers, sellers and all sorts of entities, each disagreement boils down to one basic issue: dealing with the allocation of something from which the parties derive utility in the opposite fashion. Negotiating over wages, unions push up and firms push down. Negotiating over how much of the pie party A gets, party A pushes up and party B pushes down. The application of arbitration to such a dispute in the laboratory accurately replicates the core aspects of its application to a dispute in the field.

Existing research makes it clear that using arbitration is generally a safety net rather than a threat, and tests a plethora of different mechanisms that encourage the least extreme bids and the lowest use of arbitration. It illustrates that bargainers may resort to arbitration because they are overly optimistic about their position or because they parties hold unequal information about the arbitrator's behavior. It tells us that while arbitration does not beget future arbitration, it may slow the process by which bargainers learn to avoid arbitration.

What existing research does not spend much time discussing are the outcomes of negotiations. Authors have focused steadily on settlement rates and bid values, but

analyses of final outcomes and total welfare results are noticeably absent from the picture. Papers are quick to point out that the safety net of arbitration increases the incidence of dispute, but it seems forgotten that when negotiations do fail, 100% of any surplus to be divided is lost. In cases under arbitration, even if the parties are bitterly embroiled in dispute, the entire surplus (beside the costs of an arbitrator) is saved. For workers who might be forced to strike, sellers who might be faced with a shipment of their product with no destination, or baseball teams who might be left without a second baseman, this is a substantial gain. Perhaps the literature will address this topic in the future.

Another topic that is rarely addressed in the literature is risk aversion. Almost without exception, the results reported by experimental papers in this field find bargainer behavior that is more moderate, more concessionary than expected. Because all of the predictions are made under a risk-neutral assumption, a natural explanation for this moderation is risk aversion. Farber, Neale & Bazerman (1990) finds direct evidence of risk aversion in a questionnaire that accompanied their experiment. They asked subjects for direct estimates of their reservation wages (the level at which they were indifferent between settlement and arbitration) and found that the de facto contract zones defined by these reservation wages were larger than the theoretically predicted contract zones. They also found that in many cases where a settlement was reached outside of the theoretical contract zone, the settlement was inside the de facto contract zone. Explaining the prevalence of risk aversion in small scale games, how risk aversion interacts with different arbitration mechanisms and how asymmetric risk situations (a large firm

bargaining with an individual for example) affect behavior and outcomes are all

possibilities for future research in this field.

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