The Impact of Award Uncertainty on Settlement Negotiations*

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Abstract

Legal disputes are often negotiated under the backdrop of an adjudicated award. While settlements are common, they are not universal. In this paper, we empirically explore how uncertainty in adjudicated awards impacts settlement negotiations. To do so, we develop an experimental design to test how increases in variance and positive skewness of the award distribution impact negotiations and settlement rates. We find increases in variance decrease settlement rates, while increases in skewness generally increases settlement rates. We also gather individual measures of risk aversion and prudence, and incorporate these measures into the analysis to test for heterogeneous treatment effects. Overall, our results suggest that highly variable adjudicated awards can contribute to the excess use of inefficient litigation, while more positively skewed awards can reduce the use of inefficient litigation.

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1 Introduction

Settlement negotiations between disputing parties are often carried out under the backdrop of an adjudicated award if the parties fail to settle. Examples of such disputes include: punitive damages, patent infringements, breaches of contract, antitrust, labor arbitration, and eminent domain. Litigation dispute models of this type abound, and while these models differ in their informational structures and underlying assumptions, a common feature is costly litigation when settlement negotiations fail; consequently, it is often beneficial for both parties to negotiate a settlement and avoid litigation.[3] While settlements are common in practice, they are not ubiquitous.[4] Given the (possible) inefficiency associated with excessive and costly litigation, it is important to understand the potential sources of settlement failure (as discussed by Babcock & Lowenstein, 1997).

In legal disputes, there is likely to be substantial variability and unpredictability in the adjudicated award, especially those handed down by juries. As an epitomizing example, in 1994 Stella Liebeck sued McDonald's after accidentally spilling hot coffee on herself. After failing to reach a settlement, a New Mexico, USA jury awarded Ms Liebeck over $2.86 million to cover medical expenses and punitive damages.[5] Empirical evidence of substantial variation and positive skewness across court awards has been documented in several studies (e.g., Kahneman et al., 1998, Black et al., 2005; Kaplan et al., 2008; and Mazzeo et al., 2013).[6] Sunstein et al. (2002) highlight the likely presence of variability in adjudicated awards in their concluding remarks where they state: "the result [of the award process] is a decision that is unreliable, erratic, and unpredictable." (p. 241)

We posit that the degree of uncertainty in adjudicated awards, either real or perceived, may impact settlement negotiation behavior and, consequently, the likelihood that a settlement is reached. In this paper, we develop a laboratory experiment that enables us to empirically investigate

[3] We refer readers to Posner (1973), Gould (1973), Shavell (1982), P'Ng (1983), Bebchuk (1984), Nalebuff (1987), and Schweizer (1989) for seminal legal dispute models.

[4] For example, Kaplan et al. (2008) document only a 70 percent settlement rate in labor disputes in Mexico. Similar percentages of settlement in different settings are documented in Trubek et al. (1983) and Williams (1983).

[5] On appeal, the verdict was reduced to $640,000 although a private settlement was eventually reached.

[6] Specifically, Kaplan et al. (2008) note that court awards are often more variable than expected in labor disputes in Mexico, in the sense that they are lower than settlements of similar cases. Mazzeo et al. (2013) found that in a sample of 340 patent infringement cases, the top eight court awards accounted for over 47 percent of all damages awarded, which is suggestive of substantial variance and positive skewness. Similarly, Black et al. (2005) consider a sample of closed insurance claims in Texas from 1988 to 2002, and they find that approximately 5 percent of claims account for 42 percent of payouts with jury awards tending to be excessively positively skewed.

how increases in variance and skewness of the adjudicated award distribution impact settlement negotiation behavior, settlement rates, and the degree of inefficient litigation.

Changes in the distribution of awards (assuming the mean is unchanged) would not be expected to impact negotiation behavior and settlement rates under the assumption that the involved agents are risk-neutral (e.g., P'Ng, 1983; Bebchuk, 1984; Nalebuff, 1987; and Schweizer, 1989). However, over the past several decades, a plethora of research has documented decision-making inconsistent with risk-neutrality.[7] Specifically, the role of risk aversion has been explored in various bargaining environments.[8] More recently, several studies have experimentally documented evidence that agents exhibit prudent behavior (Deck & Schlesinger, 2010; 2014; Ebert & Wiesen, 2011; 2014 Maier & Rüger, 2012; and Noussair et al., 2014). As originally termed by Kimball (1990), prudence refers to a convex marginal utility function or an aversion to increases in downside risk (Menezes et al., 1980); prudent behavior is relevant in our context because prudence implies skewness seeking (Ebert & Wiesen, 2011). That is, prudent agents have a preference for more positively skewed distributions. If disputing parties exhibit non risk-neutral behavior, then changes in the variance or skewness of the court award are likely to affect the disputing parties' settlement offers, which can then impact the likelihood of settlement (Posner, 1973).

Ideally, one would want to explore the impact of changes in variance and skewness of adjudicated awards on settlement negotiations using empirical case data. However, this poses some obvious challenges, the most significant of which is the inability to observe the degree of uncertainty in the underlying court award distribution. Second, we may not observe rejected settlements, which would make it difficult to infer welfare implications due to selection. Third, it is often difficult to observe offers in the settlement negotiation process, as well as the associated reservation values of disputing parties. Given these challenges, a controlled experiment is both a suitable and necessary approach to rigorously examine how award uncertainty impacts settlement negotiations. We develop an experimental design that allows us to systematically manipulate the degree of uncertainty in the underlying award distribution while holding other factors constant. Moreover, we also observe the negotiation stage and settlement rates, which enables us to analyze the welfare effects of changes in

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[7] We will not attempt to cite all relevant studies. Rather, we reference Cox & Harrison (2008) and Dave et al. (2010), who provide comprehensive, although not exhaustive, reviews of this extensive body of literature.

[8] Examples include: Shavell (1982) in the context of pretrial negotiation; Grossman & Katz (1983) in plea bargaining; Kihlstrom & Roth (1982) in insurance contracts; Deck & Farmer (2007) in arbitration; and White (2008) in alternate-offer negotiations.

award uncertainty. Lastly, we are able to elicit individual risk preferences and correlate these measures with the propensity to litigate. As such, our study joins a growing body of literature using a controlled experimental environment to better understand legal disputes.[9]

In our experiment, we consider a stylized, bilateral settlement negotiation game where the two involved parties are given an opportunity to negotiate a settlement under the backdrop of an adjudicated award. If negotiations fail and a settlement is not reached, then one of the negotiating parties receives the adjudicated *court* award, which consists of a random draw from a known but uncertain award distribution. We then systematically increase the variance (or skewness) of the award distribution across experimental treatments, while holding the mean and skewness (and variance) constant. By comparing across treatments, we can identify how increases in variance and skewness impact the negotiation behavior of each party (i.e., offers and propensities to accept offers) and, ultimately, settlement rates. Additionally, we elicit individual measures of risk aversion and prudence (a proxy for skewness seeking) using the binary choice lottery method developed by Eeckhoudt & Schlesinger (ES henceforth) (2006). This element of the design allows us to associate behavior in the negotiation task with relative measures of risk aversion and prudence, and provide a more robust analysis of possible differential treatment effects based on individual risk preferences.

Overall, we find that increases in the variance of the court award result in decreased settlement rates, while increases in skewness generally increased settlement rates. Perhaps most importantly, we find that even after controlling for interactions when litigation would be efficient, relatively high levels of variance in the adjudicated award leads to excessive, inefficient litigation, while some positive skewness leads to lower levels of inefficient litigation. Moreover, our main results are generally robust across both a contextually framed settlement negotiation and an abstractly framed setting, which, in our view, increases the robustness of our key findings.

To reduce the burden of excess litigation, several states have enacted tort reforms that cap punitive and/or non-economic damages, or have changed liability laws that may alter the incentives of plaintiffs, defendants, and insurers.[10] Closely related to our work is the prior research that has investigated the effect of damage caps on litigation. Such studies include Browne & Puelz (1999)

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[9] For recent examples see Croson & Mnookin (1997), Babcock & Pogarsky (1999), Pogarsky & Babcock (2001), Babcock & Landeo, (2004), Pecorino & Van Boening (2004; 2010), Landeo et al. (2007), and Collins & Isaac (2012)

[10] We refer readers to the American Tort Reform Association (ATRA) for a thorough discussion of the specific details of individual reforms at the state level (http://www.atra.org/legislation/states).

who show that damage caps tend to reduce both the value of claims and the frequency of frivolous suits. Similarly, Avraham (2007) uses medical malpractice suits and finds that award caps on pain and suffering lead to reduced settlement payments and fewer litigated cases. However, Donohue & Ho (2007) and Durrance (2010) find no evidence that damage caps result in fewer medical malpractice claims. Experimentally, Babcock & Pogarsky (1999) find that a "binding" damage cap tends to increase settlement rates; yet, in a follow-up study, Pogarsky & Babcock (2001) find that a very large "non-binding" cap actually tends to decrease settlement rates. While these prior studies suggest that the degree of award uncertainty can impact settlement negotiations, it is not possible to identify the effects resulting from changes in uncertainty from changes in the expected value of the award, since the imposition of award caps simultaneously decreases the mean, variance, and skewness of the award distribution. However, in our design, we hold constant the mean and variance (skewness), which enables us to separately identify the effect of increased skewness (variance) on settlement negotiations; we view this as an important complement to this extant body of research related to damage caps.

Previous research has suggested that self-serving bias may be one channel that contributes to settlement failure (e.g., Loewenstein et al., 1993; Babcock et al., 1995; Babcock & Loewenstein, 1997; and Babcock & Pogarsky, 1999). The general idea behind the theory is that under the presence of an uncertain and unknown award, plaintiffs hold more optimistic beliefs than the defendant regarding the likely outcome; consequently, this discrepancy in beliefs can lead to settlement failure. In our design, we eliminate this self-serving bias channel as a source of settlement failure by making the award distribution known to both parties. Yet, even with a commonly known award distribution, we document a substantial degree of settlement failure, and find that changes in the variance and skewness of the award distribution significantly impact inefficient settlement failure. Thus, we identify another possible channel through which award uncertainty can influence settlement negotiations.

More broadly, we believe this paper contributes to several areas of existing literature. Regarding the literature on legal disputes, much of the prior work has focused on the role of information asymmetries, credibility, and court cost allocations in contributing to settlement failures. This paper suggests, as an alternative contributing explanation, that the degree of uncertainty in the adjudicated award can impact settlement rates and the use of inefficient litigation. Furthermore, our study contributes to the small existing literature on ultimatum bargaining with an outside option (see

Croson et al., 2003; and Anbarci & Feltovich, 2013 for reviews). These papers have examined cases where the size of the pie is random and/or the outside option is fixed, while we study ultimatum bargaining with an uncertain outside option. Lastly, we join a recent series of papers that explore how prudence can affect economic behavior (see Noussair et al., 2014; and Ebert & Wiesen, 2014 for reviews); specifically, our study provides additional experimental evidence that subjects exhibit prudent behavior, which can influence negotiation behavior.

2 Experimental Design

2.1 The Settlement Negotiation Task

To provide participants with context in the experimental task, the settlement negotiation was framed to participants in a common legal environment – a land acquisition game under the presence of eminent domain (ED henceforth).[11] In particular, the framing is intended to represent the following setting: An individual agent, the seller, owns a plot of land, and a buyer wants to acquire it from the seller and has been granted the power of ED.[12] We assume the value of the land to the buyer is sufficiently high that it remains profitable to acquire the land through the use of ED; thus, invoking ED on the seller is a credible threat. In an attempt to avoid the court costs associated with using ED, the buyer first tries to negotiate a settlement price with the seller. If a settlement is not reached, the buyer files suit to acquire the land via ED; both parties proceed to court where the land is granted to the buyer in exchange for "just" compensation, as determined by the court. In the context of a more general legal dispute, the seller could be viewed as the plaintiff, the buyer as the liable defendant, and the just compensation as the adjudicated court award.

In the experiment, all monetary amounts are in experimental currency units (ECU), which are converted into dollars at a rate of 10 ECU = $1. Buyers are informed that their value for acquiring

[11] Eminent domain is the right of the state to acquire a property in exchange for a court determined fair market value under the takings clause of the 5th Amendment of the US Constitution. In 2005, the U.S. Supreme Court ruled in favor of the City of New London, CT in Kelo vs. New London, which extended the right of ED to private firms and developers that satisfy the public use requirement. The extended right of ED to private firms, as well as the possible inefficiencies resulting from its use, has led to a renewed interest amongst economists and legal scholars. We refer interested readers to GAO (2006), Miceli & Sergerson (2007), Lopez et al. (2009), Shavell (2010), Turnbull (2012), and Kitchens (2014) for more detailed discussions of ED rights, usages, and corresponding legal issues.

[12] One possible concern with using contextually rich framing in is that the main findings may be an artifact of the specific framing and, thus, may not generalize to other relevant negotiation settings involving an uncertain outside option. To address this concern and provide some evidence of the robustness of our main results, we run additional treatments where we use completely abstract framing. In general, we are able to replicate our main results with abstract framing. We discuss these additional treatments and provide more detail regarding the results in Section 4.

the land is 200 ECUs; sellers are informed that their reservation value for the land is 0 ECUs (for simplicity). The litigation cost of using ED is set to 50 ECUs. The negotiation phase consists of an "ultimatum" style bargaining protocol, where the buyer makes a take-it or leave-it settlement offer, and the seller decides whether to accept or reject the buyer's offer. If the seller accepts, then the property is transferred at the accepted price; otherwise, it is transferred via ED in exchange for the awarded compensation, which is a draw from the uncertain award distribution.

Table 1: Court Award Distributions for Each of the Five Treatments

Treatment	Court Award Amount (ECU)	Chance of Court Award	Mean	Variance	Skewness
Low Variance (L-Var)	80 120	50% 50%	100	400	0
Med Variance (M-Var)	0 40 100 160 200	15% 25% 20% 25% 15%	100	4800	0
High Variance / Low Skewness (H-Var / L-Skew)	0 200	50% 50%	100	10000	0
Med Skewness (M-Skew)	0 40 60 80 140 500	4% 15% 36% 15% 25% 5%	100	10000	3.14
High Skewness (H-Skew)	0 80 100 500 1000	1% 60% 37% 1% 1%	100	10000	7.87

In the experiment, we consider five different award distributions, each of which corresponds to one of the five experimental treatments. In each of the five award distributions, the mean is held constant at 100 ECUs. However, the distributions differ across two dimensions: (i) variance and (ii) skewness. Table 1 displays the award distributions and their corresponding degrees of variance and skewness.[13] Looking at Table 1, we see that across the three *variance* treatments the three distributions are symmetric with zero skewness, but the variance is increasing via a mean preserving spread.[14] Similarly, looking across skewness treatments, the mean and variance of the three distributions are held constant, while the distributions become more positively skewed. By comparing the bargaining behavior across these three variance (skewness) treatments, we are able to explore how increases in variance (skewness) of the award affect negotiation behavior and settlement rates.

In terms of payoffs, when an agreement is reached, the buyer receives his value of 200 ECUs *minus* the accepted price, while the seller receives the accepted price. In the event of a settlement failure, ED is used and the seller receives the randomly drawn court award; the buyer receives a fixed payment of 50 ECUs. This fixed 50 ECU payment to the buyer is equivalent to the buyer paying the 100 ECU *expected* court award plus the entire 50 ECU cost of ED, which results in a fixed net payoff of: 200 ECUs – 100 ECUs – 50 ECUs = 50 ECUs. The primary motivation for implementing a fixed buyer payment when there is settlement failure is that, from a design standpoint, a fixed payment allows us to consider very positively skewed award distributions with large (possible) awards to the seller, e.g., 500 ECUs ($50) and 1,000 ECUs ($100), without inducing the possibility of large negative payoffs to the buyer, which would be difficult to impose in an experimental setting.[15] From a conceptual standpoint, this allows us to explore how the presence of very positively skewed award distributions impacts the seller's (or plaintiff's more generally) behavior in the settlement negotiation and, ultimately the likelihood that a settlement is reached. A possible limiting implication of imposing a fixed payment for the buyer is that it eliminates the payoff uncertainty on the side of the buyer when there is a settlement failure. However, it is

[13] For the sake of administering payments in the experiment and making the design easier to understand for the participants, we used only integer values for the probabilities. As a result, three of the values reported in Table 1 are rounded approximations of their exact values. Specifically, the mean of distribution M-Skew is 99.6, the variance of distribution M-Skew is 9,976, and the variance of distribution H-Skew is 10,040. Given that none of these three exact values differs by more than .4% from its reported value in the table, we assume the observed behavior in treatments M-Skew and H-Skew is equivalent to the behavior that would result if the mean and variance of the distributions in M-Skew and H-Skew were the exact values reported in Table 1.

[14] By considering some limited uncertainty in L-Var, we hold constant the fact that there was some uncertainty present in all distributions. This helps ensure that any observed differences among L-Var, M-Var, and H-Var are not merely a result of the discontinuous jump of going from no uncertainty to some uncertainty.

[15] Alternatively, we could have made buyers responsible for paying the court award and then implemented some sort of bankruptcy rule. However, this would have limited the liability of buyers, which would have distorted the incentives of the buyers. We could have also just provided each buyer with a $100 endowment, although this would have been a very costly option and may have induced other drawbacks like wealth and house money effects.

important to note that the fixed payment does not induce risk-neutral behavior from the buyers as they still face strategic risk that arises from the seller's response to their offer.[16]

The ultimatum nature of the bargaining process is a stylized feature of our settlement negotiation process. Certainly ED negotiations, and settlement negotiations more generally, could involve a more dynamic bargaining process of offers and counter-offers. However, it is likely that settlement negotiations would, at some point, culminate in an ultimatum offer. Thus, even if the dispute setting featured a more complex negotiation framework, the ultimatum offer from the buyer could be thought of as capturing the last round of the negotiation prior to litigation.[17]

2.2 Lottery Choice Task

After completing the ED task, each participant completes an incentivized lottery choice task consisting of a series of 30 questions. A detailed description of the elicitation method and a list of all 30 lottery pairs are provided in Appendix A. The motivation for the lottery choice task is to elicit measures of risk aversion and prudence for each participant.

For the elicitation of risk aversion, we consider two different instruments. The first, which we denote as the ES-risk measure, consists of 10 lottery questions based on the method developed by ES (2006);[18] the corresponding ES-risk measure is the number of instances (out of 10) where the individual selected the less risky option of the lottery pair. The second measure of risk aversion is

[16] One could view the fixed payment as representing a setting where the liable defendant is assumed to be acting in a risk-neutral manner, and effectively approaches the settlement negotiation under the backdrop of being required to pay an amount equal to the expected court award when there is settlement failure. In some dispute settings, it may be reasonable to think the liable defendant (e.g., a large company or a government agency) is acting in a risk-neutral manner, especially when the defendant is repeatedly involved in settlement deputes. Alternatively, the fixed payment could also be viewed in the context of decoupled liability, where the amount the buyer (or defendant) pays can differ from the amount the seller (plaintiff) receives (see Schwartz, 1980; Salop & White, 1986 for a discussion of decoupled liability in the context of antitrust settlements, and Polinsky & Che, 1991; Chu & Chien, 2007 for theoretical models).

[17] This paper is certainly not the first to use an ultimatum bargaining protocol in the context of studying settlement negotiations. Other prominent examples include Babcock & Landeo (2004), Pecorino & Van Boening (2004); (2010), Landeo et al. (2007), and, more specific to our context, Shavell (2010) who models the ED bargaining protocol with only one take-it or leave-it offer made by the buyer. As an anecdotal example, TransCanada, which has been granted the right to use ED to construct the Keystone Pipeline, negotiated with one farmer for several years before threatening the use of ED; in the news article, the farmer was quoted as saying, "We were given three days to accept their offer, and if we didn't, they would condemn the land and seize it anyway" (Brasch, May 19, 2013).

[18] We refer interested readers back to this paper, or a follow-up paper by Eeckhoudt et al. (2009), for a more formal and thorough discussion of how choices in these lottery choice problems can be used to characterize the various orders of risk attitudes. Our implementation of the elicitation task is similar in spirit to the prior studies that have used this lottery choice method (Deck & Schlesinger, 2010; 2014; Ebert & Wiesen, 2011; 2014; Maier & Rüger, 2012; and Noussair et al., 2014).

the well-known 10-question Holt & Laury (2002) method, which we call the HL-risk measure.[19] For the elicitation of prudence, we use 10 different lottery questions based on the ES (2006) method; the corresponding measure of prudence, which we call ES-prudence, is the number of instances (out of 10) where the individual selected the more prudent lottery option.

2.3 Experimental Procedure

Experimental sessions were initially conducted at the Mississippi Experimental Research Laboratory (MERL) at the University of Mississippi in March and June 2013. We also conducted follow-up sessions at the XS/FS laboratory at Florida State University in January and February of 2016 using both the contextualized framing and a completely abstract framing. The motivation for running these follow-up sessions was to test for possible framing effects. We describe the abstract framing conditions in more detail, and summarize the main results from the abstract framing conditions in Section 4. In total, 21 sessions were conducted with a total of 332 participants. The entire experiment was computerized, and the software was programmed in z-Tree (Fischbacher, 2007). Participants were randomly assigned to either the role of buyer or seller, and they remained in this role the entire study. Copies of the role-specific experimental instructions are presented in Appendix B. Participants first completed five rounds of the ED task, followed by the lottery task.[20]

We used a within-subjects design where the five rounds of the ED task corresponded to the five different experimental treatments. Each participant was randomly and anonymously paired with a participant of the opposite role, and was randomly re-matched with a different participant each round. The advantage of the within-subjects design is that it allows us to analyze individual differences in negotiation behavior as the award distribution changes. However, there is a potential for order effects when using a within-subjects design, which can impact the comparison across treatments. To help mitigate possible order effects, we used three different randomly drawn sequences for the ordering of the five treatments.[21]

[19] One potential drawback of the Holt & Laury method is that individuals are free to choose between Option A and Option B in each of the 10 gambles, which may induce multiple switch points (e.g., Jacobson & Petrie, 2009; and Dave et al., 2010). This is problematic for inferring a measure of risk aversion for such individuals, as the Holt & Laury method requires a unique switch point for eliciting risk aversion (see Charness et al., 2013 for a discussion).

[20] By having all subjects complete the lottery task second, it is possible that the results from the ED negotiation task may have impacted decisions in the lottery task. Given that our primary research questions relate to outcomes in the ED task, we chose to run the ED task first, thus mitigating the potential for order effects on the ED task.

[21] With five different treatments, it was not feasible to consider all possible unique orderings (120 different orders). As an alternative, we ran 3 different orderings, which were as follows: (1) H-Skew; H-Var/L-Skew; L-Var; M-Var; M-

We implemented a modified strategy method in the ED task. In each round, the buyer was asked to state his price offer; contemporaneously, the seller was asked to state the minimum price she was willing to accept to avoid going to court, which we refer to as the seller's *minimum willingness to accept* (MWA). What we denote as the seller's MWA is analogous to what Babcock & Pogarsky (1999) denote as the plaintiff's reservation value, and can be similarly interpreted as the seller's "bottom line" in the negotiation phase.[22] After the buyer made his offer and the seller stated her MWA, the buyer's offer was revealed to the seller. If the offer was greater than or equal to the stated MWA, a settlement was reached at the buyer's offer. If the buyer's offer was lower than the seller's MWA, there was a settlement failure and ED was used. Buyers were only informed of whether their offer was accepted or rejected and not the MWA for sellers. This information feedback protocol is analogous to the feedback each party would receive in a direct response ultimatum bargaining format. The benefit of implementing this modified strategy method is that it allows us to gather more refined information about how the variance and skewness of the award impact sellers' MWA.

When there was a settlement failure, the buyer and the seller were not informed at that time of the actual *realized* court award draw. This was done to help limit wealth and house money effects, which could possibly influence behavior in subsequent rounds or in the lottery task. Sellers were informed in the instructions that buyers would pay a fixed amount for the land when there was a settlement failure and ED was used, but they were not informed of the amount, which helps ensure that their stated MWA was not influenced or biased by knowing the exact amount of the buyer's fixed payment. Implementing a fixed payment scheme for the buyers, while not explicitly conveying the amount to sellers, should not generate seller behavior that is systematically inconsistent from the case where the buyer pays the actual realized award.

After finishing the ED task, participants completed the risk elicitation lottery task. The 10 ES-risk and 10 ES-prudent lottery questions were presented in random order, and the lottery display

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Skew, (2) M-Var; L-Var; M-Skew; H-Var/L-Skew; H-Skew, (3) H-Var/L-Skew; M-Var; M-Skew; H-Skew; L-Var. In the analysis, we test for order effects and find essentially no statistically significant evidence of order effects.

[22] In essence, the seller is stating a threshold strategy such that for all offers less than her stated MWA, she would reject, while all offers greater than or equal to her stated MWA she would accept. The seller's strategy should follow this type of threshold pattern, so this modified strategy method should yield results consistent with the direct response method. For a more general discussion comparing the strategy vs. direct response method, we refer readers to a recent survey by Brandts & Charness (2011). The majority of the studies in their survey do not find significant differences between the two methods. Furthermore, even if the implementation of the strategy method does impact the *level* of the MWA threshold, as long as this is not correlated with the different treatments, our relative comparison of the MWA threshold across treatments remains unaffected.

was also randomized.[23] After completing both tasks, participants were privately paid their earnings. To ensure incentive compatibility for both tasks, all participants were randomly paid for *either* one randomly selected round from the ED task *or* one randomly selected lottery problem, which was determined by the outcome of a physical randomization device. The average session lasted 45 minutes and the average earnings were approximately $19/participant.

2.4 Predictions in the Settlement Negotiation Task with an Uncertain Outside Option

In our setting, the negotiation phase consists of an ultimatum bargaining environment with an outside option for each party – for the buyer, the outside option is 50 ECUs (the net payment if ED is used), and for the seller, the outside option is the draw from the award distribution. The setup of our settlement negotiation environment follows closely in spirit to the one modeled in Babcock & Pogarsky (1999) and Pogarsky & Babcock (2001).[24] As a backdrop for analyzing our settlement negotiation setting with an uncertain court award, it is pedagogical to first consider a similar negotiation environment with a *certain* court award. In particular, if the court award was a certain 100 ECUs (the expected value of the award distributions we consider), then the predicted behavior and corresponding outcome are rather straightforward. Applying backward induction, it would be optimal for the seller to accept any offer greater than or equal to the outside option of 100 ECUs, and reject all other offers; that is, the seller's MWA would be 100 ECUs. Anticipating this, the buyer then offers 100 ECUs, which would be accepted by the seller. Thus, we would predict 100% settlement rate at a price of 100 ECUs.[25]

[23] One random sequence for these lotteries was drawn prior to the experiment, and all participants saw the same sequence. In addition, all lotteries were presented in their reduced form. This differs from most of the previous applications of this lottery method, which present the lotteries in their compound forms (when warranted). However, Maier & Rüger (2012) use the reduced form representations, and the observed frequencies of risk averse and prudent choices are generally in line with the results from studies that use the compound representations.

[24] A few prior studies have considered ultimatum bargaining games with an outside option (Knez & Camerer, 1995; Pillutla & Murnighan, 1996; Boles et al., 2000; Croson et al., 2003; and Schmitt, 2004); however, these prior studies consider only *certain* outside options, while we consider an ultimatum bargaining setting with an uncertain outside option of varying degrees of variance and skewness.

[25] Obviously this analysis ignores the possibility that the seller and/or the buyer may be motivated by other-regarding or social preferences, which generally include fairness concerns, reciprocity, and efficiency concerns. Such preferences could motivate the behavior of sellers and/or buyers and possibly lead to an outcome that differs from the buyer making an offer equal to the outside option court award and the seller accepting. While the presence of other-regarding or social preferences have been extensively documented in prior literature, we abstract away from such preferences and focus on how risk preferences of the seller may impact behavior with an uncertain outside option. Furthermore, as long as such preferences are independent of the degree of uncertainty in the outside option (assuming a constant expected court award), then our relative comparison across treatments with varying degrees of uncertainty remains valid.

We now transition to the case where the court award is *uncertain*, which characterizes the setting we consider in our design. Considering the seller's decision first, the seller would determine her MWA given the distribution of the court award; subsequently, the optimal decision for the seller would be to accept all offers greater than or equal to the her MWA, and reject otherwise. Moving to the buyer's problem, the buyer must choose an offer that maximizes his expected utility, which is given as follows:

$$U_B = \Pr(\text{Reject} \mid \text{Offer}) \cdot u(50) + \Pr(\text{Accept} | \text{Offer}) \cdot u(\text{V} - \text{Offer}) \quad (1)$$

The first term represents the buyer's utility from going to court if the offer is rejected (where the buyer would receive the fixed payment of 50 ECUs), and the second term represents the buyer's utility from an accepted offer. Anticipating the seller's optimal response, characterized above, the buyer deduces that all offers greater than or equal to the seller's MWA will be accepted. Hence, the buyer's problem becomes choosing an offer to maximize the following expression:

$$U_B = \Pr(\text{Offer} < \text{MWA}) \cdot u(50) + \Pr(\text{Offer} \geq \text{MWA}) \cdot u(\text{V} - \text{Offer}) \quad (2)$$

As a benchmark case, if we assume that both the buyer and seller are risk-neutral (and the buyer knows the seller is risk-neutral), then the expected outcome is, again, rather straightforward to deduce: the seller's MWA will be the expected value of the award, which is 100 ECUs, and the buyer would then maximize his expected payoff by making an offer equal to 100 ECUs. Therefore, assuming risk-neutrality by both the buyer and seller, we would expect zero incidence of settlement failure, regardless of the degree of variance or skewness of the award distribution. However, a vast literature suggests that agents' decision-making under uncertainty is not always consistent with risk-neutral, payoff maximizing behavior. Hence, under the much more plausible scenario that the disputing parties are not acting in a risk-neutral manner, there is scope for the variance and skewness of the court award to impact the seller's MWA, the buyer's offer, and, consequently, the likelihood of settlement as the variance or skewness of the court award changes.

In the experimental setting we consider, as well as the types of legal disputes we seek to represent more generally, there is incomplete information on the side of the buyer regarding the risk preferences of the seller; hence, the seller's MWA (given the award distribution) will not be perfectly known to the buyer. As such, the buyer will need to form a prior distribution of the seller's MWA, based on the given award distribution and his beliefs about how the degree of uncertainty in the award distribution impacts the seller's MWA. Importantly, when the buyer has incomplete information about the risk preferences of the seller and, hence, the seller's MWA to avoid the uncertain court award, then in expectation we would predict a non-zero rate of settlement failure, even when buyers are choosing optimal offers to maximize their expected utility.

In terms of ascertaining the effect of increases in variance or skewness of the court award on negotiation behavior and settlement rates, we assume that negotiating parties have some sense that the population generally exhibits some degree of risk-aversion and prudence (as supported by prior literature cited in the Introduction). Under this assumption, we expect that as the variance of award distribution increases, both the sellers' MWAs and the buyers' offers to decrease. On the other hand, we expect that as the skewness of the award distribution increases, the sellers' MWAs to increase and the buyers' offers to also increase (up to 150 ECU where they are indifferent between reaching a settlement and going to court). An important implication in our setting, as well as settlement negotiation environments in the field, is that the impact of increases in variance and skewness on settlement rates is, ex-ante, ambiguous; the direction depends on the relative magnitudes of the changes in seller MWAs and buyer offers. In particular, if buyer offers change in the same direction and by the same magnitude as seller MWAs, then there would be no impact on settlement rates as variance and skewness increase, only a change in the division of surplus. However, if buyers over (under) anticipate the change in seller MWAs, then settlement rates may increase (decrease) as variance or skewness increase.

In disputes where: (i) negotiating parties face an uncertain outside option in the event of a settlement failure, (ii) the negotiation parties are not risk-neutral, and (iii) there is incomplete information about the risk preferences of the counter-party, then the impact of increases in variance or skewness of the outside option on the settlement rate is theoretically ambiguous. Our experimental design enables us to explore these questions empirically.

3 Results

In what follows, we present our findings from the pooled data across the contextually framed sessions run at the University of Mississippi and Florida State University. Before pooling the data, we tested for possible differences across the two subject pools and found little evidence of significant differences in behavior in the bargaining task or the risk elicitation task.[26] By pooling the

[26] We tested for differences in the MWAs of sellers across the two subject pools for each of the 5 treatments using a Mann-Whiney U-test, and in none of the five treatments was there a significant difference at the 5% level (in the L-

data, we have a larger sample size covering two subject pools, which increases the robustness of our results. Thus our main sample consists of 188 participants (94 buyers and 94 sellers). In Section 4 we discuss any possible differences that exist between the sessions with contextual framing and abstract framing. In our main analysis, we first compare the aggregate data separately for the variance and skewness treatments.[27] We then incorporate the elicited risk attitude measures to provide further analysis. Because of the within-subjects nature of our design, we test for differences in seller MWAs and buyer offers across treatments using a matched-pairs, Wilcoxon signed-rank test. Our main empirical findings are summarized along the way.

3.1 Aggregate Data from ED Bargaining Task

3.1.1 The Effect of Increases in Variance of the Court Award

To test for the effect of increases in variance of the court award, we compare data from treatments L-Var, M-Var, and H-Var. Table 2 compares the aggregate data for settlement rates (i.e., when the seller's MWA was less than or equal to the buyer's offer), seller MWAs, and buyer offers.

Looking first at the effect of increases in variance of the court award on settlement rates, we see from column 1 of Table 2 that settlement rates were 76% in L-Var, 47% in M-Var, and 40% in H-Var. A Pearson Chi-squared test yields a significant difference in settlement rates across the three variance treatments ($p < .001$), indicating an overall treatment effect. Pairwise, the difference in settlement rates between L-Var and M-Var and L-Var and H-Var are highly significant ($p < .001$; $p < .001$; respectively), while the difference between M-Var and H-Var is not significant ($p = .378$). Given the observed decrease in the settlement rates as variance increases, we next look at how the increase in variance separately impacts seller and buyer behavior. The reduction in settlement rates could be a result of sellers increasing their MWA, buyers reducing their offers, or both.

Var treatment there was a small difference at the 10% level with $p = .083$). We similarly tested for differences in buyer offers across the two subject pools, and in none of the five treatments was there a significant difference at the 10% level.

[27] We pool the three different sequencing versions. We tested for possible order effects by considering the pairwise comparison of both seller MWAs and buyer offers for each of the three versions, for each of the five different treatments. Of the 5 X 3 X 2 = 30 total pairwise comparisons, only 2 were significant at the 5% level, and 1 additional was significant at the 10% level. For robustness, we also tested for overall differences in either seller MWAs or buyer offers between the three versions, across the five different treatments, using a one-way ANOVA. Of the 5 X 2 =10 tests, only 1 was significant at the 5% level. Overall, we feel this is within an acceptable threshold to assume no concerning order effects and, consequently, pool the data in the analysis to provide a larger sample size and additional power.

Table 2: Results of Increases in Variance of the Court Award

Treatment	Settlement Rate	Seller's MWA		Buyer's Offer	
		Mean	IQR	Mean	IQR
L-Var	76%	98.0	[94, 100]	104.6	[100, 110]
M-Var	47%	110.8	[98, 140]	101.4	[95, 120]
H-Var	40%	112.3	[90, 150]	90.9	[75, 100]
Effect of Variance					
Treatment Effect	$p < .001$	$p = .006$		$p < .001$	
L-Var vs M-Var	$p < .001$	$p < .001$		$p = .570$	
L-Var vs H-Var	$p < .001$	$p = .005$		$p < .001$	
M-Var vs H-Var	$p = .378$	$p = .911$		$p < .001$	

Notes: All reported measures are from 94 buyer/seller pairs. IQR is the Interquartile Range for the entire distribution of Seller's MWA and Buyer's Offer. Reported *p*-values for the overall Treatment Effect on Settlement Rate are from a Pearson Chi-squared test and are from an ANOVA test for Seller's MWA and Buyer's Offer. For the paired treatment comparisons: reported *p*-values for Settlement Rate are from a Pearson Chi-squared test, and reported *p*-values for Seller's MWA and Buyer's Offer are from a 2-tailed, Wilcoxon signed-rank test for matched pairs.

In terms of seller MWAs, Table 2 shows that the average MWA was 98.0 in L-Var, 110.8 in M-Var, and 112.3 in H-Var. An ANOVA test reveals a highly significant treatment effect ($p = .006$). For the pairwise comparisons, a Wilcoxon signed-rank test yields a strongly significant difference between L-Var and M-Var ($p < .001$) and between L-Var and H-Var ($p = .005$). There is no statistically significant difference between M-Var and H-Var ($p = .911$). To provide further evidence that MWA is increasing with variance, we look at the number of sellers who decrease their MWA from L-Var to H-Var, and we find that only 27/94 (29%) of sellers decrease their MWA, which is significantly fewer than if sellers were assumed to be choosing randomly using a Binomial test ($p = .036$). Overall, the data suggests that increases in the variance of the court award generally increase the average MWA of sellers

Turning our attention to the behavior of the buyers, Table 2 reveals that buyers generally decrease their offer as the court award becomes more variable. In particular, the average offer for buyers was 104.6 in L-Var, 101.4 in M-Var, and 90.9 in H-Var. An ANOVA test reveals an overall difference across the three variance treatments ($p < .001$). For the pairwise comparisons, a Wilcoxon signed-rank test does not reveal a significant difference between L-Var and M-Var ($p = .570$), but there is a significant difference between L-Var and H-Var ($p < .001$) and between M-Var and H-Var ($p < .001$). As further evidence that buyers are generally decreasing their offers as variance increases, we find that only 19/94 (20%) buyers increase their offers from L-Var to H-Var, which a Binomial test reveals is significantly fewer than if buyers were assumed to be choosing randomly ($p < .001$).

To better understand why settlement rates decreases as the variance increases, it is instructive to examine the distributions of seller MWAs and buyer offers. We present this information in two ways. First, in Table 2, we report the interquartile range (IQR) of the distribution of MWAs and offers across the three variance treatments. Looking across the treatments, it is clear that the distribution of MWAs becomes more dispersed with more mass moving to larger values (the range of the IQR increases), as the variance of the court award increases. For buyers, as the variance increases, the IQR of offers also increases, but more mass moves to smaller values. A settlement occurs when the buyer's offer is greater than or equal to the seller's MWA; thus, for a randomly matched pair of offer and MWA, the reported pattern in the IQRs suggest a decrease in the likelihood of a settlement as the variance of the court award increases, which is consistent with the reported settlement rates. This increase in dispersion becomes even clearer when we look at the distributions of MWAs and offers. Figure 2 plots the histograms of MWAs and corresponding offers by treatment (MWAs in the first row and offers below in the second row). From this picture, it is clear that the underlying changes in the distribution of seller MWAs and buyer offers across the variance treatments should, on average, lead to a reduction in settlement as variance increases.

The main results on the aggregate impact of increases in variance are summarized below:

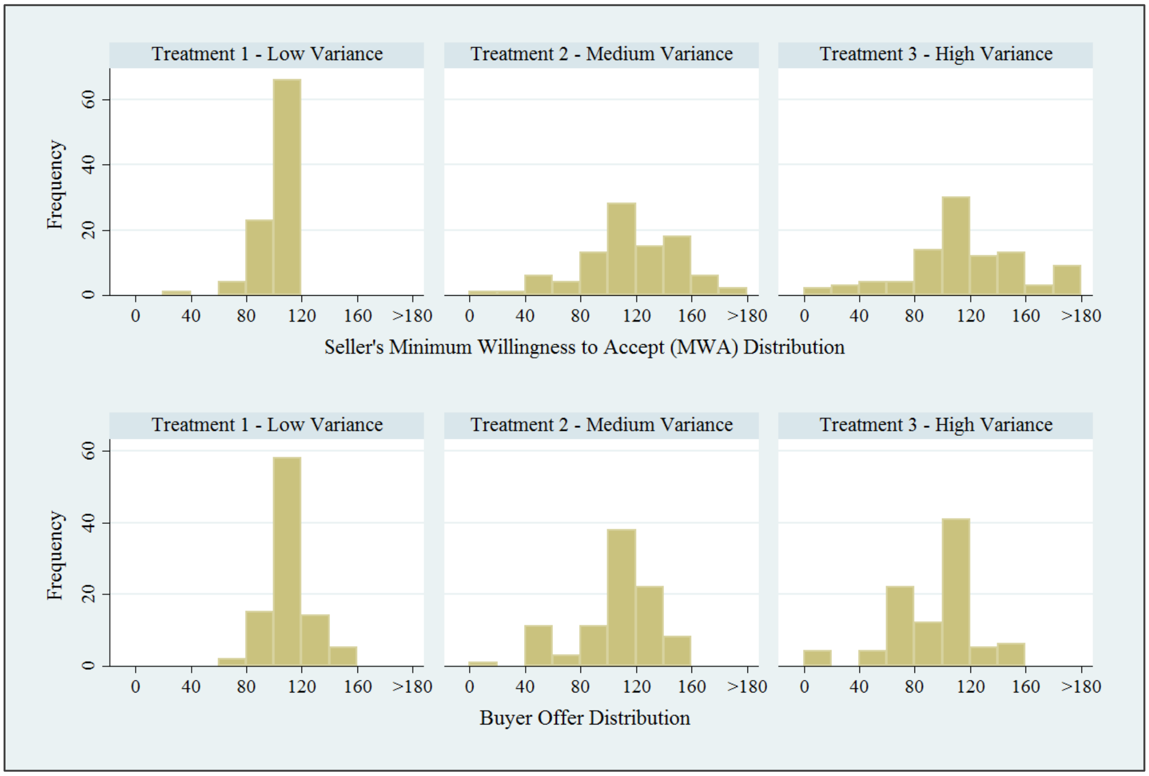
Result 1a: Increases in the variance of the court award lead to lower settlement rates.

Result 1b: Increases in the variance of the court award generally increase seller MWAs.

Result 1c: Increases in the variance of the court award generally decrease buyer offers.

Taken together, these aggregate results suggest that increases in variance of the court award *can* significantly impact negotiation behavior and, subsequently, settlement rates.

Figure 2: Distribution of Seller MWAs and Buyer Offers across Variance Treatments



3.1.2 The Effect of Increases in Skewness of the Court Award

To test the effects of increases in skewness of the court award, we compare the data from L-Skew, M-Skew, and H-Skew; the distributions in all three treatments have the same mean and variance, but the skewness increases from 0 to 3.14 to 7.87, respectively. Table 3 compares the aggregate data for settlement rates, seller MWAs, and buyer offers.

Again, we first look at the effect of increases in skewness on settlement rates. From column 1 of Table 3, we see that settlement rates were 40% in L-Skew, 60% in M-Skew, and 52% in H-Skew. Comparing across the three skewness treatments, a Pearson Chi-squared test yields a significant difference in settlement rates (p = .030). The pairwise difference between L-Skew and M-Skew is significant (p = .009) and the difference between L-Skew and H-Skew is narrowly insignificant (p = .108), while the difference between M-Skew and H-Skew is not significant (p = .304). Overall, there appears to be a generally increasing relation between the skewness of the court award and settlement rates. In particular, the settlement rate significantly increases when the court award distribution transitions from zero skewness in the L-Skew treatment to being positively skewed in the M-Skew and H-Skew treatments. To better understand these changes in settlement rates, we next look the MWAs of sellers and the offers of buyers.

Table 3: Results of Increases in Skewness of the Court Award

Treatment	Settlement Rate	Seller's MWA		Buyer's Offer	
		Mean	IQR	Mean	IQR
L-Skew	40%	112.3	[90, 150]	90.9	[75, 100]
M-Skew	60%	108.8	[70, 120]	97.6	[85, 110]
H-Skew	52%	138.5	[80, 131]	95.6	[90, 100]
Effect of Skewness					
Treatment Effect	p = .030	p = .053		p = .174	
L-Skew vs M-Skew	p = .009	p = .023		p = .020	
L-Skew vs H-Skew	p = .108	p = .755		p = .400	
M-Skew vs H-Skew	p = .304	p = .017		p = .504	

Notes: All reported measures are from 94 buyer/seller pairs. IQR represents the Interquartile Range for the entire distribution of Seller's MWA and Buyer's Offer. Reported *p*-values for the overall Treatment Effect on Settlement Rate are from a Pearson Chi-squared test and are from an ANOVA test for Seller's MWA and Buyer's Offer. For the paired treatment comparisons: reported *p*-values for Settlement Rate are from a Pearson Chi-squared test, and reported *p*-values for Seller's MWA and Buyer's Offer are from a 2-tailed, Wilcoxon signed-rank test for matched pairs.

For sellers, Table 3 shows that the average MWA was 112.3 in L-Skew, 108.8 in M-Skew, and 138.5 in H-Skew. An ANOVA test reveals a significant main effect of skewness on MWA (p = .053). More specifically, a Wilcoxon signed-rank test reveals a significant difference between L-Skew and M-Skew (p = .023) and between M-Skew and H-Skew (p = .017), while the difference between the L-Skew and H-Skew is not statistically significant (p = .755). Overall, increases in skewness seem to result in a non-monotonic effect on the MWA of sellers; the introduction of a *small* initial increase in skewness (L-Skew to M-Skew) decreases MWAs, while a *larger* increase in skewness (M-Skew to H-Skew) increases MWAs.

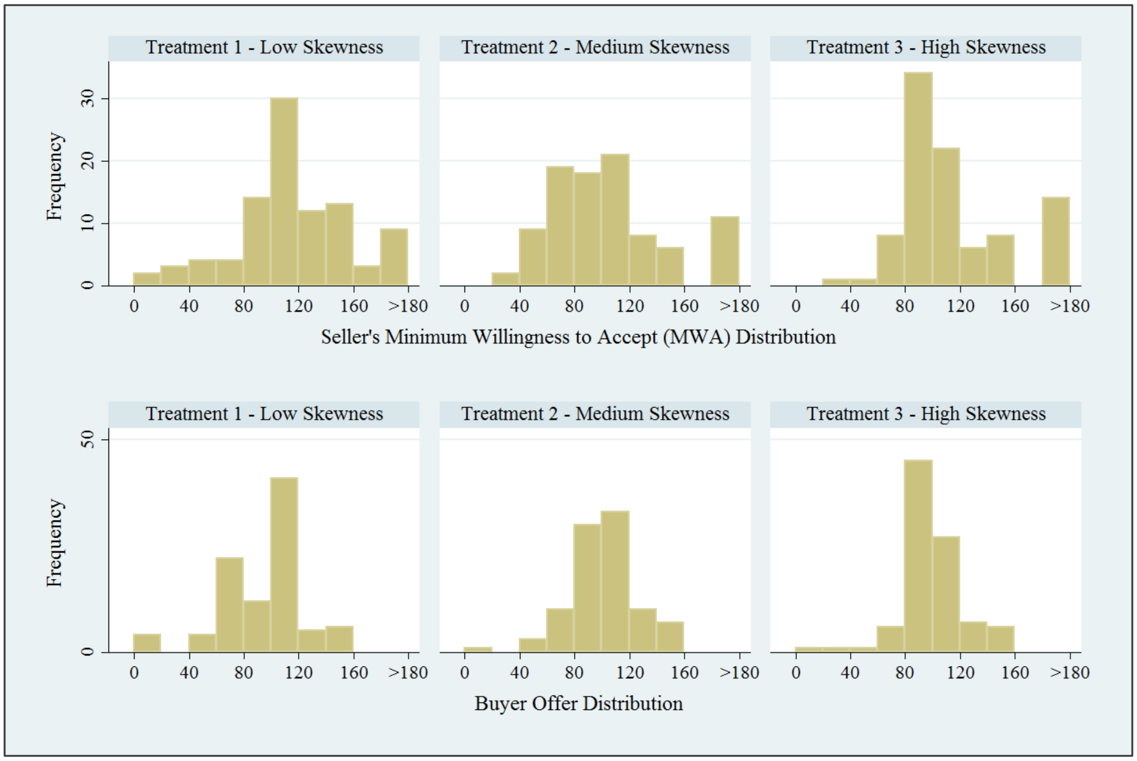
Proceeding next to buyers, Table 3 displays that the average offer was 90.9 in L-Skew, 97.6 in M-Skew, and 95.7 in H-Skew. An ANOVA test does not reveal a significant difference in offers across the three skewness treatments (p = .174). However, a Wilcoxon signed-rank test does result in a significant pairwise difference between L-Skew and M-Skew (p = .020), while the difference between L-Skew and H-Skew and M-Skew and H-Skew are not statistically significant (p = .400; p = .504; respectively). Overall, increases in the skewness of the award distribution appear to have a relatively small impact on buyer offers; the small impact is in the direction of buyers increasing their offers as skewness increases (especially from L-Skew to M-Skew).

As before, the means of the distributions of seller MWAs and buyer offers do not fully capture how increases in skewness of the award impact MWAs and offers. To get a better sense of why we see the observed changes in settlement rates as skewness increases, we further examine the distributions of seller MWAs and buyer offers. We report the corresponding interquartile ranges (IQR) in Table 3 and the entire distributions in Figure 3 (MWAs in the first row and offers below in the second row). Looking first at sellers, when skewness is introduced to the court award (moving from L-Skew to M-Skew and H-Skew) two things seem to happen: (i) more mass from the middle of the distribution of MWAs is shifted left to lower values (as evident by the IQR shifting left in M-Skew and H-Skew compared to L-Skew), and (ii) more mass is simultaneously shifted right to very large, outlying values (as evident by the MWA distributions in Figure 3), especially in H-Skew.[28] For buyers, there is a moderate rightward shift in the distribution to higher offers moving from L-Skew to M-Skew and, to a lesser extent, to H-Skew (as evident by the right shift in IQR). As a result of these changes in the distributions of MWAs and offers as skewness increases, the increase in settlement rates from L-Skew to M-Skew is driven by MWAs and offers being generally more concentrated in the range of 80-120; as a result, for a randomly drawn buyer and seller, this should, in expectation, lead to an increase in the probability of a settlement, as a larger portion of the distributions overlap. A similar pattern emerges when comparing MWAs and offers between L-

[28] A plausible contributing explanation of why mass is shifted to very high MWAs in the M-Skew and especially the H-Skew treatments is longshot bias, where some sellers subjectively over-weight the likelihood of receiving the very large, but unlikely, payoffs of 500 ECUs and 1000 ECUs. The presence of longshot bias has been documented empirically (e.g., Camerer, 1989; Woodland & Woodland, 1994; 1999; Sobel & Raines, 2003; and Smith et al., 2006).

Skew and H-Skew, which generates the moderate increase in settlement rates in H-Skew compared to L-Skew, despite the fact that average MWA actually increases in the H-Skew treatment.

Figure 3: Distribution of Seller MWAs and Buyer Offers across Skewness Treatments



The main results on the impact of increases in skewness of the court award, via the introduction of low probability large awards in the distribution, are summarized below:

Result 2a: Increases in the skewness of the court award generally increase settlement rates. Settlement rates initially increase as the award distribution becomes positively skewed, but then flatten out as the distribution becomes more positively skewed.

Result 2b: Increases in the skewness of the court award have a non-monotonic effect on seller MWAs. An initial increase in skewness (from no skewness) decreases MWAs, while a large increases in skewness (from M-Skew to H-Skew) increase MWAs.

Result 2c: Increases in the skewness of the court award, at most, marginally increase buyer offers.

Overall, these aggregate results suggest that increases in the skewness of the court award *can* significantly impact negotiation behavior and, subsequently, settlement rates.

3.3 Elicited Risk Preferences and Behavior in the ED Bargaining Task

To better understand how variance and skewness of the court award can possibly impact negotiation behavior and settlement rates, we next consider the possible relation between elicited risk preference measures and observed negotiation behavior. Before presenting these results, we first present the descriptive statistics of the three different risk preference measures: (i) ES-risk, (ii) HL-risk, and (iii) ES-prudence (see Section 2.2).[29] The average of the ES-risk measure (total number of the 10 lottery pairs where the individual chose the less risky option) across all the experimental subjects was 7.70/10. The average HL-risk measure (the switching point to the more risky lottery) was 6.33 for the 144 participants that had a unique switch point. The ES-risk and HL-risk are significantly positively correlated, with a Spearman correlation coefficient of .478 ($p < .001$). Because of the inability to recover a measure of risk aversion for all subjects using the HL-risk measure, all the data analysis regarding risk aversion is performed using the ES-risk measure; for robustness, all analyses are replicated using the HL-risk measure, and any qualitative differences are reported. The average of the ES-prudence measure (total number of the 10 lottery pairs where the individual chose the more prudent option) was 5.35/10.[30]

To explore the relation between risk measures and behavior in the ED task, we first stratify subjects based on their elicited risk measures in the lottery task. A subject whose ES-risk measure is above the median is classified as *relatively* risk-averse and below the median as *relatively* risk-loving (likewise for the HL-risk measure). Similarly, a subject whose ES-prudence measure is above the median is classified as *relatively* prudent and below the median as *relatively* imprudent.[31] Henceforth, we drop the *relative* qualifier, but it is implied throughout the remainder of the analysis

[29] We note that there were no significant differences in any of the three risk preference measures between the buyers and the sellers in our study. Therefore, the role assignment in the ED bargaining task appears to have had a negligible influence, if any, on the decisions made in the subsequent lottery task.

[30] We document less prudent behavior than in previous studies. However, the absolute level of exhibited prudent behavior is of less importance in our analysis since we explore how negotiation behavior of *relatively* more prudent subjects compares with that of *relatively* more imprudent subjects. We postulate that the less prudent decisions observed in our elicitation, relative to the previous studies, are a result of the fact that we represented the lottery choices in reduced form rather than compound form. Therefore, we would caution readers from interpreting the prudence results as providing evidence in contradiction to previous studies, which do find stronger evidence of more prudent behavior.

[31] The relative stratification of risk preferences based on the median helps mitigate any possible order effects arising from the lottery task following the ED task, which may have systematically led to either more or less risk-averse/prudent lottery choices across all experimental participants. In addition this stratification generates a balanced sample. All of the results are qualitatively robust if we instead classify subjects' degree of risk aversion on an absolute scale, where subjects whose HL-risk measure is 5 or less are classified as risk loving, and more than 5 are classified as risk averse.

that these risk preference characterizations are relative to the stratification of our participant sample around the median value.

In the variance treatments, we expect risk-averse sellers to have lower MWAs than risk-loving sellers. Furthermore, as the variance of the award increases, we expect the MWA of the relatively more risk-averse subjects to decrease, and this effect should be stronger as compared to the more risk-loving subjects. Conditional on the award distribution, we expect higher settlement rates amongst risk-averse sellers due to their lower expected MWA. In the skewness treatments, we expect prudent sellers to have higher MWAs in the M-Skew and H-Skew treatments than imprudent sellers. As the skewness of the award increases, increases in MWA of more prudent subjects should be relatively greater than those of the less prudent sellers. That said, we expect to see lower settlement rates when the seller is more prudent because of the higher expected MWA.

3.3.1 Risk Aversion and Increases in Variance of the Court Award

We begin by exploring how negotiation behavior of sellers and settlement rates vary by the risk aversion of sellers. Table 4 reports settlement rates and seller MWAs across the three variance treatments, stratified by whether sellers are categorized by being risk-averse or risk-loving.[32]

Looking first at the comparison of sellers' MWA across risk-loving and risk-averse seller, Table 4 shows that the average MWA is lower in each of the three variance treatments for the risk-averse sellers; testing for significance, a Mann-Whitney test reveals a marginally significant difference for the M-Var and H-Var treatments (p = .068; p = .076; respectively). Looking specifically within risk-averse sellers, the average MWA was 99.9 in L-Var, 115.5 in M-Var, and 115.6 in H-Var; a signed-rank test reveals a significant difference between the MWA in L-Var and M-Var (p = .003) and L-Var and H-Var (p = .026), while the difference between M-Var and H-Var is not significant (p = .884). A similar, but attenuated, pattern emerges for the risk-loving sellers where the average MWA was 96.7 in L-Var, 106.0 in M-Var, and 107.6 in H-Var; a signed-rank test reveals a significant difference between L-Var and M-Var (p = .045), while the differences between L-Var and H-Var and M-Var and H-Var are not significant (p = .339; p = .650; respectively). So while the

[32] Given that buyers do not face the uncertainty of paying the court award when ED is used, we do not expect buyer offers to vary significantly by their own risk preferences. For brevity we do not report the buyer offer data stratified by whether they are risk-averse/risk-loving or prudent/imprudent across the variance and skewness treatments; although, when we do stratify accordingly based on the risk preferences of buyers and test for differences in offers, we find no significant differences in offers between the buyer risk types for any of the 5 court award treatments.

MWA tends to be lower for risk-averse sellers, there exists a similar positive relation between the variance of the court award and the MWA for both risk-loving and risk-averse sellers.

Table 4: Stratification based on Risk Aversion of the Seller

	Settlement Rates			Seller's MWA		
Treatment	Risk Loving	Risk Averse	p-value	Risk Loving	Risk Averse	p-value
L-Var	77%	77%	p = .961	99.9	96.7	p = .183
M-Var	49%	52%	p = .810	115.5	106.0	p = .068
H-Var	33%	42%	p = .459	115.5	107.6	p = .076
Effect of Variance						
L-Var vs M-Var	p = .010	p = .034		p = .003	p = .045	
L-Var vs H-Var	p < .001	p = .004		p = .026	p = .339	
M-Var vs H-Var	p = .167	p = .445		p = .844	p = .650	

Notes: All reported measures are treatment-level averages stratified by whether the seller in the negotiating pair is classified as relatively risk-averse (31 total pairs) or risk-loving (39 total pairs). For comparisons across risk-averse and risk-loving subsamples, reported p-values are from a 2-tailed Mann-Whitney test. For the pairwise treatment comparisons: reported *p*-values for Settlement Rate are from a Pearson Chi-squared test, and reported *p*-values for Seller's MWA are from a 2-tailed, Wilcoxon signed-rank test for matched samples.

In terms of settlement rates, Table 4 displays that in all three variance treatments, settlement rates tended to be higher whenever the seller was risk-averse, compared risk-loving, because of their marginally lower MWA (on average); although, none of these differences are statistically significant. Comparing settlement rates within seller types, for risk-loving sellers a Pearson Chi-squared test across all three variance treatments reveals a significant difference (p < .001); in terms of pairwise comparisons, the difference in settlement rate between L-Var and M-Var and L-Var and H-Var are significant (p = .010; p < .001; respectively), while the difference between M-Var and H-Var is not significant (p = .167). A very similar pattern of settlement rates emerges for risk-averse sellers, where a Pearson Chi-squared test reveals a significant difference across the three variance treatments (p = .014); the difference between L-Var and M-Var and L-Var and H-Var are significant (p = .034; p = .004; respectively), while the difference between M-Var and H-Var is not significant (p = .445). The data suggests that, conditional on the variance treatment, settlement rates are, at most, marginally higher when negotiating with a more risk-averse seller. Furthermore, for both risk-loving and risk-averse sellers, the data reveals a strong negative relation between settlement rates and the variance of the court award.

Lastly, because prudence levels can impact how people makes choices under the presence of background risk, we also look at whether seller MWAs react differently to increases in variance of the court award based on their degree of prudence. For sellers classified as imprudent, their average MWA was 97.4 in L-Var, 114.1 in M-Var, and 109.3 in H-Var. For sellers classified as prudent, their average MWA was 97.3 in L-Var, 106.1 in M-Var and 112.2 in H-Var. Comparing across prudent and imprudent sellers, the difference in MWA is not significant for any of the three variance treatments using a Mann-Whitney test (p = .376; p = .261; p = .821; respectively). Moreover, for both prudent and imprudent sellers we see the same general pattern of MWAs increasing as the variance of the award distribution increases from the L-Var treatment to the M-Var and H-Var treatments. As such, it does not appear that our aggregate results regarding how sellers react to increases in variance of the court award, and the consequent effect on settlement rates, are being driven by differential reactions to the increase in variance between prudent and imprudent sellers.

The main results on the observed relation between increases in variance of the court award and individual measures of risk aversion are summarized as follows:

Result 3a: Risk-averse sellers have marginally lower MWAs, but increases in variance of the court award generally increase the MWA for both risk-averse and risk-loving sellers.

Result 3b: Settlement rates are marginally higher when sellers are risk-averse, but there is a strong negative relation between settlement rates and variance of the court award for risk-averse and risk-loving sellers.

3.3.2 Prudence and Increases in Skewness of the Court Award

Next, we explore if and to what extent negotiation behavior and settlement rates vary by the prudence of sellers as the skewness of the court award increases. Table 5 shows settlement rates and seller MWAs for the three skewness treatments stratified by imprudent and prudent sellers.

Looking first that the MWA of sellers, the right two columns of Table 5 reports the average MWA across the three skewness treatments for both imprudent and prudent sellers. For the imprudent sellers, the average MWA was 109.3 in L-Skew, 107.0 in M-Skew, and 141.2 in H-Var, while the corresponding average MWA for prudent sellers was 112.2, 114.2, and 139.6, respectively. Comparing across prudent and imprudent sellers, the average MWA is generally very similar the L-Skew, M-Skew and H-Skew treatments, and none of the differences are statistically significant using a Mann-Whitney test (p = .410; p = .441; p = .420; respectively).[33] Within seller type, for imprudent sellers there are no significant differences in MWA across the three skewness conditions; while the average MWA in the H-skew condition appears to be much larger than in the L-Skew and M-skew, this is being driven by a few outliers reporting very high MWAs in the H-Skew treatment. Looking next within prudent sellers, there are no significant differences in MWA between L-Skew and M-Skew or L-Skew and H-Skew, but the difference between M-Skew and H-Skew is marginally significant using a signed-rank test (p = .074). Overall, the data reported in Table 5 reveals that, conditional on the skewness of the court award, the sellers' MWA is similar between sellers classified as being prudent and imprudent, and prudent sellers are marginally more responsive – their MWA marginally increases – as the court award becomes highly skewed in the H-Skew treatment.

In terms of settlement rates, the left two columns of Table 5 report the settlement rates across imprudent and prudent sellers for the L-Skew, M-Skew and H-Skew treatments. Comparing across imprudent and prudent sellers, the settlement rates are similar in the L-Skew treatment (38% and 42% respectively), and are slightly higher for prudent sellers in M-Skew treatment (64% compared to 50%) and in the H-Skew treatment (57% compared to 45%); however, these settlement rates are not statistically significant using a Pearson Chi-squared test (p = .621; p = .191; p = .272; respectively). At first glance, the fact that settlement rates are higher for the set of prudent sellers seems contradictory given that the average MWA is higher for prudent sellers. However, what is driving the higher settlement rates for the group of prudent sellers is a change in the shape of the distribution of MWAs. In particular, the median offer is actually lower for the prudent sellers compared to imprudent sellers in both M-Skew (90 compared to 100) and H-Skew (97.5 compared

[33] We would expect prudent sellers, who have a preference for positive skewness, to express higher WTA, on average, in the M-Skew and H-Skew treatments. One plausible reason why we did not observe such a pattern in our data is that our participant sample, in the aggregate, exhibited a relatively low degree of prudence in the lotter elicitation task – only choosing the more prudent option an average of 5.35/10 and a median of 5/10. Thus, many of the sellers classified as *relatively* prudent (above the median) may not have been overly prudent. In addition, of the 42 sellers classified as prudent, 15 were also classified in the domain of being relatively risk-loving; these risk-loving sellers could have expressed a higher WTP in the M-Skew and H-Skew treatments in response to the possible misperception that those court award distributions had more variance.

to 100). Thus, for prudent sellers more mass is shifting to lower MWAs in the M-Skew and H-skew treatments (despite the fact that the average MWA is increasing), which then makes it more likely that the buyer's offer will be higher than the seller's MWA and a settlement will occur. In terms of settlement rates within seller type and across the skewness treatments, a very similar pattern emerges for both prudent and imprudent sellers; namely, settlement rates increase from L-Skew to M-Skew and then slight decrease from M-Skew to H-skew. Overall, the data suggests that settlement rates are similar whether negotiating with a prudent or imprudent seller.

Table 5: Stratification based on Prudence of the Seller

	Settlement Rates			Seller's MWA		
Treatment	Imprudent	Prudent	p-value	Imprudent	Prudent	p-value
L-Skew	38%	42%	p = .621	109.3	112.2	p = .410
M-Skew	50%	64%	p = .191	107.0	114.2	p = .441
H-Skew	45%	57%	p = .272	141.2	139.6	p = .420
Effect of Variance						
L-Skew vs M-Skew	p = .260	p = .049		p = .269	p = .257	
L-Skew vs H-Skew	p = .496	p = .190		p = .973	p = .462	
M-Skew vs H-Skew	p = .654	p = .503		p = .384	p = .074	

Notes: All reported measures are treatment-level averages stratified by whether the seller in the negotiating pair is classified as relatively imprudent (40 total pairs) or prudent (42 total pairs). For comparisons across imprudent and prudent subsamples, reported p-values are from a 2-tailed Mann-Whitney test. For the pairwise treatment comparisons: reported *p*-values for Settlement Rate are from a Pearson Chi-squared test, and reported *p*-values for Seller's MWA are from a 2-tailed, Wilcoxon signed-rank test for matched samples.

Lastly, we consider if seller MWAs possibly react differently to increases in skewness of the court award based on their degree of risk aversion. For those sellers classified as risk-loving, their average MWA was 115.5 in L-Skew, 118.1 in M-Skew, and 162.6 in H-Skew. For sellers classified as risk-averse, their average MWA was 107.6 in L-Skew, 110.4 in M-Skew and 125.2 in H-Skew. While the average MWA is higher for the risk-loving sellers in all three skewness treatments, a Mann-Whitney test does not reveal a statistically significant difference for any of the three treatments (p = .151; p = .252; p = .301; respectively). What appears to be a large difference in the average MWA in the H-Skew treatment is driven primarily by a few risk-loving outliers expressing very large MWAs.[34] Thus, risk-averse sellers appear to be expressing, at most, marginally higher MWAs as the skewness of the court award increases.

The main results regarding the relationship between prudence of the seller and outcomes in the ED negotiations as the court award becomes more skewed are summarized as follows:

Result 4a: The average MWA for prudent and imprudent sellers is similar, but only the prudent sellers tend to increase their MWA as the court award becomes highly skewed

Result 4a: Overall, settlement rates are marginally higher for prudent sellers compared to imprudent sellers, but settlement rates for both prudent and imprudent sellers exhibit a similar pattern as the skewness of the court award increases.

3.4 Welfare implication of Increases in Variance and Skewness

We conclude the results section by discussing the welfare implications of our findings. In doing so, it is important to note that decreases in settlement rates are not necessarily evidence of more inefficiency. The reason being is that, given the fixed payment of 50 ECUs for the buyer when there is a settlement failure, the buyer would never offer more than 150 ECUs to settle (as he would be better off litigating); as a result, settlement failure is only inefficient in instances when the seller's MWA is less than 150 ECUs. When the seller's MWA is less than 150 ECUs the contact zone, which refers to the range of prices that are higher than the seller's MWA (i.e., the seller's reservation) and lower than 150 ECUs (i.e., the buyer's reservation), is non-empty and there is the possibility, ex-ante, for the buyer and seller to reach an efficient settlement.

In order to better ascertain the welfare effect of increases in variance and skewness of the court award, we look at the number of *potentially efficient settlements* that were actually reached, where a potentially efficient settlement is defined as an instance where the seller's MWA was less than or equal to 150 ECUs. Table 6 presents the fraction of sellers with a MWA less than or equal to 150 ECUs, and the number of potentially efficient settlements reached for each treatment. Looking first at the two rightmost columns of Panel A, we see that as the variance increases, the number of

[34] Chiu (2005) document that agents may prefer more variable distributions if they are also more skewed. Hence, some risk-averse sellers may have been operating as if there were a tradeoff between variance and skewness, and may have had a higher MWA for the H-Skew distribution, which they erroneously perceived as being more variable that the L-Skew and M-Skew distributions.

potentially efficient settlements reached monotonically decreases from 75.6% (L-Var) to 51.1% (M-Var) to 46.3% (H-Var). A Pearson Chi-squared test across all three variance treatments reveals a significant difference (p < .001); moreover, the difference in settlement rates between L-Var and M-Var and L-Var and H-Var are significant (p = .001; p < .001; respectively), while the difference between M-Var and H-Var is not significant (p = .532).

Table 6: Comparison of Potentially Efficient Settlements Reached by Treatment

Panel A: The Effect of Increasing Variance

	Seller's MWA < 150 ECUs		# of Potentially Efficient Settlements Reached	
Treatment	Fraction	Percent	Fraction	Percent
L-Var	94/94	100%	71/94	75.6%
M-Var	86/94	91.5%	44/86	51.1%
H-Var	82/94	87.2%	38/82	46.3%

Panel B: The Effect of Increasing Skewness

	Seller's MWA < 150 ECUs		# of Potentially Efficient Settlements Reached	
Treatment	Fraction	Percent	Fraction	Percent
L-Skew	82/94	87.2%	38/82	46.3%
M-Skew	83/94	88.3%	56/83	67.5%
H-Skew	80/94	85.1%	49/80	61.3%

In terms of how increases in skewness impact efficient settlements, the two rightmost columns of Panel B in Table 6 display the fraction of potentially efficient settlements reached across the three skewness treatments is 46.3% in H-Skew, 67.5% in M-Skew, and 61.3% in H-Skew. A Pearson Chi-squared test across all three skewness treatments reveals a significant difference (p = .018); in terms of pairwise comparisons, the difference in settlement rates between L-Var and M-Var and L-Var and H-Var are significant (p = .006; p = .057; respectively), while the difference between M-Var and H-Var is not significant (p = .407).

Thus, from a welfare perspective, we see that there is significantly more *inefficient* litigation as the variance of the court award increases. While there are fewer potentially efficient settlements as variance increases, there are also relatively fewer settlements actually reached; this seems to be driven in large part by more mass in the aggregate distribution of MWAs being shifted to higher values (i.e., many sellers respond to the higher variance with a higher MWA), while more mass in the aggregate distribution buyer offers is shifted to lower values. With regard to skewness, we see that a moderate initial increase in skewness (from L-Skew to M-Skew) significantly decreases the incidence of *inefficient* litigation, but this effect flattens out as skewness increases further (from M-Skew to H-Skew). As the skewness increases from L-Skew to M-Skew, the number of potentially efficient settlements stays relatively constant, but a significantly larger fraction of the potentially efficient settlements actually settle. This reason for this is twofold: (i) buyers generally increase their offers as the skewness increases, and (ii) more mass in the distribution of MWAs is shifted to lower values (despite the presence of a few outliers at the very upper end of the MWA distribution that pull the average MWA higher as the skewness increases).

4 Replication using Abstract Framing

In our baseline experimental design, we include a substantial degree of contextual framing in the negotiation task (i.e., seller/buyer labeling, the description of land ownership, the ED legal context, and the possible adjudicated court award). A potential concern is that our primary findings are, at least partially, an artifact of the contextual framing interacting with the treatments; thus, limiting the generalizability of our results.[35]

To investigate the role of *possible* framing effects in our study, we ran additional sessions at Florida State University with a completely abstract framing with no mention of a legal environment (a copy of the unframed experimental instructions is provided in Appendix C); henceforth, these sessions are referred to as the *unframed* condition.[36] In total, we ran 6 unframed sessions with a total

[35] Given that testing for framing effects is not the primary motivation of our paper, we refrain from providing a comprehensive review of the literature, which is rather extensive. Instead we refer readers to Abbink & Hennig-Schmidt (2006) and Dufwenberg et al. (2011) and the references thein for more detailed discussion about framing effects, as well as Copper et al. (1999), Stahl & Haruvy (2008), and Barr & Serra (2009) for experimental studies comparing behavior under non-neutral and neutral framing. More specific to our setting, Babcock & Loewenstein (1997) discuss the benefits of using a legal context in the framing of their study involving topics related to legal disputes.

[36] Specifically, participants were given generic role labels of Player A (instead of buyer) and Player B (instead of seller), their object of the negotiation was a token, and failure to reach an agreement would result in Player B (who was originally endowed with the token) receiving a draw from a lottery of payouts (as opposed to a court award).

of 144 participants. To ensure the cleanest test of possible framing effects, we conducted 3 additional *framed* sessions at Florida State University using 62 participants from same general subject pool. Table 7 compares the bargaining behavior across framed and unframed conditions conducted at Florida State University.

Table 7: Comparison of Framed versus Unframed Conditions

Panel A: Seller's MWA					
	Award Distribution Treatment				
Condition	L-Var	M-Var	H-Var/L-Skew	M-Skew	H-Skew
Framed	101.2	109.7	108.3	99.5	114.7
Unframed	97.1	108.6	95.2	93.0	112.6
p-value	p = .996	p = .897	p = .313	p = .996	p = .998

Panel B: Buyer's Offers					
Condition	L-Var	M-Var	H-Var/L-Skew	M-Skew	H-Skew
Framed	103.2	96.8	87.5	95.8	89.5
Unframed	97.8	91.9	92.8	92.2	88.1
p-value	p = .643	p = .996	p = .391	p = .961	p = .601

Notes: All reported measures are treatment-level averages stratified by the framed (31 total pairs) and unframed (72 total pairs) conditions. Reported p-values are from a KS-test. Results are generally robust if a Mann-Whiney test is alternatively used to compare the framed and unframed conditions, with the exception that there is a marginal difference in MWA for the H-Var/L-Skew treatment (p = .079).

From Panel A of Table 7 we see that the average MWAs in the framed condition were 101.2 in the L-Var treatment, 109.7 in M-Var, 108.3 in H-var/L-Skew, 99.5 in M-Skew, and 114.7 in H-Skew. In the unframed condition, the corresponding average MWAs were 97.1, 108.6, 95.2, 93.0, and 112.6, respectively. In the unframed condition, the average MWA is moderately lower than in the framed condition for all of the 5 award distribution treatments (with this difference being the most pronounced in the H-Var/L-Skew treatment). However, if we test for differences in the distribution of MWAs across the framed and unframed condition using a KS-test, none of the differences are statistically different. There appears to be, at most, only marginal differences the MWAs between the framed and unframed conditions, and the small differences appear to be in the form of overall level effects, rather than a differential treatment effect based on framing. In Panel B of Table 7, we report the average buyer offers in the framed and unframed conditions across the five treatments. The average offers in the framed condition were 103.2 in the L-Var treatment, 96.8 in M-Var, 87.5 in H-var/L-Skew, 95.8 in M-Skew, and 89.5 in H-Skew. In the unframed condition, the corresponding average offers were 97.8, 91.9, 92.8, 92.2, and 88.1, respectively. The level of buyer offers are also generally lower in the unframed condition (4 of 5 treatments), although none of these differences are statistically significant using a KS-test. Thus, there are no statistically significant framing effects, and any possible effects appear to be small in magnitude and in the form of an overall level effect, rather than differential treatment effects.

For brevity, and because we do not observe any significant differences in the distributions of stated MWAs for sellers and offers for buyers between the framed and unframed conditions, we refrain from providing a complete replication of the treatment effect analysis for the unframed condition. Instead, we report some of the key findings from the unframed condition in route to establishing some general consistencies observed in the data patterns between the unframed and framed conditions. In terms of increases in variance of the court award, we document the following: (i) seller MWAs significantly increase from L-Var to M-Var, (ii) buyer offers significantly decrease from L-Var to M-Var, and (iii) settlement rates significantly decrease from 65% in L-Var to 48% in M-Var. Overall, in the unframed condition, an initial increase in variance decreases settlement rates.[37] With regard to increases in skewness of the court award, we find the following: (i) seller MWAs are significantly higher in the H-Skew condition, (ii) buyer offers are not different across the skewness treatments, (iii) settlement rates increase from 59% in L-Skew to 69% in M-Skew and then decrease to 53% in H-Skew. Consistent with the direction of the pattern observed in the framed condition, we find that initial increases in skewness increase the settlement rate, while further increases in skewness lead to a decrease in the settlement rate.

5 Conclusion

Disputes are often negotiated outside of court under the backdrop of an adjudicated award in the event of an impasse. While it is often mutually beneficial to negotiate a settlement, settlements are

[37] Unlike in the framed condition, as the variance increase further from M-Var to H-Var, seller MWAs significantly decrease and, as a result, settlement rates moderately increase to 59%, as opposed to a further decease in settlement rate, which is documented in the framed condition. That said, the settlement rate of 59% in the H-Skew treatment is still lower than the 65% settlement rate in the L-Var treatment, which is suggestive of a general downward trend in settlement rates as the variance of the court award increases, as is documented in the framed condition.

not ubiquitous, and the involved parties are often resigned to the use of costly litigation. Furthermore, the adjudicated award in such settings can be highly unpredictable and variable (Sunstein et al., 2002). We contend that the presence of uncertainty in the adjudicated award can impact settlement negotiation behavior and, consequently, the likelihood that a settlement is reached. We investigate this hypothesis empirically using a laboratory experiment where we systematically increase the variance and skewness of the award distribution across treatments. In addition, we also elicit individual measures of risk aversion and prudence to test for heterogeneous treatment effects based on risk attitudes. We view our results as being applicable to a variety of legal disputes where adjudicated awards are likely to be uncertain including: punitive damages, patent infringements, contract breaches, antitrust, labor disputes, and eminent domain.

Overall, our results suggest that court award uncertainty can significantly impact settlement negotiations and, consequently, settlement rates. In particular, we find that increases in the variance of the court award lead to lower settlement rates. This result is driven by sellers generally increasing their minimum willingness to accept (MWA) as the variance of the award increases, while buyers generally decrease their price offers. When we further examine the data, classifying sellers as relatively risk-averse or risk-loving, we find a similar pattern for both types of sellers. Regarding increases in skewness of the court award, we find that settlement rates generally increase, although the increase is the strongest for an initial increase in skewness (from zero skewness to some positive skewness in the distribution). This seems to be driven by seller MWAs being more concentrated at lower values as skewness increases (despite the presence of skewness seeking outliers who express very large MWAs, especially in the H-Skew treatment), while buyers moderately increase their price offers. Notably, our main results are generally robust in both a contextually framed settlement negotiation environment and an abstractly framed negotiation environment, which provides more robust and convincing evidence that increases in variance and skewness of adjudicated awards can impact settlement negotiation in significant and important ways.

It is worth noting that in our design, lottery complexity – the number of possible outcomes in the lottery – varies across the five treatment. This may be relevant since it has been documented experimentally that agents prefer less complex lotteries (See Huck & Weizsäcker, 1999; Mador et al., 2000; and Sonsino et al., 2002). In the context of our design, the distribution in M-Var (5 outcomes) is more complex than the distributions in L-Var and H-Var (2 outcomes each). Likewise, the distributions in M-Skew and H-Skew (6 and 5 outcomes, respectively) are more complex than

L-Skew (2 outcomes). Thus, based on the previous findings, some sellers in our experiment may have been less attracted to the M-Var distribution (compared to L-Var), which should have lowered their MWA. Similarly, some sellers may have been less attracted to the M-Skew and H-Skew treatments (compared to L-Skew) and, hence, lowered their MWA. However, these effects generally work in the opposite direction of our main findings. As a result, it seems unlikely that the difference in lottery complexity across treatments substantially confounded our results.

An interesting pattern that emerges in our data is the positive relation between sellers' MWA and the variance of the court award; moreover, this positive relation holds even for those seller who are risk-averse (especially when going from L-Var to M-Var), which seems counter-intuitive. While not the primary motivation of the paper, we briefly speculative about a possible mechanism that could be driving this pattern. In both the M-Var and H-Var treatments, there is the possibility for sellers to receive much larger awards compared to the L-Var treatment. We suspect that these larger awards might have been more salient to sellers (Bordalo et al., 2012; 2015), especially given the contextual framing of the negotiation environment where the sellers become enticed with the prospect of the *court* awarding them a large payout. As a result of sellers possibly being drawn to these large and more salient awards, they may have subjectively over-weighted the likelihood of receiving these larger awards leading to inflated MWAs.[38]

When examining welfare implications, we note that when court awards are uncertain, settlement failure is not always necessarily inefficient. The reason is that when awards are highly variable or largely positively skewed, the plaintiff's reservation value to settle may be much larger than the expected court award; this could result if the plaintiff has a strong preference for skewed award distributions, exhibits long-shot bias or saliency bias, or becomes enticed with the possibility to "hit it big". If the plaintiff's reservation value is *too large,* there may be no possibility for a mutually agreeable settlement. In such instances, settlement failure is not inefficient, and we would expect litigation to be imminent. This is apparent in our data where in the high variance (high skewness) treatments, settlement is not efficient for 13 percent (15 percent) of the negotiating pairs, since the

[38] The plausibility of saliency bias contributing to sellers stating higher MWAs in the M-Var and H-Var treatments is reinforced when we look at the unframed condition. With completely abstract framing and no mention of *court awards*, we would expect the large values of the distribution to be less salient to sellers, relative to the framed condition. As such, the larger awards would receive less weight in the unframed conditions and sellers would respond with lower MWAs, relative to the framed condition. While not statistically significant, the average MWAs in the H-Var condition (where there is the presence of just one large award) is lower than in the framed condition, providing some indirect evidence in-line with saliency bias playing a role.

seller's MWA exceed the buyer's expected payment of proceeding to court. However, even if we restrict the analysis to the subset of disputes where an efficient settlement was possible, we see the following results emerge. First, high levels of variance in the court award lead to an increase in excessive, inefficient litigation. Second, some positive skewness in the court award leads to a decrease in inefficient litigation. Importantly, our results show that court award uncertainty can impact settlement rates through two channels: (i) by reducing the number of potentially efficient settlements, and (ii) by altering the number of potentially efficient settlements that are actually reached (i.e., the instance of inefficient litigation).

We note that the implications of our results would be applicable even in dispute settings where the actual underlying court award had very little uncertainty; rather, the plaintiff had misguided perceptions about the award distribution. This scenario could arise if, for example, the plaintiff held an erroneous or biased belief regarding the magnitude of possible court awards, or the likelihood of receiving awards at the upper end of the distribution. Such misguided beliefs could occur if plaintiffs exhibit "self-serving" biases where they may over-estimate the value of the adjudicated award, which has been documented (e.g., Loewenstein et al., 1993; Babcock et al., 1995; Babcock & Loewenstein, 1997). In such a case, litigation may be the preferred course of action for the defendant, as the defendant's expected payoff may be lower than paying the requisite amount to settle. While we do not explore asymmetries in beliefs about awards, this could be an interesting area for future research.

While we believe our design contributes to our overall understanding of settlement failures in legal disputes, we acknowledge the possible limitations of our study. Our sample is comprised of student subjects who were randomly assigned their roles and who may be inexperienced, while legal disputes usually involve expert lawyers who may be able to more accurately predict the responses of a jury or a particular judge. Indeed, more experienced subjects may have been able to avoid court with a higher frequency, resulting in less inefficient litigation, although this is purely speculative. That said, plaintiffs who file suit may be inexperienced, and they are the ones ultimately deciding whether to accept any proposed settlement offer. Another possible limitation is that participants only partook in five rounds of the negotiation (one round for each different award distribution) and, thus, had little opportunity to learn in this environment. Again we speculate that as the negotiating parties learn through experience, we may observe attenuated effects of changes in variance and skewness of adjudicated on settlement rates. At the same time, there is likely to be substantial heterogeneity from one legal dispute to the next and litigants may only be occasionally involved in disputes, which would minimize the opportunities for learning (as discussed by Babcock and Loewenstein, 1997).

In terms of broader implications, we recognize that explicitly manipulating the level of uncertainty of adjudicated awards is likely not a plausible mechanism for reducing inefficient litigation. Yet, the results from this study can provide useful insights as to other more feasible approaches. For example, one approach would be to extend the use of award caps, which several states have implemented through widespread tort reform over the past several decades. Such award caps could have the effect of moderating the level of perceived variance and/or skewness in the award distribution (in addition to possibly lowering the perceived mean); as a result, the corresponding decrease in perceived variance and/or skewness could lead to higher efficient settlement rates, even if the perceived mean award remains unchanged after the imposition of the award cap.[39] Another possible approach might be to institute measures that increase the quantity and/or accuracy of information available to the plaintiff, such as the mandatory disclosure provision of Rule 26 of the Federal Rules of Civil Procedure. Such mandates may reduce the variance in plaintiffs' assessment of the award distribution, which could reduce inefficient litigation.

[39] Much of the prior literature on the effect of award caps on litigation has focused on how award caps can impact the level of care taken by the liable party, or the likelihood that the potential claimant files a claim. We are by no means suggesting that these types of moral hazard effects and selection effects are not possible consequences of award caps. Rather, we are suggesting that another possible avenue through which award caps can impact litigation is by altering the degree of award uncertainty and, subsequently, the likelihood that a settlement is reached.

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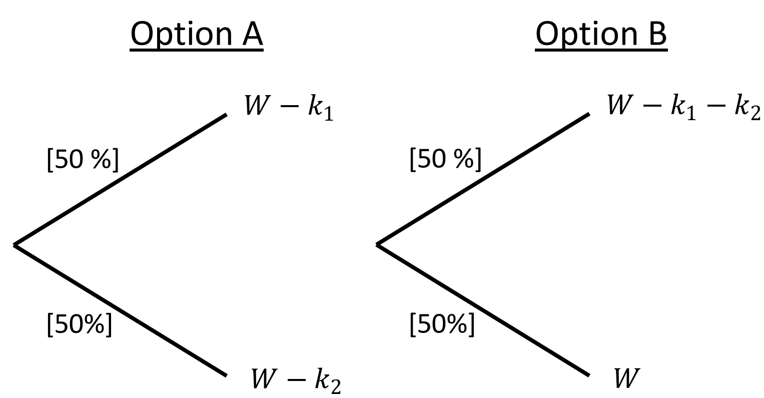
Appendix A: Risk Preference Elicitation Method

The first method for eliciting risk aversion is based on the method developed by Eeckhoudt and Schlesinger (ES, henceforth) (2006), which characterizes risk attitudes based on choices over binary lottery pairs. This method was used to keep a consistent framework with the prudence elicitation method, which is described below. The general idea of this instrument is as follows: An individual is assumed to have a wealth level W, and there are two possible losses of magnitude, k_1 *and* k_2, that the individual faces; ES (2006) refers to these losses more generally as "harms". The individual faces two 50/50 lotteries of the following form in Figure 9:

Figure 9: ES (2006) Binary Choice Risk Lottery Pair



An individual's choice exhibits risk aversion if he/she prefers Option A to Option B. That is, in the terminology used by ES (2006), the individual has a preference for disaggregating the harms, which is equivalent to a dislike for mean preserving spreads and a concave utility function ($u'' < 0$). We consider 10 lottery pairs that take this general form. A full description of these 10 lottery pairs, with their corresponding values of W, k_1 *and* k_2, is provided in Table 5 below. In terms of the ES-measure of risk, we use the total number of times that the individual selected Option A in these 10 lotteries. For robustness, the second instrument we use for eliciting risk aversion is the well-known Holt and Laury (2002) (HL, henceforth) method. This instrument consists of the following 10 pairs of gambles depicted in Table 6 below.

For each pair, the participant has to select whether he/she prefers Option A or Option B. The possible payoffs in both Option A and Option B remain constant, while the probabilities change. The 10 gambles are ordered such that the gamble where individuals *switch* from preferring Option

A to Option B can be used as a measure of risk aversion. A risk-neutral individual would switch to Option B at gamble 5, and the later the switch point, the higher degree of risk aversion. The HL-risk measure is simply the lottery where the individual switched from Option A to Option B, assuming a unique switch point.

Table 5: ES Binary Choice Risk Lotteries

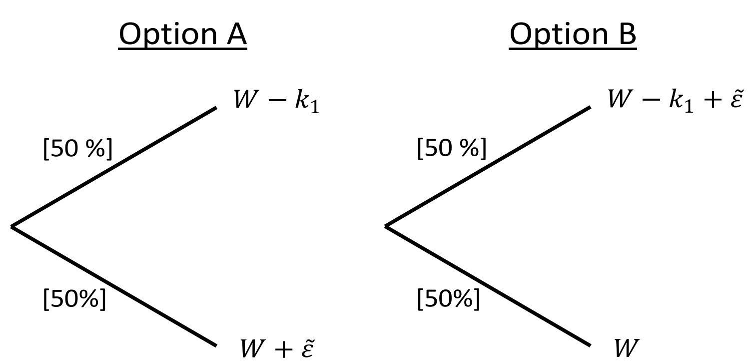
	Option A		**Option B**		**Parameters**		
Lottery	Amount (ECU)	% Chance	Amount ECU)	% Chance	*W*	k_1	k_2
1	80	100%	40 120	50% 50%	120	40	40
2	40 100	50% 50%	20 120	50% 50%	120	20	80
3	100	100%	50 150	50% 50%	150	50	50
4	120 140	50% 50%	100 160	50% 50%	160	20	40
5	120 160	50% 50%	80 200	50% 50%	200	20	40
6	150	100%	40 260	50% 50%	260	110	110
7	60	100%	40 80	50% 50%	80	20	20
8	280	100%	80 480	50% 50%	480	200	200
9	70	100%	30 110	50% 50%	110	40	40
10	150 200	50% 50%	100 250	50% 50%	250	50	100

Table 6: Holt Laury (HL) Risk Lotteries

	Option A		Option B	
Gamble #	160 ECU	200 ECU	10 ECU	385 ECU
1	90%	10%	90%	10%
2	80%	20%	80%	20%
3	70%	30%	70%	30%
4	60%	40%	60%	40%
5	50%	50%	50%	50%
6	40%	60%	40%	60%
7	30%	70%	30%	70%
8	20%	80%	20%	80%
9	10%	90%	10%	90%
10	0%	100%	0%	100%

For elicitation of prudence, we use an instrument that is based on the ES (2006) method. The method functions as follows: The individual is, again, assumed to have a wealth level, W, there is a sure loss of magnitude k_1, and there is a mean zero random variable $\tilde{\varepsilon}$. The individual then faces two 50/50 lotteries of the form in Figure 10:

Figure 10: ES (2006) Binary Choice Prudence Lottery Form



An individual's choice exhibits prudence if he/she prefers Option A to Option B. This choice of A over B is equivalent to a convex marginal utility ($u''' > 0$) in an expected utility framework. The idea is that a prudent individual prefers to face the zero mean shock, $\tilde{\varepsilon}$, in the higher wealth state.[40] We consider 10 lotteries that take this general form; a complete list of each of these lottery pairs, with its corresponding values of W, k_1, and the distribution of $\tilde{\varepsilon}$, is included in Table 7 below. Subsequently, the ES-prudence measure is the number of times the individual selects Option A in these 10 lotteries pairs.

Table 7: ES Binary Choice Prudent Lotteries

	Option A		Option B		Parameters			
Lottery	Amount (ECU)	% Chance	Amount (ECU)	% Chance	*W*	k_1	ε	Pr(ε)
	160	50%	148	40%	200	40	-12	80%
1	188	40%	200	50%			48	20%
	248	10%	208	10%				
	40	50%	28	35%	80	40	-12	70%
2	68	35%	68	15%			28	30%
	108	15%	80	50%				
	120	50%	108	40%	120	-40	-12	80%
3	148	40%	160	50%			48	20%
	208	10%	168	10%				
	80	50%	68	35%	80	-40	-12	70%
4	108	35%	108	15%			28	30%
	148	15%	120	50%				
	100	50%	60	25%	200	100	-40	50%
5	160	25%	140	25%			40	50%
	240	25%	200	50%				
6	80	75%	60	25%	100	20	-20	50%
	120	25%	100	75%			20	50%
	50	50%	10	25%	100	50	-40	50%
7	60	25%	90	25%			40	50%
	140	25%	100	50%				
	30	50%	10	25%	90	60	-20	50%
8	70	25%	50	25%			20	50%
	110	25%	90	50%				
	60	50%	40	25%	100	40	-20	50%
9	80	25%	80	25%			20	50%
	120	25%	100	50%				
	260	25%	180	25%	420	80	-160	50%
10	340	50%	420	50%			160	50%
	580	25%	500	25%				

[40] It follows that if k_1 was a sure gain, instead of a loss, then a prudent individual would prefer the gamble that combines k_1 and $\tilde{\varepsilon}$ (see Ebert & Wiesen, 2011); hence, the prudent individual would then prefer the lottery of the form in Option B. We note this because 2 of our 10 prudent lotteries involve a sure gain (Lotteries 3 and 4).

Appendix B – Experimental Instructions for Contextually Framed Condition

EXPERIMENTAL INSTRUCTIONS

BUYER

PART I: THE BARGAINING TASK

You have been randomly assigned the role of **Buyer**, and you will remain in this role for the rest of the experiment. You will be randomly and anonymously paired with another participant who has been assigned the role of **Seller.** In this task, the seller has been endowed with a plot of land. As the buyer, you are trying to purchase the land from the seller. You and the seller will be given an opportunity to bargain over the price of the land (the specific bargaining process is described below). If you are unable to reach an agreement, then you and the seller will go to court, where the seller will be forced to sell the land to you. If you go to court, then you, as the buyer, will receive a fixed payment for acquiring the land. The price the seller receives for the land will be randomly determined by the court (the specific process of how the court amount is determined is described in more detail below).

Bargaining with the Seller:

In the experiment, we will be using a fictitious currency called: *Thaler*. Throughout the experiment your earnings will be in terms of Thalers, which will then be converted at the end of the experiment into dollars at a rate of: 10 Thaler to $1. As the buyer, your value for the plot of land is: **200 Thalers.** Your earnings from acquiring the land from the seller will be your value of 200 Thaler *minus* the price you pay. You and the seller will have an opportunity to bargain over the price of the plot of land. The bargaining process will work as follows:

Buyer: You will first make an offer (in Thalers) to the seller for the land.
Seller: The seller will then decide whether or not to accept or reject your offer.

If the seller accepts offer then you acquire the land at the price you offered, and your earnings are: ***200 - the accepted offer***. The seller receives the accepted offer as payment for the land.

If the seller does not accept your offer, then you and the seller will go to *court*, where the seller is forced to sell the land to you. You will have to pay a fixed payment of 150 Thaler for the land. So your earning, if you have to go to court, will be: **200 – 150 = 50**. The amount of money that the seller will receive for the land will depend on how much money the court awards the seller. The exact amount that the seller will receive will be determined randomly based on the possible court award amounts and the likelihood that these possible amounts are awarded, which is described below.

The Court Award:

In the event that an agreement is not reached in the bargaining stage, because the seller rejects your offer, the court will randomly determine how much the seller will receive. The possible amounts that the seller may be awarded, and the likelihood that each of these possible amounts is awarded to the seller will be displayed in a court award table. Below is an example of what one of these court award tables might look like:

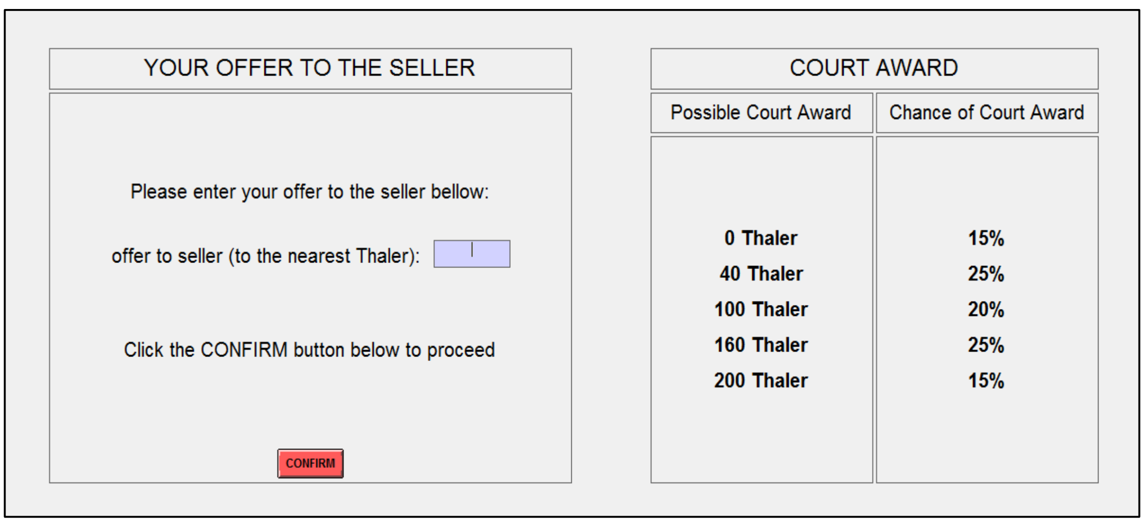
Possible Court Awards	Chance of Court Award
40 Thaler	10%
60 Thaler	20%
100 Thaler	40%
140 Thaler	20%
160 Thaler	10%

What this table conveys, is that if you and the seller go to court, then there would be a 10% chance the court would award the seller 40 Thaler, a 20% chance of 60 Thaler, a 40% chance of 100 Thaler, a 20% chance of 140 Thaler, and a 10% chance of 160 Thaler. Remember that you, as the buyer, will pay just a fixed amount of 150 as payment for acquiring the land, regardless of what the court decides, as described above.

Note: both you and seller will know what the possible court awards are and the likelihood that each occurs prior to making decisions in the bargaining stage. However, if you and the seller go to court, then you will not receive feedback about what the actual realized court award was.

Procedure and Computer Interface:

All of your decisions in the bargaining task will be made on the computer. The screen for entering your offer is split into two halves: on the right side of the screen, you will see the specific court award table (if an agreement is not reached), on the left side of the screen you will be asked to enter your offer (to the nearest Thaler). After you have entered in your offer, you will be asked to click the CONFIRM button. Below is a sample of what the scree will look like:



Multiple Times and Random Re-matching:

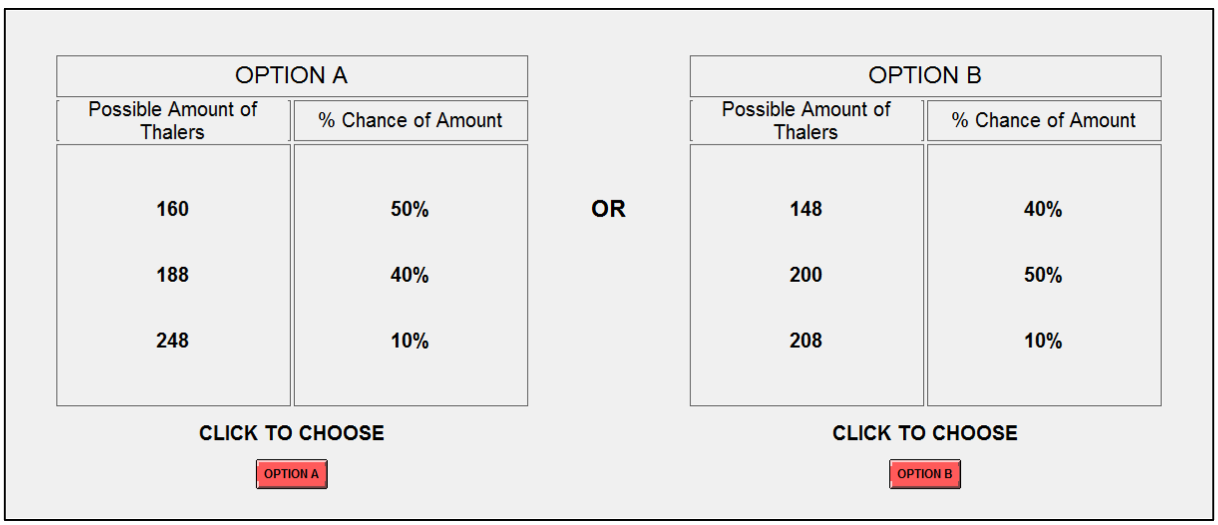
You will be participating in this bargaining task a total of 5 times. **In each of the 5 rounds of the bargaining task, you will be randomly re-matched with a different participant seller. That is, you will be paired with a different seller in each of the 5 rounds.** Additionally, in each of the 5 rounds, the possible court awards and/or the likelihood that each occurs will be different so be sure to look at the court award table before making your offer.

PART II: THE LOTTERY CHOICE TASK:

After you have finished the 5 rounds of the bargaining task, you will proceed to the lottery task part of the experiment. In this lottery task, you will make a decision in a series of 30 lottery choices problems. In each of the 30 lottery choice problems, there will be two possible lottery options, which will denote as: **OPTION A AND OPTION B**. Each of these lottery options will involve possible amounts of Thaler that you could earn and the corresponding likelihood (expressed as a probability) that you would win that amount. For each of the 30 different lottery problems, you will be asked to select the option that you **most prefer** of the two options.

Procedure and Computer Interface:

For each of the 30 lottery choice problems, you will see a screen that displays OPTION A on the left and OPTION B on the right, with the corresponding possible amounts of Thaler and the % chance of winning that amount for each option. You will make your preferred choice between the two options by simply clicking the corresponding button below the option. You will proceed in this manner through all 30 lottery choice problems, and this will conclude the experiment. Below is a screen shot of a sample lottery choice problem:



In the above sample lottery problem, if you choose OPTION A, then there is a 50% chance you would win 160 Thaler, a 40% chance you would win 188 Thaler, and a 10% chance you would win 248 Thaler. If you choose OPTION B, then there is a 40% chance you would win 148 Thaler, a 50% chance you would win 200 Thaler, and a 10% chance you would win 208 Thaler.

FINAL PAYMENT:

Your total earnings for this experiment will be determined as follows: First, you will receive $5 for showing up and participating in the experiment. In addition, you will be paid your earnings (converted from Thalers to dollar at a rate of 10 Thaler to $1) in **either** one randomly drawn round of the bargaining task **or** one randomly drawn lottery choice problem from the lottery choice task. This randomized payment will work as follows: First, after the experiment has ended, an experimenter will flip a coin to determine whether the bargaining task or the lottery task will be paid. Thus, each of the tasks is equally likely to be selected for payment. If it is heads then all participants will get paid for the bargaining task, and if it is tails then the lottery task will be paid.

If the bargaining task is selected, then an experimenter will come to your carrel where you will individually draw 1 ping pong ball from a bag that contains 5 balls, each one labeled for each of the 5 rounds. You will then be paid the earnings that correspond to the round that you selected.

If the lottery task is selected, then an experimenter will come to your carrel where you will individually draw 1 ping pong ball from a bag that contains 30 balls, each one labeled for each of the 30 lottery choice problems. You will then role two 10 sided dice to determine the amount that you will win, which will be based on the option that you actually choose for the lottery problem that you selected. The experimenter will have a sheet that displays which numbers of the die role correspond to which amount won (these die numbers are selected in a way to generate the same % chance of winning that is displayed in the option you selected).

After you have finished the experiment, please remain quietly seated until an experimenter comes to your carrel to determine your earnings. You will then be paid you total earnings in cash. After you have been paid you may quietly exit the lab.

THANK YOU FOR YOU PARTICIPATION AND COOPERATION

EXPERIMENTAL INSTRUCTIONS

SELLER

PART I: THE BARGAINING TASK

You have been randomly assigned the role of **Seller**, and you will remain in this role for the rest of the experiment. You will be randomly and anonymously paired with another participant who has been assigned the role of **Buyer.** In this task, you, as the seller, have been endowed with a plot of land. The buyer has been tasked with trying to purchase the land from you. You and the buyer will be given an opportunity to bargain over the price of the land (the specific bargaining process is described below). If you are unable to reach an agreement, then you and the buyer will go to court, where you will be forced to sell the land to the buyer. If you go to court, then the price you will receive for the land will be randomly determined by the court (the specific process of how the court amount is determined is described in more detail below). The buyer will simply pay a fixed payment for acquiring the land.

Bargaining with the Buyer:

In the experiment, we will be using a fictitious currency called: *Thaler*. Throughout the experiment your earnings will be in terms of Thalers, which will then be converted at the end of the experiment into dollars at a rate of: 10 Thaler to $1. As the buyer, your earnings from selling the land to the buyer will be the price you receive for the land (in Tahlers). You and the buyer will have an opportunity to bargain over the price of the plot of land. The bargaining process will work as follows:

Buyer: The buyer will first make you an offer (in Thalers) for the land.
Seller: You will be asked to state the *minimum offer* (in Thalers) that you would be willing to accept from the buyer to avoid going to court.

After you state your minimum acceptable offer, the buyer's offer will be revealed to you. If the buyer's offer is **higher** than your minimum acceptable offer, then you will sell the land at a price equal to the buyer's offer. Your earnings will be: ***the accepted buyer offer***.

If the buyer's offer is **lower** than your minimum acceptable offer, then you and the buyer will go to *court*, where you will be forced to sell the land to the buyer. The amount of money that you will receive for the land will depend on how much money the court awards you. The exact amount that you will receive will be determined randomly based on the possible court award amounts and the likelihood that these possible amounts are awarded, which is described below. Your earnings in this case will be: ***the court award***.

The Court Award:

In the event that an agreement is not reached in the bargaining stage, because the buyer's offer is lower than your minimum acceptable offer, the court will randomly determine how much you will receive as payment for the land. The possible amounts that you may be awarded, and the likelihood that each of these possible amounts is awarded, will be displayed in a court award table. Below is an example of what one of these court award tables might look like:

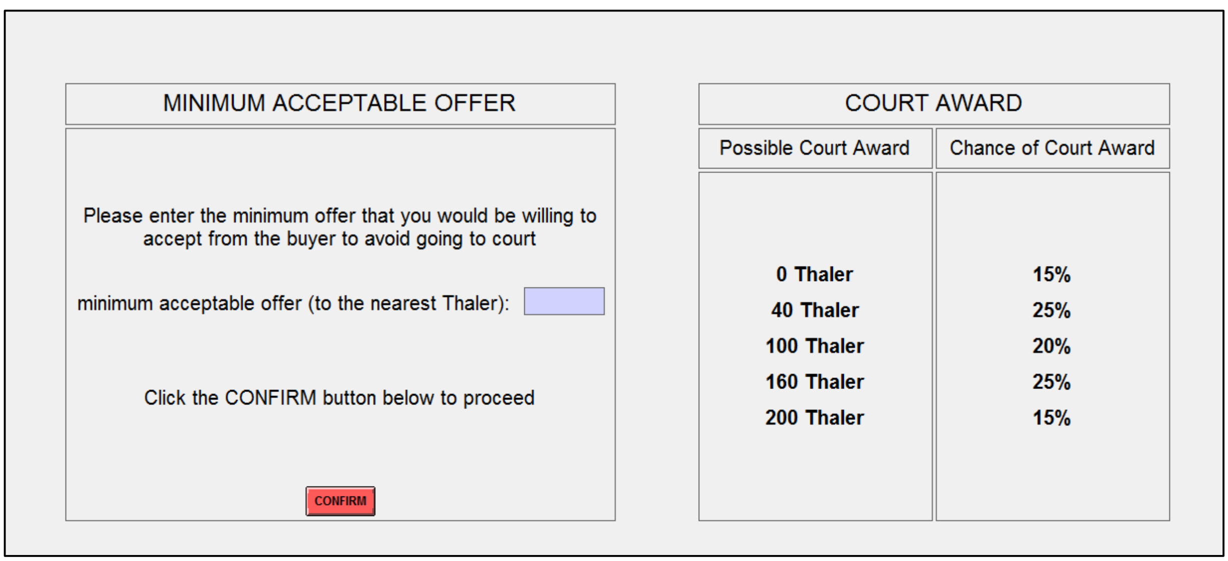
Possible Court Awards	Chance of Court Award
40 Thaler	10%
60 Thaler	20%
100 Thaler	40%
140 Thaler	20%
160 Thaler	10%

What this table conveys, is that if you and the buyer go to court, then there would be a 10% chance the court would award you 40 Thaler, a 20% chance of 60 Thaler, a 40% chance of 100 Thaler, a 20% chance of 140 Thaler, and a 10% chance of 160 Thaler.

Note: both you and buyer will know what the possible court awards are and the likelihood that each occurs prior to making decisions in the bargaining stage.

Procedure and Computer Interface:

All of your decisions in the bargaining task will be made on the computer. The screen for entering the minimum offer that you are willing to accept is split into two halves: on the right side of the screen, you will see the specific court award table (if an agreement is not reached), on the right side of the screen you will be asked to enter your minimum acceptable offer (to the nearest Thaler). After you have entered your minimum acceptable offer, you will be asked to click the CONFIRM button. Below is a sample of what the scree will look like:



Multiple Times and Random Re-matching:

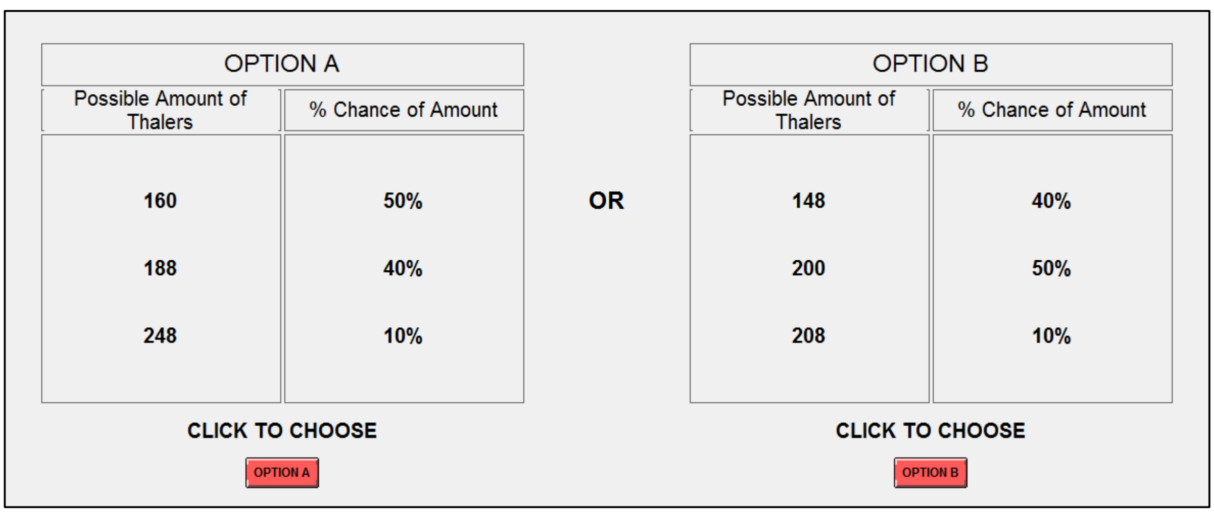
You will be participating in this bargaining task a total of 5 times. **In each of the 5 rounds of the bargaining task, you will be randomly re-matched with a different participant buyer. That is, you will be paired with a different buyer in each of the 5 rounds.** Additionally, in each of the 5 rounds, the possible court awards and/or the likelihood that each occurs will be different so be sure to look at the court award table before making your offer. If you do go to court in a particular round, you will not be informed about the actual realized court award until after the experiment has ended and payments are determined.

PART II: THE LOTTERY CHOICE TASK:

After you have finished the 5 rounds of the bargaining task, you will proceed to the lottery task part of the experiment. In this lottery task, you will make a decision in a series of 30 lottery choices problems. In each of the 30 lottery choice problems, there will be two possible lottery options, which will denote as: **OPTION A AND OPTION B**. Each of these lottery options will involve possible amounts of Thaler that you could earn and the corresponding likelihood (expressed as a probability) that you would win that amount. For each of the 30 different lottery problems, you will be asked to select the option that you **most prefer** of the two options.

Procedure and Computer Interface:

For each of the 30 lottery choice problems, you will see a screen that displays OPTION A on the left and OPTION B on the right, with the corresponding possible amounts of Thaler and the % chance of winning that amount for each option. You will make your preferred choice between the two options by simply clicking the corresponding button below the option. You will proceed in this manner through all 30 lottery choice problems, and this will conclude the experiment. Below is a screen shot of a sample lottery choice problem:



In the above sample lottery problem, if you choose OPTION A, then there is a 50% chance you would win 160 Thaler, a 40% chance you would win 188 Thaler, and a 10% chance you would win 248 Thaler. If you choose OPTION B, then there is a 40% chance you would win 148 Thaler, a 50% chance you would win 200 Thaler, and a 10% chance you would win 208 Thaler.

FINAL PAYMENT:

Your total earnings for this experiment will be determined as follows: First, you will receive $5 for showing up and participating in the experiment. In addition, you will be paid your earnings (converted from Thalers to dollar at a rate of 10 Thaler to $1) in **either** one randomly drawn round of the bargaining task **or** one randomly drawn lottery choice problem from the lottery choice task. This randomized payment will work as follows: First, after the experiment has ended, an experimenter will flip a coin to determine whether the bargaining task or the lottery task will be paid. Thus, each of the tasks is equally likely to be selected for payment. If it is heads then all participants will get paid for the bargaining task, and if it is tails then the lottery task will be paid.

If the bargaining task is selected, then an experimenter will come to your carrel where you will individually draw 1 ping pong ball from a bag that contains 5 balls, each one labeled for each of the 5 rounds. You will then be paid the earnings that correspond to the round that you selected. If in the round that you selected you went to court, then you will then role two 10 sided dice to determine the amount you will be awarded, which will be based on the specific court award table from that round. The experimenter will have a sheet that displays which numbers of the die role correspond to which court awards (these die numbers are selected in a way to generate the same % chance of winning that is displayed in the specific court award table from that round).

If the lottery task is selected, then an experimenter will come to your carrel where you will individually draw 1 ping pong ball from a bag that contains 30 balls, each one labeled for each of the 30 lottery choice problems. Again, you will then role two 10 sided die to determine the amount that you will win, which will be based on the option that you actually choose for the lottery problem that you selected. The experimenter will have a sheet that displays which numbers of the die role correspond to which amount won (these die numbers are selected in a way to generate the same % chance of winning that is displayed in the option you selected).

After you have finished the experiment, please remain quietly seated until an experimenter comes to your carrel to determine your earnings. You will then be paid you total earnings in cash. After you have been paid you may quietly exit the lab.

THANK YOU FOR YOU PARTICIPATION AND COOPERATION

Appendix C – Experimental Instructions for Abstractly Framed Condition

EXPERIMENTAL INSTRUCTIONS

PLAYER A (BUYER ANALOG)

PART I: THE BARGAINING TASK

You have been randomly assigned the role of **Player A**, and you will remain in this role for the rest of the experiment. You will be randomly and anonymously paired with another participant who has been assigned the role of **Player B.** In this task, Player B has been endowed with one fictitious *token*. As Player A, you are trying to purchase this *token* from Player B. You and Player B will be given an opportunity to bargain over the price of the *token* (the specific bargaining process is described below). If you are unable to reach an agreement, then you will be given the *token*, and you will pay a predetermined fixed amount for acquiring the *token*. The price the seller will receive as compensation for the *token* will be randomly determined by a draw from a lottery (the process of how the lottery amount is determined is described in detail below).

Bargaining with Player B:

In the experiment, we will be using an experimental currency called: *Thaler*. Throughout the experiment your earnings will be in terms of Thalers, which will then be converted at the end of the experiment into dollars at a rate of: 10 Thaler to $1. As Player A, your value for the *token* is: **200 Thalers.** Your earnings from acquiring the *token* from Player B will be your value of 200 Thaler *minus* the price you pay. You and Player B will have an opportunity to bargain over the price of the *token*. The bargaining process will work as follows:

Player A: You will first make a price offer (in Thalers) to Player B for the *token*.

Player B: Player B will then decide whether or not to accept or reject your price offer.

If Player B accepts your offer, then you acquire the *token* at the price you offered, and your earnings are: ***200 - the accepted price offer***. Player B receives the accepted offer as payment for the *token*.

If Player B does not accept your offer, then you will be given the *token*. You will have to pay a fixed payment of 150 Thaler for the *token*. So your earning, if you and Player B do not reach an agreement, will be: **200 – 150 = 50**. The amount of money that Player B will receive for the *token* will depend on the draw of the lottery that Player B faces as compensation for the *token*. The exact amount that Player B will receive will be determined randomly based on the possible outcomes of the lottery and the likelihood (expressed as a % chance) that these outcomes occur, which is described below.

The Lottery:

In the event that an agreement is not reached in the bargaining stage, because Player B rejects your offer, a random draw from a lottery determines how much Player B receives for the *token*. The possible amounts that Player B may receive, and the likelihood that Player B receives each of these possible amounts, will be displayed in a lottery table. Below is an example of what one of these lottery tables might look like:

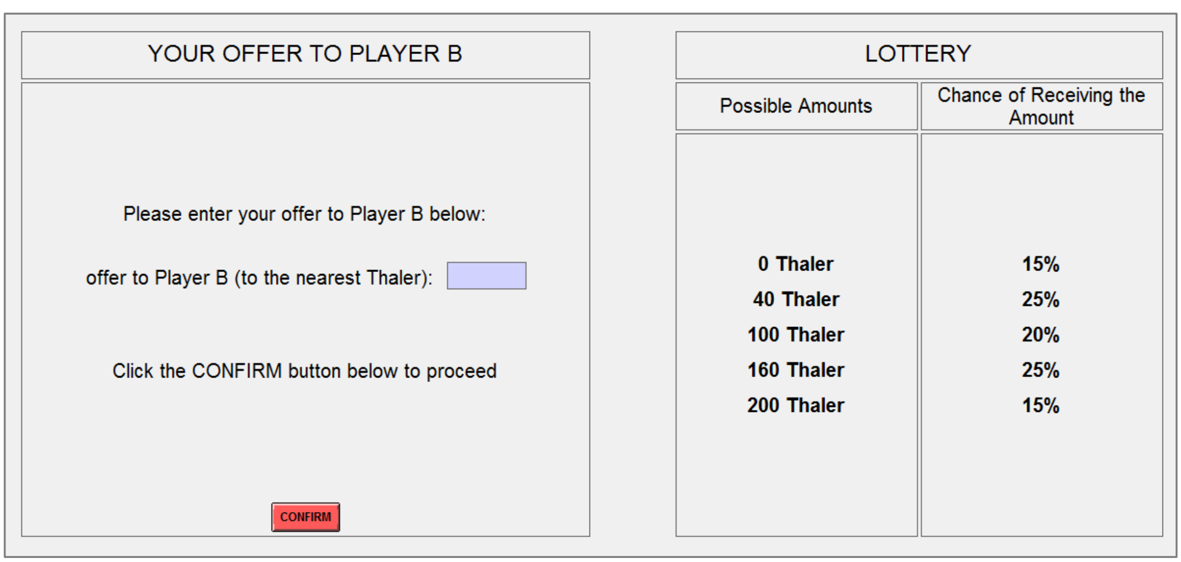
Possible Amounts	Chance of Receiving the Amount
40 Thaler	10%
60 Thaler	20%
100 Thaler	40%
140 Thaler	20%
160 Thaler	10%

What this table conveys is that if you and Player B do not reach an agreement, then there would be a 10% that Player B would receive 40 Thaler for the *token*, a 20% chance of receiving 60 Thaler, a 40% chance of receiving 100 Thaler, a 20% chance of receiving 140 Thaler, and a 10% chance of receiving 160 Thaler. Remember that you, as Player A, will pay just a fixed amount of 150 as payment for acquiring the *token*, regardless of the outcome of the lottery, as described above.

Note: both you and Player B will know what the possible amounts of the lottery are, and the likelihood that each occurs, prior to making your decisions in the bargaining stage.

Procedure and Computer Interface:

All of your decisions in the bargaining task will be made on the computer. The screen for entering your offer is split into two halves: on the right side of the screen, you will see the specific lottery table (if an agreement is not reached); on the left side of the screen you will be asked to enter your price offer (to the nearest Thaler). After you have entered your offer, you will be asked to click the CONFIRM button. Below is a sample of what the scree will look like:



Multiple Rounds and Random Re-matching:

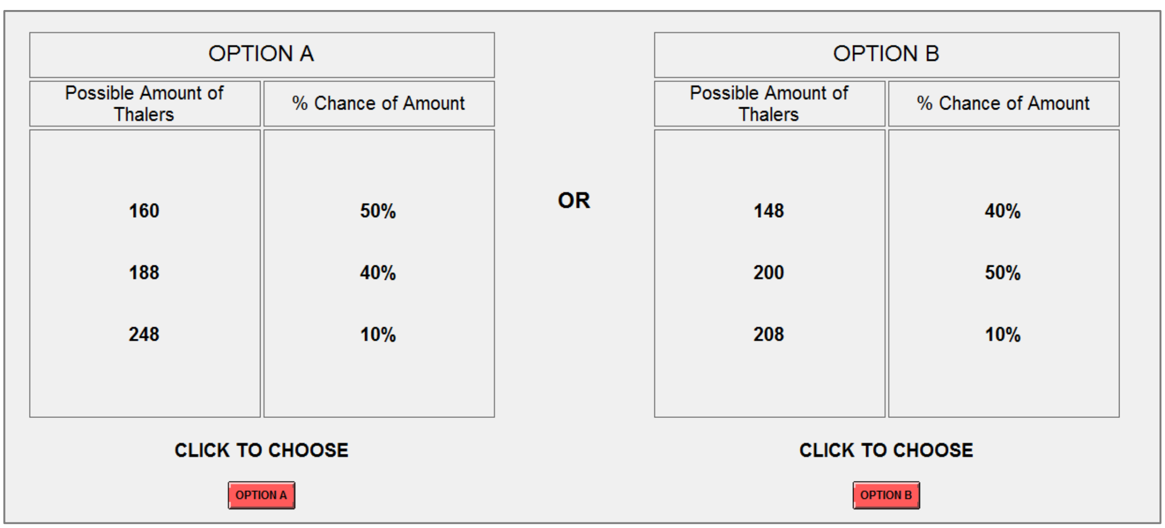
You will be participating in this bargaining task a total of 5 times. **In each of the 5 rounds of the bargaining task, you will be randomly re-matched with a different Player B. That is, you will be paired with a different Player B in each of the 5 rounds.** Additionally, in each of the 5 rounds, the possible lottery amounts and/or the chance of receiving the amount will be different, so be sure to look at the lottery table before making your offer. In the event that you and Player B don't reach an agreement and Player B's payment is determined by the lottery, you will not receive feedback about the actual realized outcome of the lottery.

PART II: THE LOTTERY CHOICE TASK:

After you have finished the 5 rounds of the bargaining task, you will proceed to the lottery task part of the experiment. In this lottery task, you will make a decision in a series of 30 lottery choices problems. In each of the 30 lottery choice problems, there will be two possible lottery options, which will be denoted as: **OPTION A and OPTION B**. Each of these lottery options will involve possible amounts of Thaler that you could earn and the corresponding likelihood (expressed as a % chance) that you would win that amount. For each of the 30 different lottery problems, you will be asked to select which of the two options that you **most prefer**.

Procedure and Computer Interface:

For each of the 30 lottery choice problems, you will see a screen that displays OPTION A on the left and OPTION B on the right, with the corresponding possible amounts of Thaler and the % chance of winning that amount for each option. You will make your preferred choice between the two options by simply clicking the corresponding button below the option. You will proceed in this manner through all 30 lottery choice problems, and this will conclude the experiment. Below is a screen shot of a sample lottery choice problem:



In the above sample lottery problem, if you choose OPTION A, then there is a 50% chance you would win 160 Thaler, a 40% chance you would win 188 Thaler, and a 10% chance you would win 248 Thaler. If you choose OPTION B, then there is a 40% chance you would win 148 Thaler, a 50% chance you would win 200 Thaler, and a 10% chance you would win 208 Thaler.

FINAL PAYMENT:

Your total earnings for this experiment will be determined as follows: First, you will receive $5 for showing up and participating in the experiment. In addition, you will be paid your earnings (converted from Thalers to dollar at a rate of: 10 Thaler to $1) in **either** one randomly drawn round of the bargaining task **or** one randomly drawn lottery choice problem from the lottery choice task. This randomized payment will work as follows: First, after the experiment has ended, an experimenter will flip a coin to determine whether the bargaining task or the lottery task will be paid. Thus, each of the two tasks is equally likely to be selected for payment. If it is heads, then all participants will get paid for the bargaining task; if it is tails, then all participants will get paid for the lottery task.

If the bargaining task is selected, then an experimenter will come to your carrel where you will individually draw 1 ping pong ball from a bag that contains 5 balls, each one labeled for each of the 5 rounds. You will then be paid the earnings that correspond to the round that you selected.

If the lottery task is selected, then an experimenter will come to your carrel where you will individually draw 1 ping pong ball from a bag that contains 30 balls, each one labeled for each of the 30 lottery choice problems. You will then role two 10-sided die to determine the amount that you will win, which will be based on the option that you actually choose from the lottery problem that you selected. The experimenter will have a sheet that displays which numbers of the die role correspond to which amount won (these die numbers are selected in a way to generate the same % chance of winning that is displayed in the option you selected).

After you have finished the experiment, please remain quietly seated until an experimenter comes to your carrel to determine your earnings. You will then be paid you total earnings either by cash or check. After you have been paid you may quietly exit the lab.

THANK YOU FOR YOU PARTICIPATION AND COOPERATION

EXPERIMENTAL INSTRUCTIONS

PLAYER B (SELLER ANOLOG)

PART I: THE BARGAINING TASK

You have been randomly assigned the role of **Player B**, and you will remain in this role for the rest of the experiment. You will be randomly and anonymously paired with another participant who has been assigned the role of **Player A.** In this task, you, as Player B, have been endowed with one fictitious *token*. Player A has been tasked with trying to purchase the *token* from you. You and Player A will be given an opportunity to bargain over the price of the *token* (the specific bargaining process is described below). If you are unable to reach an agreement, then Player A will be given the token. In return, the price you will receive as compensation for the *token* will be randomly determined by a draw from a lottery (the process of how the lottery amount is determined is described in detail below). Player A will pay a fixed payment for acquiring the *token*.

Bargaining with Player A:

In the experiment, we will be using a fictitious currency called: *Thaler*. Throughout the experiment your earnings will be in terms of Thalers, which will then be converted at the end of the experiment into dollars at a rate of: 10 Thaler to $1. As Player B, your earnings from selling the *token* will be the price you receive for the *token* (in Thalers). You and Player A will have an opportunity to bargain over the price of the *token*. The bargaining process will work as follows:

Player A: Player A will first make you a price offer (in Thalers) for the *token*.

Player B: You will be asked to state the *minimum price offer* (in Thalers) that you would be willing to accept from Player A for the *token* to avoid having the price be determined by the lottery

After you state your minimum acceptable offer, Player A's offer will be revealed to you. If Player A's offer is **higher** than your minimum acceptable offer, then you will sell the *token* at a price equal to Player A's offer. Your earnings will be: ***the accepted offer made by Player A***.

If Player A's offer is **lower** than your minimum acceptable offer, then Player A will be given the *token*. The amount of money that you will receive as compensation for the *token* will be randomly determined by a draw from a lottery. The exact amount that you will receive will be determined randomly based on the possible outcomes of the lottery and the likelihood (expressed as a % chance) that these outcomes occur, which is described below. Your earnings in this case will be: ***the random draw of the lottery***.

The Lottery:

In the event that an agreement is not reached in the bargaining stage, because Player A's offer is lower than your minimum acceptable offer, the price you will receive for the *token* will be randomly determined by a draw from a lottery. The possible amounts that you may receive, and the likelihood that you receive each of these possible amounts, will be displayed in a lottery table. Below is an example of what one of these lottery tables might look like:

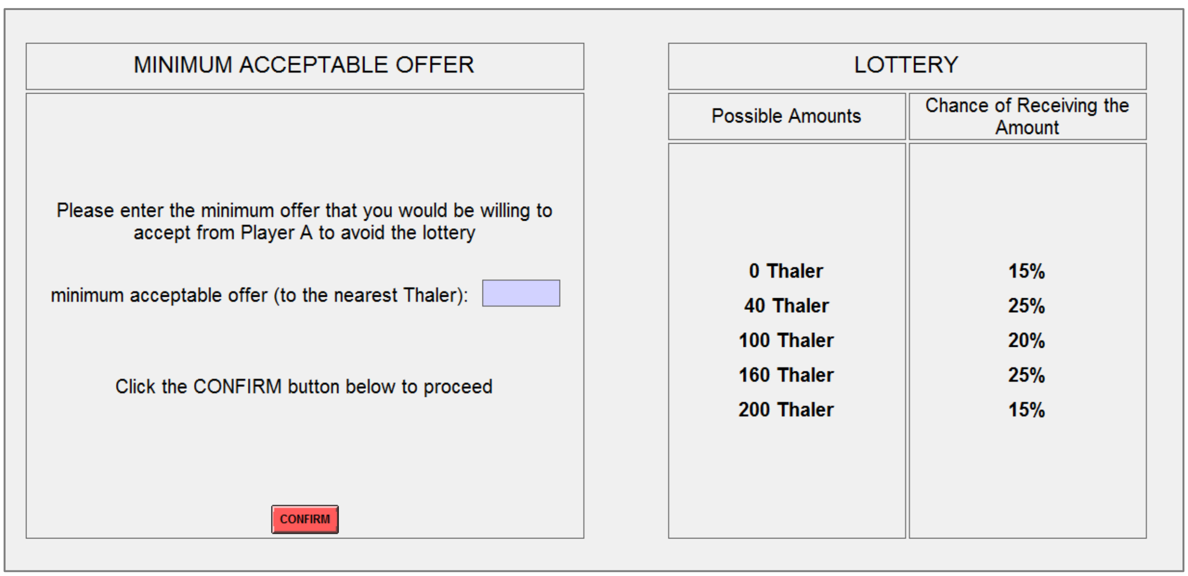
Possible Amounts	Chance of Receiving the Amount
40 Thaler	10%
60 Thaler	20%
100 Thaler	40%
140 Thaler	20%
160 Thaler	10%

What this table conveys is that if you and Player A do not reach an agreement, then there would be a 10% that you would receive 40 Thaler for the token, a 20% chance you would receive 60 Thaler, a 40% chance you would receive 100 Thaler, a 20% chance you would receive 140 Thaler, and a 10% chance you would receive 160 Thaler.

Note: both you and **Player A** will know what the possible amounts of the lottery are, and the likelihood that each occurs, prior to making your decisions in the bargaining stage.

Procedure and Computer Interface:

All of your decisions in the bargaining task will be made on the computer. The screen for entering the minimum offer that you are willing to accept is split into two halves: on the right side of the screen, you will see the specific lottery table (if an agreement is not reached), on the left side of the screen you will be asked to enter your minimum acceptable offer (to the nearest Thaler). After you have entered your minimum acceptable offer, you will be asked to click the CONFIRM button. Below is a sample of what the scree will look like:



Multiple Times and Random Re-matching:

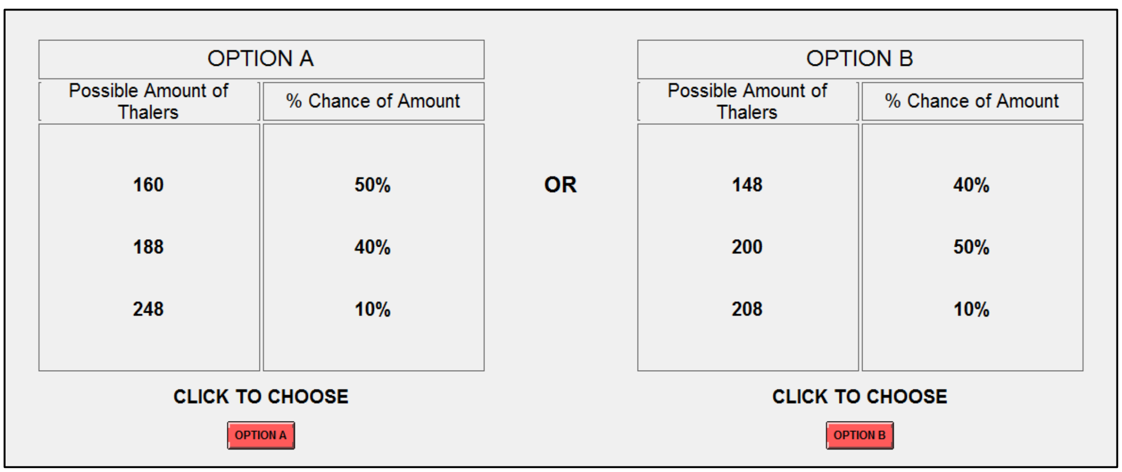
You will be participating in this bargaining task a total of 5 times. **In each of the 5 rounds of the bargaining task, you will be randomly re-matched with a different participant assigned to the role of Player A. That is, you will be paired with a different Player A in each of the 5 rounds.** Additionally, in each of the 5 rounds, the lottery will be different, so be sure to look at the lottery table before making your minimum acceptable offer. In the event that you and Player A don't reach an agreement and your payment is determined by the lottery, you will not be informed about the actual realized outcome of the lottery draw until after the experiment has ended and payments are determined.

PART II: THE LOTTERY CHOICE TASK:

After you have finished the 5 rounds of the bargaining task, you will proceed to the lottery task part of the experiment. In this lottery task, you will make a decision in a series of 30 lottery choices problems. In each of the 30 lottery choice problems, there will be two possible lottery options, which will be denoted as: **OPTION A and OPTION B**. Each of these lottery options will involve possible amounts of Thaler that you could earn and the corresponding likelihood (expressed as a probability) that you would win that amount. For each of the 30 different lottery problems, you will be asked to select the option that you **most prefer** of the two options.

Procedure and Computer Interface:

For each of the 30 lottery choice problems, you will see a screen that displays OPTION A on the left and OPTION B on the right, with the corresponding possible amounts of Thaler and the % chance of winning that amount for each option. You will make your preferred choice between the two options by simply clicking the corresponding button below the option. You will proceed in this manner through all 30 lottery choice problems, and this will conclude the experiment. Below is a screen shot of a sample lottery choice problem:



In the above sample lottery problem, if you choose OPTION A, then there is a 50% chance you would win 160 Thaler, a 40% chance you would win 188 Thaler, and a 10% chance you would win 248 Thaler. If you choose OPTION B, then there is a 40% chance you would win 148 Thaler, a 50% chance you would win 200 Thaler, and a 10% chance you would win 208 Thaler.

FINAL PAYMENT:

Your total earnings for this experiment will be determined as follows: First, you will receive $5 for showing up and participating in the experiment. In addition, you will be paid your earnings (converted from Thalers to dollar at a rate of 10 Thaler to $1) in **either** one randomly drawn round of the bargaining task **or** one randomly drawn lottery choice problem from the lottery choice task. This randomized payment will work as follows: First, after the experiment has ended, an experimenter will flip a coin to determine whether the bargaining task or the lottery task will be paid. Thus, each of the tasks is equally likely to be selected for payment. If it is heads then all participants will get paid for the bargaining task, and if it is tails then the lottery task will be paid.

If the bargaining task is selected, then an experimenter will come to your carrel where you will individually draw 1 ping pong ball from a bag that contains 5 balls, each one labeled for each of the 5 rounds. You will then be paid the earnings that correspond to the round that you selected. If in the round that you selected an agreement was not reached and your payment is determined by the lottery, then you will role two 10 sided dice to determine the amount you will receive based on the corresponding lottery table from that round. The experimenter will have a sheet that displays which numbers of the die role correspond to which possible outcomes of the lottery (these die numbers are selected in a way to generate the same % chance of winning that is displayed in the specific lottery table from that round).

If the lottery task is selected, then an experimenter will come to your carrel where you will individually draw 1 ping pong ball from a bag that contains 30 balls, each one labeled for each of the 30 lottery choice problems. Again, you will then role two 10 sided die to determine the amount that you will win, which will be based on the option that you actually choose for the lottery problem that you selected. The experimenter will have a sheet that displays which numbers of the die role correspond to which amount won (these die numbers are selected in a way to generate the same % chance of winning that is displayed in the option you selected).

After you have finished the experiment, please remain quietly seated until an experimenter comes to your carrel to determine your earnings. You will then be paid you total earnings either by cash or check. After you have been paid you may quietly exit the lab.

THANK YOU FOR YOU PARTICIPATION AND COOPERATION