An Experiment on Gender Representation in Majoritarian Bargaining*

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Abstract

Women are underrepresented in political and business decision-making bodies across the world. To investigate the causal effect of gender representation on multilateral negotiations, we experimentally manipulate the composition of triads in a majoritarian, divide-the-dollar game. First, we find that inclusive splits and unanimous agreement rates are highest in all-female groups and lowest in all-male groups suggesting that female representation increases fairness. Second, we document a robust gender gap in earnings, driven largely by the exclusion of women from coalitions rather than differential shares within coalitions. Experiments with different subject pools show that distinct bargaining dynamics can underlie the same inequitable outcomes: While gender-biased outcomes are sometimes caused by outright discrimination, they can also be driven by more complex dynamics related to gender differences in bargaining strategies. These different dynamics manifest in mixed-gender coalitions being less stable when the excluded party is male rather than female. Men are more likely to make opening offers and enjoy a payoff advantage for doing so, but women suffer backlash for proposing first.

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1 Introduction

Corporate boards of directors, boards of trustees, self-managed teams, academic departments, legislatures, and panels of judges are a few examples of the many settings where members typically engage in bargaining to reach agreements. However, evidence from multiple studies and surveys reveals that women are largely underrepresented in decision-making bodies worldwide across business, economic, and political domains.[1] This imbalance has led to widespread calls for policies aiming to close the gender gap of female representation in decision-making bodies (e.g., European Commission Gender Equality Strategy 2020-2025 and United Nations 2030 Sustainable Development Goals).

Besides a first-order equity concern for gender parity, it is often argued that women's underrepresentation in committees may systematically lead to *less desirable overall outcomes* and affect women in particular negatively.[2] Such considerations may become more important if decisions are reached via majority voting since members of the gender majority might coalesce and discriminate against members of the minority, further diminishing women's actual effect on decision-making.[3] However, the precise way the gender composition of committees causally affects multilateral bargaining outcomes is unknown and warrants careful investigation. Are agreements more inclusive as the number of women increases? Will majority members discriminate against minority members, and if so, which gender is more prone to doing so? Are men more likely than women to make an opening offer or does this depend on the gender of the bargaining partners? Does the first mover's gender determine which gender prevails in the winning coalition? Do men and women behave differently when left-out of a coalition?

To answer these questions and more, we conduct a laboratory experiment in which participants are randomly assigned to one of the following treatment conditions: *all female* (FFF), *female majority* (FFM), *male majority* (MMF), or *all male* (MMM). In the experiment, participants are placed in groups of three in order to divide a sum of money through a free-form bargaining protocol. Agreements are reached via majority voting and delays are monetarily costly because the amount of money available to divide shrinks over time. To reach a final agreement, at least two members of the triad must form a temporary pre-agreement which will become *ratified* only if it is continuously supported for a pre-determined ratification time period. During the ratification period, a member who is not a

[1] In the 116th United States Congress (2019-2021), only 23% of members of Congress and 26% of Senators are women. In 2019, 24.9% of all members of parliamentary bodies around the world were women (Inter-parliamentary Union, 2020). Women represent only 22% of chief executives in the United States (Huang et al., 2019).

[2] For example, Bourreau-Dubois et al. (2020) find that French judge panels impose higher child support payments when the judges are all women (regardless of the gender of the creditor) compared to mixed panels, but there is no difference with all male panels. Boyd et al. (2010) find that males in judge panels lacking women are less likely to rule in favor of plaintiffs in cases of discrimination in the United States. All-female groups in a management game are more likely to invest in social corporate responsibility. However, they perform lower compared to mixed and all male groups (Apesteguia et al., 2012). Female students randomly assigned to male-majority study groups in an economics course are more likely to drop the course than women in other groups (Shan, 2020). We elaborate on the relationship of our work with this literature in our discussion section.

[3] Note that such behavior could be vetoed by the minority members under a unanimity rule.

party to the pre-agreement may engage in making offers in order to lure partners into a new coalition, thus impeding the ratification. Also, parties to the preliminary agreement are free to reconsider and propose alternatives. To the best of our knowledge, we are the first to experimentally study the impact of committees' gender composition on multilateral bargaining agreements and dynamics.

Previous laboratory studies that exogenously vary gender pairing in bargaining have focused exclusively on bilateral bargaining settings such as the dictator and ultimatum games (Eckel and Grossman, 2001; Solnick, 2001; Sutter et al., 2009; Eriksson and Sandberg, 2012; Hernandez-Arenaz and Iriberri, 2020; Exley et al., 2020). Taken together, the results from the previous studies indicate that women are more generous than men (Engel, 2011; Bilén et al., 2020; Eckel et al., 2008) and women are more likely to accept lower offers than men in the ultimatum game.

Coalition formations and dissolutions are central to the back-and-forth negotiations typically described in legislative bodies in which temporary informal agreements can be dissolved later and new coalitions may form. Moreover, in many contexts, it is rarely pre-established who makes the first proposal, which is fixed in experiments using a structured bargaining protocol such as the dictator, ultimatum, or power-to-take games. And, critical to the aim of the present paper, bilateral bargaining protocols do not allow for studying the impact of changing the representation of women from minority to majority status or the behavior of members left out of coalitions.

While bilateral settings are a natural starting point for investigating bargaining behavior and valuable insights have been gained by studying them, we believe they do not capture essential elements inherent to more general bargaining processes. In particular, if women are more willing than men to accept lower shares, they become more attractive to others (men and women alike) as coalition partners. This implies that men could be left out of agreements more often. As such, it is unclear whether the lower payoffs that women earn in bilateral settings are a harbinger of a gender gap in multilateral, majoritarian bargaining.

Our experimental setting presents three novel features that differentiate it from previous studies of gender in bargaining games. First, by implementing a multilateral setting, we naturally allow for agreements to include both minimum winning coalitions (MWCs), where only two participants receive a positive share, and grand coalitions (GCs), in which all members receive a positive share. Second, because any member of a bargaining triad can make an offer at any point in time, we can assess whether there exists a gender difference in making an opening offer. Third, to capture the behavior of members excluded from a coalition, our protocol requires a ratification period before a temporary agreement becomes binding in which we can observe the behavior of excluded members.

Gender differences in bargaining have also been studied in the field (Castillo et al., 2013; Leibbrandt and List, 2015; Andersen et al., 2018; Hernandez-Arenaz and Iriberri, 2018; Säve-Söderbergh, 2019). These studies offer valuable insights regarding the negotiation of wages, how the supply-side treats men and women bargainers when on the demand-side, the gender choice of bargaining part-

ners, and the role of culture.[4] However, due to the innate hurdles associated with implementing a field experiment, these studies also rely on simple bargaining transcripts that cannot fully capture the bargaining dynamics that we aim to study. The practical difficulties with conducting a field experiment that tackles our proposed research are evident—which make a laboratory experiment desirable as a first step. Moreover, a laboratory experiment allows us to design controlled counterfactual settings to identify causal relationships, which is particularly appropriate for studying the research questions addressed in this paper.

We also contribute to the vast experimental economics literature on gender differences, which has found that men are more inclined to enter competitions (Niederle and Vesterlund, 2007), contribute ideas (Coffman, 2014), lead a team (Born et al., 2020), and give advice on how to play strategically (Cooper and Kagel, 2016). Importantly, by now, there are robust findings showing that women's decision-making is influenced by gender stereotypes, as well as by gender composition, when the domain is stereotypically perceived as disadvantageous for women (Coffman, 2014; Bordalo et al., 2019; Geraldes, 2020; Stoddard et al., 2020). Thus, understanding the role of gender in multilateral bargaining outcomes and dynamics will expand our understanding of men's and women's behavioral patterns in a novel important direction.

In our *Main* experiment, which we conducted with 282 participants from the BEELab subject pool (Maastricht University), we find that the overall split of the surplus becomes more inclusive as the number of women increases, with grand coalitions (i.e., splits of the surplus in which every player receives a positive share) averaging 26% of agreements in FFF and only 13% in MMM. Hence, our experiment provides a causal link between female representation and outcome fairness.

Second, we uncover a gender gap in earnings. Men earn 21% more than women in MMF and 2.1% more in FFM. We replicate this finding in a different sample (n=240) with participants from the LINEEX subject pool (University of Valencia), albeit with a wider gap in FFM, with men earning approximately 20% more than women.

There is not a unique mechanism giving rise to the gender gap in earnings, however there are several common findings in both experiments. The first behavioral regularity we identify is that men are more prone to making opening offers, which makes them more likely to be part of a coalition giving rise to a payoff advantage. Importantly, men benefit from proposing first, whereas women do not. Hence, even if women attempted to mimic male behavior in opening offers, there is no reason to expect that this will aid in closing the gender gap in earnings.

It is natural to ask whether majorities discriminate against minorities, and if such behavior could contribute to the gender gap in earnings. We find that 67% of MWCs are mixed-gender in FFM, while only 58% in MMF. Note that perfect randomization in partner choice means that the coalition will be mixed-gender 2/3 of the time, which coincides with what we observe for FFM. While

[4] See also Recalde and Vesterlund (2020) who thoroughly review the field experiments focusing on wage bargaining and prices. These authors conclude that men are more successful when negotiating over labor-market outcomes than women, especially when there is uncertainty regarding what can be negotiated.

this may suggest that men discriminate against women in MMF, an exploratory investigation of the bargaining process reveals this is not the case in the *Main* experiment. In fact, when males make the first offer, they invite the only female in the triad more often (56% of the time). However, left-out males are quite aggressive and insistent in their attempts to break the mixed-gender MWC, and included males are more likely to break the interim agreement. This leads to greater stability of mixed-gender coalitions when the excluded party is female rather than male. These findings are not in line with a taste-based explanation for the gender gap in earnings in which men directly or intentionally discriminate against women. Instead, our analysis underscores the relevance of studying in detail the endogenous bargaining dynamics that arise in a negotiation.

Our findings concerning gender differences in the behavior of members who are left out of coalitions were exploratory in nature and unexpected. Moreover, we had hypothesized no differences in the prevalence of mixed-gender coalitions between male majority (MMF) and female majority (FFM) triads, but this hypothesis was rejected. Because both of these findings are important in explaining the gender gap in earnings that we uncovered, we conducted a second experiment at the University of Valencia focusing on the mixed-gender treatments. In our *Follow-up* experiment, we find very similar bargaining outcomes, thus confirming the robustness of our results, in particular the gender gap in earnings that we uncovered in the *Main* experiment. However, the bargaining dynamics in the second experiment differ in some important aspects. While men are more likely to propose first in both experiments, whom they propose to differs. In the *Follow-up* experiment, we find that men display a preference for partnering with each other in male majority treatments (MMF), which was not the case in the *Main* experiment.

Collectively, the results from our experiments reveal three mechanisms through which women can be at a disadvantage in majoritarian, multilateral bargaining. Two of these channels stem from bargaining dynamics that do not appear *intentionally discriminatory*. First, men propose first more often than women, and second, women do not attempt to break existing coalitions as much as men do when they are left out. The third channel is that men coalesce with other men more often than with the woman in the triad when they are in a male-majority triad. These results highlight that gender differences in strategic behavior and male homophillic preferences may contribute to the gender gap, which has important practical implications for institutional designers seeking to mitigate gender inequality. Specifically, our results suggest that context matters for tailoring interventions to promote gender equality in earnings within a bargaining setting.

This article proceeds as follows. In Section 2, we present the design of the *Main* experiment. Next, in Section 3, we formulate our research hypotheses based on a review of the literature. In Section 4, we present our main results. Section 5 presents the results of the *Follow-up* experiment. In Section 6, we discuss our results and their robustness. Finally, Section 7 concludes the article.

2 Experimental Design

2.1 The Bargaining Game

Participants were randomly grouped in triads to divide 12 points, which corresponded to up to 36 euros. A silhouette indicating the gender of each member of the committee was displayed. At any moment during the bargaining process, participants could: (1) make a proposal on how to divide the twelve points, (2) provisionally support (or not) an existing proposal, or (3) withdraw the proposal after having made one. Agreements were reached when at least two members of the triad agreed on a split for a ten-second *ratification period*. This design closely follows the unstructured bargaining protocol of Tremewan and Vanberg (2020).

Importantly, each second that goes by during the game, the value of the fund decreases by 24 cents.[5] Thus, if 150 seconds went by without agreement, all players earned 0. The experiment was computerized using zTree software (Fischbacher, 2007). Screenshots, experimental instructions, and details of the bargaining interface can be found in the Online Appendix. All interactions are anonymous and there is no communication allowed between participants. In each treatment, the bargaining game was repeated 12 times. In what follows, we denominate each repetition of the bargaining game as a *period*.

2.2 Treatments and Session Details

We conducted four treatments (between-subjects): *All female* (FFF), *Female majority* (FFM), *Male majority* (MMF), and *All male* (MMM). This means that the gender composition of the triads was fixed in each treatment even though the triads were randomly re-matched in each of the 12 periods. The number of repetitions was selected with two purposes in mind. First, we wanted to allow for ample learning opportunities and second, we wanted the experiment to remain within a reasonable time limit.

Following the same protocol as Geraldes (2020), we recruited equal number of men and women to participate in each session, so that upon arriving to the laboratory, participants would see a gender balanced group.[6] During each session, we conducted two treatments concurrently but subjects only participated in one of them. Thus, there are two matching groups in each session from which participants are rematched each period. Six sessions were for the treatments FFF and MMM, and the other six sessions were for the treatments FFM and MMF. In the sessions involving the two mixed-gender treatments, 1/3 of the men were matched with 2/3 of the women to run the FFM treatment and the remaining participants assigned to treatment MMF. The order of mixed-gender treatments' and same-gender treatments' sessions was randomized. This particular recruiting and treatment

[5] The total fund continues to fall each second during the ratification period.

[6] The order of treatments was randomized, so that participants are effectively randomly assigned.

allocation procedure was done in order to avoid revealing the objective of the experiment ex-ante.[7]

Prior to the start of the session, a demographic survey was conducted which asked for gender among several other questions. Importantly, participants saw the same silhouettes they would see at the bargaining stage when selecting their gender.[8] In our sample, it was always the case that the reported gender matched what the experimenters determined when assigning participants to computer terminals. Importantly, gender was never mentioned in the instructions or invitation email.

A total of 282 subjects participated in our experiment. They were undergraduate students from Maastricht University, mostly from the School of Business and Economics (82%). Only one period was randomly selected for payment in order to equally incentivize each period (Azrieli et al., 2018). A show-up fee of 5 euros was offered and earnings averaged 16.50 euros. Sessions lasted about 60 minutes. Our design and hypotheses were preregistered.

3 Previous Literature and Hypotheses

There is a large and growing body of experimental literature studying majoritarian bargaining games. One of the most widely studied models in the laboratory is the legislative bargaining game by Baron and Ferejohn (1989). In this game, players are randomly selected to propose a distribution of a unit of wealth, followed by a voting stage in which a majority must approve. In case of rejection, the process repeats itself and discounting occurs.[9]

Another approach to study multilateral majoritarian bargaining in the laboratory, which we pursue in the present study, is to allow for free-form protocols where time is continuous and any player may propose a division of the pie at any point (and withdraw it).[10] Two recent studies (Tremewan and Vanberg, 2020; Siegenthaler and Kamm, 2021) show that bargaining outcomes (i.e., agreed splits) are quite similar in structured and unstructured bargaining protocols despite the differences in the procedures.

Without claiming that one approach is *better* than the other in general, we consider the unstructured bargaining protocol more appropriate for our investigation because it captures better the realm of the motivating real-world settings that we have set forth. Importantly, the fundamental purpose of this study is to assess men's and women's bargaining behavior, not to test the accuracy of game-theoretic predictions. Finally, the present work also opens the question of whether our findings translate to more structured bargaining protocols, which we believe presents an interesting avenue

[7] The participants' characteristics support that our procedure to randomly assign participants across treatments has been successful (see Section C of the Online Appendix for details).

[8] Thus, it was common knowledge during the bargaining game that silhouettes represented their gender and the gender of their opponents.

[9] For experiments with cheap talk see Agranov and Tergiman (2014); Baranski and Kagel (2015). For veto treatments see Kagel et al. (2010). For one-round games with exogenous continuation values see Diermeier and Gailmard (2006). For treatments with varying voting weights see Diermeier and Morton (2005); Fréchette et al. (2005).

[10] The unstructured bargaining approach has a long history in bilateral bargaining, see Roth (1987); Roth et al. (1981); Roth and Murnighan (1982); Bolton et al. (2003); Bolton and Brosig-Koch (2012); Camerer et al. (2019).

for further exploration as a means to reduce any gender disparities we might uncover.

With the exception of Laroze et al. (2020), we are unaware of any other multilateral bargaining experiment in which the gender of group members is displayed intentionally or the gender composition of the committee is varied exogenously. There are several important differences between the studies. First, our study is exclusively focused on assessing the effect of displaying gender information on the bargaining process whereas in Laroze et al. information about gender, race, and political orientation is publicly displayed simultaneously. Second, we exogenously set the gender composition of the group and keep it fixed within a session (which is essential to have participants exposed to only one treatment), while in Laroze et al. group gender composition is randomly formed and varies within periods of play and sessions. Third, we study an unstructured bargaining process, whereas in Laroze et al. participants play a Baron and Ferejohn protocol that preestablishes the order of moves. The authors find no effect of race or gender on proposer power or coalition partner choice, but report that the offered shares decrease as ideological distance increases.

Given that we lack data about the effect of gender on multilateral bargaining games, we will draw on insights from meta-analyses of the experimental literature on simple bilateral bargaining settings, namely, the dictator game to set forth hypothesis on gender differences. Moreover, as we are not aware of a meta-analysis of gender differences in ultimatum games, we base our hypothesis regarding gender differences also on the studies by Eckel and Grossman (2001), Solnick (2001), and McGee and Constantinides (2013), along with the survey evidence in Eckel et al. (2008). The results for dictator games meta-analyses and for ultimatum games with gender pairing are summarized in Tables A1 and A2 of the Appendix.

We first consider whether female representation changes the *nature* of agreements, in particular the frequency of GCs.[11] Collectively, the studies in Tables A1 and A2 indicate that women share more than men, and importantly, Rand et al. (2016) show that the altruistic effect of time pressure is stronger on women. The latter result is particularly pertinent for our setting since the fear of exclusion from a coalition may create an urgency to reach an agreement. While this urgency is faced by both men and women, the results of Rand et al. (2016) suggest that this effect will move women more frequently to egalitarian divisions than men.

Furthermore, evidence from dictator games with two recipients in Fehr et al. (2006) shows that women are 10% more likely than men to choose the most egalitarian outcome among a set of three alternatives. Note that in their study, the alternatives differ in efficiency as well, which is not the case in our game. Thus, we do not have competing motives or trade-offs between fairness and efficiency.

Hypothesis 0. *The proportion of GC agreements is increasing in the number of women in the bar-*

[11] Note that we define a GC as an allocation in which three members receive a positive share regardless of whether the number of players supporting the coalition is two or three. Arguably, for a coalition to include three players, we would need their consent. Nonetheless, the standard nomenclature in the literature is to report two-way splits as MWCs even if three people support the proposal, and 3-way splits as grand coalitions (or surplus coalitions) even if only a simple majority approves. Throughout the paper, we abide by the standard nomenclature.

gaining group.

Our next question of interest is whether outcomes in multilateral bargaining are different for men and women. *A priori*, it is unclear whether women will be advantaged or disadvantaged, and this may depend on whether they are in the minority or majority. Existing experiments on both structured and unstructured bargaining find that, while the surplus is frequently shared between all players in a GC, MWCs are the modal outcome and become more frequent over time (see Baranski and Morton (forthcoming) for a meta-analysis on structured bargaining). Inequality could therefore arise from one gender receiving less when part of a coalition, or being more frequently excluded from coalitions altogether. Consequently, we do not take a stand on the direction of any possible effect in our first hypothesis:

Hypothesis 1. *Men and women earn the same, regardless of the group's gender composition.*

We now proceed to hypothesize with respect to the gender composition of the coalitions. A natural conjecture is that if participants in an anonymous bargaining game randomize over whom they invite to their coalition, gender information can alter the probability with which men and women will invite each other. What is not clear is which direction to expect: will there be same-gender favoritism in coalition formation? Or will members of the gender majority in the group seek coalitions with the minority player who may be seen to be in a weaker bargaining position and thus demand less of the surplus? Given the paucity of previous studies assessing the effect of gender composition on coalition formation[12], we draw on insights from related games.

The meta-analysis on discrimination in experiments by Lane (2016) shows evidence of a significant *outgroup bias* for gender identity: both men and women discriminate positively toward the opposite gender. According to their estimates, the probability of discriminating in favor of the opposite gender is almost 33% with an effect size of close to 50%. The results in Eckel and Grossman (2001) for male responders' acceptance behavior in ultimatum bargaining games are in line with this pattern: men are more likely to accept an offer (controlling for the share) when offered by a female. However, women are more likely to accept offers from other women. The latter result is not supported in the study by Solnick (2001), where female pairs account for the largest rejection rates of all pairings. Considering this mixed evidence, we hypothesize no gender differences will arise in the mixed-gender coalitions emerging in treatments FFM and MMF. Note that perfect randomization over partner choice implies that female-male coalitions arise with 2/3 probability in both FFM and MMF.

Hypothesis 2. *Women are equally likely to be included in a MWC coalition as men, i.e., two-thirds of MWCs in heterogeneous groups (FFM and MMF) will be mixed-gender.*

Conditional on a mixed-gender coalition, how will payoffs be divided? Considering the previous results that women are more generous than men, and the findings by Eckel and Grossman (2001);

[12] Unfortunately Laroze et al. (2020) do not report the probability of inclusion into MWCs by proposer and voter gender.

Solnick (2001) that women are offered typically smaller shares of the pie than men, we believe that women will obtain smaller shares in mixed-gender coalitions. However, note that a women being offered a small share by a man in a mixed-gender coalition in treatment FFM has the option to partner with another women in order to raise her share. Thus, we believe that payoff asymmetry in favor of males will be more prominent in mixed-gender coalitions when men are the majority (MMF).

Hypothesis 3. *Women receive a smaller share than men in mixed-gender coalitions when men are the group majority, but not when women are the group majority.*

Thus far, we have hypothesized about bargaining *outcomes* but not about the bargaining *process*. Because we implement a free-form protocol of negotiations, our analysis is essentially exploratory. Nonetheless, we hypothesize about one specific variable of interest: the opening offer. Will men and women differ in their willingness to move first? Note that in structured bargaining protocols, such as Baron and Ferejohn, ultimatum, and dictator games, the proposer role is exogenously assigned. Thus, to our knowledge, we are the first to experimentally assess the propensity to move first in a multilateral bargaining setting.

Exley et al. (2020) study a wage setting game between an employer and an employee that have worked (i.e., real effort task) to generate a contribution that determines joint profits to be divided via bargaining. In their main treatment, employees can choose to enter a wage negotiation game. Their results show that women are significantly less likely than men to enter negotiations (66% vs. 74%).

Evidence from other domains is also illuminating on this matter. For example, Coffman (2014) finds that, controlling for ability, women are less likely than men to contribute their ideas (e.g., answer to a quiz). Vast experimental evidence following Niederle and Vesterlund (2007) shows that men are more likely to sort into competitive environments than women. In a group decision domain, Ertac and Gurdal (2012) show that women and men differ substantially in the willingness to make a decision on behalf of their group: 55% of women compared to 86% of men volunteer to make a group decision. Men are also more likely than women to give advice on how to play a game strategically (Cooper and Kagel, 2016).[13]

If we assume that the forces driving the willingness to enter into a negotiation, contribute an idea, offering advice on strategic play, or sort into competition, affect bargaining postures, then we should expect women to take a more passive stance in our setting. Moreover, the competitive nature of the bargaining setting may foster even larger differences in willingness to propose if the environment is perceived as male-typed. Our last hypothesis is therefore:

Hypothesis 4. *In mixed-gender groups (i.e., FFM and MMF), men are more likely than women to make the opening proposal.*

[13] For experimental work on leadership and gender, see Reuben and Timko (2018) and Reuben et al. (2012).

4 Results of the *Main* Experiment

In this section, we report the results of our *Main* experiment. In Table 1, we summarize the structure of the data. In total, we observed 288 bargaining games in the FFF and MMM treatments, and 276 bargaining games in the FFM and MMF treatments.

Table 1: Description of Data Set

Treatment	Subjects	Periods	Agreements[1]	Matching groups	Subjects per matching group
FFF	72	12	288	6	12
FFM	69	12	276	6	9, 12 [2]
MMF	69	12	276	6	9, 12 [2]
MMM	72	12	288	6	12

[1] An agreement refers to a bargaining outcome (there are no disagreements in our sample). It is the number of periods times the number of subjects divided by 3.

[2] In one of our sessions, not enough subjects showed up. Hence, the two matching groups in that session had 9 subjects each.

In Subsection 4.1, we test our hypotheses regarding bargaining outcomes. To this end, we follow the same order of our stated hypotheses. In Subsection 4.2, we conduct an exploratory analysis on individual bargaining strategies.

4.1 Bargaining Outcomes

First, we note that there are no disagreements in our sample, and therefore we observe a monetary division for every game played.

4.1.1 Final Agreements: Types of Coalitions

We start by analyzing the type of allocations that triads agreed upon. In Table 2, we report the proportion of MWCs and GCs for each treatment, which are all in line with the literature. Clearly, the MWCs are modal representing approximately 80% of all agreements. In Figure 1, we see that the proportion of GCs is decreasing (and thus MWCs is increasing) with experience in all treatments.[14]

Table 2 shows a clear pattern: As the number of women increases in the triad, so does the proportion of GCs. To probe the statistical significance of these observations, we conduct a probit regression (clustering at the matching group level) of the probability of GC on the number of women. The marginal effects are reported in Table 3. We also accounted for a period trend (and its interaction with the number of women) in a second model (column 4).

[14] A linear probability model corroborates this result. In an unreported regression, we regressed a dichotomous variable for whether an agreement is a GC on treatment dummies, a period trend, and its interaction with each treatment, and we did not find any significant difference in the rate of GC decay by treatment.

Table 2: Proportion of Minimum Winning and Grand Coalitions by Treatment

	FFF	FFM	MMF	MMM
Minimum Winning Coalitions				
All	0.740	0.739	0.844	0.872
Equal splits (50% each)	0.535	0.551	0.594	0.635
Grand Coalitions				
All	0.260	0.257	0.152	0.128
Equal splits (33.3% each)	0.149	0.178	0.109	0.090
Gender Composition of MWCs				
mixed-gender	n.a.	0.67	0.58	n.a.
same-gender	n.a.	0.33	0.42	n.a.

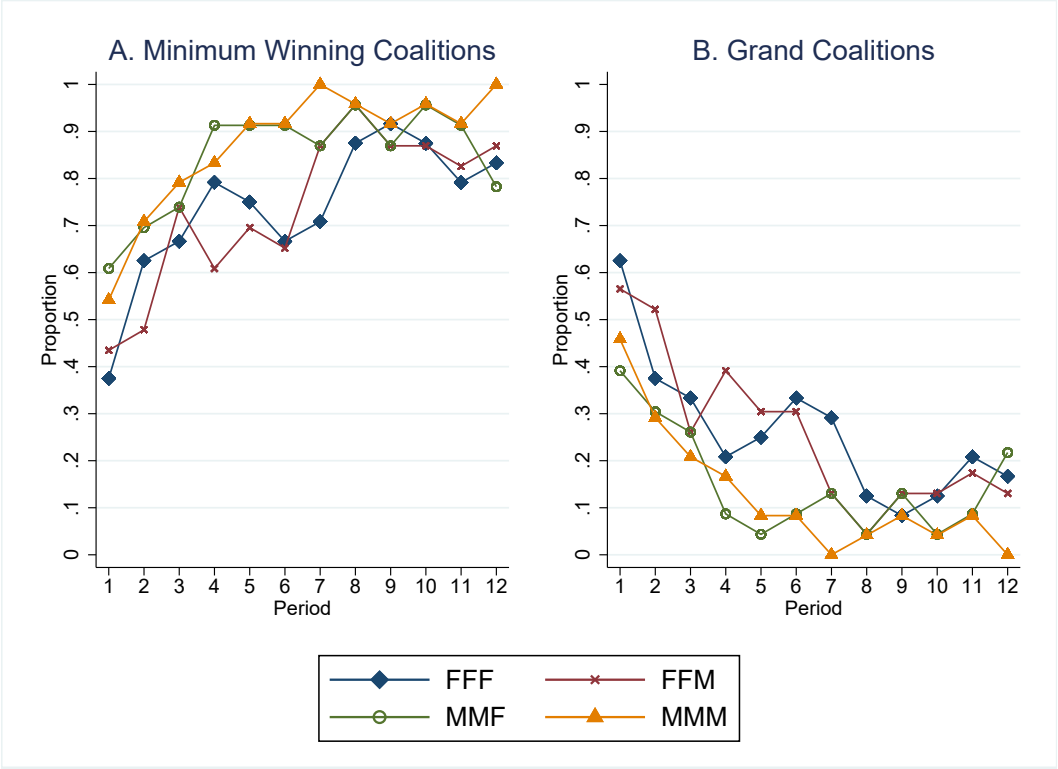

Figure 1: Minimum Winning and Grand Coalitions over Periods of Play, by Treatment

Supporting Hypothesis 0, our regression shows that each additional female in a triad represents a 5 percentage point increase in the probability of observing a GC.[15]

[15]For robustness, we conducted the same regression, but instead of considering the number of women as a continuous variable, we had individual treatment dummies and we also conducted a regression with a dichotomous variable for female majority versus male majority. The direction of our results are largely confirmed, although not all treatment differences

Table 3: Marginal Effects of Probit Models for Grand Coalition Agreement

	All Periods	Periods 1-6	Period 7-12	All Periods
Number of Women	0.050***	0.060**	0.040*	0.050***
	(0.019)	(0.027)	(0.021)	(0.019)
Period				-0.029***
				(0.005)
N	1128	564	564	1128

Standard errors clustered at the matching group level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

An important observation is that unanimous approval is more common in FFF and FFM than in MMM and MMF. While willingness to approve is evidently correlated with the amount of the surplus that a participant receives, it further evidences that the female representation in committees increases the number of agreements which are viewed as acceptable by the entire group. See Section D.2 of the Online Appendix for supporting tables.

Result 0. *Minimum winning coalitions are the modal agreements. The proportion of grand coalitions is increasing in the number of women in the bargaining group.*

4.1.2 Are There Gender Differences in Earnings?

We now address the question of gender disparities in earnings. Average earnings by gender and treatment are displayed in Table 4. In the mixed treatments, a gender difference in earnings is only apparent when men are in the majority: men earn approximately 22% more than women in MMF (11.34 EUR vs. 9.32 EUR, $p = 0.006$, Mann-Whitney test), whereas the gender gap observed in FFM is only 2% (10.89 EUR vs 10.66 EUR, $p = 0.146$, Mann-Whitney test). The small difference in earnings between the homogenous treatments is driven by the fact that all-male groups come to an agreement marginally faster than all-female groups (15.31 seconds in MMM vs. 16.85 seconds in FFF)[16].

Table 4: Average Earnings (in Euros)

	FFF	FFM	MMF	MMM
Women	10.64	10.66	9.32	n.a.
Men	n.a.	10.89	11.34	10.77

We summarize in our next result:

reach significance at conventional levels. See Section D.1 of the Online Appendix.

[16] See Section D3 in the Online Appendix for an analysis of time to agreement.

Result 1. *Men earn more than women in FFM and MMF, with the gap being substantial and statistically significant only when women are the minority.*

We now investigate the degree to which the observed gender gap in earnings in MMF is driven by the gender composition of MWCs, or the distribution of earnings within coalitions. In principal, it is possible that these forces counteract one another in FFM: women may coalesce together to increase otherwise lower payoffs if shared with a male partner. Thus, we perform the same analysis on both mixed-gender treatments.

How often do mixed-gender coalitions emerge in FFM and MMF? We find that 67% of the time MWCs are mixed-gender in FFM—which is consistent with equiprobable partner choice—but only 58% in MMF (see bottom of Table 2). This implies that outcomes are worse for women than for men when they are in the minority, but are not better when in the majority. The proportion of mixed-gender coalitions in MMF is significantly lower than in FFM ($p = 0.047$, two-sided Chi-square test). There is only weak statistical evidence that mixed-gender coalitions in MMF occur less than by chance ($p = 0.099$, standard errors clustered by matching group).

Result 2. *The proportion of mixed-gender MWCs in MMF is significantly lower than in FFM. In FFM the evidence suggests that coalitions partners are chosen at random on average while men are more likely to be part of a coalition in MMF.*

Table 5: Shares in Mixed-Gender Coalitions, by Treatment and Gender

	FFM	MMF
Mixed-Gender MWCs		
Women	48.96	50.43
Men	51.04	49.57
Grand Coalitions		
Women	33.63	28.97
Men	32.74	35.52

Turning to our next hypothesis, we now investigate whether there are gender differences in the split of the surplus within mixed-gender coalitions (see Table 5). First, we note that approximately 73% of all agreements in mixed-gender MWCs are equal splits. Women take 49% of the pie in FFM and 50.4% in MMF. The regression analysis presented in Table 6 shows no statistical evidence that being in the majority or in the minority affects women's shares within a MWC. If anything, what we find is a slight gender minority advantage. Computing the mean share difference between minority and majority members (pooling FFM and MMF) we obtain 0.18, but it is not significantly different from 0 (p=0.324).[17]

[17]The p-value was obtained from a linear regression of the share difference on a constant, with standard errors clustered at the matching group level.

Despite not having a hypothesis regarding the shares of men and women in GCs, we consider it important to look at these agreements as well. The data looks different when we focus on GCs. In these agreements, gender minorities obtain, on average, 3 percentage points less of the pie (p=0.066). In FFM, men receive 32.7% of the pie while women receive 33.6%. A wider gap arises in MMF, where women receive 29% and men 35.5%.

Table 6: Linear Regression for Female Share in Mixed-Gender Coalitions

	(1) All Periods	(2) Periods 1-6	(3) Period 7-12	(4) All Periods
Male Majority (MMF)	0.177	-0.001	0.333	-0.098
	(0.169)	(0.191)	(0.208)	(0.262)
Period				-0.010
				(0.025)
MMF × Period				0.041
				(0.036)
N	271	127	144	271
R^2	0.01	0.00	0.02	0.01

Standard errors clustered at the matching group level. FFM is the baseline.
* p<0.1, ** p<0.05, *** p<0.01

In a nutshell, we reject Hypothesis 3.

Result 3. *(1) Men and women in mixed-gender MWC receive the same share regardless of the gender majority of the bargaining group. (2) There is a gender minority disadvantage in grand coalitions.*

4.1.3 Who Proposes First?

We now test our final hypothesis on opening offers, which we conjectured are mostly done by men. Note that in mixed-gender treatments, the majority gender should make the opening offer 2/3 of the time if each gender had equal likelihood of proposing first.

In Table 7, we show that men are indeed more likely than women to make the opening offer. When men are the majority, one of them moves first 79% of the time. When men are the minority, they move first 45% of the time. Both of these proportions are greater than what would arise if both men and women proposed first with equal likelihood (see test in Table 7). Thus, the data support Hypothesis 4.

Do first movers enjoy a payoff advantage? Figure 2 shows the mean share of the fund in the approved allocation received by participants that proposed first, for each gender. The figure also displays the share corresponding to an equal split at 1/3 (dashed line). In both mixed-gender treatments, male first movers enjoy a payoff advantage compared to female first movers. The gap is of 10

Table 7: Proportion of First Offers by Males in Mixed-Gender Treatments

	FFM	MMF
(1) Observed	0.45	0.79
(2) If Random	0.33	0.67
p-value for test[1] (1)=(2)	0.059	0.003

[1] Test based on a linear regression with standard errors clustered at matching group level.

percentage points in MMF (28.4 vs 38.2, p=0.013) and smaller in FFM (34.4% vs. 36.5%, p=0.191). Note that women propose MWCs more often than men when they are the minority, hence the large gap in first-mover advantage in MMF is not due to women proposing more inclusive splits (see Figure A1).

Importantly, we controlled for how much the first mover was demanding for him or herself in the opening offer, but this had no impact of the first mover advantage. Thus, we rule out that women are penalized for proposing first because those who self-select into making opening offers are more demanding than men or other women. The regression results are reported in Table A3.

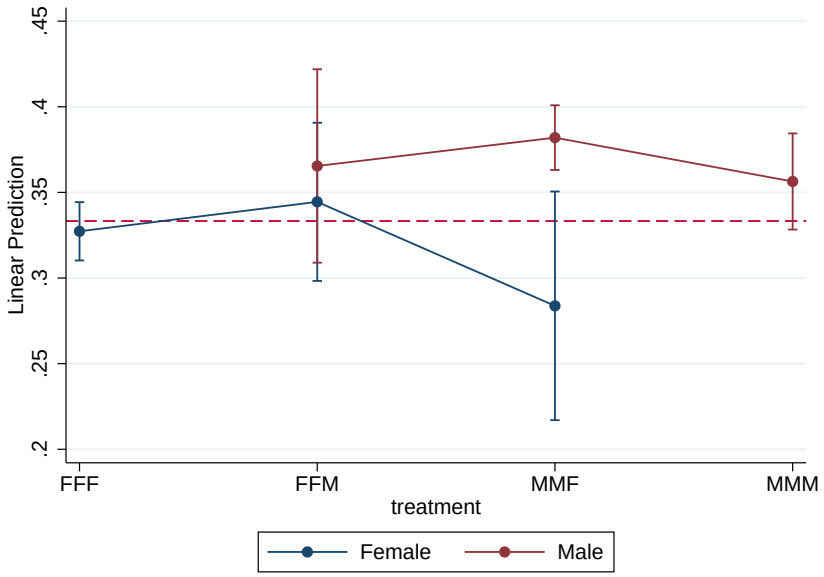

Figure 2: Share of the Fund for First Proposers in Approved Allocations

Comparing MMM and FFF, we also see a gender gap in first-proposer advantage (32.7% of the pie for women and 35.7% for men (p=0.080).

Result 4. *Men are more likely than women to make the first offer regardless of whether they are in majority or minority. Men who propose first enjoy a larger share of the pie than women who propose*

first.

4.2 Exploratory Analysis—Formation of Mixed-Gender Coalitions in FFM and MMF

Why are mixed-gender coalitions more prevalent in FFM than in MMF? In this section, we conduct an exploratory analysis to better understand the differences in the formation of mixed-gender coalitions between FFM and MMF. Our motivation to take a closer look at the data is the lower earnings of women in MMF as reported in Subsection 4.1.2. Thus, we are primarily interested in assessing whether women are left out of MWCs more often than men in MMF. The insights we gather in this exploratory analysis will be summarized in a series of hypotheses, which we will test in the *Follow-up* experiment. As such, we do not conduct statistical tests in this section.

We focus on three initial events of the bargaining games: (1) the first offer, (2) the first provisional agreement, and (3) the first counter-offer during the first ratification period.[18] The latter element is fundamental for assessing how provisional agreements may break down. We also limit our attention to MWCs, which are more straightforward to analyze because they are the vast majority of agreements and in a GC, it is not clear who a proposal has been made to.

4.2.1 Why are Women Excluded from MWCs More Often Than Men in MMF?

We consider three main reasons why a woman may be more likely to be excluded in implemented MWCs when matched with two men. The most obvious is that men have a preference to make proposals to other men. Our data from the *Main* experiment does not support this explanation: when a male first-mover proposes a MWC, only 44% of the proposals are made to the other man, so any existing bias is *in favor* of women.

Another possible reason is that women are more likely to propose GCs, which are seen as less attractive by men. Although first proposals by women are 12% more likely to be GCs across all treatments, we see in Figure A1 that women in MMF are marginally $less$ likely to propose GCs. Interestingly, while men's proposals for GCs is consistent across treatments, women seem to conform to the male behavior when in the minority.

A third possibility is that the difference is caused by men being faster at making the opening offer. Indeed, men offer first in 79% of the MMF games, which is more than the 2/3 suggested by chance. While this behavior contributes to the widening of the gender gap as reported previously, it is certainly not decisive because 66% of first MWC provisional agreements in MMF are mixed-gender.

[18] We focus our analysis on these events of the bargaining process because they are straightforward to observe and quantify, and the number of comparable observations available as the game goes on decreases rapidly (most games end after the first agreement and, as time elapses, the ever-decreasing number of games is divided among an exponentially increasing number of possible histories). Also, in around 80% of the games of MMF and FFM, it is the first or second provisional agreement that is implemented.

4.2.2 First Provisional Agreements and Counter-Offers

Bargaining dynamics may differ by gender, which can affect final agreements. How does the bargaining process evolve such that women become excluded? In Table 8, we report whether initial MWCs are implemented, and, if not, the type of agreement that follows. Note that all-male initial MWCs are 12 percentage points more likely to be implemented than mixed-gender coalitions, which is in line with excluded women being less successful in breaking coalitions than men.

In Table 9, we break down the types of clicks (i.e., offers) immediately following initial MWCs. Regarding the first counter proposals following an initial mixed-gender provisional MWC in MMF, 45% of those made by excluded men are MWCs proposals to women, compared to 31% to the other men. Again, as with the first offers, women are favored. Thus, we can confidently rule out deliberate discrimination as an explanation for more (than expected if random) women being left out. There is, however, evidence that women are not as good as men at breaking coalitions: excluded women are more likely not to click at all (11% vs. 5%) and more likely to propose GCs (21% vs. 14%), which are less popular, as we have shown in Section 4.1.

Table 8: Fate of First (Temporary) MWC Agreements

Treatment	**FFM**		**MMF**	
(Gender Composition of MWC)	**(MF)**	**(FF)**	**(MF)**	**(MM)**
Same coalition partners				
Implemented as is	94 (69%)	48 (75%)	92 (60%)	57 (72%)
Renegotiated	3 (2%)	2 (3%)	12 (8%)	6 (8%)
New coalition partners				
New MF	16 (12%)	14 (22%)	18 (12%)	15 (19%)
New FF	17 (13%)	n.a.	n.a.	n.a.
New MM	n.a.	n.a.	27 (18%)	n.a.
GC	6 (4%)	0 (0%)	4 (3%)	1 (1%)
Num. Obs.	136	64	153	79

Furthermore, in MMF, men leave a mixed-gender MWC more frequently than women. First of all, 12% of the first clicks of a coalition member during a provisional agreement are made by the man breaking the agreement compared to 7% for women. This behavior can also be observed in Table 8: when a new MWC forms with the excluded man, in 27 out of 45 cases it is the man from the initial agreement who leaves.

Thus, in light of our exploratory analysis, we derive the following new hypotheses for the treatment MMF:

Hypothesis 5. *1. Men proposing MWCs randomize over their coalition partner.*

2. Women left out of a MWC are less likely to make counteroffers than left out men.

3. Men are more likely than women to leave a preliminary agreement.

Table 9: Counteroffer after First (Temporary) MWC Agreement Formed

Treatment	**FFM**		**MMF**	
(Gender Composition of MWC)	**(MF)**	**(FF)**	**(MF)**	**(MM)**
Counteroffer made by:				
Men in provisional agreement	11 (8%)	n.a.	18 (12%)	14 (18%)
Women in provisional agreement	12 (9%)	10 (16%)	10 (7%)	n.a.
Excluded member	102 (75%)	47 (73%)	117 (76%)	56 (71%)
No counteroffer made	11 (8%)	7 (11%)	8 (5%)	9 (11%)
Num. Obs.	136	64	153	79
Counteroffers by Excluded Member				
Propose a GC	31 (30%)	6 (13%)	16 (14%)	12 (21%)
Propose a MWC to F	37 (36%)	36 (77%)	53 (45%)	n.a.
Propose a MWC to M	22 (22%)	n.a.	36 (31%)	39 (70%)
Other	12 (12%)	5 (11%)	12 (10%)	5 (9%)
Num. Obs.	102	47	117	56

5 *Follow-up* Experiment: An Investigation of the Gender Gap in Earnings in Mixed-Gender Coalitions

In order to probe the robustness of the gender gap in earnings, as well as to test the significance of the exploratory analysis of mixed-gender coalition dynamics (section 4.2), we conducted 8 additional sessions of the mixed-gender treatments (FFM and MMF). While hypothesis 5 concerns MMF only, we conducted both MMF and FFM treatments because otherwise it would be impossible to keep the recruitment protocol constant (i.e., to preserve an equal number of males and females present in the laboratory). Our *Follow-up* experiment was also preregistered.

The *Follow-up* experiment was conducted at LINEEX, which is the Laboratory for Research in Behavioural Experimental Economics (University of Valencia). A total of 192 subjects took part in the experiments and all the procedures were identical to those of the *Main* experiment.

5.1 Results

First and foremost, we replicate our main finding: men earn more than women in both treatments. On average, the share a man receives is 5.4 percentage points higher (p=0.001, pooling both treatments). While we find the gender gap in MMF to be 1.8 percentage points higher than in FFM, the difference is not significant (p=0.464). Also, there is no statistically significant difference between the *Main* and the *Follow-up* experiments (p=0.475).

Men are more likely to be part of a MWC in both mixed-gender treatments. Mixed-gender coalitions occur 59% of the time in MMF, which is less than predicted by a random coalition formation process (p=0.036). In FFM these represent 77% which is higher than predicted by chance (p=0.018).

Table 10: Bargaining Outcomes in Mixed-Gender Treatments (*Follow-up* Experiment)

	FFM	MMF
Minimum Winning Coalitions		
All	0.792	0.740
Equal splits	0.573	0.482
Gender Composition of MWCs		
Mixed-gender	0.770	0.590
Same-gender	0.230	0.410
Mean Share of Pie		
Women	0.312	0.304
Men	0.375	0.348
Mean Earnings (in Euros)		
Women	9.88	9.61
Men	11.95	11.02
Agreement reached in		
First attempt (%)	56.25	59.11
Second attempt (%)	21.09	15.36
Third attempts and beyond (%)	22.66	25.52

We corroborate in the *Follow-up* experiment that men are more likely to propose first. In FFM, men propose first 48% of the time, which is significantly higher than 1/3 (p=0.004). In MMF, women propose first 22% of the time, which is significantly lower than 1/3 (p=0.013). This is the main behavioral pattern of the bargaining process in mixed-gender triads that we observe in both the *Main* and *Follow-up* experiments. A gender gap also arises in the first-mover advantage (see Figure A2).

When focusing on the first proposal on the floor conditional on the offer being a MWC, we cannot reject that women in FFM randomize over whom to invite in the coalitions (p=0.500). Conversely, men in MMF display discriminatory behavior: they offer a positive share to the other man with 57% chance, significantly higher than predicted by a coin toss (p=0.004). Thus, we reject part 1 of Hypothesis 5 and identify another channel through which women are disadvantaged in male majority groups, which did not arise in the *Main* experiment.

We now investigate whether women in MMF are are less likely to *fight back* when left out of a MWC compared to left-out men, as we had documented in the *Main* experiment. With reference to Table 12, we do not find such behavior in the *Follow-up* experiment: in 4% of preliminary MWCs the excluded men does not make a counteroffer while this only happens 2% the time when the female is the excluded member. Thus, we cannot attribute the gender gap that we find in the *Follow-up* experiment to women displaying a more passive bargaining posture when excluded, and as such, cannot support Hypothesis 5.2.

Are men more likely than women to leave a mixed-gender MWC in MMF as we hypothesized?

Table 11 shows that out of the 59 cases where a new MWC is formed, 28 times it was the men who left the provisional mixed-gender MWC to join a male-male MWC and 31 times it was the female who left the provisional mixed-gender MWC for a new male partner. Further evidence is provided in Table 12 which shows that men make counteroffers 9% of the time, and women do so 11%. While these difference are not statistically significant, their direction is contrary to our stated hypothesis.

Table 11: Fate of First (Temporary) MWC Agreements, by Treatment (*Follow-up* Experiment)

	FFM		**MMF**	
(Gender Composition of MWC)	**(MF)**	**(FF)**	**(MF)**	**(MM)**
Same coalition partners				
Implemented as is	148 (68%)	35 (48%)	103 (54%)	72 (72%)
Renegotiated	4 (2%)	3 (4%)	11 (6%)	6 (6%)
New coalition partners				
New MF	25 (11%)	31 (42%)	31 (16%)	21 (21%)
New FF	33 (15%)	n.a.	n.a.	n.a.
New MM	n.a.	n.a.	28 (15%)	n.a.
GC	9 (4%)	4 (5%)	18 (9%)	1 (1%)
Num. Obs.	219	73	191	100

Table 12: Counteroffer after First (Temporary) MWC Agreement Formed, by Treatment (*Follow-up* Experiment)

Treatment	**FFM**		**MMF**	
(Gender Composition of MWC)	**(MF)**	**(FF)**	**(MF)**	**(MM)**
Counteroffer made by:				
Men in provisional agreement	12 (5%)	n.a.	16 (9%)	18 (18%)
Women in provisional agreement	17 (8%)	20 (28%)	21 (11%)	n.a.
Excluded member	179 (82%)	52 (72%)	146 (80%)	80 (82%)
No Offer is made	11 (5%)	1 (1%)	8 (4%)	2 (2%)
Num. Obs.	219	73	191	100
Counteroffers by Excluded Member				
Propose a GC	59 (33%)	9 (17%)	40 (27%)	20 (25%)
Propose a MWC to F	55 (56%)	33 (63%)	54 (37%)	n.a.
Propose a MWC to M	44 (44%)	n.a.	37 (25%)	49 (61%)
Other	21 (12%)	10 (17%)	15 (10%)	11 (14%)
Num. Obs.	179	52	146	80

Result 5. *In male majority groups, we identify the following bargaining dynamics which can explain the gender gap in earnings:*

1. *Men are more likely to make the opening offer than women (Main and Follow-up experiments).*

2. *Excluded women are less aggressive in trying to break all-male coalitions and men are faster at making proposals (Main experiment).*

3. *Men are more willing to break a mixed-gender coalition (Main experiment).*

4. *Men are more likely to choose a man as their coalition partner than a woman (Follow-up experiment).*

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6 Discussion

In this section, we discuss two aspects that may affect our results and their interpretations: whether participants noticed the gender composition indicated by silhouettes and the effect of personal characteristics (risk, altruism, etc.) on the share of the surplus that participants earn.

In a debriefing question, we find that 72% and 68% of the participants reported that they did not notice the silhouettes in the *Main* and *Follow-up* experiments, respectively. However, we are cautious about interpreting these answers. Because we also find evidence for explicit discrimination in explaining the gender gap in earnings, this indicated that the use of silhouettes to prime gender was not necessarily unsuccessful. That is, despite participants' (negative) answer to the manipulation check, we cannot rule out that: (1) they did not notice consciously, but the effect is subconsciously operating, and (2) they noticed the silhouettes but lied about it to avoid being labeled as sexist or discriminatory.

In Table 13, we check for discrimination in first offers, controlling for whether or not the offerer correctly stated their bargaining partners' genders in the post-experimental questionnaire. In the MMF treatment of the *Follow-up* experiment, where we observed the strongest evidence of same-gender bias, only men who report that did not notice they are interacting with one male and one female, significantly favor males. We take this as evidence that those who discriminated wished to hide it.

Another question that naturally arises is whether the gender disparity in earnings can be explained by gender differences in personal characteristics that likely influence behavior in multilateral bargaining. To examine this aspect, we checked for a gender effect on earnings, controlling for cognitive ability (using the three-question cognitive reflection test), self-reported risk preferences, altruism, enjoyment derived from competing, and enjoyment derived from winning. For succinctness, we pool data from both heterogenous groups in both experiments. In Table 14, we see that while many of these variables are significant and their inclusion explains part of the gender effect, the residual effect remains sizeable and statistically significant.

Table 13: Linear Regression for First Offer to Male

	Main Experiment		*Follow-Up* Experiment	
	FFM (females only)	MMF (males only)	FFM (females only)	MMF (males only)
Noticed Correctly	-0.120	-0.106	-0.108	-0.097
	(0.078)	(0.081)	(0.062)	(0.083)
Constant	0.548***	0.465***	0.563***	0.573***
	(0.055)	(0.039)	(0.032)	(0.023)
H0: Constant=0.5				
F-stat	0.76	0.81	3.79*	10.56**
H0: Constant+Noticed Correctly=0.5				
F-stat	0.56	4.80*	0.82	0.13
N	118	194	155	248
R^2	0.01	0.01	0.01	0.01

Standard errors clustered at the matching group level.

* p<0.1, ** p<0.05, *** p<0.01

Table 14: Linear Regression for Share of the Surplus (in points) Earned

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Male	0.496***	0.471***	0.475***	0.386***	0.466***	0.470***	0.314**
	(0.121)	(0.116)	(0.122)	(0.130)	(0.121)	(0.116)	(0.131)
Risk		0.0263					0.0162
		(0.0188)					(0.0182)
Altruism			-0.0607***				-0.0430*
			(0.0193)				(0.0223)
CRT				0.146***			0.140***
				(0.0457)			(0.0456)
Enjoys Competing					0.0529*		0.0474*
					(0.0263)		(0.0268)
Enjoys Winning						0.0884**	0.0643
						(0.0393)	(0.0398)
Constant	3.752***	3.606***	4.191***	3.598***	3.520***	3.298***	3.286***
	(0.0638)	(0.134)	(0.164)	(0.0624)	(0.133)	(0.241)	(0.425)
N	3,960	3,960	3,960	3,960	3,960	3,960	3,960
R^2	0.008	0.009	0.011	0.012	0.009	0.010	0.016

Risk and Altruism are self-reported attitudes on a scale from 0 (low) 10 (high). CRT refers to the number of correct answers (0-3) to the standard Cognitive Reflection Task questions. Enjoys Competing and Enjoys Winning variables are self-reported willingness to compete and win respectively on a scale 1 (strongly disagree) - 7 (strongly agree).
Robust standard errors in parentheses, clustered at the Subject level. Pooling both experiments. *** p<0.01, ** p<0.05, * p<0.1 .

7 Concluding Remarks

Collectively, the results from our experiments demonstrate that the gender composition of a bargaining committee affects the agreements reached, the dynamics of negotiations, and the process leading to agreement. Our results show that female representation causally and positively affects the proportion of GC splits, which is evidence that women act more pro-socially than men in a majoritarian bargaining setting. As such, unanimous agreements occur more frequently in female majority triads (FFF and FFM) relative to male majority triads (MMF and MMM). If equality in resource distribution is a goal societies or organizations pursue, our results indicate that such an objective is more likely to be achieved when committees are predominantly female. They are also consistent with recent findings that women favor more egalitarian redistribution in committees with joint production Ranehill and Weber (forthcoming).

Our study is the first to document the existence of a gender gap in earnings in majoritarian bargaining: men earn more than women. Importantly, this gender gap in earnings is robust to different subject samples.

In mixed-gender treatments, the gender gap in earnings arises regardless of whether women are a minority or a majority. We identify three mechanisms contributing to the gender gap in earnings in mixed-gender triads. First, men are more likely to make the opening offer, which enhances their odds of being part of a winning coalition. Importantly, the first-mover advantage is enjoyed by men as women do not benefit, and may even suffer backlash, for proposing first. Since this behavioral pattern is robust to both samples of our study, we argue that it is a key driver of the gender gap in earnings.

Second, gender differences in the bargaining process also play a role in explaining differentials in earnings. In the *Main* experiment, we find that excluded women in male-majority triads are less proactive and successful in breaking male-male coalitions compared to left-out men, which skews towards men reaching an agreement with each other in which a woman is excluded. Furthermore, in male-majority triads, men leave mixed-gender coalitions to partner with the other man in the triad more often than women break away.

A third mechanism explaining the gender gap is discrimination, for which we find strong evidence in the *Follow-up* experiment. In particular, we find that men tend to partner with each other in male-majority triads more than expected by chance, whereas women do not display such behavior when they are in majority. Male-male MWCs generally end in agreement (close to 70% of the time) in male-majority triads. In contrast, the female-female coalitions are rather unstable in the *Follow-up* experiment; they are dissolved 48% of the time and result in mixed-gender coalitions.

In the Introduction section, we briefly mentioned several previous findings that highlighted how the gender composition of a group affects outcomes in other domains (see Footnote 2). Specifically, Bourreau-Dubois et al. (2020) find that all-women judge panels tend to allocate higher child support than all-male or mixed-gender panels. Apesteguia et al. (2012) report results from a management

training game played in groups and finds that groups of three women are more likely to make investments in corporate social responsibility programs compared to other group compositions.

Besides the problem of non-random allocation into groups for establishing causality, the two previous settings have one aspect in common, which differentiates them from our study: the resulting decisions have consequences over third parties. We argue, however, that generosity toward others will display the same increasing pattern in the number of women in the committee. Recent work by Cason et al. (2021) reveals that increasing female representation in groups leads to higher prosocial outcomes in a coordination game. Further experimental work is needed to understand how exogenous variation in the gender composition of a committee affects outcomes when the decisions being made have consequences for third parties.

In closing, the experimental investigations of gender differences in bargaining over the last three decades have focused on bilateral settings and little is known about gender differences in multilateral bargaining. We uncover a gender gap and in our exploratory analysis we identify plausible behavioral mechanisms that can give rise to it. We view this exploratory examination of the detailed bargaining dynamics as what Alvin Roth refers to as a "search for facts" (Roth, 1995). Having identified these plausible mechanisms, we leave for future work structured experiments specifically designed for testing related hypotheses.[19] The findings presented here have implications for business, academic, and political settings. In our ongoing work, we will focus on how to close the gender gap in earnings, with a specific aim at identifying institutional factors that may aid in restoring equity.

[19]Because the specific interactions we are interested only occur in a fraction of games, we would need a very large number of observations to perform well-powered tests in the framework of our experiment.

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A Supporting Tables and Figures

Table A1: Meta-Analyses Results on Gender Differences in Dictator Games

Study	Finding Summary	Significance	Sample
Engel (2011)	Women transfer 5.8 more percentage points of the total pie than men.	p<0.1	12 studies
Bilén et al. (2020)	Women transfer 4.2 percentage points more of the total pie than men.	p<0.001	53 studies (15,042 obs.)[1]
Rand et al. (2016)	The effect of increasing reliance on intuition by experimentally reducing response time on transfers is 5.5 percentage points larger in women than men.	p<0.001	22 studies (4,366 obs.)

[1] This study uses raw data, while the others use effect sizes.

Table A2: Results from Ultimatum Game Studies with Gender Pairings

	Share Offered (%)			**Rejection Rate** (%)		
	EG (2001)	S (2001)	MC (2013)	EG (2001)	S (2001)	MC (2013)
Female	38.5	46.8	46.6	10.5	13.5	15.9
F to F	37.8	43.1	47.2	3.1	23.1	14.7
F to M	39.8	51.3	45.9	9.4	6.3	15.6
Male	36.5	46.7	45.8	14.1	4.2	16.8
M to M	36.6	47.3	45.8	18.8	4.5	18.2
M to F	36.6	44.3	45.8	17.2	0.0	17.2

[1] EG is for Eckel and Grossman (2001). S is for Solnick (2001). MC is for McGee and Constantinides (2013).
Sources: Table 2 in EG (2001) and MC (2013). Data for MC and EG is for all 8 periods. S is a one-shot game.

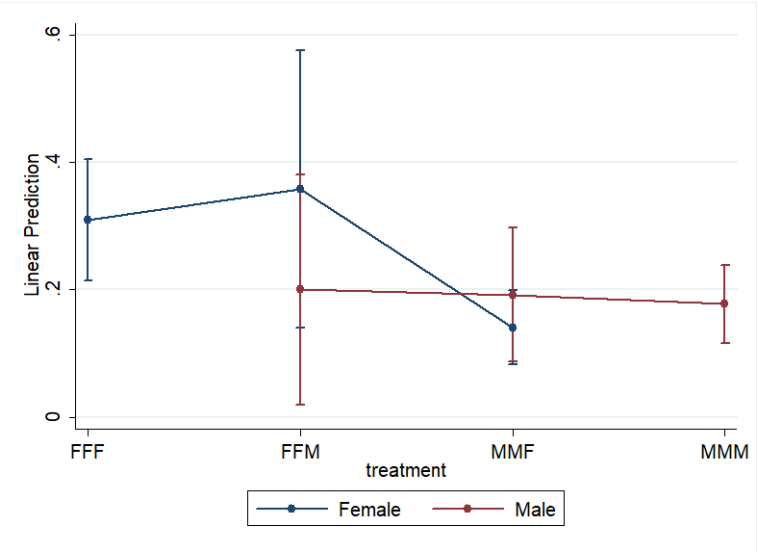

Figure A1: Proportion of First Offers Proposing Grand Coalitions, Main Experiment

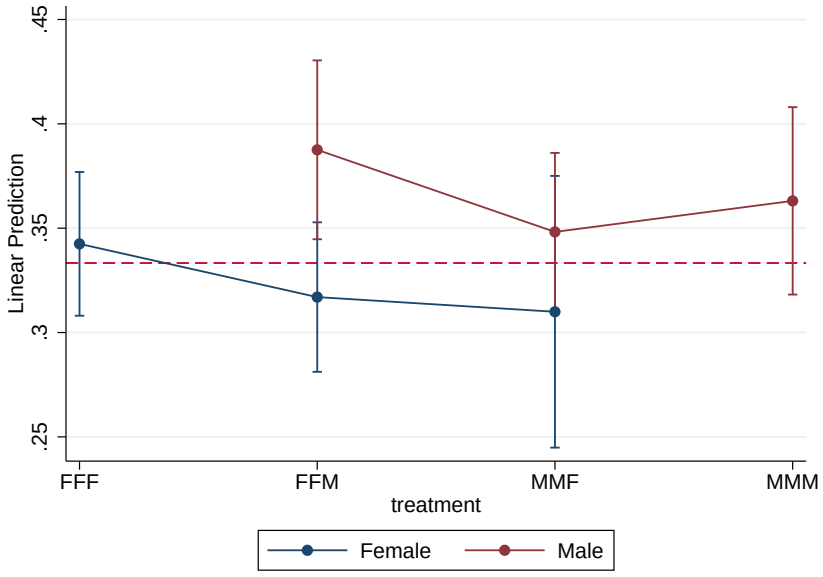

Figure A2: Share of the Fund for First Proposers in Approved Allocations, Follow-up Experiment

Table A3: Linear Regression for Share of the Pie Received

	(1)	(2)
FFM	0.017	0.017
	(0.024)	(0.024)
MMF	-0.044	-0.044
	(0.033)	(0.033)
MMM	-0.069*	-0.069*
	(0.040)	(0.040)
First Mover Male (=1 if yes)	0.098**	0.098**
	(0.036)	(0.037)
FFM × First Mover Male	-0.077	-0.077
	(0.048)	(0.049)
Share to self (in points)		0.001
		(0.005)
Constant	0.327**	0.323**
	(0.008)	(0.033)
N	1128	1128
R^2	0.012	0.013

Robust standard errors in parentheses, clustered at the matching group level. Treatment FFF is the base level. The variable First Mover Male is only interacted with mixed-gender treatments because all first movers are male in MMM and none in FFF.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$