Gender Differences in Alternating-Offer Bargaining: An Experimental Study*

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Abstract

A laboratory study is carried out to study gender differences in structured alternating-offer bargaining. In a symmetric environment the 50:50 split is the norm and we find no gender differences. In asymmetric environments, where there is no clear sharing norm, but one bargaining party is expected to get more than the other (due to empowerment, entitlement and informational asymmetries), we find that men are less likely to reach an agreement, and that when they do, they bargain for longer and obtain a larger share of the pie. However, gender is not an effect-modifying factor when comparing symmetric and asymmetric environments.

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1 INTRODUCTION

The gender wage gap has long been a major subject for study in economics. Although it has shown a decreasing trend over time, its persistence in developed countries challenges classical explanations based on differences in human capital, preferences or statistical discrimination (Blau and Kahn (2000), Blau and Kahn (2017)).

Gender differences in negotiation have been put forward as an alternative explanation for the gender wage gap. Starting wages are often the result of bilateral negotiation. Moreover, wages are also affected by negotiations that come later in one's career, e.g. for pay increases. If women are less likely to negotiate starting salaries and to ask for pay increases, and/or if women obtain worse deals when negotiating, this would clearly go some way towards explaining the gender wage gap (Azmat and Petrongolo (2014); Card et al. (2016)). The focus so far has been on gender differences in the likelihood of starting a negotiation. The influential book by Linda Babcock and Sara Laschever "Women Don't Ask" reveals important gender differences in the likelihood of negotiating. A study mentioned in the book shows that among graduates of Carnegie Mellon University 57% of men negotiated the starting salary offered to them, while only 8% of women did so. More recently, Leibbrandt and List (2014), using a field experiment, find that women are less likely to negotiate wages when they are not described explicitly as negotiable, but that the difference disappears when they are described as negotiable. Exley et al. (2016) propose a controlled environment such as the laboratory to show that women are less likely to start a negotiation.[1] To gain a better understanding of whether men and women obtain different outcomes in bilateral bargaining, it is important not only to study gender differences in the likelihood of starting a negotiation, but also gender differences *when* bargaining.

This paper seeks to shift the focus onto studying gender differences and gender interaction effects in alternating-offer bargaining, using a controlled environment such as the laboratory. The design of the experiment was registered at the *AEA RCT registry* before any sessions were run, under the reference AEARCTR-0002029.[2] A laboratory setting enables researchers to study not only bargaining outcomes but also the bargaining process, such as offers and demands. In addition, the laboratory offers the possibility of measuring individuals' self-assessment of their ability to perform a task and to bargain, as well as their risk and social preferences, which are hard, if not impossible, to control for in the field.

We use a symmetric bargaining setting as a benchmark, where bargaining parties show equal strength so that a 50:50 split of the pie is the only expected sharing norm.

[1] Gender interaction effects have received little attention in studies of entry into negotiation. An exception is the paper by Eriksson and Sandberg (2012), who find that women are less likely to initiate a negotiation if they are matched with a female partner.

[2] The pre-plan analysis can be checked at https://www.socialscienceregistry.org/trials/2029/history/15499.

We predict that in a symmetric bargaining environment, when a clear 50:50 split norm is the only sensible sharing rule, subjects will follow that norm so that neither gender differences nor gender interaction effects appear. We then introduce asymmetries, making one bargaining party stronger (the *proposer* in our setting) and the other weaker (the *responder* in our setting). The asymmetries are expected to shift the division of the pie away from 50:50 norm, so that the proposer is now expected to get a larger share of the pie than the responder. We investigate three types of asymmetry: empowerment (only the proposer has a positive outside option), entitlement (the proposer is entitled to a greater share than the responder) and informational power (only the proposer knows the actual size of the pie). In all the asymmetric bargaining environments implemented in our experiment there is no a clear sharing norm to be followed, but the proposer is expected to get more than the responder. We therefore allow for enough wiggle room when individuals bargain over a common pie. We predict that these environments would be the ones in which gender differences in bargaining are likely to flourish.

Our laboratory study consists of three main stages. Subjects first perform a real effort task, where each subject obtains a productivity which then determines the pie to be shared. In the second stage, subjects are randomly matched and have 3 minutes to bargain over the pie. The bargaining stage consists of 10 bargaining periods with a different matched participant each time. Finally, in the third stage we elicit a set of beliefs to measure their self-assessed ability in the task and in bargaining, as well as risk and social preferences.

The laboratory design relies on random matching of individuals to form the matches that will bargain over a pie, and on men and women being ex-ante equally likely to be allocated to either the strong or the weak bargaining position. This design allows us to study two main important questions on gender differences when bargaining. First, we study gender differences and gender interaction effects in both bargaining outcomes (probability of reaching an agreement, time taken to reach an agreement and the responder's share of the pie) and bargaining behavior (offers and demands) in the symmetric and the three asymmetric bargaining environments (Tables 3 and 4). Second, we compare gender differences in each asymmetric environment with those in the symmetric environment to test whether gender is an effect-modifying factor, i.e. whether men and women react differently to the presence of asymmetries in the bargaining environment (Table 5).

In the symmetric bargaining benchmark we find that, as expected, the split remains 50:50. Indeed 69% of the negotiations end up with the pie being split exactly equally, and the responder's average share of the pie is 0.5. As conjectured, we find no gender differences or gender interaction effects. When asymmetries are introduced we do find important gender differences in the stereotypically expected direction, where having a male responder makes it more likely that the process will end up in disagreement, men in both roles bargain for longer and men in both roles obtain a higher share of

the pie. In particular, when the proposer is empowered, male proposers obtain 4.4 percentage points (0.38 standard deviations of the mean) more of the pie than female proposers, which is explained by male proposers making lower offers. When the proposer is entitled to a larger share, male responders obtain a share 3.6 percentage points (0.32 standard deviations of the mean) larger than women, which is explained by the demand side, as male responders make significantly higher demands. Finally, when the proposer is the only party informed about the size of the pie, male responders obtain a share 4.2 percentage points (0.27 standard deviations of the mean) larger than female responders, which is explained again by the demand side, as male responders make significantly higher demands. It is interesting to note that when empowerment is implemented, gender differences in bargaining outcomes appear in the strong bargaining role, while when entitlement and informational asymmetries are introduced gender differences in bargaining outcomes appear in the weak bargaining role. In addition, we test for the existence of gender interaction effects but we find no evidence for them. When comparing gender differences in each asymmetric bargaining environment with those in the symmetric bargaining environment, we find no evidence for gender being an effect-modifying factor.

In the robustness section we perform two additional tests. First, we find that a minority of participants, 10% of them, mention gender as an objective to be studied by the experiment. We therefore test how robust the main findings are to the experimenter demand effects. Second, we find an important deadline effect. Almost 25% of the successful negotiations are reached within the last 10 seconds of the 3-minute time limit. This is consistent with previous experimental findings in bargaining (Roth et al. (1988) and Gneezy et al. (2003)). Although these two checks were not contemplated in the pre-plan analysis, we find that the main findings are robust to both experimenter demand and deadline effects.

Gender differences in bargaining have been studied by economists. For example, male proposers' behavior has been analyzed in studies of discrimination by carrying out field experiments in which the gender of potential scripted buyers is varied (Ayres (1991); Ayres and Siegelman (1995); Castillo et al. (2013)). To study gender differences in wage negotiation, Säve-Söderbergh (2007) uses wage bids and wage offers of recent graduates and finds that women post lower wage bids, and receive lower offers. More recently, Andersen et al. (2013) find that gender differences in bargaining depend on culture. Economists have also studied gender differences in controlled settings such as laboratories, mostly using the ultimatum game, which represents a reduced-form bargaining setting, as it allows for a single offer (or demand) and the response to it. Rigdon (2012) finds that women demand less than men in a demand-ultimatum-game in the laboratory. More recently, when studying gender differences in the choice to negotiate, Exley et al. (2016) include a baseline treatment, where subjects are *forced* to negotiate in an unstructured setting with limited time. They find that men and women achieve similar returns. Note that all these findings are consistent with our results. When gender differences are found, they go in the stereotypically expected direction

with men obtaining better deals. Most of these settings show clear multiple asymmetries offering enough wiggle room for gender differences to flourish. The exception is given by the setting in Exley et al. (2016), which is closest to our symmetric bargaining environment. The similarity comes –not in the existence of the 50:50 norm– but in that there is a clear sharing norm that dictates how the pie should be divided. This is due to the strong entitlement effect, where bargaining parties know exactly how much of the pie each bargaining party contributed. In that respect, for reasons similar to those in our symmetric bargaining environment, we would expect no gender differences.

Gender interaction effects in bargaining have received less attention. Given that bargaining requires interaction between two agents, gender differences in one role may crucially depend on the gender of the interlocutor. Existing studies based on field data or field experiments do not study gender interaction effects, either because the gender of the person in one role is not known (e.g. Leibbrandt and List (2014)) or because there is not enough variation (e.g. Castillo et al. (2013)). Economists are thus limited to the use of laboratory experiments. Eckel and Grossman (2001), using face-to-face ultimatum games, find that women are more likely to accept offers from women (*solidarity*) and that men are more likely to accept offers from women (*chivalry*). Solnick (2001), in an ultimatum game where gender is commonly known, finds that women are more likely to accept offers from male proposers than from female proposers. Closer to our alternating-offer bargaining setting, Dittrich et al. (2014) use a laboratory face-to-face alternating-offer wage-bargaining game where the firm is empowered, and find that starting salaries offered by men to women are lower than those offered by women to men, resulting in significant gender interaction effects on wage-bargaining outcomes. Hernandez-Arenaz and Iriberri (2017), using data from a TV-show in which bargaining parties show major asymmetries in all three dimensions (empowerment, entitlement and information), find that the matching between a male proposer (strong) and a female responder (weak) is the only one that differs from the rest, yielding higher profits for the proposer. Contrary to our findings here, they find significant interaction effects. However, as pointed out below, this may be because their settings have more than one type of asymmetry simultaneously.

Our paper makes four important contributions. First, it extends the bargaining environment from dictator and ultimatum games to more realistic environments where bargaining parties are allowed to have multiple rounds of offers and demands, bringing the bargaining process closer to reality. Second, it proposes a way to determine when gender differences in bargaining can be expected: when there is no clear sharing rule. This is confirmed by our experimental data and is consistent with other findings in the literature. Third, it is the first study to look at different types of asymmetric bargaining situations in connection to gender differences. Asymmetric bargaining settings are the rule rather than the exception in economically significant situations such as the labor market. The fact that all the studies mentioned above include some type of asymmetry confirms that the significant settings indeed involve asymmetries between player roles. Unfortunately, most of the time different sources of asymmetry are con-

founded. This paper isolates each of the three sources of asymmetry so as to study whether gender differences and gender interaction effects are different for each type of asymmetry (empowerment, entitlement, and informational asymmetries). Fourth, it proposes an experimental framework for studying not only gender differences but gender interaction effects, which have not been as studied as gender differences.

The rest of the paper is organized as follows. Section 2 describes the procedures and the design of the laboratory experiment, the data, the identification strategy, and the hypotheses. Section 3 describes the main results. Section 4 concludes.

2 Experimental Procedures and Design

A laboratory experiment was run at the Bilbao Laboratory of Experimental Analysis (Bilbao Labean) at the University of the Basque Country and at the Experimental Economics Lab (LEE) at University University Jaume I, on a computer based form using z-Tree experimental software (Fischbacher (2007)). Subjects were recruited through ORSEE (Greiner (2015)), with a total of 322 participants –160 (49.7%) men and 162 (50.3%) women– split into eight different sessions. Recruiting was carried out in such a way that the gender balance in each session was assured while subjects were unaware of this at the time of recruiting.

At the beginning of each session, subjects were provided with written general instructions, which informed subjects that the experiment consisted of 3 different stages and that the detailed instructions would be displayed on their computer screens before the start of each stage. All instructions, both written general instructions and detailed instructions regarding each of the stages, were read aloud to guarantee that the information was public knowledge. A translation of the instructions can be found in Appendix B. Each session lasted for about one and a half hours, including payment. Average earnings were 14.97 Euro (s.d. 5.49) including a show-up fee of 3 Euro, and total earnings ranged from 5 Euro to 34.5 Euro.

2.1 Design: Time-line of the Experiment

All sessions included three different stages: a real effort task, an alternating-offer bargaining task and a set of elicitation tasks. The real effort task and the elicitation tasks were identical in all sessions, but we varied the bargaining setting from one session to another in order to generate four different bargaining environments: *Symmetric* (80 subjects, 2 sessions of 40 each), *Empowerment* (80 subjects, 2 sessions of 40 each), *Entitlement* (80 subjects, 2 sessions of 40 each), and *Information* (82 subjects, 2 sessions, 1 with 42 subjects and one with 40 subjects). These bargaining environments differ from one another in the source of the induced bargaining asymmetry. In the rest of this section we explain each stage of the experiment in detail and outline the differences between

FIGURE 1– EXAMPLE OF A MATRIX SHOWN TO SUBJECTS DURING THE REAL EFFORT TASK

0	1	1	0	1	1
0	1	1	0	0	1
0	0	0	1	1	1
1	0	0	0	0	0
1	1	0	0	1	0
0	0	0	1	0	0

the four bargaining environments.

Real Effort Task: Subjects were presented with a matrix filled with "0"s and "1"s similar to that in Figure 1 and asked to count the number of ones.[3] Once a number was entered for a matrix and the subject confirmed the input, a new matrix appeared on the screen. Subjects performed this task for 5 minutes and the performance measure was the total number of matrices for which the correct number of "1"s was provided.[4] This task was not directly incentivized but subjects were informed that their performance in this task was important for determining their earnings in the bargaining stage.[5] Consistent with previous findings, this task proved to be gender neutral in performance, in the number of matrices attempted, and in the failure rate.[6]

At the end of this stage and just before entering into the bargaining stage, subjects' gender was elicited. In particular, they were presented with two avatars representing the silhouettes of a man and a woman and explicitly asked "Are you a man or a woman?". As can be checked in Figure 2, these avatars were chosen to elicit subjects' gender in the most aseptic and neutral way possible, without giving any further cues such as facial expressions. These avatars are used to make bargainers' genders common knowledge, as it is clear in Figure 3.

Bargaining Stage: Symmetric. Based on their relative performances in the real

[3] A similar task was used, for example in Abeler et al. (2011) and Mengel (2015).

[4] The z-Tree program was designed such that the maximum number of matrices that could be attempted was 60. This was explicitly sated in the instructions. Data show that this constraint is not binding as the maximum number of matrices that a subject faced was 33 with an average of 23.48.

[5] As will become clear in the explanation of the bargaining stage, the relationship between performance and the pie to be bargained over in the bargaining stage may induce competitive attitudes. To preclude any feeling of competition while subjects performed the real effort task, the instructions of the real effort task said the following: "The number of correct answers that you provide will determine your productivity. The higher your productivity the higher will be, on average, the amount of money you will have to divide in the next stage".

[6] Men (160 observations) on average provide the correct number of "1"s in 19.06 matrices (s.d. 4.74), while women (162 observations) in 19.17 (s.d. 4.54). Moreover, this gender neutrality in performance, effort, and productivity remains within each treatment. In addition, the three measures are similar in all four bargaining environments.

FIGURE 2– GENDER AVATARS

effort task, subjects were assigned a *productivity*, which determined the pie to be bargained over. In particular, the top third of performers were endowed with a productivity of €15, the middle third with a productivity of €10, and the bottom third with a productivity of €5. Subjects were informed about this exact protocol, only after they completed the real effort task, but no information about their actual productivity was provided.

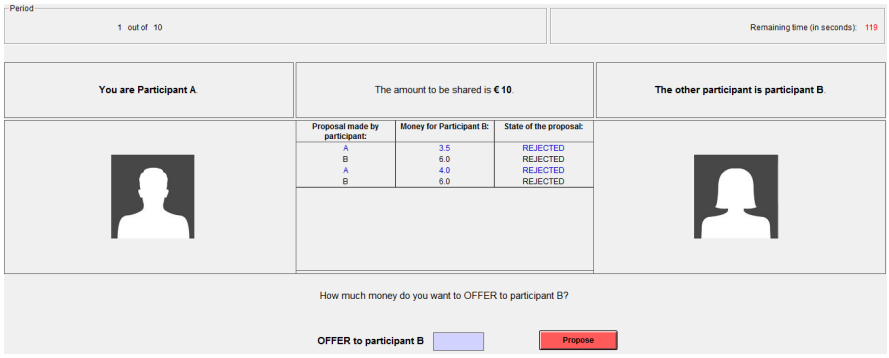
Each subject was then randomly matched with another subject. One is assigned the role of participant A (hereafter the *Proposer*) and the other that of Participant B (hereafter the *Responder*). The role of *Proposer* was assigned to the subject in the matching with the higher score in the real effort task, although this protocol was not revealed.[7] Within each match, the pie to be bargained over was randomly drawn from the productivity of the proposer and that of the responder with equal probabilities. This means that the potential pie size was 5, 10, or 15 Euro. Once the pie size was determined, this information was made public and each matching had 3 minutes to reach a deal on how to split the resulting pie through an alternating-offer bargaining process. During the bargaining proposers decided on offers to responders while responders decided on demands from proposers. In other words, the whole bargaining process took place in terms of the amount of money that the responder would get. During the bargaining, the information available to all subjects consisted of their own avatar and that of the opponent (their gender and that of their matched partner), the size of the pie to be shared and the bargaining history of offers and demands. See Figure 3 for an illustration. Importantly, subjects did not observe their own productivity or their opponent's. If they reached a deal within the 3-minute limit, the agreed split was implemented. Otherwise they got 0.

The whole bargaining process was repeated for 10 periods in all treatments, with a different matched participant each time.[8] Importantly, from one period to the next the

[7] In particular, the subjects were just told that they would be given a bargaining role. Roles were assigned in this way in order to facilitate comparison across different bargaining environments. In case of ties, roles were randomly assigned.

[8] In one of the *Symmetric* sessions there was a technical problem and the z-Tree program stopped at the second repetition. We ran the bargaining module again and everything worked fine the second time. Thus, for the *Symmetric* environment we gather data from 12 bargaining periods instead of 10 but given that periods 1 and 3 and periods 2 and 4 involve exactly the same matchings, we only consider periods 1-2 and 5-12 for the analysis of this bargaining environment.

FIGURE 3– SCREEN SEEN BY PROPOSERS DURING A THE BARGAINING STAGE (SYMMETRIC ENVIRONMENT)



role in the bargaining matching (proposer or responder) and the pie to be split could change. For payment, subjects were informed that the computer would take two periods randomly –one from periods 1-5 and another from periods 6-10– and the resulting outcomes would be implemented.

Bargaining Stage: Empowerment. Everything is as in the *Symmetric* bargaining except that there was an outside option for the proposer. In particular, if a deal was not reached within the 3-minute limit the proposer had an outside option while the responder got 0. The outside option available to the proposer was a random amount drawn from a uniform distribution of between 50% and 85% of the pie. Both parties know about the outside option but neither knew its exact value when bargaining.

Bargaining Stage: Entitlement. Everything is as in the *Symmetric* bargaining except that the subjects were able to observe their own productivity and that of their partners. This was public knowledge. This bargaining environment thus informed subjects of whose productivity determined the size of the pie. This was intended to generate a feeling of entitlement.[9] In case of a tie, there is no entitlement effect, so that we do not consider those bargaining matchings in the analysis in the rest of the paper (note the lower number of observations in the entitlement treatment).

Bargaining Stage: Information. Everything is as in the *Symmetric* environment except that only the proposer could observe the actual size of the pie, while the responder only knew that it could be 5, 10 or 15 Euro. This was public knowledge.

[9]Notice that, by design, the productivity of the proposer is at least as high as that of the responder. So, we argue that when the size of the pie is the proposer's productivity the proposer feels a positive entitlement –the pie is high thanks to the proposer's productivity– while when the pie size is the responder's productivity the responder feels a negative entitlement –the pie is low because of the responder's productivity. Regression analysis shows that positive and negative entitlement play a similar role when coming to analyze gender and gender interaction effects so we do not use this distinction in the main analysis.

Elicitation Tasks. After completing the 10 bargaining periods, subjects entered the third and last stage of the experiment. We first asked the subjects explicitly: "What do you think the objective of this experiment is?." This answer was not incentivized and they were allowed to provide their answers in free format. One potential concern with the way we made subjects' genders common knowledge is that this feature of the design could yield some type of experimenter demand effect, which is addressed in the robustness checks (Section 3.3). Also, in this stage we elicited beliefs about self-assessed ability and gender differences in performing both the real effort task and the bargaining task. Regarding the real effort task, subjects were asked to reveal which quartile of the performance distribution they thought they were in and to state which gender they believed had performed better (or whether there were no gender differences). Similarly, for the bargaining task subjects were asked to reveal which quartile of the distribution they thought they were in based on the relative surplus obtained during the 10 negotiations and to state which gender on average had obtained a greater share of the pie over the 10 periods (or whether there were no gender differences). All these measures were incentivized. In this stage we also elicited risk attitudes following the methodology in Eckel and Grossman (2002) and social preferences via the primary Slider Measure items described in Murphy et al. (2011) and implemented for z-Tree by Crosetto et al. (2012). Self-assessed measures of confidence on the task and on the bargaining ability, as well as risk preferences and social orientation values are used as additional controls in all regression analysis. Table A1 in the Appendix A shows the mean values for these control variables by gender. The main notable gender differences show up in risk preferences, women being more risk averse than men, and women being less confident in their bargaining ability.

At the end of the experiment subjects completed a non-incentivized questionnaire that asked for standard demographics and for the big five personality traits (Gosling et al. (2003)). Given that preliminary analysis does not return theoretically-consistent predictions, we decided not to use personality traits measures as individual controls.[10]

2.2 Data, Hypotheses and Identification Strategy

The experimental design consists of a 2 (Male Proposer, Female Proposer)×2 (Male Responder, Female Responder)×4 (Symmetric, Empowerment, Entitlement, Information) factorial design. The first two factors allow us to test for the existence of gender differences in each of the bargaining roles, as well as for the existence of gender interaction effects, by looking at the interaction Male Proposer×Male Responder. Meanwhile, the third factor allows us to check for the role of gender as an effect modifying factor

[10] In order to measure the big-five personality traits, we used the short version developed by Gosling et al. (2003). This short version is composed by 10 different questions such that the score at each personality trait is computed as the combination of two of these answers. Unfortunately, when we run principal component analysis on the self-reported answers provided by our subjects, the resulting 5 principal factors do not match the structure provided by Gosling et al. (2003), so the resulting factors can hardly be interpreted as claimed by previous authors. Thus, we decided to not use this personality traits as we do not really know what are they are measuring.

between symmetric and asymmetric bargaining environments.

From the experiment we gather data on 1,472 different negotiations coming from 322 different experimental subjects.[11] This data set includes variables of interest of two different types: bargaining outcomes and bargaining behavior. Regarding bargaining outcomes, we look at the probability of reaching an agreement within the 3-minute limit (*Success*), the time left from the three minutes limit since an agreement is reached (*Remaining Time*), and the share of the pie that is obtained by the responder when an agreement is reached (*Responder's Pie Share*). Regarding bargaining behavior we study opening offers (1^{st} *Offer*), *Subsequent Offers*, and *Demands*. We differentiate between opening and subsequent offers because the very first offer is the only action in the bargaining process that can be considered to be exogenous: All other actions in the bargaining are affected by the past bargaining history.

Given the experimental design and the treatments, we can test for two different hypotheses. First, we can test for the existence of gender differences. The null hypothesis is that there is no gender difference in bargaining, while the alternative is that we find some type of gender differences. The stereotypically expected gender difference would go in the direction of men being tougher and better bargainers such that they would obtain a higher share of the pie. In order to test for this hypothesis, for each variable of interest Y, we run:

$$Y_{ij} = \alpha + \beta_1 MaleProp_i + \beta_2 MaleResp_j + \gamma X_{yij} + \epsilon_{yij} \quad (1)$$

$$Y_{ij} = \alpha' + \beta_1' MaleProp_i + \beta_2' MaleResp_j + \beta_3' MaleProp_i * MaleResp_j + \gamma' X_{yij} + \epsilon_{yij}' \quad (2)$$

where $MaleProp_i$ ($MaleResp_j$) takes a value of 1 if the *Proposer* i (*Responder* j) is a man and 0 for a woman and X_{yij} is a set of control variables specific to variable Y and the matching between *Proposer* i and *Responder* j. Specification (1) enables us to test whether gender differences in bargaining can be detected, i.e. whether men and women in the role of *Proposer*/*Responder* obtain different outcomes from bargaining and/or behave differently while bargaining. In this specification our coefficients of interest are β_1 and β_2. Additionally, for each analysis we show the results from the specification in (2) to test whether the potential gender effect detected under specification (1) is independent of the gender of the other bargainer, i.e. whether there is any gender interaction effect. In this specification our coefficient of interest is β_3'. Thus in the rest of the analysis we focus on the sign and significance of the coefficients β_1, β_2, and β_3'.

[11] We have actually collected data on 1,610 different bargains, but 138 are from the *Entitlement* treatment from matchings in which no entitlement was implemented and thus we drop these observations from our data set.

We hypothesize that gender differences will be non-existent in the symmetric bargaining environment, where the 50:50 norm is prevalent. Our symmetric bargaining setting is closest to the one modeled in Ma and Manove (1993), where players do not know with certainty whether their offer will be the last one. The reason is that if they wait for too long they might not be able to submit the offer and to get a response from the other player, while if they send their offer too early the opponent might send a counteroffer so that their offer is not the last one. In this framework, the expected division of the pie is unique and close to an even split.[12] In contrast, we hypothesize that asymmetric bargaining environment may yield gender differences. Notice that asymmetries are introduced into the bargaining environment in a way such that a clear sharing norm is absent. So, asymmetries break with the 50:50 sharing norm by making the proposer the stronger bargaining party relative to the responder. This lack of clear sharing rule also allows for enough wiggle room for the bargaining parties to show their bargaining abilities. In particular, for the empowerment setting we decided not to provide the exact value of the outside option so as not to make that amount too salient.[13] In the entitlement setting, although it is clear the proposer is entitled to a higher share of the pie, because her productivity was higher, it is not clear how much her share of the pie should be because the pie is determined randomly by the productivity of only one bargaining party. Finally, in the informational asymmetry, bargaining parties might expect the stronger party will try to take advantage of the informational asymmetry. So the three asymmetric settings share the common feature that the proposer is expected to get more than the responder but no clear sharing rule exists, which might indeed allow for enough wiggle room for gender differences to flourish. These estimation results are shown in Tables 3 and 4.

Second, given we also vary bargaining environments, we test the null hypothesis of whether gender is an effect modifying factor when changing from the symmetric to an asymmetric bargaining environment. With this purpose, we compare each of the asymmetric treatments with the *Symmetric* one by performing the following regression analysis:

$$\begin{aligned} Y_{ij} = \alpha + \beta_1 MaleProp_i + \beta_2 MaleResp_j + \beta_3 Asym + \beta_4 Asym * MaleProp_i + \\ \beta_5 Asym * MaleResp_j + \gamma X_{yij} + \theta Asym * X_{yij} + \epsilon_{yij} \end{aligned} \tag{3}$$

where, as before, $MaleProp_i$ ($MaleResp_j$) takes a value of 1 if the *Proposer* i (*Responder*

[12] In Ma and Manove (1993), the authors characterize a symmetric Markov-perfect equilibrium, unique at almost all nodes, in which players adopt strategic delay early in the game, make and reject offers later on, and reach agreements late in the game. In equilibrium players miss the deadline with positive probability.

[13] In addition, we decided to guarantee that the outside option would be at least 50% of the pie in order to properly implement a bargaining asymmetry through the introduction of an outside option. Notice that in this case, the Nash bargaining solution (Nash Jr (1950)) and the *deal-me-out* solution (Binmore et al. (1989)) return the same and, more importantly, agree on the effect of the outside option. By contrast, if the outside option is lower than 50% these two solution concepts disagree on whether the existence of an outside option has any effect.

j) is a man and 0 for a woman and X_{yij} is a set of control variables specific to variable Y and the matching between *Proposer* i and *Responder* j. In each of the regressions, the omitted treatment is the symmetric one, while *Asym* takes the value of 1 if the observation comes from an asymmetric bargaining environment. In the regression (3) the coefficients of interest are β_4 and β_5; whose sign and significance show if gender indeed plays an effect modifying role between symmetric and asymmetric bargaining environments. Note that we also include the interaction effect between all the control variables and each of the asymmetric environments ($Asym * X_{yij}$) as the same feature of the bargaining environment (e.g. *Pie Size*) or the same characteristic of the bargainers (e.g. risk attitude) may have different impacts within each environment.[14] The estimation results for these test is shown in Table 5.

In all specifications for bargaining outcomes, we use an OLS specification and perform a two-way clustering at the subject or participant level (Cameron et al. (2011); Thompson (2011)). When analyzing bargaining behavior in successful negotiations we exploit the panel structure of the database, i.e. we use the round by round bargaining data but specify each individual matching as the panel variable and estimate a random effects model. In this specification we cluster standard errors based on the role of the decision maker (i.e. at the proposer/responder level when analyzing offers/demands).

Also, two types of control variables are applied in all regressions. First, there are control variables that refer to the characteristics of the proposers and responders, such as risk preferences, social value orientation, self-assessed ability in the real effort task, and self-assessed ability in bargaining. All these variables are incentivized elicited measures from the experimental design. Second, there are control variables that are specific to the bargaining matching: *Pie Size*, *Period* and *Session* fixed effects.

2.3 Assessing the Experimental Design

Before presenting the results, we must check for the suitability and validity of our experimental design to answer the research questions posed above.

We first assess whether the matching protocol generated a balanced gender matching distribution. Since this study aims to look at potential gender differences and gender interaction effects in bargaining, a crucial step is to look at whether all possible gender matchings are balanced across different bargaining environments but also within each bargaining environment. While the matchings between subjects are done randomly, the role assigned to each party is not. In particular, although not publicly revealed to subjects, within each matching the party with the higher score in the real effort task is the one that is assigned the role of proposer (see footnote 7). However,

[14] We also allow for testing if gender interaction effects are different between the symmetric and each of the asymmetric settings. We do not show these results or the regression because we do not find any evidence of gender interaction effects in the regression 2.

given the gender neutrality of the real effort task we would expect that all matchings should be evenly represented. This is confirmed in Table 1, where it can be checked that, within each treatment, each different matching accounts for close to 25%, the figure expected under full randomization. It can also be checked in Table 1 that within each treatment close to 50% of the matchings have a male proposer and 50% a male responder. The same thing is checked when pooling different bargaining environments (last column).

TABLE 1– DISTRIBUTION OF GENDER MATCHINGS ACROSS AND WITHIN EACH BARGAINING ENVIRONMENT

	Symmetric	Empowerment	Entitlement	Information	Total
FF	24.50%	24.25%	22.52%	25.85%	24.46%
MF	24.25%	25.50%	20.61%	28.05%	25.00%
FM	26.75%	26.00%	30.92%	22.68%	26.15%
MM	24.50%	24.25%	25.95%	23.41%	24.39%
Male Proposer	48.75%	49.75%	46.56%	51.46%	49.39%
Male Responder	51.25%	50.25%	56.87%	46.10%	50.54%
Observations	400	400	262	410	1,472

Thus, Table 1 shows that the procedure implemented in the experimental design and the gender neutrality in performance of the real effort task used in stage one generated a distribution of matchings which was balanced both across and within environments. In order words, men and women had ex-ante equal probabilities of being assigned the strong and weak bargaining roles. This allows to test for the existence of gender differences and gender interaction effects in bargaining.

We then check whether the *Empowerment*, *Entitlement*, and *Information* treatments generated the asymmetry we aimed for. In particular, we test whether these asymmetries break with the 50:50 sharing norm that is expected under the symmetric treatment by allowing the proposer to get a higher share of the pie. The *Symmetric* bargaining setting is the natural benchmark as it shows the most balanced bargaining situation between the proposer and the responder, so bargains can be expected to end in a 50:50 split. The data confirms this intuition: In the 343 bargaining matchings that reached a deal within the 3-minute limit the responder's average share of the pie is 0.5 (s.d. 0.113). In addition, the data show that 69% of the successful negotiations in this treatment end up in the 50:50 split. We take this as evidence of the symmetry that exists in this treatment.

We next compare the *Symmetric* bargaining setting with the three asymmetric treatments. Table 2 shows the average treatment effect of each asymmetric treatment in comparison with the *Symmetric* treatment for the three main bargaining outcome variables: The likelihood of reaching an agreement within the 3-minute limit (*Success*), the time in seconds from the reaching of an agreement to the end of the 3-minute limit (*Remaining Time*), and the share of the pie that is obtained by the responder in each

TABLE 2– AVERAGE TREATMENT EFFECT ON THE OUTCOME VARIABLES

	Success	Remaining Time	Responder's Pie Share
	(1)	(2)	(3)
Empowerment	0.0314	-28.28**	-0.224***
	(0.0517)	(11.28)	(0.0224)
Entitlement	0.0564	-22.73*	-0.0485***
	(0.0475)	(11.73)	(0.0136)
Information	-0.0213	-39.13***	-0.0954***
	(0.0494)	(11.30)	(0.0172)
No. Bargains	1,472	1,263	1,263
No. Clusters	322	322	322
R-squared	0.050	0.115	0.429
H_0: Emp=Ent	0.5246	0.6005	0.0000
H_0: Emp=Inf	0.1575	0.2664	0.0000
H_0: Ent=Inf	0.0338	0.1227	0.0224

Notes: OLS for the mean effect of each treatment on the main outcome variables. The omitted treatment is *Symmetric*. *Success* takes a value of 1 if the subjects reach a deal within the 3-minute limit and 0 otherwise. *Remaining Time* is the number of seconds from the time when agreement is reached until the three-minute limit expires. *Responder's Pie Share* is the share obtained by the responder in each successful bargain. All regressions control for *Pie Size*, *Period* and *Session* Fixed Effects. *Individual Controls* include subjects' gender, risk and social preferences and their self-assessed ability levels in the real effort task and in the bargaining ability, separately for both *Proposers* and *Responders*. *Entitlement* considers only those matchings in which an effective entitlement is implemented, so ties between subjects' productivities are disregarded. Standard errors are clustered at the subject level using two-way clustering. *** p<0.01, ** p<0.05, * p<0.1

successful negotiation (*Responder's Pie Share*).[15]

As intended in the design, the results in column (3) of Table 2 show that the *Empowerment*, *Entitlement*, and *Information* treatments give significant advantage to the proposer, enabling her/him to obtain a greater share of the pie. This asymmetry in bargaining roles is further evidenced by the fact that the proportion of divisions other than a 50:50 split in each asymmetric treatment is 99% for *Empowerment*, 78% for *Entitlement*, and 75% for *Information*. The three asymmetric treatments break the symmetry between the bargaining parties and make the proposer's role stronger than the responder's.

In addition, column (1) of Table 2 show that neither the existence of asymmetries nor their nature seem to have much effect on the probability of reaching a deal within the 3-minute limit. This shows that asymmetries do not affect the efficiency –measured by the likelihood of failing to reach a deal and thus destroying the pie– of the bargaining. Column (2) of Table 2 also suggests that asymmetries do affect the time required to reach an agreement, where all asymmetric treatments require longer than in the *Symmetric* setting. This suggests that introducing asymmetries into the bargaining setting, whatever their nature, increases the conflict with respect to a symmetric situation.

[15] Alternatively, the number of offers and demands can be used as an indicator of bargaining length instead of the *Remaining Time* variable. The results are qualitatively the same.

Asymmetric bargaining environments indeed led to asymmetric bargaining outcomes, in particular, led to an asymmetric split of the pie, where the proposer gets a larger share of the pie than the responder. This allows us to test if gender is an effect modifying factor when moving from a symmetric to an asymmetric bargaining environment.

3 RESULTS

3.1 ESTIMATION RESULTS 1: GENDER DIFFERENCES AND GENDER INTERACTION EFFECTS IN BARGAINING

We start by testing for gender differences and gender interaction effects in bargaining, based on the random bargaining matching and the gender neutrality of the task. Table 3 shows the aggregate results across all four bargaining environments for bargaining outcomes (columns (1) to (3)) and bargaining behavior (columns (4) to (6)).

TABLE 3– GENDER AND GENDER INTERACTION EFFECTS: AGGREGATE ANALYSIS

	Bargaining Outcomes			**Bargaining Behavior**		
	Success	Remaining Time	Responder's Pie Share	1^{st} Offer	Subsequent Offers	Demands
	(1)	(2)	(3)	(4)	(5)	(6)
β_1: Male Prop	-0.0258	-10.69**	-0.0207**	-0.0220	-0.00495**	-3.71e-05
	(0.0201)	(4.265)	(0.00974)	(0.0133)	(0.00242)	(0.00235)
β_2: Male Resp	-0.0660***	-14.60***	0.0163**	0.0176**	0.00528***	0.0108***
	(0.0183)	(4.013)	(0.00770)	(0.00688)	(0.00152)	(0.00316)
β_3': Male#Male	0.00499	8.702	-0.0125	0.00488	-0.00337	-0.00241
	(0.0333)	(5.897)	(0.0120)	(0.0132)	(0.00284)	(0.00486)
Observations	1,472	1,263	1,263	1,263	7,264	6,655
No. Bargains	1,472	1,263	1,263	1,263	1,068	1,014
No. Clusters	322	322	322	271	263	254

Notes: **Bargaining Outcomes**: OLS for the three main outcome variables, where negotiations from different bargaining environments are pooled together. *Success* takes a value of 1 if the subjects reach a deal within the 3-minute limit and 0 otherwise. *Remaining Time* is the number of seconds from the time when agreement is reached until the three-minute limit expires. *Responder's Pie Share* is the share obtained by the responder in each successful bargain. *Entitlement* considers only those matchings in which an effective entitlement is implemented, so ties between subjects' productivity levels are disregarded. All regressions control for each bargaining environment, *Pie Size*, *Period* and *Session* fixed effects. Individual level controls include subjects' risk and social preferences and their self-assessed ability levels in the real effort task and in bargaining ability, separately for *Proposers* and *Responders*. All fixed effects and individual level controls, are interacted with each bargaining environments. Standard errors are clustered at subject level using two-way clustering. **Bargaining Behavior**: GLS random-effects model for behavior variables, where negotiations from different bargaining environments are pooled together. Opening offers (1^{st} *Offer*), *Subsequent Offers*, and *Demands*. All variables represent the *Responder's Pie Share*. Other controls include the round and the time remaining in seconds at the point when the offer (demand) is made, the previous offer, the previous demand, and the individual controls for the *Proposer* (*Responder*). Clustered standard errors at the proposer level for offers and at the responder level for demands. *** p<0.01, ** p<0.05, * p<0.1

We find no evidence for gender interaction effects but only evidence for gender

differences. With respect to gender differences in bargaining outcomes, the stereotypically expected results that men are tougher bargainers and that they get better deals are confirmed: Male responders make successful bargaining less likely (6 percentage points lower), and when an agreement is reached, men not only take longer (11 and 15 seconds longer for male proposers and male responders) but also get better deals on both sides of the bargaining process (2 percentage points and 1.6 percentage points for male proposers and male responders, 0.18 and 0.12 standard deviations of the mean, respectively). This is backed up by the gender differences found in bargaining behavior. Female responders get lower offers, both initially (1.7 percentage points lower) and later, while men make lower subsequent offers. The magnitudes in subsequent offers seem to be rather small (around 0.05 percentage points). Male responders also make higher demands (1 percentage point higher). Thus, overall we find gender differences in the stereotypically expected direction: men are tougher bargainers, negotiate for longer and obtain better deals than women, which is explained by men making lower offers, receiving higher offers and demanding more than women.

Notice that in the aggregate analysis, shown in Table 3, the estimated magnitudes reflect an average gender difference across all four different bargaining environments. We now turn to the treatment by treatment analysis, shown in Table 4, where Panel A shows the results for bargaining outcomes and Panel B shows the results for bargaining behavior. As in the aggregate analysis, we find no evidence for gender interaction effects in either bargaining environment. With respect to gender differences, we find similar results regarding the sign of the coefficients across environments but some notable differences in magnitude and significance. In particular, we find no evidence for gender differences in the symmetric environment while in the asymmetric environments some significant gender differences are found, so we comment below on each treatment separately.

In the symmetric bargaining treatment (columns (1) to (3)) we find no evidence for gender differences or gender interaction effects except in bargaining time, where two male bargainers reach an agreement slightly earlier than they would if no interaction effect existed. More importantly, columns (1) to (3) show that in the symmetric treatment gender differences are close to zero. For example, a look at the share captured by responders reveals that the coefficients for male proposer and male responder are negligible, as conjectured, putting them far from traditional levels of significance. This may well be because, as explained in the descriptive statistics, 69% of the bargaining matches coordinated in the 50:50 split norm.

In bargaining with an empowered party (columns (4) to (6)) male responders are less likely to reach an agreement and make the bargaining last longer. Also, male proposers tend to get a significantly better deal (4.4 percentage points higher, 0.38 standard deviations of the mean). This is explained because male proposers overall make lower offers. Indeed, when mean offers are added as an additional control to explain how the pie is split, the coefficient for male propose becomes insignificant, suggesting that

TABLE 4– GENDER DIFFERENCES AND GENDER INTERACTION EFFECTS

Panel A: Bargaining Outcomes

	Symmetric			Empowerment			Entitlement			Information		
	Success	Remaining Time	Responder's Pie Share	Success	Remaining Time	Responder's Pie Share	Success	Remaining Time	Responder's Pie Share	Success	Remaining Time	Responder's Pie Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
β_1: Male Prop	0.00347	-16.20	-0.00867	-0.0447	-12.54	-0.0436**	-0.0555	-5.341	-0.0303	-0.0144	-7.457	-0.00418
	(0.0461)	(10.21)	(0.00933)	(0.0418)	(8.207)	(0.0220)	(0.0389)	(8.817)	(0.0188)	(0.0313)	(6.821)	(0.0195)
β_2: Male Resp.	-0.0290	-10.63	0.00486	-0.103**	-20.95***	-0.00850	-0.0585	-13.87	0.0362**	-0.0716**	-12.55**	0.0423***
	(0.0296)	(7.000)	(0.0131)	(0.0419)	(7.333)	(0.0119)	(0.0443)	(12.27)	(0.0175)	(0.0286)	(6.035)	(0.0159)
β_3': Male#Male	-0.00792	29.20**	-0.0160	0.0430	11.24	-0.00605	-0.0479	8.896	-0.00801	0.0138	-13.75	-0.0210
	(0.0358)	(11.79)	(0.0235)	(0.0755)	(7.656)	(0.0175)	(0.0912)	(15.34)	(0.0255)	(0.0677)	(10.46)	(0.0250)
Observations	400	343	343	400	339	339	262	229	229	410	352	352
Clusters Subject	80	80	80	80	80	80	80	80	80	81	81	81

Panel B: Bargaining Behavior

	Symmetric			Empowerment			Entitlement			Information		
	1^{st} Offer	Subsequent Offers	Demands	1^{st} Offer	Subsequent Offers	Demands	1^{st} Offer	Subsequent Offers	Demands	1^{st} Offer	Subsequent Offers	Demands
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
β_1: Male Prop.	-0.0188	-0.00216	0.000617	-0.0352	-0.0160**	0.00331	-0.0648**	-0.00467	-0.00276	0.0103	-0.00106	-0.00261
	(0.0219)	(0.00461)	(0.00334)	(0.0263)	(0.00633)	(0.00322)	(0.0303)	(0.00573)	(0.00521)	(0.0267)	(0.00356)	(0.00535)
β_2: Male Resp.	0.0253*	0.00687**	0.00295	-0.0203**	0.000341	0.00425	0.0217	0.00422	0.0227**	0.0419***	0.00692***	0.0183**
	(0.0138)	(0.00284)	(0.00441)	(0.0100)	(0.00293)	(0.00327)	(0.0193)	(0.00496)	(0.00930)	(0.0128)	(0.00236)	(0.00776)
β_3': Male#Male	0.0168	-0.00489	0.00163	0.00645	-0.00180	-0.00574	0.00918	0.00312	0.00310	-0.0183	-0.00536	-0.00570
	(0.0276)	(0.00593)	(0.00542)	(0.0203)	(0.00486)	(0.00697)	(0.0371)	(0.00791)	(0.0119)	(0.0254)	(0.00464)	(0.0119)
Observations	343	1,573	1,449	339	1,915	1,688	229	1,168	1,062	352	2,608	2,456
No. Bargains	343	266	249	339	302	291	229	179	166	352	321	308
No. Clusters	75	70	65	69	66	70	52	52	47	75	75	72

Notes: **Panel A**: OLS for the three main outcome variables for each treatment, separately. *Success* takes a value of 1 if the subjects reach a deal within the 3-minute limit and 0 otherwise. *Remaining Time* is the number of seconds from the time when agreement is reached until the three-minute limit expires. *Responder's Pie Share* is the share obtained by the responder in each successful bargain. *Entitlement* considers only those matchings in which an effective entitlement is implemented, so ties between subjects' productivity levels are disregarded. All regressions control for *Pie Size*, *Period* and *Session* fixed effects. Individual controls include subjects' risk and social preferences and their self-assessed ability levels in the real effort task and in bargaining ability, separately for *Proposers* and *Responders*. Standard errors are clustered at subject level using two-way clustering. **Panel B**: GLS random-effects model for opening offers (1^{st} *Offer*), *Subsequent Offers*, and *Demands*. All variables represent the *Responder's Pie Share*. Other controls include the round and the time remaining in seconds at the point when the offer (demand) is made, the previous offer, the previous demand, and the individual controls for the *Proposer* (*Responder*). Clustered standard errors at the proposer level for offers and at the responder level for demands. *** p<0.01, ** p<0.05, * p<0.1

the gender differences in offers explain the gender difference observed on the side of the proposers (results available upon request). In addition, we find that there is discrimination against men in initial offers, as they receive lower offers, which might explain why male responders bargain for longer. However, note that this does not explain why men end up with a larger share of the pie.

In bargaining with entitlement (columns (7) to (9)) male responders obtain a significantly higher bargaining share (3.6 percentage points higher, 0.32 standard deviations of the mean). We find that male proposers make lower initial offers and that male responders post higher demands. The only sensible explanation for gender differences in how the pie is finally split is that there are gender differences on the demand side. This is corroborated by the fact that once mean demands are added as additional controls for explaining *Responder's Pie Share*, the coefficient for male responders becomes insignificant (results available upon request).

Finally, in bargaining with informational asymmetries (columns (10) to (12)) male responders obtain a significantly larger share of the pie (4.2 percentage points, 0.27 standard deviations of the mean). Male responders receive higher offers (both initial and subsequent) and also post higher demands (conditional on offers received). In this case, all three findings concerned with behavior may help explain why men in the role of responders get more than their female counterparts. However, only when mean demand is controlled for does the coefficient for male responders in *Responder's Pie Share* becomes insignificant. This indicates that the main driver for the gender difference found in the final outcome lies in differences in the responder's behavior and not in discrimination in offers (results available upon request).

Overall, we find that there is no evidence for gender interaction effects, and that when each bargaining setting is analyzed in isolation gender differences are found in asymmetric bargaining environments but not in the symmetric one.[16] Furthermore, those gender differences that are found always go in the stereotypically expected direction: men are tougher bargainers and they tend to get better deals than women. Empowerment reveals gender differences on the side of the proposer, while entitlement and informational asymmetric environments reveal gender differences on the side of the responder. The size of the gender effects in terms of the share of the pie works out to about 4 percentage points, resulting in a share that is between 9 and 10% lower in entitlement and information, respectively, for female responders and 5% lower in empowerment for female proposers. In terms of standard deviations of the mean, the differences are within the range of 0.27 and 0.38 standard deviations of the

[16] We also replicated the analysis in Tables 3 and 4 without controlling for individual level characteristics. Regarding Table 3 the results are quantitatively the same and even more significant. Regarding Table 4, all the results become stronger and we also find other significant gender differences, such us male responders in the symmetric environment and male proposers in the entitlement environment getting larger shares of the pie. Thus, as expected, controlling for individual level characteristics such as confidence and risk attenuates the gender effects estimated in bargaining.

mean pie share. We thus conclude that gender differences detected are not negligible in magnitude.

3.2 Estimation Results 2: Gender as an Effect-Modifying Factor in Asymmetric Bargaining

When testing for gender differences as reported in the previous section, we found no such differences in symmetric bargaining but did find evidence for them in asymmetric bargaining environments. We now proceed to test whether gender is an effect-modifying factor when symmetric bargaining environments are compared with asymmetric bargaining environments. In other words, we seek to test whether the coefficients of gender differences in the symmetric and asymmetric environments are indeed different by testing whether the introduction of asymmetries affects men and women differently, leading to gender differences. Table 5 shows the results of this diff-in-diff analysis for bargaining outcomes (Panel A) and bargaining behavior (Panel B) when each asymmetric bargaining environment is compared with the symmetric one.

TABLE 5– GENDER AS EFFECT MODIFYING FACTOR IN ASYMMETRIC BARGAINING

Panel A: Bargaining Outcomes

Symmetric *vs*	Empowerment			Entitlement			Information		
	Success	Remaining Time	Responder's Pie Share	Success	Remaining Time	Responder's Pie Share	Success	Remaining Time	Responder's Pie Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
β_4: Male Prop#Asym	-0.0481	3.655	-0.0350	-0.0590	10.86	-0.0216	-0.0179	8.741	0.00449
	(0.0622)	(13.10)	(0.0239)	(0.0603)	(13.49)	(0.0210)	(0.0557)	(12.28)	(0.0216)
β_5: Male Resp#Asym	-0.0740	-10.31	-0.0134	-0.0295	-3.234	0.0313	-0.0426	-1.921	0.0375*
	(0.0513)	(10.14)	(0.0177)	(0.0533)	(14.13)	(0.0219)	(0.0412)	(9.242)	(0.0206)
Observations	800	682	682	662	572	572	810	695	695
No.Clusters	160	160	160	160	160	160	162	162	162

Panel B: Bargaining Behavior

Symmetric *vs*	Empowerment			Entitlement			Information		
	1^{st} Offer	Subsequent Offers	Demands	1^{st} Offer	Subsequent Offers	Demands	1^{st} Offer	Subsequent Offers	Demands
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
β_4: Male Prop#Asym	-0.0164	-0.0117	0.00269	-0.0460	-0.00288	-0.00157	0.0291	0.00108	-0.00322
	(0.0341)	(0.00739)	(0.00462)	(0.0371)	(0.00775)	(0.00542)	(0.0344)	(0.00600)	(0.00629)
β_5: Male Resp#Asym	-0.0455***	-0.00710*	0.00130	-0.00351	-0.00167	0.0176*	0.0166	0.00132	0.0153*
	(0.0170)	(0.00402)	(0.00547)	(0.0235)	(0.00601)	(0.00956)	(0.0187)	(0.00382)	(0.00890)
Observations	682	3,488	3,137	572	2,741	2,511	695	4,181	3,905
No. Bargains	682	568	540	572	445	415	695	587	557
No. Clusters	144	136	135	127	122	112	150	145	137

Notes: The omitted treatment is the symmetric bargaining environment and *Asym* takes the value of 1 if *Empowerment* (columns (1) to (3)), *Entitlement* (columns (4) to (6)) and *Information* (columns (7) to (9)). The controls are as in Table 4, plus all the interaction of those controls with each of the asymmetric treatments. Standard errors are clustered at subject level using two-way clustering. *** p<0.01, ** p<0.05, * p<0.1

On analyzing bargaining outcomes we do not find any hard evidence for gender being an effect-modifying factor in asymmetric bargaining environments. In other words, we cannot claim that asymmetric bargaining environments make for gender differences that are significantly different from those found in the symmetric bargain-

ing environment.[17] Note that, as shown by Tables 4 and 5, the size of the gender differences between the symmetric and asymmetric environments is not negligible (above 3 percentage points), but do not reach conventional significance levels (although they are not far away from them with p-values of around 0.15). The only exception is the *Information* asymmetry, which shows that, although significant at only 10%, the introduction of this asymmetry actually changes the gender gap in what share the responder is able to capture. In particular, as shown by the results in Panel A of Table 5, the gender gap among responders actually increases when there is a change from a symmetric environment to one in which there are informational asymmetries, enabling male responders to get a lager share of the pie than female ones. Moreover, Panel B in Table 5 suggests that this is indeed generated by the differential effect that the introduction of informational asymmetries has on men's and women's demands.

3.3 Robustness: Experimenter Demand Effect and Deadline Effect

We perform two robustness checks. First, some participants might be responding to experimental demand effects given the way in which we communicated the gender of the bargaining parties. Second, we find a significant "*deadline effect*" such that 25% of the negotiations are still ongoing in the last 10 seconds. These two robustness tests were not included in the pre-plan analysis but given their prevalence we considered them important to test whether and how our main results are affected by these two effects.

Robustness 1: Experimenter Demand Effect

One potential concern with the way we made subjects' genders common knowledge is that this feature of the design could yield some type of experimenter demand effect. Remember that participants are first asked about their gender. Also, during the bargaining stage, participants observe both their own as well as their opponent's gender avatar.

It is reassuring that only 10% of the subjects mentioned a gender related objective and that there was no gender difference on this. Nevertheless, we replicated our main analysis leaving out those negotiations in which *either* bargaining party mentioned that the experiment had the objective of testing for gender differences to see whether the results in Tables 4 and 5 are biased by the presence of those participants subject to experimenter demand effects. Table 6 shows the results for the main outcome variable of *Responder's Pie Share*. The top panel, for gender differences, shows virtually the

[17] We also replicated the analysis in Table 5 without controlling for individual level characteristics. In this case, we do find some differences. In particular, the gender differences in empowerment and entitlement are significantly greater than in the symmetric environment in the role of the proposer. However, the weak effect found with respect to the informational environment becomes insignificant.

TABLE 6– GENDER DIFFERENCES AND GENDER AS AN EFFECT-MODIFYING FACTOR IN RESPONDER'S PIE SHARE ROBUST TO EXPERIMENTER DEMAND EFFECTS

	Aggregate	Symmetric	Empowerment	Entitlement	Information
	(1)	(2)	(3)	(4)	(5)
β_1: Male Prop.	-0.0140	-0.0156	-0.0257	-0.0242	0.00215
	(0.00984)	(0.00962)	(0.0204)	(0.0217)	(0.0211)
β_2: Male Resp.	0.0207***	0.00917	0.00291	0.0387**	0.0391**
	(0.00747)	(0.0143)	(0.00953)	(0.0178)	(0.0160)
Observations	1,049	286	284	173	306
Clusters	290	72	74	69	75

Asymmetric vs.			Empowerment	Entitlement	Information
			(1)	(2)	(3)
β_4: Male Prop#Asym:			-0.0101	-0.00853	0.0178
			(0.0225)	(0.0237)	(0.0232)
β_5: Male Resp#Asym:			-0.00626	0.0296	0.0299
			(0.0172)	(0.0228)	(0.0214)
Observations			570	459	592
Clusters			146	141	147

Notes: All regressions control for *Pie Size*, *Period* and *Session* Fixed Effects. *Individual Incentivized Controls* include risk and social preferences and self-assessment in the real effort task and in bargaining for *Proposers* and *Responders*. Standard errors are clustered at *Proposer* and *Responder* level using two-way clustering. Clustered standard errors at participant level using two-way clustering. *** p<0.01, ** p<0.05, * p<0.1

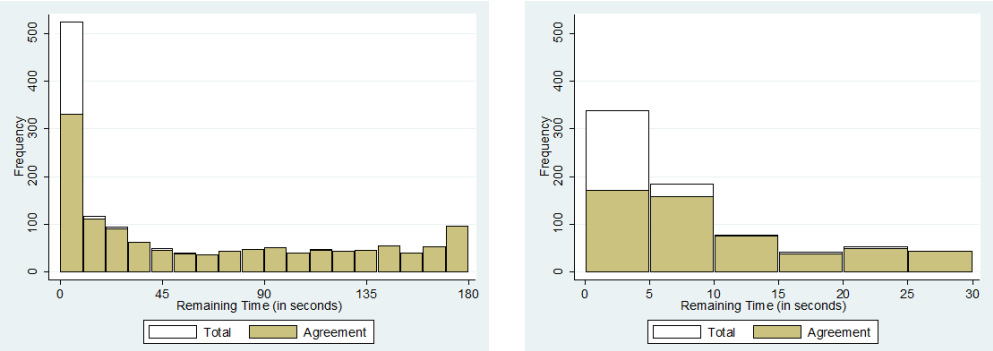
same results as in the tables with the full data. The only noteworthy difference is that now no gender differences are found in either role for the empowerment environment. With respect to the question of whether gender is an effect-modifying factor, the bottom panel shows qualitatively the same results as in Table 5 with the sole exception that now we find no evidence for gender being an effect-modifier for the introduction of informational asymmetries. We conclude that the main findings are robust to the experimenter demand effects.

ROBUSTNESS 2: DEADLINE EFFECT

One consistent finding when looking at bargaining processes with fixed time limit is the so called "*deadline effect*". This has been shown to shift a substantial number of agreements toward the deadline, delaying the whole process. This effect has been widely documented both with field data (see for example Cramton and Tracy (1992)) and in the lab (see for example Roth et al. (1988) or Gächter and Riedl (2005)).[18] The existence of this deadline effect is important, not only because delays in agreements may generate inefficiencies but also because they seem to be caused by bargainers for strategic reasons (Sterbenz and Phillips (2001); Gneezy et al. (2003)).

[18]The deadline effect is not exclusive to bargaining settings. It has also been documented in auctions, both in the field (Roth et al. (2002)) and in the lab (Ariely et al. (2005)). This is especially surprising because both Roth et al. (2002) in the field and Ariely et al. (2005) in the lab use data from second-bid auctions, in which there are no strategic reasons to delay as there could be in a bargaining setting.

FIGURE 4– DEADLINE EFFECT



Notes: Distribution of the last proposals (offer or demand) over time in seconds. *Total* refers to the total number of matchings that make their last proposal in a given time window. *Agreement* refers to the number of matchings that make their last proposal in a given time window *and* are accepted (Distribution of agreements over time).

As shown by Figure 4, our experimental data shows substantial deadline effects, which are consistent with previous findings.[19] 35.5% of negotiations (523 out of 1,472) are still ongoing in the last 10 seconds –i.e., one bargaining party makes a new proposal within that time window. In particular, 26% of the 1,263 successful negotiations are closed within the last 10 seconds, and the proportion remains similar across different bargaining environments (22% in the symmetric environment, 23% for empowerment, 29% entitlement and 32% for informational asymmetries).

Notice that as the timing of new proposals approaches the deadline, they can be considered as equivalent to take-it-or-leave-it proposals, as the chances of effectively making a counterproposal in the remaining time becomes very small. The receiver is thus obliged to accept the proposal or let the bargaining fail. Thus, we identify and refer here to proposals (independently of whether they are offers or demands) made within the last 10 seconds as *ultimatums*. In line with this classification, Table A2 in Appendix A shows that in *ultimatum* agreements whether the last proposal is a demand or an offer matters for the final split of the pie, but it does not matter in non-*ultimatum* ones.[20]

In light of this existence of the so called *deadline effect*, two questions arise. First, given that bargaining parties might self-select into an ultimatum bargaining environment, it is advisable to test for gender differences in the likelihood of ending up in an

[19]The proportion of deals closed in an ultimatum situation is similar to that typically found in the literature. For example, using data from 4 different experiments with a total of 1237 observations, Roth et al. (1988) found that the percentage of deals closed within the last 10 seconds was 28.3% which is similar to our overall figure of 26.5%.

[20]Complementary analysis shows that negotiations that end up in an *ultimatum* are tougher because as offers (specially opening ones) are lower and demands greater. In other words, the claims of proposers and responders are less aligned in *ultimatum* agreements than in non-*ultimatum* agreements.

TABLE 7– PROBABILITY OF REACHING AN ULTIMATUM

Panel A: Gender Differences in the Likelihood of Reaching an *Ultimatum*

	Overall	Symmetric	Empowerment	Entitlement	Information
	(1)	(2)	(3)	(4)	(5)
β_1: Male Prop.	0.0846***	0.0371	0.203***	-0.00442	0.0612
	(0.0301)	(0.0615)	(0.0583)	(0.0586)	(0.0502)
β_2: Male Resp.	0.1131***	0.0686	0.117**	0.131	0.144**
	(0.0319)	(0.0547)	(0.0550)	(0.0817)	(0.0698)
Observations	1472	400	400	262	410
No. Clusters	322	80	80	80	82

Panel B: Gender Differences in the Likelihood of Closing an *Ultimatum* Agreement

	Overall	Symmetric	Empowerment	Entitlement	Information
	(1)	(2)	(3)	(4)	(5)
β_1: Male Prop.	0.0797***	0.0477	0.189***	-0.0637	0.0814*
	(0.0296)	(0.0451)	(0.0607)	(0.0752)	(0.0485)
β_2: Male Resp.	0.08304***	0.0552	0.0749	0.0847	0.115
	(0.03107)	(0.0583)	(0.0480)	(0.0750)	(0.0708)
Observations	1263	343	339	229	352
No. Clusters	322	80	80	80	82

Notes: OLS for the probability of closing a deal within the last 10 seconds. All regressions control for *Pie Size* and include *Period* and *Session* Fixed Effects. *Individual Controls* include subjects' risk and social preferences and their self-assessed ability levels in the real effort task and in the bargaining ability, separately for both *Proposers* and responders. Standard errors are clustered at the participant level using two-way clustering. *** p<0.01, ** p<0.05, * p<0.1.

ultimatum type of bargaining process. Table 7 looks at gender differences and gender interaction effects on the propensity for closing a deal via an *ultimatum* in each of the four treatments. The results suggest that a bargaining matching involving men is more likely in general to close a deal of this type.[21] This finding is particularly consistent across different treatments for male responders, while for male proposers it seems to be driven mainly by the empowerment environment. This is consistent with the findings in Tables 3 and 4 that men are tougher bargainers and delay agreements longer.[22]

Second, and most importantly, since our results show that *ultimatum* deals are different from non-*ultimatum* ones in regard to how the pie is split (Table A2 in Appendix A), we next focus on non-*ultimatum* agreements alone, to see whether the results in Tables 4 and 5 are biased by the presence of these *ultimatum* deals. Table 8 shows the results for the main outcome variable of *Responder's Pie Share*. The top panel, for gender differences, shows virtually the same results as in the tables with the full data. The only noteworthy difference is that now no gender differences are found in either role for the empowerment environment. However, the hypothesis that gender differences are the same in both non-*ultimatum* and *ultimatum* deals cannot be rejected. With respect to the question of whether gender is an effect-modifying factor, the bottom panel

[21] Interestingly, complementary analysis shows that the results in Table 7 come from men tending to *make* more *ultimatum* type offers and not from receiving them.

[22] The results remain qualitatively the same if we analyze all last proposals, independently of whether they end up in agreement or not.

TABLE 8– GENDER DIFFERENCES AND GENDER AS AN EFFECT-MODIFYING FACTOR IN RESPONDER'S PIE SHARE IN NON-ULTIMATUM AGREEMENTS

	Aggregate	Symmetric	Empowerment	Entitlement	Information
	(1)	(2)	(3)	(4)	(5)
β_1: Male Prop.	-0.2273*	-0.00725	-0.0396	-0.0350	-0.0143
	(0.01164)	(0.0124)	(0.0244)	(0.0264)	(0.0250)
β_2: Male Resp.	0.0145*	0.00524	-0.0109	0.0324*	0.0455***
	(0.008034)	(0.0153)	(0.0157)	(0.0166)	(0.0115)
Observations	932	268	262	163	239
Clusters	319	80	80	78	81

Asymmetric vs.			Empowerment	Entitlement	Information
			(1)	(2)	(3)
β_4: Male Prop#Asym:			-0.0323	-0.0278	-0.00708
			(0.0274)	(0.0292)	(0.0279)
β_5: Male Resp#Asym:			-0.0161	0.0272	0.0403**
			(0.0219)	(0.0225)	(0.0191)
Observations			530	431	507
Clusters			160	148	161

Notes: All regressions control for *Pie Size*, *Period* and *Session* Fixed Effects. *Individual Incentivized Controls* include risk and social preferences and self-assessment in the real effort task and in bargaining for *Proposers* and *Responders*. Standard errors are clustered at *Proposer* and *Responder* level using two-way clustering. Clustered standard errors at participant level using two-way clustering. *** p<0.01, ** p<0.05, * p<0.1

shows qualitatively the same results as in Table 5 with the sole exception that restricting the data to non-*ultimatum* agreements increases the significance and magnitude of the responder's gender as a modifier effect for the introduction of informational asymmetries.

To sum up, this section shows that limiting bargaining to a fixed duration yields an important deadline effect, which shows important consequences as to how the pie is split. Although this does not seem to affect the magnitude and significance of the gender differences found, ideally we would like to get rid of the deadline effect, as it is more of an artifact due to the exogenous time limit implemented in the laboratory. Future research seeking to understand gender differences and gender interaction effects should be directed at removing the deadline effect. However, the methodology used in experiments in order to get rid of the deadline effect comes at a cost.[23] Most importantly, our results show that the stereotypically expected gender differences are not due to the existence of the so called deadline effect but are present and indeed found mainly in those agreements that are not reached close to the deadline.

[23]Two alternatives to fixed time limit are random stopping time (i.e. in Dittrich et al. (2014)) and shrinking pie in real time (i.e. in Embrey et al. (2014)). As men and women are known to differ in their risk preferences, these alternative methodologies might yield major gender differences in bargaining due to their different risk aversion levels, so we decided to stick to the fixed time limit.

4 DISCUSSION

Most, if not all, bargaining situations are asymmetric in economically relevant situations, such as in wage negotiation in labor markets. Also, it is hard to study gender differences and gender interaction effects in real life settings, as many relevant variables are not observable to the researcher. We thus propose a laboratory experiment to study gender differences and gender interaction effects in asymmetric bargaining situations.

We find that gender differences are absent in symmetric settings, where a 50:50 split is the norm, but become important when asymmetries between bargaining roles are introduced. Furthermore, all the gender differences detected go in the stereotypically expected direction in that men make reaching an agreement harder, and they bargain for longer and obtain a higher share of the pie when reaching an agreement. Interestingly, when bargaining roles differ in their power, gender differences appear in the role of the proposer, where men tend to offer less, while when bargaining roles differ in their entitlement and information, gender differences appear in the role of the responder, where men tend to demand more. A robustness analysis shows that the finding in the empowerment treatment could be due to strategic reasons derived from the existence of a deadline effect, but this is not the case for the entitlement and informational treatments.

Future research should be directed at studying how much wiggle room is needed to be able to detect these gender differences. Note that our study shows that asymmetries are a *necessary* condition for gender differences to flourish because it is necessary to break the prevalence of 50:50 norm. However, our study does not show that they are sufficient. Further research is therefore needed to understand how much of a wiggle room is needed for gender differences to appear and also how this affects the magnitude of gender differences.

REFERENCES

Abeler, J., Falk, A., Goette, L., and Huffman, D. (2011). Reference points and effort provision. *The American Economic Review*, 101(2), 470–492.

Andersen, S., Ertac, S., Gneezy, U., List, J. A., Maximiano, S., et al. (2013). On the cultural basis of gender differences in negotiation.

Ariely, D., Ockenfels, A., and Roth, A. E. (2005). An experimental analysis of ending rules in internet auctions. *RAND Journal of Economics*, 36(4), 891–908.

Ayres, I. (1991). Fair driving: Gender and race discrimination in retail car negotiations. *Harvard Law Review*, (pp. 817–872).

Ayres, I. and Siegelman, P. (1995). Race and gender discrimination in bargaining for a new car. *The American Economic Review*, (pp. 304–321).

Azmat, G. and Petrongolo, B. (2014). Gender and the labor market: What have we learned from field and lab experiments? *Labour Economics*, 30, 32–40.

Babcock, L. and Laschever, S. (2009). *Women don't ask: Negotiation and the gender divide*. Princeton University Press.

Binmore, K., Shared, A., and Sutton, J. (1989). An outside option experiment. *The Quarterly Journal of Economics*, 104(4), 753–770.

Blau, F. D. and Kahn, L. M. (2000). Gender differences in pay. *The Journal of Economic Perspectives*, 14(4), 75–99.

Blau, F. D. and Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature*, 55(3), 789–865.

Cameron, A. C., Gelbach, J. B., and Miller, D. L. (2011). Robust inference with multiway clustering. *Journal of Business & Economic Statistics*, 29(2), 238–249.

Card, D., Cardoso, A. R., and Kline, P. (2016). Bargaining, sorting, and the gender wage gap: Quantifying the impact of firms on the relative pay of women. *The Quarterly Journal of Economics*, 131(2), 633–686.

Castillo, M., Petrie, R., Torero, M., and Vesterlund, L. (2013). Gender differences in bargaining outcomes: A field experiment on discrimination. *Journal of Public Economics*, 99, 35–48.

Cramton, P. C. and Tracy, J. S. (1992). Strikes and holdouts in wage bargaining: Theory and data. *The American Economic Review*, (pp. 100–121).

Crosetto, P., Weisel, O., and Winter, F. (2012). A flexible z-tree implementation of the social value orientation slider measure (murphy et al. 2011)–manual–. *Jena Economic Research Papers*, 2012, 062.

Dittrich, M., Knabe, A., and Leipold, K. (2014). Gender differences in experimental wage negotiations. *Economic Inquiry*, 52(2), 862–873.

Eckel, C. C. and Grossman, P. J. (2001). Chivalry and solidarity in ultimatum games. *Economic Inquiry*, 39(2), 171.

Eckel, C. C. and Grossman, P. J. (2002). Sex differences and statistical stereotyping in attitudes toward financial risk. *Evolution and Human Behavior*, 23(4), 281–295.

Embrey, M., Fréchette, G. R., and Lehrer, S. F. (2014). Bargaining and reputation: An experiment on bargaining in the presence of behavioural types. *The Review of Economic Studies*, 82(2), 608–631.

Eriksson, K. H. and Sandberg, A. (2012). Gender differences in initiation of negotiation: Does the gender of the negotiation counterpart matter? *Negotiation Journal*, 28(4), 407–428.

Exley, C. L., Niederle, M., and Vesterlund, L. (2016). *Knowing When to Ask: The Cost of Leaning In*. Technical report, National Bureau of Economic Research.

Fischbacher, U. (2007). z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, 10(2), 171–178.

Gächter, S. and Riedl, A. (2005). Moral property rights in bargaining with infeasible claims. *Management Science*, 51(2), 249–263.

Gneezy, U., Niederle, M., Rustichini, A., et al. (2003). Performance in competitive environments: Gender differences. *The Quarterly Journal of Economics*, 118(3), 1049–1074.

Gosling, S. D., Rentfrow, P. J., and Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, 37(6), 504–528.

Greiner, B. (2015). Subject pool recruitment procedures: Organizing experiments with ORSEE. *Journal of the Economic Science Association*, 1(1), 114–125.

Hernandez-Arenaz, I. and Iriberri, N. (2017). Women ask for less (only from men): Evidence from alternating-offer bargaining in the field.

Leibbrandt, A. and List, J. A. (2014). Do women avoid salary negotiations? Evidence from a large-scale natural field experiment. *Management Science*, 61(9), 2016–2024.

Ma, C. A. and Manove, M. (1993). Bargaining with deadlines and imperfect player control. *Econometrica: Journal of the Econometric Society*, (pp. 1313–1339).

Mengel, F. (2015). Gender differences in networking.

Murphy, R. O., Ackermann, K. A., and Handgraaf, M. J. (2011). Measuring social value orientation. *Judgment and Decision Making*, 6(8), 771–781.

Nash Jr, J. F. (1950). The bargaining problem. *Econometrica: Journal of the Econometric Society*, (pp. 155–162).

Rigdon, M. (2012). An experimental investigation of gender differences in wage negotiations.

Roth, A. E., Murnighan, J. K., and Schoumaker, F. (1988). The deadline effect in bargaining: Some experimental evidence. *The American Economic Review*, 78(4), 806–823.

Roth, A. E., Ockenfels, A., et al. (2002). Last-minute bidding and the rules for ending second-price auctions: Evidence from ebay and amazon auctions on the internet. *American Economic Review*, 92(4), 1093–1103.

Säve-Söderbergh, J. (2007). Are women asking for low wages? Gender differences in wage bargaining strategies and ensuing bargaining success.

Solnick, S. J. (2001). Gender differences in the ultimatum game. *Economic Inquiry*, 39(2), 189.

Sterbenz, F. P. and Phillips, O. R. (2001). Bargaining experiments with deadlines and random delays. *Economic Inquiry*, 39(4), 616–626.

Thompson, S. B. (2011). Simple formulas for standard errors that cluster by both firm and time. *Journal of Financial Economics*, 99(1), 1–10.

A Appendix: Additional Tables

TABLE A1– DESCRIPTIVE STATISTICS

	Women (N=162) (1)	Men (N=160) (2)	*p*-value (3)
Self-Assessment (Task)	2.29	2.15	0.161
	(0.90)	(0.88)	
Self-Assessment (Bargaining)	2.71	2.4	0.002
	(0.85)	(0.95)	
Risk Preferences	3.31	4.01	0.001
	(1.82)	(2.09)	
SVO angle	19.55	19.54	0.997
	(11.92)	(14.93)	

Notes: Mean values and standard deviations (in parentheses) for individual control variables by gender. *Self-Assessment (Task)* refers to the self-reported rank in the real effort task and takes values 1 (top quartile) to 4 (bottom quartile). *Self-Assessment (Bargaining)* refers to the self-reported rank in bargaining and takes values 1 (top quartile) to 4 (bottom quartile). *Risk Preferences* takes values 1-8, with lowest numbers indicating greater risk aversion. *SVO angle* is the SVO angle from Murphy et al. (2011). Column (3) displays the *p*-value from a two-tailed *t*-test on the equality of means by gender.

TABLE A2– EFFECTS OF ULTIMATUMS IN RESPONDER'S PIE SHARE

	All (1)	*Successful Agreements* (2)
Ultimatum	0.0720***	0.0365***
	(0.0134)	(0.0126)
Offer	-0.0205**	-0.0115
	(0.00947)	(0.00800)
Ultimatum#Offer	-0.127***	-0.0682***
	(0.0162)	(0.0138)
Other Controls	YES	YES
Observations	1,472	1,263
Clusters	322	322

Notes: *Offer* is a dummy variable that takes the value of 1 if the proposal is coming from the *Proposer* and 0 otherwise. All regressions control for each of the bargaining environments, *Pie Size*, *Period* and *Session* fixed effects. Individual level controls include subjects' risk and social preferences and their self-assessed ability levels in the real effort task and in the bargaining ability, separately for both *Proposers* and *Responders*. All fixed effects and individual level controls, are interacted with each of the bargaining environments. Standard errors are clustered at the subject level using two-way clustering. *** p<0.01, ** p<0.05, * p<0.1

B Appendix: Instructions

General Instructions

THANK YOU FOR PARTICIPATING IN THE EXPERIMENT!

We are going to start the experiment. From now on it is not allowed to talk, to look at what other participants are doing or to walk around. Please, switch off your mobile phone. If you

have any question or you need help, raise your hand and one of the researchers will assist you. If you do not follow these instructions YOU WILL BE ASKED TO LEAVE THE EXPERIMENT AND YOU WILL NOT GET ANY PAYMENT. Thank you.

The University of the Basque Country has provided the funds for this experiment. The quantity you can earn depends on your decisions, the decisions of other participants as well as on luck.

Experimental stages and tasks: The experiment consists of 3 stages:

In the first stage, you will see matrices with "0"s and "1"s during 5 minutes. Your task consist in counting the number of "1"s in each matrix. The number of correct answers that you provide will determined your productivity which will be relevant for the next part of the experiment.

In the second stage of the experiment, the computer will randomly match you with another partner and your task will consist of dividing an amount of money through a bargaining. This quantity depends on your productivity and the productivity of the participant you are matched with. You will have 3 minutes for each negotiation. There will be 10 bargaining rounds in which you will be matched with a different participant each time.

In the third stage you will be presented with three short tasks in which you can earn more money.

Earnings:

You have 3 euro for sure. In addition, in the second stage of the experiment, once the experiment had concluded, the computer will choose two bargaining rounds randomly and you will be paid the amount you had earned in each of those. Finally, in the third stage you can earn extra money for each of the three short tasks. Therefore, at the end of the experiment your final earnings will be the sum of the 3 euro you get for participating, plus your earnings in the two bargaining rounds randomly selected, plus your earnings in each of the short tasks from stage 3. Your earnings will be paid in cash privately at the end of the experiment.

We will now start with the experiment. At the beginning of each stage, we will include detailed information about the task, the decisions as well as about earning.

REAL EFFORT TASK

In the stage, you will see matrices with "0"s and "1"s, similar to the ones displayed below, during 5 minutes.

Your task consist in counting the number of "1"s in each matrix. The size of the matrices will vary. Once you introduce an answer for one matrix and press the bottom "OK", the next matrix will appear. All participants will see the same matrices in the same order. There is a maximum of 60 matrices.

Example 1: 8x8 Matrix, Solution = 30

1	1	0	1	0	1	1	0
1	0	1	0	1	0	1	1
0	0	1	0	1	0	1	1
0	0	0	0	0	1	1	0
0	0	0	0	1	0	1	0
1	0	0	0	0	0	1	1
0	0	0	1	1	0	1	0
0	0	1	1	1	1	1	1

Example 2: 6x6 Matrix, Solution = 16

1	0	0	0	1	1
1	0	0	0	1	0
0	0	0	1	0	0
1	0	0	1	0	0
1	1	0	0	1	1
1	1	1	1	0	0

The number of correct answers that you provide will determine your productivity. The higher your productivity the higher will be, on average, the amount of money you will have to divide in the next stage.

BARGAINING STAGE: SYMMETRIC

In this stage you will be matched randomly with another participant and your task consists in dividing an amount of money through a bargaining. This amount can be €5, €10 or €15.

HOW IS COMPUTED THE AMOUNT OF MONEY TO BE DIVIDED?

It will be proceed in the following way:

1. The number of correct answers in the first stage will determine the productivity of each participant in the following way:
    - Bottom third: Those participants with a fewest number of correct answers will have a productivity of €5
    - Intermediate third: Those participants with an intermediate number of correct answers will have a productivity of €10
    - Top third: Those participants with the highest number of correct answers will have a productivity of €15
2. In each round, you will be randomly matched with another participant and the amount to be divided will be:
    - YOUR PRODUCTIVITY with a 50% chance
    - THE PRODUCTIVITY OF THE PARTICIPANT YOU ARE MATCHED WITH with a 50% chance

For example, if your productivity is €5 and the productivity of the other participant is €15, the amount to be divided will be €5 with a 50% chance and €15 with a 50% chance. Finally, if you and the participant with whom you are matched have the same productivity of 5, 10, or 15 euro, then the amount to be divided will be 5, 10 and 15 euro respectively.

WHAT DECISIONS CAN BE TAKEN DURING A BARGAINING?

Before starting, for each couple, you will be told whether you are participant A or participant B. During the negotiation you will have to decide HOW MUCH MONEY WILL GET PARTICIPANT B, such that if you are participant A you will make offers to participant B and if you are the participant B you will make demands from participant A.

The negotiation works in the following way:

- Participant A will start the negotiation with a first offer, deciding how much money wants to offer to participant B.
- Participant B can accept or reject that offer. If the offer is accepted, participant B will get the amount offered and participant A will get the pie to be divided minus the amount offered to participant B.
- If the offer is rejected, the bargaining continues and it will be the turn of participant B for making a demand from participant A, deciding how much money wants to get.
- Participant A can accept or reject that demand. If the demand is accepted, participant B will get the amount demanded and participant A will get the pie to be divided minus the amount demanded by participant B.
- If the demand is rejected, the bargaining continues and it will be the turn of participant A for making a new offer to participant B. And so on and so forth.

Offers and demands have to be multiples of €0.1 (10 cents). You will have a total of 3 minutes to reach a deal. If during this time you don't reach a deal, both participants will get €0.

There will be 10 different bargaining rounds where you will be matched with a different participant each time. During each negotiation you will be informed about the amount of money you have to divide, if you are participant A or participant B, of the remaining time left for the 3 minutes, as well as on the complete bargaining record: offers made by A, demands made by B and whether they have been accepted or rejected.

For payment, at the end of the experiment, the computer will choose two bargaining rounds randomly, one between rounds 1 and 5 and another between rounds 6 and 10, and you will be paid according to the deal you have reached in those negotiation rounds or €0 in case that you didn't reach a deal.

BARGAINING STAGE: EMPOWERMENT

[. . .] If during this time you don't reach a deal,
participant A will get an amount of money for sure, while participant B will get €0. The amount of money that participant A get, is a randomly chosen amount between 50% and 85% of the amount to be divided.
That is, in case in which you don't reach a deal within the 3 minutes, participant A will get:

- Between €2.5 and €4.25 if the amount to be divided is €5
- Between €5 and €8.5 if the amount to be divided is €10
- Between €7.5 and €12.75 if the amount to be divided is €15

The exact amount will be randomly chosen by the computer once the negotiation had finished.

[...] At the end of the experiment, the computer will choose two bargaining round randomly, one between rounds 1 and 5 and another between rounds 6 and 10, and you will be paid according to the deal you have reached in those negotiation rounds or
a positive amount if you are participant A and €0 if you are participant B in case that you didn't reach a deal.

BARGAINING STAGE: ENTITLEMENT

[...] as well as on the complete bargaining record: offers made by A, demands made by B and whether they have been accepted or rejected.
In addition, you will know your productivity and the productivity of the participant with whom you are matched, so you could learn whether the amount to divide corresponds to your productivity or to the productivity of the participant with whom you are matched.

BARGAINING STAGE: INFORMATION

[...] There will be 10 different bargaining rounds where you will be matched with a different participant each.
During each negotiation only the participant A will observe the amount to be divided while the participant B will only know that this amount can be 5, 10 or 15 euro, but not the exact amount. The participant A cannot accept demands that are higher than the amount of money to be divided.

ELICITATION TASKS

This stage of the experiment consists of three short tasks with which you can earn extra money. The first one consists in answering four different questions regarding this session. In the second and in the third you will have to choose among different options.

As you will progress in this third stage of the experiment, we will provide you with more detailed instructions about each task.

TASK I:

Next you will be asked 4 questions relative to this session. At the end of the experiment the computer will choose one of them randomly and you will be paid €1 if the answer you have provided is correct according to the data we have gather during the session and €0 otherwise.

QUESTION 1: If we sort all participants in this session from lowest to highest number of correct answers in stage 1 (counting "1"s), and we divide all subjects in 4 segments of equal size such that the participants with highest scores are in the first segment, the next in the second, the next in the third and the ones with lowest in the fourth segment, in which segment do you think you will be?
Options: 1^{st} segment/2^{nd} segment/3^{rd} segment/4^{th} segment

QUESTION 2: On average, who do you think has performed better in the task from stage 1 (counting "1"s)?
Options: Men/No differences/Women

QUESTION 3: In each negotiation, a participant could get between 0% and 100% of the amount of money to be divided. If we sort all participants in this session from lowest to highest share of money that on average has obtained during the 10 negotiations, and we divide all the subjects in 4 segments of equal size such that the participants who obtained on average the highest share of money are in the first segment, the next in the second, the next in the third and the ones with lowest in the fourth segment, in which segment do you think you will be?
Options: 1^{st} segment/2^{nd} segment/3^{rd} segment/4^{th} segment

QUESTION 4: On average, who do you think has obtained a higher share of money during the negotiations?
Options: Men/No differences/Women

TASK II:

On the next screen you will be presented with 8 different options, each of which offers two different quantities that you can win by choosing that option. In all the options, each outcome has a probability of 50%, i.e., the result of choosing an option depends exclusively on luck. At the end of the experiment the computer will randomly pick one result from the option you have chosen and you will be paid accordingly.

Below this text you will find the 8 available options. To see in more detail how to read this table, consider option 5. In this option the possible results are €0.7 and €2.7. Both are equally likely, which means that the computer will choose €0.7 as the payment on one of every 2 occasions and €2.7 the other.

You must choose one of the 8 possible options. To that end, an empty box will appear where you must enter the number of the option (from 1 to 8) that you want to choose.

	Probability 50%	Probability 50%
1	€1.5	€1.5
2	€1.3	€1.8
3	€1.1	€2.1
4	€0.9	€2.4
5	€0.7	€2.7
6	€0.6	€2.8
7	€0.4	€2.9
8	€0	€3

TASK III:

Next you will be matched randomly with another participant in this room. You will be presented with 6 situations in which you will have to choose one from among 9 options. Each option represents the quantity of money that you can earn from this task as well as the quantity of money that can earn the participant with whom you are matched.

At the end of the task, one participant in the matching will be randomly selected as Decisor and the other as Receptor. The computer will randomly select one of the 6 situations and the payment you will get is the following:

- If you are the Decisor, you will obtain what you have chosen for yourself in the situation selected by the computer

- If you are the Receptor, you will obtain what the other participant have chosen for you in the situation selected by the computer

The quantities displayed represent cents of euro.