

# The role of information in negotiations with the opposite gender - Experimental evidence

Graciela Kuechle\*      Hannes Rau†

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## Abstract

Laboratory experiments on bargaining show that women perform worse than men in the presence of asymmetric power and gender information. However, it is not clear whether the results are driven by the asymmetry, the gender information or the combination of both. We close this gap by adopting a comprehensive design, which varies both factors in the context of a Rubinstein bargaining setup. When power asymmetry is high and gender is revealed, men obtain more favorable deals than women, particularly when they are in the strong position. We also find gender pairing effects whereby, women in the weak position earn less when facing a man. This suggests that when there is room for bargaining, the information is more profitable for men. All differences disappear when gender is not disclosed or the asymmetry is small.

Keywords: Gender differences, Bargaining, Gender wage gap

JEL-Codes: J71, J31, C78

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\*graciela.kuechle@hs-heilbronn.de, Heilbronn University, Max-Planck-Str. 39, 74081 Heilbronn, Germany

†Corresponding author: hannes.rau@kit.edu, University of Karlsruhe, Department of Economics, Fritz-Erler-Str. 1-3, 76133 Karlsruhe, Germany.

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# 1 Introduction and Literature Review

Although the gender wage gap has narrowed considerably in recent decades, there is still a significant difference between men and women's earnings after controlling for key factors such as human capital, individual preferences and discrimination (Bertrand, 2011; Blau & Kahn, 2017). This phenomenon has been attributed in part to gender differences in bargaining skills and behavior (Babcock & Laschever, 2009; Card, Cardoso, & Kline, 2015; Mazei et al., 2015). In this respect, empirical evidence from labor markets shows that men are more likely than women to initiate wage negotiations and that they are more successful in doing so (Babcock & Laschever, 2009; Bowles, Babcock, & McGinn, 2005; Bowles, Babcock, & Lai, 2007; Niederle & Vesterlund, 2007; Croson & Gneezy, 2009; Azmat & Petrongolo, 2014; Small et al., 2007; Säve-Söderbergh, 2019). These findings have led to a considerable number of experimental studies and a more nuanced picture of the gender wage gap.

The experimental literature on gender differences in bargaining focused initially on attitudes toward bargaining, performance under competition, backlash, and social norms. According to these studies, women are more reluctant to initiate a negotiation (Eriksson & Sandberg, 2012; Exley, Niederle, & Vesterlund, 2020; Gago, 2020; Leibbrandt & List, 2015; Small et al., 2007), and perform worse under competition (Gneezy, Niederle, & Rustichini, 2003; Niederle & Vesterlund, 2007; Stuholmacher & Walters, 1999) although this depends on the circumstances (Kennedy & Kray, 2015). In addition, women are more concerned about compliance with social norms and are more likely to suffer from backlash due to aggressive bargaining. (Amanatullah & Tinsley, 2013; Azmat & Petrongolo, 2014; Babcock & Laschever, 2009; Mazei et al., 2015; Bowles et al., 2007).

A more recent stream of research has begun to focus on bargaining power, gender disclosure and context as crucial factors influencing gender differences in negotiation outcomes. (Dittrich, Knabe, & Leipold, 2014; Hernandez-Arenaz & Iribarri, 2019; D'Exelle, Gutekunst, & Riedl, 2020). Our paper is a contribution to this

last stream of research. Experimental studies on sequential bargaining distinguish between gender effects and interaction effects. Gender effects are overall differences in the payoffs or behavior between men and women, while interaction effects (or pairing effects) are differences in the payoffs between men and women conditioned on the gender of the bargaining partner. From a theoretical perspective, gender effects can occur in the absence of knowledge about the gender of the bargaining partner. Pairing or interaction effects, on the other hand, can only occur if the negotiating partners know the gender of the opponent or at least have some belief about it. Depending on their outside options, bargaining parties can have either symmetric or asymmetric power. Wage negotiations, for instance, belong to the last category. Usually, the employer has a higher degree of power (e.g., when several applicants apply for the same job), although there are also cases where the power lies with the employee. In any case, bargaining power is an important factor, which needs to be taken into consideration to get a complete picture of gender differences in wage negotiations.

The current literature on gender differences in bargaining has produced inconclusive results. A possible reason is that although it incorporates negotiation power and information about gender, it uses different designs. In their study of the effects of minimum wages in experimental wage negotiations, Dittrich et al. (2014) find that men earn more on average than women do, but only in the role of employees. These differences are particularly pronounced when a male employer is interacting with a female employee. The authors provide evidence that these differences are triggered by initial offers and demands. They also find evidence of pairing effects. Men and women employers make the same offers on average, but both offer lower wages to women compared to men. In this way, women earn less than men do but only in the weak position. It should be noted that these results refer to overall payoffs, which also include cases in which no agreement was reached.

Hernandez-Arenaz and Iribarri (2019) investigate the effects of different types of

asymmetry in an alternating bargaining setup.<sup>1</sup> In their study, there are no gender differences in average payoffs between men and women when the power is symmetrically distributed. However, significant differences emerge in the treatments with asymmetric power. Conditional on reaching a deal, men earn more than women, both in the role of proposer and respondent. A result of this paper, which is not in line with Dittrich et al. (2014), is the absence of pairing effects, both under symmetric and asymmetric power. As for negotiation behavior, women are more likely to reach a deal and need less time to do so. However, they receive lower offers initially and subsequently while men demand more. These results are partially explained by risk attitudes. Men prefer longer shots and waste more resources, so that if one includes the payoffs of the pairs that did not reach a deal, there are no overall gender effects.

In another paper, Hernandez-Arenaz and Iribarri (2018) provide data from a TV show, in which two participants bargain over a fixed pie during three minutes. In this setup, only the proposers have a positive outside option and are informed about the size of the pie, which is quite substantial. The responders are chosen by the proposers from the pool of participants and the whole interaction is recorded. The data shows evidence of pairing effects, according to which, women demand less only from male proposers. A limitation of this bargaining setting is the lack of random random matching. The authors account for this by performing several robustness checks for which they show that the results are not mainly due to the selection process. Regardless of whether this environment adequately represents standard wage negotiations, it is an important piece of evidence for the existence of pairing effects.

D'Exelle et al. (2020) perform a lab-in-the-field experiment in rural Uganda to investigate the influence of gender and gender pairing on bargaining outcomes and behavior. They adopt a symmetric bargaining setup where participants play a

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<sup>1</sup>The authors consider three sources of asymmetry, namely, empowerment, entitlement and informational asymmetry. We only report their results from the empowerment treatment, as it is the source of asymmetry implemented in our setup

one-shot Nash-demand game. According to their results, when the gender of the negotiation partner is unknown, there are neither gender nor pairing effects. Neither are there gender differences in behavior. In contrast, when gender is revealed and negotiations without agreement are included, women earn higher payoffs than men. In that treatment, there is also evidence of pairing effects. Women's final earnings are lower in mixed gender pairs compared to same gender pairs, while men's final earnings do not depend on the gender of their partner. When only agreed payoffs are considered, men and women earn the same, regardless of the gender of their partner. The reason for this is that men make higher demands in mixed-sex couples, which makes agreements 30% less likely than in female-only couples. Furthermore, D'Exelle et al. (2020) find that both men and women underestimate their opponent's demands. However, conditional on their beliefs, women leave more on the bargaining table, increasing their chances of reaching a deal.

Although the experimental evidence from bargaining settings is mixed, one stylized fact stands out, namely that when bargaining parties have equal power and gender is unknown, men and women earn the same on average. Another main lesson is that power asymmetry is a necessary factor for the existence of gender and interaction effects. This is likely because it creates some latitude beyond social norms about what is a fair share. Nevertheless, besides Hernandez-Arenaz and Iribarri (2019), this factor has not been systematically studied.

In addition, the literature indicates that gender revelation is of importance. However, the bargaining experiments of Dittrich et al. (2014), Hernandez-Arenaz and Iribarri (2019) lack a baseline in which gender is not revealed. Obviously, information about gender is necessary for gender effects to occur, but its effect can only be demonstrated in the presence of a baseline that does not reveal this information. D'Exelle et al. (2020) have such a treatment, but they focus on simultaneous one-short interactions rather than sequential negotiations.

We close this gap by providing a comprehensive design to investigate gender and pairing effects under different conditions of asymmetry and gender information in a sequential two-player bargaining setup (Rubinstein, 1982). We focus on empow-

erment asymmetry stemming from the outside option because our goal is to clarify inconclusive results of bargaining setups that use this type of asymmetry. We implement a baseline where gender is unknown and provide gender information as one item within a set of demographic indicators to minimize demand effects. In this respect, the experimental designs adopted so far are face-to-face interactions (Dittrich et al., 2014), avatars (Hernandez-Arenaz & Iribarri, 2019) and identity revelation (D'Exelle et al., 2020). Finally, we also collect information about subjects' beliefs and risk attitudes to disentangle their effects from those of gender information and asymmetry. In this way, we can assess whether gender behavior is driven by lower expectations, satisfaction with smaller shares or risk attitudes. The main reason for adopting a Rubinstein's bargaining setup is that it represents real wage negotiations better than one-shot interactions, such as the Nash-demand game and the ultimatum game. Although these games offer interesting insights into bargaining, they lack a sequential aspect, which makes them more exposed to risk preferences and focal points. The reason is that erroneous beliefs about the other players' demands can immediately frustrate an agreement. In contrast, sequential negotiations provide scope for experimentation, which allows players to react to their opponents' behavior.

According to our results, there are no gender differences in average earnings in the environment with low asymmetry despite the fact that bargaining partners know the genders of their opponents. In this setting, we observe many deals near the 50:50 split. A plausible explanation is that bargaining partners view this situation as resembling a symmetric interaction in which the norm of equal sharing is a very natural heuristic.

In contrast, in bargaining situations with high asymmetry male employers are able to achieve more favorable outcomes than their female counterparts, but only if the gender of the bargaining partner is known. These differences are quite substantial. This is true both for average earnings conditional on reaching a deal and earnings including negotiation failures. Male employees also earn more than female employees but the differences are not significant. In line with previous findings, one

explanation for these differences is than men bargain more aggressively, particularly against women. In a similar fashion, we find evidence of gender interaction effects in the environment with high asymmetry and gender information. Especially in mixed gender pairings where a male employer is interacting with a female employee, women achieve clearly worse outcomes. Again, without gender disclosure these effects mainly disappear.

An across treatment comparison of gender differences and interaction effects confirms the above findings: Analyzing the data from both treatments with high asymmetry and variation of gender information, results show a treatment effect for both gender and interaction effects (with the latter being marginally significant). This leads us to the conclusion that the disclosure of gender information indeed seems to be one of the driving forces behind the gender differences in bargaining, even under a very mild regime of information disclosure. Furthermore, an environment without a clear sharing norm is a necessary condition for these differences to appear. Given there is some room for bargaining and genders are known, men try to obtain a larger share of the pie, especially in mixed pairings and frequently they succeed in doing so.

## 2 Experimental Design

### 2.1 Bargaining Setup

Subjects are matched into groups-of-two and bargain over the division of a fixed pie of 100 experimental units by making alternating offers. Beforehand, subjects are randomly assigned to one of two roles, called “employer” and “employee”, which remain constant during the whole negotiation process. The employer is in a more privileged position reflecting the asymmetry in bargaining power.

In each round, one player the *proposer* makes a proposal about how the pie should be split. Simultaneously, the other player, the *responder*, is asked to state her min-

imum share, for which she would just accept the offer.<sup>2</sup> This reported minimum share is private information. The proposer only receives feedback if his or her offer has been accepted or not. In this respect, our design is slightly different from the classical Rubinstein bargaining game. We adopted this specification, as it allows us to elicit more detailed information about the demands of both players, compared to just observing if an offer is accepted or not. To be in line with the strategic framework of the original setup, subjects learn about the proposals made, but not about the minimum values (in case the offered share is below the minimum of the other player, the players are just informed that "no agreement has been reached"). If the share offered to the responder is higher than her stated minimum, the proposal is automatically implemented and the game ends (corresponding to an acceptance of the proposal). As the actual distribution of shares is not influenced by the reported minimum, it is weakly dominant to truthfully state one's reservation value.<sup>3</sup> If no agreement is reached, it is the other subject's turn to make a counteroffer in the next round.

Bargaining continues in this way, until either the parties achieve an agreement or the game is terminated exogenously. From round 3 onwards, there is a probability of 20% that the negotiation will break down at the end of the round, if the partners have failed to reach an agreement so far. If this happens, a exogenously given outside option is implemented. The exact values of the outside option are known to the participants and vary between treatments. The employer is always in a more privileged position, as his outside option is higher than that of the employee.<sup>4</sup> Ad-

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<sup>2</sup>This corresponds to what is called a *cold* elicitation, as the responder makes her decision without knowing the exact offer of the proposer. In most cases, no differences are found compared to the *direct-response method* (Brandts & Charness, 2011).

<sup>3</sup>This is true for bargaining in round 3 and in subsequent rounds.

<sup>4</sup>We did not implement a purely symmetric treatment, as previous evidence such as Hernandez-Arenaz & Iribarri, 2019 suggests that a certain degree of asymmetry is a necessary condition for gender differences to occur because there exists no clear sharing norm. The treatment with a low degree of asymmetry can be seen as a robustness check to show that a certain threshold is necessary to create enough room for bargaining.

ditionally, the employer makes the proposal in the first round and subsequently in all odd-numbered rounds, which gives him an additional strategic advantage in this framework. This specification is supposed to reflect real world (wage) negotiations in a more realistic way, where usually one side is in a better bargaining position than the other.

In contrast to experiments in related studies, the game (bargaining) is played only once to avoid learning effects and past period outcomes influencing future behavior. Also from the perspective of real-life applications, it seems more realistic to have one negotiation taking place at one point in time, instead of several different negotiations shortly following one after another.

The whole scenario is framed as a business context. Throughout the description of the situation, we use terms that are linked to an employer-employee interaction where partners negotiate about the distribution of the surplus of a (potential) collaboration. We decided to use this contextual language for external validity reasons and because it can increase the comprehension of the task. (Alekseev, Charness, & Gneezy, 2017).

## 2.2 Treatments and Procedures

The experiment consists of three treatments varying the degree of asymmetry and the disclosure of demographic (gender) information:

1. Treatment Info & Low Asymmetry (“Info\_low”)
2. Treatment Info & High Asymmetry (“Info\_high”)
3. Treatment No Info & High Asymmetry (“No Info\_high”)

All sessions of all treatments follow the same timeline:

1. Demographic questionnaire
2. Instructions for the bargaining task

3. Comprehension quiz (incentivized)

4. Bargaining task (main part)

5. Debriefing questionnaire

In all treatments, subjects respond to a demographic questionnaire where they answer questions about age, gender, place of residence and study enrollment. In the treatments with information disclosure, the bargaining partners are mutually shown the elicited information during the negotiation (see Figure 1). In the no info condition, the procedure is exactly the same except for the revealing of demographic information.

Figure 1: Screen gender revealing in Info treatments

Your role: Employer
Bargaining round: 1

**Proposal**

It is your turn to make an offer in this bargaining round.

The other participant meanwhile states her or his minimum share for which she or he would just accept the offer.

After both participants made their decisions, it will automatically be checked, if the offer has been accepted. If the offer has not been accepted, it is the turn of the other player to make a counter-offer in the next round according to the same procedure.

The assigned roles do not change during the bargaining process.

Please choose your offer: 0  100

You (role Employer) receive (monetary units): 0

The other participants receives (monetary units): 0

**Submit proposal**

**Information about the other participant**

Age	Gender	Studies
<input type="radio"/> below 20 years <input checked="" type="radio"/> 20-22 years <input type="radio"/> 23-25 years <input type="radio"/> above 25 years	<input checked="" type="radio"/> female <input type="radio"/> male	<input checked="" type="radio"/> full-time studies <input type="radio"/> part-time studies <input type="radio"/> no studies
Place of residence	Semester	
Heidelberg	<input type="radio"/> No studies <input checked="" type="radio"/> 1. - 3. semester <input type="radio"/> 4. - 6. semester <input type="radio"/> unknown	

In case the game is terminated by the random draw without an agreement being reached, an asymmetric outside option is implemented. In the treatment with

low asymmetry, the outside option has the values (20, 0) and in the treatments with high asymmetry the values are (40, 0). The first number corresponds to the employer's payoff and the second to the payoff of the employee. According to game-theoretic predictions, this creates an advantage for the employer of slightly more than the values of their outside option (in addition there is the first-mover advantage).<sup>5</sup>

Before subjects start with the bargaining task, they have to answer several incentivized control questions with immediate feedback. This stage is meant to increase subjects' understanding of the rules of the game.<sup>6</sup> Before the bargaining task starts, subjects are asked to state their expected outcome of the negotiation (knowing their role). After the task, subjects complete a debriefing questionnaire, in which they enter certain demographic information, give a self-reported assessment of their risk preferences and describe their bargaining strategy.<sup>7</sup> The original instructions for each treatment can be found in the appendix.

### 2.3 Implementation

The experiment was conducted between 08/2017-11/2018 in the experimental lab of the University of Heidelberg. The bargaining process was implemented using z-Tree experimental software (Fischbacher, 2007). A total of 471 subjects, mostly

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<sup>5</sup>For the lack of space, we leave out the exact calculations. In a subgame-perfect equilibrium under the assumption that the continuation probabilities represent player's discount factors, the pie shares for the employer and the employee are approx. (73, 27) under high asymmetry and (64, 36) under low asymmetry.

<sup>6</sup>The intended effect seemed to have worked very well, as more than 90% of all participants managed to answer at least 6 out of 7 questions correctly. Additionally, all subjects received detailed feedback about the correct answers before the experiment continued.

<sup>7</sup>In relation to this question, subjects were asked if they took any demographic information into account during the negotiation. Across both treatments with information disclosure, only 16.0% explicitly mentioned "gender". Therefore, we see our treatment manipulation as rather subtle. However, this number most likely underestimates the true fraction, as some participants might not reveal that they took the information into account or they did so unconsciously.

students, took part.<sup>8</sup> The average duration of each session was about 35-40min and average earnings were 8.52€ per subject, with payoffs ranging from 4.00€-14.00€. Further details are summarized in table 1 below:

Table 1: Sessions overview

<b>Treatment</b>	<b>Sessions</b>	<b>Subjects</b>	<b>Ratio of Females</b>
Info_low	12	160	56.9%
Info_high	12	159	60.4%
No Info_high	10	152	59.9%

There is a slight imbalance of genders, but across treatments the ratio of female participants is similarly high.

### 3 Results

First, we analyze gender differences and gender interaction effects in bargaining outcomes within treatments. In a second step, we check if these effects persist when the disclosure of gender information is varied (between treatment comparison). Overall success rates of the negotiation are relatively high. Across treatments, the parties reached an agreement before the bargaining process was terminated in 88,3% of the time. We report success rates in Table 10 in the appendix. There are no clear patterns in terms of gender differences or pairing effects. Only male employees in treatment Info\_low are slightly less successful compared to the rest of the pairings.

In the main sections, we focus on the case, in which a deal was reached. The main reason for this selection is our focus on explaining potential gender differences in

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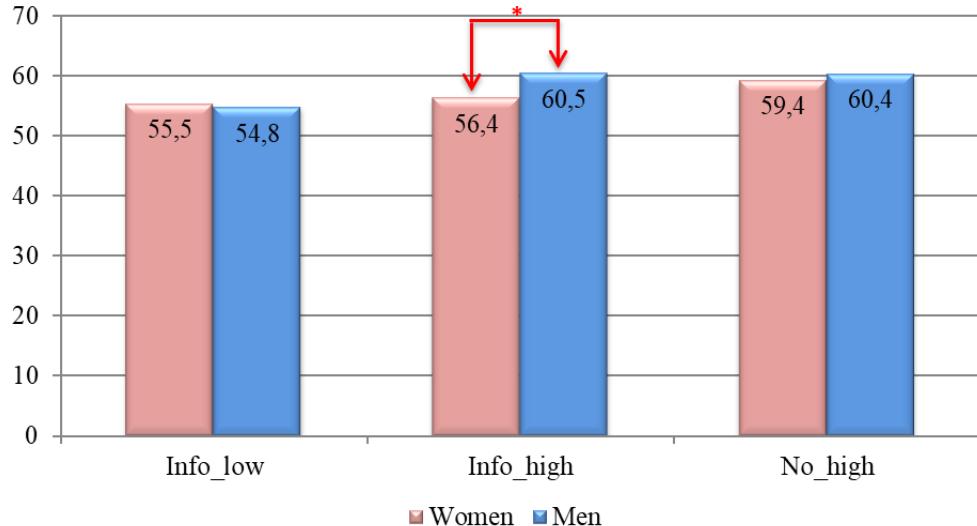
<sup>8</sup>One observation had to be removed, as one participant suddenly became sick and abandoned the experiment.

real-world wage negotiations, where one only observes the outcomes of the contracts which materialize. Another reason is that the outcomes including negotiation failures depend additionally on random draws that terminated the game. This could confound the true effects to some extent. We report the results including the cases when no agreement was reached in the appendix. All of our main results regarding gender differences and gender interaction effects can be replicated when including the cases where bargaining was not successful. For some findings, the degree of significance increases using this data.

### 3.1 Gender Differences in Outcomes

Compared to the game theoretic predictions employers are never able to fully exploit their bargaining power. Maybe, fairness considerations, inequity-aversion and risk aversion to some degree attenuate given imbalances of power. In treatment Info\_low there are no significant gender differences for either role. A plausible explanation is that subjects often follow a (social) norm such as the 50:50 split. Figures 2 and 3 display for the treatments Info\_high and No Info\_high average bargaining outcomes for a given role and gender (summarized also in Table 2).

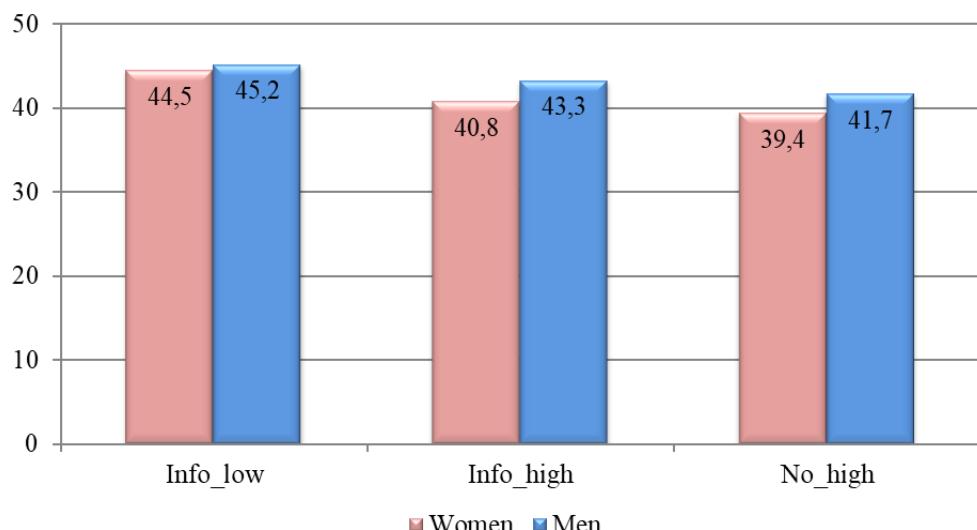
Figure 2: Mean payoffs of employers in Info\_high



$*p < 0.05$ ,  $** p < 0.01$ ,  $*** p < 0.001$

Note: Considering only cases, when a deal was reached.

Figure 3: Mean payoffs of employees in No Info\_high



Note: Considering only cases, when a deal was reached.

Table 2: Mean outcomes by roles and gender

Treatment	F Prop.	M Prop.	p-value	F Resp.	M Resp.	p-value
Info_low	55.5 (6.5)	54.8 (7.7)	0.67	44.5 (7.3)	45.2 (6.4)	0.69
Info_high	56.4* (7.0)	60.5* (8.8)	0.036	40.8 (8.6)	43.3 (7.1)	0.22
No Info_high	59.4 (9.6)	60.4 (8.7)	0.65	39.4 (10.0)	41.7 (7.6)	0.36

Standard errors in parentheses; considering only cases where a deal has been reached  
p-values from a t-test of equality of means by gender

In the treatments with a more asymmetric environment, men achieve more favorable outcomes than women for both roles. However, these differences are only significant for employers within treatment Info\_high (two sided t-test,  $p = 0.036$ , see Table 2). Likewise, as employee women achieve worse outcomes than men in treatment Info\_high, but the differences are not significant. All these differences practically disappear in treatment No Info\_high.

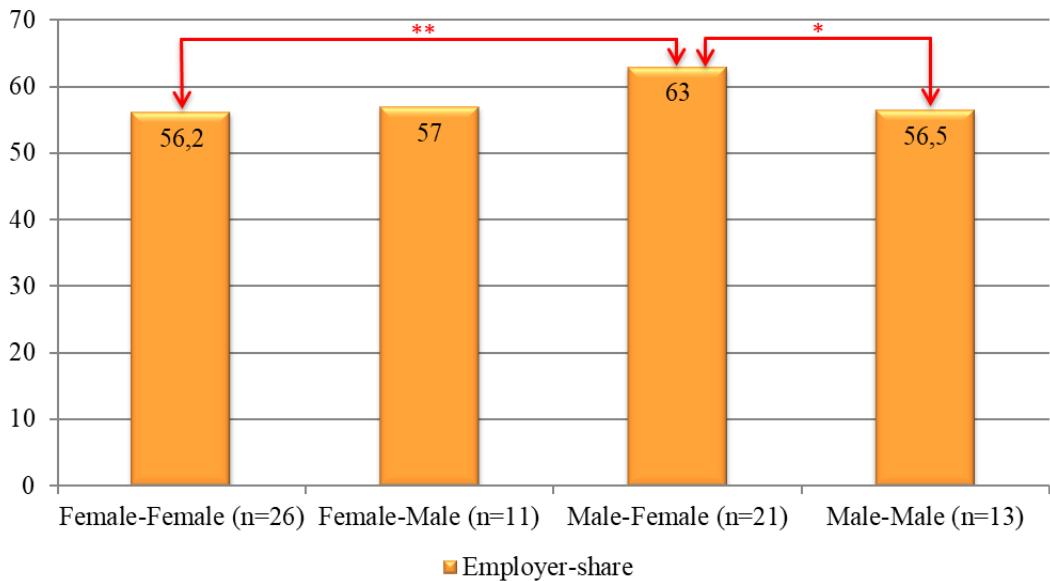
The data does not yet provide a full picture of the results, as it does not take into account the gender of the bargaining partner. In the next section, we analyze gender pairing effects to gain a more in depth understanding of the mechanisms at play.

### 3.2 Gender Pairing Effects

Figures 4 and 5 show average shares of employers in treatments Info\_high and No info\_high for each of the four possible gender-pairings. The first attribute refers to the gender of the employer, e.g. in the pairing “Female-Male”, a female employer is interacting with a male employee. We only report employers’-shares, because the shares of the employees’ correspond to the residual. We perform the analysis

from both the employers' and the employees' perspective by comparing a specific gender pairing (for example "Female-Male") to the gender pairings where either the gender of the employer ("Male-Male") or that of the employee ("Female-Female") is varied.

Figure 4: Mean payoffs in treatment Info\_high

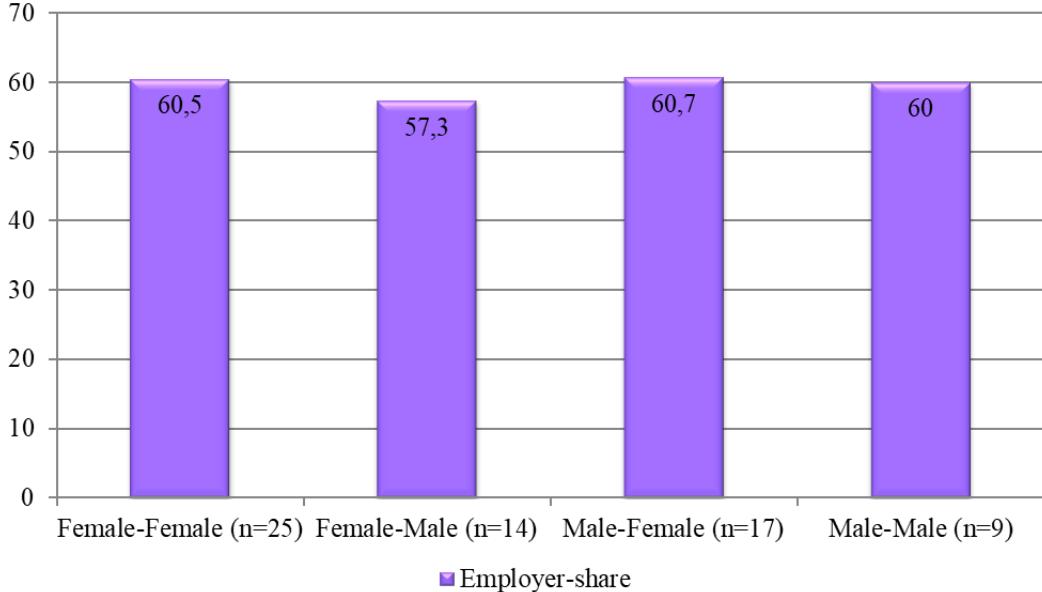


$*p < 0.05$ ,  $** p < 0.01$ ,  $*** p < 0.001$

Note: Considering only cases, when a deal was reached.

We do not display the results of treatment Info\_low here, since in that treatment there are no significant differences in outcomes for any gender pairing. They can be found in Table 8 in the appendix. In the second treatment, however, there are clear differences in gender pairings (see Figure 4): Male employers receive a substantially higher share, when bargaining with a woman, instead of bargaining with a man (rank-sum test,  $p = 0.05$ ). Similarly, men earn more than women in the role of employers, when paired with a female employee. In the latter case, effects are strongest (rank-sum test,  $p = 0.01$ ), but in these categories there are also more observations.

Figure 5: Mean payoffs in treatment No Info\_high



Note: Considering only cases, when a deal was reached.

The previous differences between the pairings “Male-Female” and “Male-Male” are not present in treatment No Info\_high (see Figure 5). Female employers achieve worse outcomes, when bargaining with male employees. However, the differences remain insignificant (rank-sum test,  $p = 0.70$ ). When looking at bargaining behavior, it seems that to some extent the results in treatment Info\_high are driven by male employers, who bargain more aggressively against female employees.

### 3.3 Treatment Effect of Gender Revealing

In this section, we report a regression analysis that examines the effect the disclosure of information has on gender differences and gender interaction effects. In doing so, we compare results of treatments Info\_high and No Info\_high with the former as the baseline. The results are presented in Table 3. We only report results from the perspective of the employer as under this specification results from the employee’s perspective are equivalent with the sign reversed.

Table 3: OLS-regression: Bargaining outcomes of the employer (Deals only)

Employer's pie share	
male	5.981* (2.488)
male_opp	0.683 (3.013)
male#male_opp	-7.690 <sup>+</sup> (4.226)
No Info	4.118 <sup>+</sup> (2.349)
male#No Info	-7.110* (3.605)
male_opp#No Info	-3.955 (4.110)
male#male_opp#No Info	11.52 <sup>+</sup> (6.186)
risk_loving	0.515 (0.383)
expectations	0.189* (0.088)
Observations	136

Standard errors in parentheses, <sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$

Control variables are risk preferences (measured on a scale from 1-10)

and expectations (measured on a scale from 0-100)

The baseline is Treatment Info\_high

According to the results, there is clear evidence of gender differences that are treatment-dependent. Male employers achieve significantly better outcomes than female employers in treatment Info\_high ( $p = 0.02$ ). However this effect entirely disappears when genders are not known to the bargaining partners (interaction term male#No Info,  $p = 0.05$ ). Furthermore, there is some evidence that the gender interaction effects are treatment-dependent (male#male\_opp#No Info,  $p = 0.07$ ). Very similar results are found when including also the cases where no deal was reached (see Table 9 in the appendix).

The evidence suggests, that in environments where there is an asymmetry in bargaining power, knowing each other's gender is a key factor for the existence of gender differences and interaction effects.

### 3.4 Analysis of Bargaining Behavior

In this section we analyze gender differences in players' bargaining strategies and how this affects the likelihood of reaching an agreement. In Tables 4-6 players' demands for the first three rounds are presented. Remember, after the third and later rounds, there was a chance of 20% that the negotiation was terminated exogenously if no agreement had been reached. This created some "pressure" to achieve a deal before the end of round 3. As a consequence, the clear majority of bargaining partners came to an agreements within the first 3 rounds (79,0% across all treatments). For this reason we focus our analyses on these three rounds.<sup>9</sup> Consistent with previous studies(Dittrich et al., 2014 and Hernandez-Arenaz & Iribarri, 2019), the examination of gender differences in bargaining behavior shows that there is a tendency that men bargain more aggressively. On average men demand higher shares than women throughout all treatments. This effect is particularly pronounced, when men are in the position of the *responder* stating their minimum acceptable

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<sup>9</sup>In round 4, there are on average only 12 negotiations left per treatment and in subsequent rounds these numbers decrease even further by design. This would make it hard to draw meaningful conclusions from the data.

offer (regardless of whether they are in the role of the employer or the employee).<sup>10</sup> These differences are significant at the 5% level for first round demands in treatments Info\_low and No Info\_high and for second rounds demands in treatment Info\_high. Furthermore, in treatment Info\_high we find gender interaction effects for first rounds demands such that men demand more against female opponents. These effects are marginally significant ( $p = 0.06$ ). To some extent these patterns can explain our overall findings with respect to bargaining outcomes: Gender differences and gender interaction effects, which mainly appear in treatment Info\_high, are driven by higher demands from male participants, especially when bargaining with a female counterpart.

Table 4: OLS-regression: Demanded share in first round

	Info_low		Info_high		No I_high	
	Employer	Employee	Employer	Employee	Employer	Employee
male	1.46 (3.50)	5.84* (2.69)	2.86 (2.81)	-0.43 (2.43)	1.61 (2.99)	7.58* (3.63)
male_opp	1.60 (3.25)	3.41 (2.90)	1.09 (3.28)	-2.38 (2.08)	-2.65 (3.14)	4.36 (3.46)
male#male_opp	0.67 (5.13)	-1.50 (4.25)	-9.14 <sup>+</sup> (4.81)	1.03 (3.55)	0.57 (4.86)	-6.87 (5.62)
Observations	80	80	80	79	76	76

Robust standard errors in parentheses

<sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$

<sup>10</sup>By design, in the first and third round it is always the employee who gives her minimum acceptable offer, while in the second round this is done by the employer.

Table 5: OLS-regression: Demanded share in second round

	Info_low		Info_high		No I_high	
	Employer	Employee	Employer	Employee	Employer	Employee
male	8.98 <sup>+</sup> (4.63)	2.97 (2.43)	7.94* (3.60)	-0.81 (2.62)	0.46 (3.99)	3.70 (3.49)
male_opp	6.76 (4.16)	1.15 (2.71)	1.43 (4.00)	-3.72 (2.36)	-6.37 (4.29)	-1.38 (3.24)
male#male_opp	-5.22 (6.17)	-1.24 (3.60)	-5.68 (6.10)	0.96 (3.99)	7.58 (6.37)	-3.83 (5.18)
Observations	58	58	68	68	58	58

Robust standard errors in parentheses

<sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$

Table 6: OLS-regression: Demanded share in third round

	Info_low		Info_high		No I_high	
	Employer	Employee	Employer	Employee	Employer	Employee
male	6.67 (3.96)	2.82 (3.68)	2.62 (2.73)	6.41 <sup>+</sup> (3.53)	-3.32 (3.80)	-0.56 (4.98)
male_opp	0.92 (3.48)	-2.77 (4.18)	-3.70 (3.37)	-2.04 (2.85)	-2.07 (4.04)	2.92 (4.68)
male#male_opp	-3.18 (4.85)	5.55 (5.12)	0.90 (5.66)	-3.67 (5.92)	-0.00 (5.88)	4.17 (7.25)
Observations	33	33	38	38	36	36

Robust standard errors in parentheses

<sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$

## 4 Discussion and Conclusion

Evidence from labor markets and experimental studies suggests that the gender wage gap may be due in part to gender differences in negotiation attitudes and behaviors. However, to date it is unclear to what extent these effects are due to the asymmetric nature of wage bargaining, gender-specific information, or a combination of both. We fill this gap by adopting a design that manipulates both factors in the context of a Rubinstein bargaining setup. A distinctive feature of our study is that it has a baseline in which players have no gender-specific information.

Consistent with previous experimental findings on bargaining (Dittrich et al., 2014; Hernandez-Arenaz & Iribarri, 2019), our data show that men obtain more favorable deals than women when power asymmetry is high and gender is revealed. This holds for both roles, but the differences are significant only for men in the role of the employer. This result is consistent with Hernandez-Arenaz and Iribarri (2019) and, to a lesser extent, with Dittrich et al. (2014). In the former study, men earn more in both roles, whereas in the latter, men earn more only in the employee role.

Although, the payoffs of female employees are not significantly lower in the presence of high asymmetry and gender information, we find significant pairing effects according to which they earn less against male employers. This provides a potential mechanism for the occurrence of the gender wage gap. In line with previous work (Dittrich et al., 2014; Hernandez-Arenaz & Iribarri, 2018), the matching between male employers and female employees is the most favorable from the employer's perspective. It appears to be a robust finding that women in mixed-sex couples have a hard time being in the weaker position.

As far as bargaining behavior is concerned, experimental studies diverge about the source of this effect. In some studies, men make higher demands and receive higher offers from their bargaining partners regardless of their gender (Dittrich et

al., 2014), while in other studies, female employees demand less from male employers (Hernandez-Arenaz & Iribarri, 2018). A consistent pattern we also observe is that, on average men demand higher shares than women (Dittrich et al., 2014; Hernandez-Arenaz & Iribarri, 2018; 2019; D'Exelle et al., 2020). In the treatment with high asymmetry and gender information, we additionally find some evidence of pairing effects, whereby male employers offer less to female employees. To some extent, these patterns can explain the observed differences in outcomes and confirm the assumption that gender interactions are relevant in explaining gender effects (Hernandez-Arenaz & Iribarri, 2018).

We draw three main conclusions from our results. First, in bargaining games, gender differences and pairing effects occur only when both asymmetric power and gender information are present. These differences disappear when either gender is not revealed or when power is only marginally asymmetric. Second, women perform worse when they negotiate with a man, especially when they are in a weaker position. In this sense, our study contributes to the clarification of the inconclusive findings on the existence of pairing effects and their role in bargaining outcomes. Third, gender disclosure seems to affect men and women differently. When gender is disclosed, men receive higher earnings than women in both roles. These differences disappear when the information is not disclosed. Thus, when there is room for negotiation, gender information appears to be more profitable for men. Interestingly, this result also shows that women are as successful as men when negotiating without information about the gender of their opponent. Consistent with a emerging consensus in the literature (Kennedy & Kray, 2015; Recalde & Vesterlund, 2020) our findings suggest that there is no intrinsic difference in negotiation performance between men and women.

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## Appendix

### A.1 Gender Differences (All Cases)

Table 7: Mean outcomes by roles and gender

Treatment	F Prop.	M Prop.	p-value	F Resp.	M Resp.	p-value
Info_low	52.5 (11.7)	50.4 (13.7)	0.46	43.5 (9.9)	36.6 (18.9)	0.04
Info_high	53.8** (8.9)	59.3** (9.8)	0.01	36.9 (14.6)	38.5 (15.4)	0.65
No Info_high	57.2 (10.9)	56.6 (11.3)	0.83	35.2 (15.5)	33.0 (18.4)	0.58

Standard errors in parentheses; considering also cases where no agreement has been reached  
p-values from a t-test of equality of means by gender

## A.2 Gender Interaction Effects (All Cases)

Table 8: Mean outcomes by roles and gender pairings (all cases)

	Female employer bargaining with		Male employer bargaining with	
Treatment	Female employee	Male employee	Female employee	Male employee
Info_low	56,0; n=26 (6,0)	48,5; n=22 (15,2)	52,6; n=17 (12,3)	47,9; n=15 (15,2)
Info_high	54,0**; n=30 (8,6)	53,4; n=14 (9,8)	61,0**; n=23 (10,9)	56,5; n=13 (7,1)
No_high	59,0; n=27 (11,3)	54,2; n=17 (10,0)	57,6; n=20 (11,8)	55,0; n=12 (10,7)

	Female employee bargaining with		Male employee bargaining with	
Treatment	Female employer	Male employer	Female employer	Male employer
Info_low	44,0; n=26 (6,0)	42,6; n=17 (14,2)	37,0; n=22 (19,0)	46,1; n=15 (19,3)
Info_high	39,3*; n=29 (15,1)	33,8*,*; n=23 (13,7)	33,8; n=14 (19,5)	43,5*; n=13 (7,1)
No_high	36,6; n=27 (14,4)	33,5; n=20 (17,0)	35,2; n=17 (18,3)	30,0; n=12 (18,9)

Standard errors in parentheses; n reports the number of observations per category

+  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$

p-values from a rank-sum test of equality of means by gender

Several gender interaction effects can be found in treatment Info\_high: From the perspective of the employer, there are highly significant interaction effects for the comparison of a female vs. male employer interacting with a female employee (rank-sum test,  $p < 0.01$ ). These effects naturally also appear from the reversed

side.<sup>11</sup> Furthermore, male employees achieve significantly better outcomes when interacting with male than with female employers (rank-sum test,  $p = 0.02$ ).

### A.3 Effect of Gender Revealing (All Cases)

Table 9: OLS-regression: Bargaining outcomes of the employer

Employer's pie share	
male	9.913* (2.883)
male_opp	-0.733 (3.327)
male#male_opp	-3.719 (4.880)
No Info	5.035 <sup>+</sup> (2.731)
male#No Info	-8.332* (4.155)
male_opp#No Info	-3.996 (4.606)
male#male_opp#No Info	5.702 (7.007)
risk_loving	0.067 (0.425)
expectations	-0.025 (0.097)
Observations	156

Standard errors in parentheses, <sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$

Risk preferences are measured on a scale from 1-10, expectations on a scale from 0-100

The baseline is Treatment Info\_high

<sup>11</sup>in the category of female employees who are matched with female employers there is one observation less due to the participant who abandoned the experiment.

## A.4 Deal Success Rates by Gender and Pairing

Table 10: OLS-regression: Success rates per gender and pairing

	Info_low	Info_high	No I_high
male Employer	-0.059 (0.092)	0.046 (0.088)	-0.076 (0.105)
male Employee	-0.182* (0.085)	-0.081 (0.103)	-0.102 (0.110)
male#male_opp	0.041 (0.135)	0.168 (0.151)	0.002 (0.174)
Constant	1.000 (0.058)	0.867 (0.058)	0.926 (0.069)
Observations	80	80	76

Robust standard errors in parentheses

+  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$

## A.5 Translated Instructions (next pages)

## Experiment - General Information

Welcome to this experiment and thank you very much for your participation!

Please, switch off your mobile now and do not communicate with the other participants anymore. If you have any questions raise your hand, one of the experimenters will come to your place and answer them in private.

In this experiment, you can earn a certain amount of money, which will be paid to you at the end of the experiment in cash. For showing-up and participating in the experiment, you receive a flat pay of 4 Euro. You may earn further payoffs in the main part depending on your decisions on the decisions of other participants. In addition, you will be paid an extra amount of 1 Euro, if you answer correctly at minimum six out of seven of the control questions.

Taken together, as total payoff you receive:

$$\textbf{Total Payoff} = 4\text{€} + (1\text{€}) + \textbf{Payoff of Main Part}$$

It is ensured that all information you submit and all your decisions are saved completely anonymously and cannot be linked to your personal identity.

The general procedure of the experiment is identical for all participants and can be summarized as follows:

- 1) First you answer a short demographic questionnaire
- 2) Then you receive detailed instructions for the decision-making situation
- 3) Before you proceed, you answer several control questions
- 4) Then you are asked to make your decision(s)
- 5) Afterwards you answer a debriefing questionnaire
- 6) Then all participants receive their earnings

## Instructions – Main Part

In the following situation, you and some other randomly selected subject form **a group-of two** for the rest of the experiment. One participant of every group takes on the **role as “employer”**, the other takes the **role of an “employee”**. **Roles are assigned randomly**.

Your assigned role will be displayed on the screen of your computer.

Both members of a group are in a bargaining situation over a possible employment contract, which would yield **a profit of 100 monetary units**. In the following **you and the other participant bargain about the distribution of this profit between the two of you**. In doing so you and your partner will alternately make proposals how the pie of 100 monetary units should be split between both of you. The person who is in the role of employer makes the first proposal. Meanwhile the other participant states her minimum share for which she would just

accept the proposal. If the offered amount is bigger or equal to the stated minimum, the offer is automatically implemented and the profit of 100 monetary units is split according to the proposal just made. If the offer is below the minimum of the other player, the proposal is rejected and a new bargaining round starts. In this round it is the other player's turn to make a new proposal.

*Example 1: Player A offers to split the pie into 60 monetary units for herself and 40 monetary units for player B. The minimum of player B for this round is 30 monetary units. This proposal will be accepted and the resulting distribution is 60 monetary units for player A and 40 monetary units for player B.*

*Example 2: If the minimum of player B would be 50 monetary units (instead of 30 as before), the proposal would not be implemented and a new bargaining round will start in which player B makes a counter-offer.*

**This bargaining process continues until a proposal is accepted or until the process is terminated externally.** External termination can only end the process after the first 3 rounds have been completed. If in round 3 or any subsequent rounds there is no agreement, a random generator will determine whether or not there will be another round. The probability that there is another bargaining round is always 80%.

If the bargaining process is terminated externally and no agreement has been reached, **the participant in the role of employer receives a share of 40 monetary units [Treatment Info\_Low: 20 monetary units]** and the player in the role of "employee" receives 0 monetary units.

**At the end of the experiment, all monetary units will be converted into Euros at an exchange rate of 10:1, that means for each 10 monetary units you receive a payoff of 1 Euro in this part.**

Additionally, you and your partner will mutually get to know each other's demographic information during the bargaining process, such as age, gender, status of occupation ...

**[Treatment No\_Info: The previously submitted demographic information such as age, gender, status of occupation will not be revealed to any of the bargaining partners...]**