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Can gender diversity prevent risky choice shifts? The effect of gender composition on group decisions under risk

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Abstract

Our study contributes to the literature on choice shifts in group decision-making by analyzing how the level of risk-taking within a group is influenced by its gender composition. In particular, we investigate experimentally whether group composition affects how preferences ‘shift’ when comparing individual and group choices. Consistent with hypotheses derived from previous literature, we show that male-dominated groups shift toward riskier decisions in a way that is not explained by any simple preference aggregation mechanism. We discuss potential channels for the observed pattern of choice shifts.

Keywords: Experiment; gender; group decisions; risk-taking; risky shift

JEL Codes: D71; D81; D91; J16

1. Introduction

Many important economic and politically relevant decisions are made by groups, such as boards of directors, supervisory boards, parliaments, and other political bodies, as well as smaller-scale working groups and teams. Increasing gender diversity in these decision-making bodies, which are often male-dominated, has been a key political goal. To achieve this, measures such as gender quotas and mentorship programs (Flory et al., 2021; Kofoed, 2019) have been implemented with varying success.

The focus on gender diversity has spurred a growing body of research examining its impact on decision-making. Research in policymaking yields mixed results, ranging from no impact of quotas (Bagues & Campa, 2021; Ferreira & Gyourko, 2014) to improved qualifications of politicians (Baltrunaite et al., 2014) and the adoption of more egalitarian policies (Ranehill & Weber, 2022). Studies of corporate boards similarly provide mixed evidence regarding the impact of quotas on firm performance and valuation (Ahern & Dittmar, 2012; Eckbo et al., 2016; Johansen & Sandnes, 2008; Matsa & Miller, 2013; Nygaard, 2011). However, research on gender-diverse management teams finds some evidence for better performance of more diverse teams (Adams & Ragunathan, 2015; Apesteguia et al., 2012; Bansak et al., 2011; Cueva & Rustichini, 2015; Hoogendoorn et al., 2013).

This paper focuses on risk-taking, a crucial aspect of many economic and political decisions. Risk-taking is, for instance, important for firm performance (e.g., Gilley et al., 2002; Walls & Dyer, 1996), and there are compelling reasons to believe that gender composition significantly affects

group decisions under risk. Literature indicates that women and men differ in economic preferences (see Croson & Gneezy, 2009, for an overview). There exists abundant evidence that women are more risk-averse than men in financial risk-taking and many other domains (Byrnes et al., 1999; Croson & Gneezy, 2009), though the extent and economic relevance of this gender difference remain debated (Filippin & Crosetto, 2016). However, group decisions do not always reflect the individual preferences of group members.

A crucial yet underexplored question is how men and women change their decisions in a group setting and how gender diversity influences these shifts. This paper investigates how the level of risk-taking within a group is influenced by its gender composition and how this composition affects the shift from individual to group decisions. Our study contributes to the literature on choice shifts in group decision-making by examining how choice shifts are affected by gender composition. Understanding the impact of gender composition on group decision-making under risk has important implications for policymakers and organizations aiming to increase gender diversity and improve decision-making outcomes.

The difference between individual and group risk-taking has been extensively debated in social psychology, dating back to Stoner's (1961) seminal work, and has recently gained attention in the economics literature. A common pattern is the polarization of group decisions, where groups, on average, tend to take more risks than individuals, a phenomenon known as the "risky shift." Early evidence on risky shifts was based on studies employing choice dilemma questionnaires. Recently, several studies analyzed group decisions under risk with monetarily incentivized experiments, producing mixed results. Some studies find evidence of risky shifts (Nieboer, 2015; Sutter, 2009), while others report cautious shifts, where groups take less risk than individuals (Baker et al., 2008; Masclet et al., 2009; Shupp & Williams, 2008), or observe no systematic differences (Harrison et al., 2013). Several reasons for these choice shifts have been proposed, including the conformity hypothesis (Cialdini & Goldstein, 2004; Jagau & Offerman, 2018), the diffusion of responsibility (Eliaz et al., 2006; Wallach et al., 1962, 1964), and the risk-as-value hypothesis (Bauer & Turner, 1974; Vidmar, 1970).¹

Evidence that gender plays a significant role in group decisions under risk is provided by Nieboer (2015) and Bogan et al. (2013). Using an investment task and an investment portfolio management decision task, respectively, they find that gender is the only individual characteristic that significantly affects risk-taking in group settings. Moreover, they observe that the presence of men increases risk-taking, although the effect is not linear in the case of Bogan et al. (2013). We add to this literature by using a simple lottery choice experiment and a one-shot decision task, avoiding potential priming effects related to investment tasks that can impact risk attitudes (Eckel & Grossman, 2008), as well as learning effects or changes in group decision-making over multiple rounds. In contrast to previous studies that rely on between-subject comparisons, we use a within-subject design to directly compare individual and group decision-making under risk.

Despite the importance of understanding choice shifts in group decision-making, direct evidence of gender's role remains limited. Our study directly addresses this gap. Daly and Wilson (2001) offer indirect evidence by comparing individual risky decisions made in private with those made in public, where subjects had to announce their individual choice in front of a group of peers. They found that men took significantly more risk in public than in private, whereas women showed no such difference. This indirect evidence suggests that male group members may take more risks and appear more risk tolerant in group settings, thereby enhancing the risky shift with a higher proportion of males in the group.

Further indirect evidence is provided by Ertac and Gurdal (2012), who find that men are generally more willing to lead groups. Those men willing to lead also take more risks on the group's behalf than those not willing to lead. For women, they find no differences. This evidence is underpinned by

¹Further details on these theories are provided in Section 3.

literature focusing on leadership. Recent studies confirm that women are less willing to lead, particularly when the leader's gender is revealed to group members, with female leaders being most willing to lead in all-female groups (e.g., Grossman et al., 2015; Li et al., 2020). This result also holds in a simple risky environment where decisions involve how much of a fixed endowment to invest in a risky asset. When placed in groups of five, women are more likely to refuse to decide on their group's behalf (Ertac & Gurdal, 2012).

Recent discussions suggest that these differences arise because, on average, men are more self-confident, more likely to run for elections, have more influence, and are ranked higher than equally performing women (e.g., Born et al., 2022; Chen & Houser, 2019; Kanthak & Woon, 2015).

In this paper, we analyze the impact of gender composition on group decisions under risk and choice shifts by using a simple lottery choice experiment with monetary incentives. Groups of three with varying gender compositions were formed, and their group choices were compared to the individual choices of the group members. We varied whether the group or the individual decision was made first, and all group decisions were made face-to-face.

Our results reveal several important findings. First, our results show a clear and significant impact of gender composition on group decision-making. Female-dominated groups take significantly less risk than male-dominated groups. Second, and crucially, we find that gender composition plays an important role in choice shifts. While female-dominated groups show no significant shifts, male-dominated groups exhibit substantial risky shifts, taking on average more risk than the average and median preferences of group members would imply. Finally, we discuss potential channels for these observed choice shifts, highlighting the influence of male presence in driving the shift toward riskier decisions.

The paper is structured as follows: [Section 2](#) outlines the experimental design, [Section 3](#) formalizes our gender-specific hypothesis more precisely, and [Section 4](#) presents the results. The conclusion follows in [Section 5](#).

2. Experimental design

2.1. Participants and procedure

The experiment, involving 492 participants, was conducted in the student canteen of the University of Kiel, Germany.² The gender ratio was balanced (51.53% women), and the average age was 23.24 (SD 4.95). Participants were recruited among the canteen's customers to take part in an economic experiment, which was conducted in designated quiet areas of the canteen. Potential participants were told they would receive a €2 participation fee and could gain additional money by playing a lottery.

To discreetly control the group's gender composition, recruiters used a systematic approach. Participants were approached individually and invited to participate without revealing the gender-based aspect of the grouping. As individuals agreed to participate, their gender was recorded, and recruiters tracked the required gender balance for each group composition (FFF, FFM, FMM, MMM).³ To ensure that group members were unfamiliar with each other, participants were asked if they knew anyone present before groups were formed.

The recruiters then formed groups of three people, ensuring a mix of gender compositions according to the experimental design. This process allowed the researchers to control the gender composition of each group discreetly without making it apparent to the participants that gender was

² One subject in treatment GF did not return after the individual phase, so most of the analysis is done for 491 subjects only.

³ In the post-experiment survey in treatment IF, we asked participants about the criteria they thought were used to determine the groups after the treatment. The majority, ca. 75%, answered that it was by chance. Only 6.5% thought of demographic characteristics.

Table 1 Gender composition of groups

Gender composition	Nb of groups			Nb of participants		
	Treatment: GF	Treatment: IF	Total	Women	Men	Total
FFF	22	19	41	123	0	123
MMM	21	16	37	0	110	110
FMM	21	21	42	42	84	126
FFM	21	23	44	88	44	132
Overall	85	79	164	253	238	491

Notes: The left side of the table displays the number of participating groups in the two treatments sorted by their gender composition. The right side of the table shows the number of women and men who participated in the experiment, sorted by the gender composition of their group.

a factor in their grouping.⁴ All other group characteristics were randomly allocated.⁵ The sample size was determined based on previous studies using the incentivized Eckel and Grossman (2002) task. A meta-analysis by Filippin and Crosetto (2016) reports that the average gender effect size for this task is equal to Cohen’s $d = .55$ on the individual level.⁶ Overall, data from 41 purely female groups (further mentioned as FFF), 44 groups with two women and one man (FFM), 42 groups with 1 woman and 2 men (FMM), and 37 purely male groups (MMM) were collected; an overview is given in Table 1.

A critical feature of experimental designs that analyze group polarization is the order in which individual and group choices are elicited. Most studies elicited individual preferences first, although some have reversed the order, each approach has its distinct advantages and drawbacks. When participants make multiple evaluations, earlier decisions can serve as an anchor, biasing subsequent choices (Ariely et al., 2003). As a result, anchoring tends to favor eliciting individual preferences first. Recent research, however, suggests that individual decisions are also heavily influenced by the social context, particularly gender composition. For instance, Castillo et al. (2015) let subjects make individual risk-taking decisions while sitting in a room with other people. Although the decisions are private and not revealed to other subjects, the gender composition in the room systematically impacts individual preferences. Consequently, in the case of group decisions, the gender composition of the group might also influence individual risk preferences. However, this effect is at least reduced if subjects anchor on the individual decision they made before in private, that is, without any influence of the social context.

Given the significant role of social context in decision-making, we implemented two experimental treatments to vary the order of the choices: one with the group decision first (GF) and the other with the individual decision first (IF). Consistent with previous literature on choice shifts, participants in the IF treatment were unaware of their group’s composition when making individual choices. We tested whether the order of decisions systematically affected the group and individual preferences and found no significant impacts on either group or individual decisions (see Section 4). This supports previous work by Harrison et al. (2013), which found that the order of decisions does not influence individual risk preferences.

For both treatments, participants were approached as they were about to leave the canteen, minimizing the chance they could share information with others who had yet to participate. While we

⁴In the IF treatment, we asked participants after the treatment about the criteria they thought were used to determine the groups. The majority, ca. 75%, answered that it was by chance – only 6.5% thought of demographic characteristics.

⁵Standardized differences of covariates between treatments, gender domination in the group, and gender, as well as means and standard deviations of covariates by group types, can be found in Tables A1 and A2 in Appendix A.

⁶Assuming that the median voter is more likely to be female in female-dominated and male in male-dominated groups, we collected data from 85 female-dominated and 79 male-dominated groups to detect a medium-sized gender effect in group choices (with $\beta = 0.90$, $\alpha = 0.05$).

cannot entirely exclude this possibility of information exchange, the risk is inherent in consecutive sessions of lab experiments as well. Conducting the experiment in a natural canteen setting, rather than in a lab, allowed for a more realistic group context. Although the risk of information transmission was potentially greater in this environment, we think it did not bias our results. First, subjects were unaware that gender composition was central to the study and could, therefore, not transmit this information. Second, even if some information about the experiment was shared, this would have no systematic impact on the differences we observe related to group composition.

In the GF treatment, groups were formed at the beginning of the experiment, and it was explained to the participants that they had to make a risky decision as a group first, then had to fill out a questionnaire on their own, and in the end, had to reunite in their initial group to receive their payment. After the groups were formed, a card displaying six lottery options was provided to them (see Fig. 1). Participants were told that the group had to choose exactly one of these lotteries by consensus. There were no time constraints for discussion and reaching a consensus and no fallback option (no group took longer than five minutes to reach a consensus). When participants within a group agreed on a lottery, they stated their choice to the experimenter and were handed the questionnaires, which had to be filled out in private. The questionnaire included an individual risk preference task (which equaled the group task with all amounts divided by three), basic demographic questions (gender, age, highest educational degree⁷), happiness (self-reported happiness on a five-point Likert scale) and their level of satisfaction with the group choice on a five-point Likert scale. After completing the questionnaires, participants reunited in their groups for the payoff.

In the IF treatment, participants first had to decide on the individual risk preferences task in private, without being aware of the group composition they were allocated to in the sequel. We had four quiet places (each for one subject only) for these private decisions in different corners of the canteen, so subjects could not see that other subjects were also making a private decision simultaneously. After the group decided, subjects had to fill out the individual questionnaire again in private and finally reunited for the payoff.

The payoff mechanism was the same in both treatments and took place at the very end of the experiment. To determine the payoff, a coin was flipped twice. The first coin flip indicated whether the group or the individual lottery choice would be relevant for payment. The second coin flip determined the outcome – high or low payoff – according to the group or individual choice.

2.2. Methods

Risk preferences. A well-established task developed by Eckel and Grossman (2002) was used to elicit risk preferences. The task is distributed along a one-dimensional spectrum. The groups had to choose exactly one out of six lotteries depicted in Fig. 1 by consensus. The lotteries were represented with coins that had two colored sides indicating the size of a gain (in Euro) – orange (high gain) and pink (low gain). For all six lotteries, the chances to win the high or low gain were equal (50% probability).

The lotteries increased in risk and expected value starting from lottery 1 with a sure gain of €12 (or €4 for each group member) to lottery 5 with an expected value of €15 (€8 or €2 for each group member). Lottery 6 had the same expected value as lottery 5 but a higher risk (€9 or €1 for each group member) and allowed the detection of risk-loving attitudes. The lottery number chosen by the group will be referred to as group choice (GC) in the sequel. Generally, the higher the GC, the lower the given group's degree of risk aversion. To control for individual risk preferences, the questionnaire included the same lottery task but with individual gains (i.e., group amount divided by three). Responses to this task will be termed individual choice (IC). Again, a higher number of IC indicates lower risk aversion. The group shift is given by $GC - IC$ where $GC - IC > (< 0)$ indicates a risky (cautious) shift.

⁷In the analysis, degrees were coded on a scale from 0 to 4, reflecting 0 – no degree, 1 – high school degree, 2 – bachelor, 3 – master's, 4 – PhD.

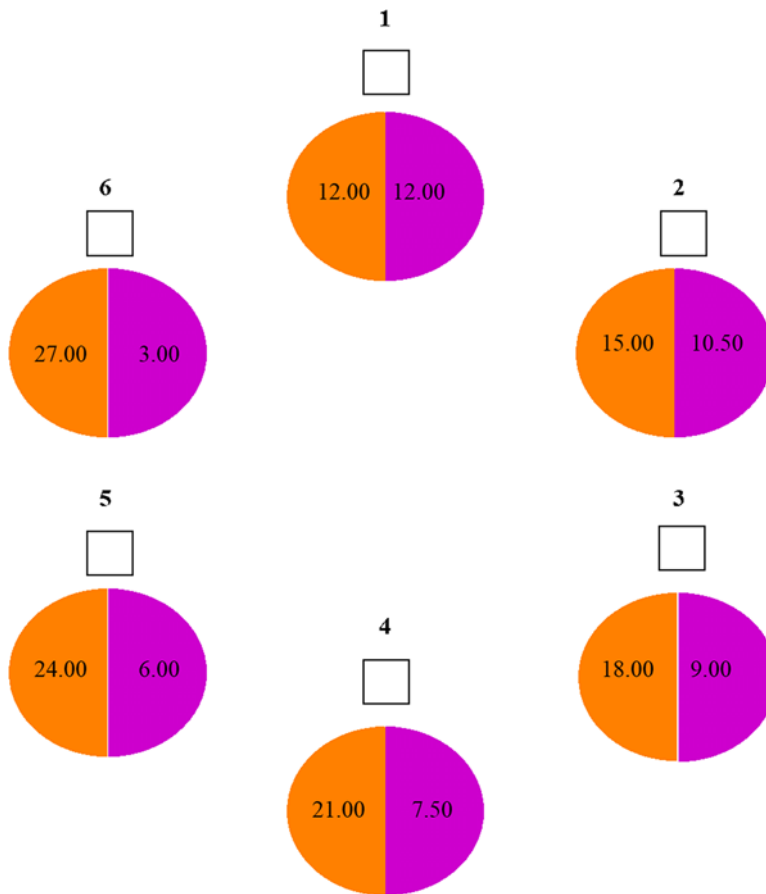


Fig. 1 Lotteries for group decision-making
Notes: The figure displays the gains of each of the six lotteries of the experiment, with the orange side showing the high gain amount, and the pink side showing the low gain amount.

3. Hypotheses

There is abundant evidence that women are more risk-averse than men in financial risk-taking (Charness & Gneezy, 2012; Croson & Gneezy, 2009), although the effects are sometimes small and task-specific (Filippin & Crosetto, 2016). For the task employed in the present paper, gender differences were consistently observed, such that we expect to see them also reflected in individual choices.

Hypothesis 1: IC is higher for men than for women.

In the group setting, we did not provide specific instructions to subjects on how to reach a group decision, leading to two potential scenarios for how decisions might be made.

The first scenario assumes majority voting as the decision process. From the political economy literature, it is well-established that under certain conditions, in particular a one-dimensional spectrum and single-peaked preferences, the outcome of majority voting is determined by the median voter (Black, 1948). This has also been supported by experimental evidence (Ambrus et al., 2015). Assuming that women are generally more risk-averse than men, the median voter in female-dominated groups (FFF and FFM) is more likely to be female, leading to more cautious group

decisions. Conversely, in male-dominated groups (FMM and MMM), the median voter is likely to be male, resulting in riskier group decisions.

The second scenario considers the possibility of a leading group member influencing the group's decision. Literature suggests that women are less willing to take on leadership roles, especially when the leader's gender is revealed to group members (Grossmann et al., 2015; Li et al., 2020). Women are most willing to lead in all-female or female-majority groups (Born et al., 2022). Consequently, the leader is more likely to be male, as the number of male group members increases, which should, according to Hypothesis 1, result in higher risk-taking of the group also in this scenario.

Therefore, based on both scenarios, we hypothesize that:

Hypothesis 2: GC increases with the number of male group members.

The primary focus of this paper is to compare individual and group choices. As mentioned, group decisions do not always reflect the individual preferences of group members, and several explanations exist for that behavior.

The conformity hypothesis states that individuals tend to align their preferences with those of the majority (Cialdini & Goldstein, 2004; Jagau & Offerman, 2018). This conformity can arise from two primary goals: (1) an accuracy goal, where individuals adjust their choices based on the belief that the majority is more likely to be correct, and (2) an affiliation goal, where individuals conform to the group to gain social approval and avoid negative judgment (Asch, 1956; Brown, 1965; Nordhøy, 1962; Stoner, 1968).

In a group setting, this could lead to shifts toward either more cautious or riskier decisions depending on the majority's preferences. Based on Hypotheses 1 and 2, we predict that in male-dominated groups, these majority preferences would align with those of the male group members, leading to a risky shift. Conversely, in female-dominated groups, the majority will reflect the female members' preferences, resulting in a cautious shift.

Another explanation for choice shifts is the diffusion of responsibility in the group context. When individuals make risky decisions, they bear the full responsibility for the outcome. However, in the group context, the perception of responsibility is diffused, and individuals may feel less accountable for the final decision (Wallach et al., 1962, 1964). The reduced sense of responsibility can make individuals more willing to take risks in the group setting, leading to riskier group decisions and explaining the phenomenon of a risky shift.

While the diffusion of responsibility has been initially used to explain risky shifts, Eliaz et al. (2006) showed that the direction of choice shifts depends on the prevailing social norm within the group. If the social norm is cautious, the group is more likely to shift toward safer decisions; if the norm favors risk-taking, the group is more likely to shift to riskier choices. We hypothesize that the social norm in male-dominated groups is riskier than in female-dominated groups. Therefore, we expect a risky shift in male-dominated groups.

A related theory is the risk-as-value hypothesis, which suggests that (moderate) risk-taking is a socially approved trait (Bauer & Turner, 1974; Vidmar, 1970). According to this hypothesis, individuals who perceive themselves as more risk-averse than others in the group may adjust their preferences to align more closely with the perceived cultural norm, which could lead to a general risky shift. However, previous studies with designs similar to ours have not observed a universal risky shift. Based on the literature that suggests that risk-taking is a cultural value more strongly associated with men (e.g., Daly & Wilson, 2001), we hypothesize that men particularly change their individual preferences toward higher risk-taking in group contexts, leading to a risky shift in group decision.

Combining these theories, we propose the following hypothesis:

Hypothesis 3: GC – IC is higher in male- than in female-dominated groups

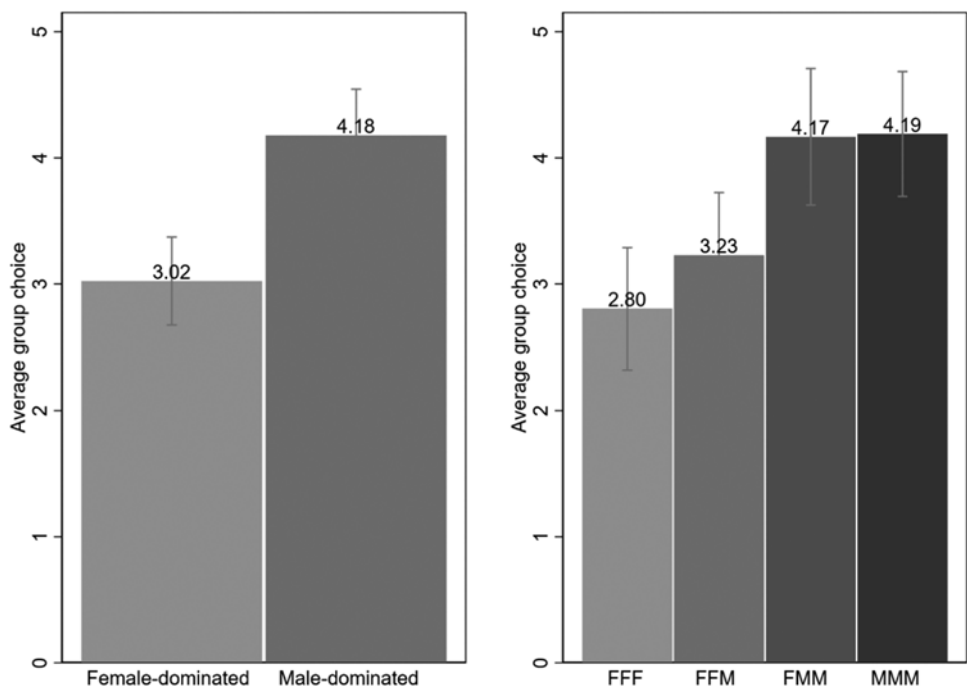


Fig. 2 Average group choices by group types
Notes: The left figure displays the average group choice of female vs. male-dominated groups, whereas the right figure displays the average group choice with respect to the specific gender composition of the groups. The gray whiskers indicate the 95% confidence interval.

4. Results

4.1. Individual choice

The average individual choice IC is 3.48 (SD = 1.79). In line with Hypothesis 1, we find that men take more risk ($M = 3.97$, $SD = 1.74$) than women (3.02, $SD = 1.72$). This difference is statistically significant (Wilcoxon rank sum test: $z = 5.884$, $p < .001$).⁸ There are no significant differences between the two treatments (GF and IF) in terms of IC (which holds for all subjects, for women only, and for men only⁹).

4.2. Group choice

The average group choice is 3.58 (SD = 1.73). In the first step, we compare the average group decisions between male-dominated and female-dominated groups and between group types, as shown in Fig. 2.¹⁰

⁸Table A3 in the Appendix states the number of observations per lottery and the frequencies. The same is given for male-/female-dominated groups and all group types.
⁹We do not find any treatment differences in terms of the average IC using a Wilcoxon rank sum test for all participants: $z = 1.087$, $\text{Prob} > |z| = .277$; for women only: $z = .580$, $\text{Prob} > |z| = .562$; and for men only $z = .851$, $\text{Prob} > |z| = .395$. In addition, we do not find any significant treatment differences within the four group types for all participants, for women only and men only, except the FMM group testing for men only (here, men in the GF treatment show a higher average IC than in the IF treatment). Finally, within the respective treatments GF and IF, we do not observe significant differences between women's IC across groups; the same holds for men.
¹⁰Again, we find no significant differences between the two treatments regarding GC. No treatment differences are found for all groups and group types separately. Wilcoxon rank sum test: All groups: $z = -.109$, $\text{Prob} > |z| = .913$; FFF: $z = -.495$, $\text{Prob} > |z| = .621$; FFM: $z = -.418$, $\text{Prob} > |z| = .676$; FMM: $z = .402$, $\text{Prob} > |z| = .688$; MMM: $z = .284$, $\text{Prob} > |z| = .776$.

Table 2 Ordered Probit regressions with group choice as the dependent variable and male-dominated as the independent variable plus controls

	Model 1	Model 2	Model 3	Model 4	Model 5
Male-dominated groups	.731*** (.17)	.399** (.18)	.436** (.18)	.446** (.18)	.477*** (.18)
Avg. IC		.667*** (.08)		.673*** (.09)	
Median IC			.51*** (.06)		.508*** (.06)
Group characteristics				Yes	Yes
Treatment control				Yes	Yes
No. of Obs.	164	164	164	164	164
Psd. R2	.034	.151	.151	.16	.156
Prob > chi2/F	0	0	0	0	0

Notes: Regressions at the group level, standard errors in parenthesis, significance level: * $p < .1$, ** $p < .5$, *** $p < .1$.

Male-dominated group is a dummy variable equal to 0 for FFF and FFM groups and 1 for FMM and MMM groups. *Avg. IC* reflects the average individual choice in a group, ranging from 1 (no risk) to 6 (risk-seeking). As group controls, we included the following variables: *Avg. age* is the average age in the group. *Avg. degree* reflects average degrees in the group, ranging from 0 (no degree) to 4 (PhD). *Avg. happiness* reflects average self-reported happiness in the group, ranging from 1 (unhappy) to 5 (very happy). *Treatment* is a dummy variable equal to 0 for the GF treatment and 1 for the IF treatment. The full regression table is given in Appendix A.

Figure 2 shows that group risk-taking generally increases with the number of male group members, supporting our second hypothesis.

Purely female groups (FFF) thereby have the lowest mean with 2.8 (SD = 1.57), while purely male groups (MMM) have the highest mean with 4.19 (SD = 1.52). A pairwise comparison of the means with a two-sample Wilcoxon rank sum test reveals a significant difference between purely male (MMM) and purely female groups (FFF) ($z = -3.63$, $p < .001$) and also between FMM and FFM ($z = -2.51$, $p = .012$). However, the differences between purely female and FFM groups and between purely male (MMM) and FMM groups are not statistically significant. In the following, we compare female-dominated (FFF and FFM) and male-dominated groups (FMM and MMM).

To gain further insight into group decision-making, we conducted ordered Probit regressions with the group choice as the dependent variable and male-dominated as the key independent variable (Table 2, Model 1). The coefficient for male-dominated groups is highly significant, confirming that these groups exhibit higher risk-taking than female-dominated groups. Importantly, this effect remains significant when controlling for the average and median of the group member's individual choices (Models 2 and 3). This suggests that the higher risk-taking in male-dominated groups cannot be fully explained by the individual choices of group members (their higher average and median IC). As expected, the positive coefficients for the average and median IC indicate that the groups' risk-taking increases with the individual risk tolerance of group members. All other control variables (group averages of age, highest degree, happiness, and treatment) do not alter the results.¹¹

¹¹The results remain qualitatively the same, and the effects are similar in size. For age, we find a slight negative coefficient; the highest degree is insignificant, in line with other findings for this risk elicitation task (Dave et al., 2010). Happiness and treatment are also significant.

Table 3 Comparison of group and individual choice

Group type		Group choice GC	Indiv. choice Avg. IC	Difference GC – avg. IC	Indiv. choice Median IC	Difference GC – median IC
All groups	Frequency	164	164	164	164	164
	Mean	3.58	3.48	.1	3.47	.107
	Std. dev.	(1.73)	(1.22)	(1.35)	(1.57)	(1.44)
Female dom. (FFF & FFM)	Frequency	85	85	85	85	85
	Mean	3.02	3.1	-.07	3.02	0
	Std. dev.	(1.63)	(1.2)	(1.24)	(1.48)	(1.32)
Male dom. (FMM & MMM)	Frequency	79	79	79	79	79
	Mean	4.18	3.88	.29**	3.96	.222
	Std. dev.	(1.65)	(1.12)	(1.45)	(1.53)	(1.57)

Notes: The table displays the frequencies, means, and standard deviations (in parenthesis) of GC, average IC, and the difference between the two, as well as the Median IC and the difference between GC and median IC at the group level. GC and avg. ICs are statistically significantly different from each other for male-dominated groups (2-sample Wilcoxon rank sum test – z = 2.032, p = .042). Significance level: *p < .1, **p < .05, ***p < .01.

4.3. Choice shifts and polarization

4.3.1. Group level

The paper’s primary focus is whether the group composition influences choice shifts. We begin our analysis at the group level. Overall, we find no general choice shift in our sample. As shown in Table 3, the average group choice (M = 3.58, SD = 1.73) is slightly higher than o the average individual choice (M = 3.48, SD = 1.22), but the difference is small and statistically insignificant (GC – avg. IC = .1, SD = 1.35). Therefore, our data does not reveal a general risky or cautious shift. However, when we differentiate between group types, we find that, in line with Hypothesis 3, the difference between group choice and average individual choice is notably higher in male- than in female-dominated groups (see Table 3). In female-dominated groups, the difference is slightly negative but insignificant (Diff = -.07, SD = 1.24). In contrast, male-dominated groups show a significant positive difference (Diff = .29, SD = 1.45, Two-sample Wilcoxon rank-sum test z = 2.032, p = .042), indicating a risky shift. The positive difference suggests that group members in male-dominated groups are willing to take more risks as a group than they would individually, on average. Most studies analyze choice shifts by comparing group choice with the average individual choice, often using between-subject designs (see Nieboer, 2015; Sutter, 2009). In our within-subject, we can also compare the group choice with the median individual choice of the corresponding group members, providing a benchmark in the decision process under majority voting. According to the median voter theorem, we would expect that the group choice reflects the median individual choice. Table 3 shows that, in the general data, we observe no choice shift using the median individual choice. However, the risky shift observed in male-dominated groups is also visible when comparing the median individual choice, though the difference is not statistically significant.

In the next step, we analyze the difference between group and individual choice in greater detail. Our within-subject design allows us to compare the average individual choices of group members with the group choice. We conduct OLS regressions and estimate the following regressions:

$$\Delta \left(GC_i - \overline{IC}_i \right) = \alpha + \beta * \text{Male-dominated} + \gamma \overline{IC}_i + \delta X_i + \varepsilon_i$$

$$\Delta \left(GC_i - \widetilde{IC}_i \right) = \alpha + \beta * \text{Male-dominated} + \gamma \widetilde{IC}_i + \delta X_i + \varepsilon_i$$

Table 4 OLS regressions with group shift as the dependent variable

	GC – avg. IC	GC – avg. IC	GC – median IC
Male-dominated groups	.423** (.21)	.562** (.22)	.616*** (.22)
Avg. IC		–.175* (.09)	
Median IC			–.374*** (.07)
Group characteristics	Yes	Yes	Yes
Treatment control	Yes	Yes	Yes
Constant	1.697* (1.01)	2.385** (1.06)	2.85*** (1.06)
No. of Obs.	164	164	164
Adj. R2	.024	.04	.141
Prob > chi2/F	.117	.052	0

Notes: Regression at the group level, standard errors are given in parenthesis, significance level: * $p < .1$, ** $p < .05$, *** $p < .01$. *Male-dominated group* is a dummy variable equal to 0 for FFF and FFM groups and 1 for FMM and MMM groups. *Avg. IC/Median IC* reflects the average/median I in the group, ranging from 1 (no risk) to 6 (risk-seeking). As group controls, we included the following variables: *Avg. age* is the average age in the group. *Avg. degree* reflects average degrees in the group, ranging from 0 (no degree) to 4 (PhD). *Avg. happiness* reflects average self-reported happiness in the group, ranging from 1 (unhappy) to 5 (very happy). *Treatment* is a dummy variable equal to 0 for the GF treatment and 1 for the IF treatment.

We analyze the shift from individual to group decision at the group level i , using the difference between the group choice (GC) and the average ($\overline{IC}$) or median ($\tilde{IC}$) individual choice as the dependent variable. To account for the effects of gender composition, we include a dummy variable for male-dominated groups. To ensure that the effect is not driven by general differences in risk preferences (mechanical effect), we also control for the average or median individual choice of the group members and individual characteristics (X_i).

Table 4 presents our regression results. Male-dominated groups have significantly larger differences between group choice and both the average and median individual choice than female-dominated groups, confirming Hypothesis 3. This result remains robust when controlling for the average or median individual choices of group members. By construction, the average individual choice is negatively correlated with the size of the choice shift. As in the previous analysis, there is no significant difference between the two treatments (GF and IF). As a robustness check, we also ran the regression at the individual level, and the results are consistent with the results on the group level (see Table A4 in Appendix A).

4.3.2. A closer look at the choice shifts

In the previous subsection, we showed that male-dominated groups exhibit risky shifts compared to female-dominated groups. In this subsection, we further investigate the difference between group and individual decisions at both the group and individual levels. Table 5 presents the frequencies and the sizes of choice shifts, while Fig. 3 displays the distribution of choice shifts. The shifts are calculated as the difference between group choice and median individual choice at the group level or the differences between group choice and individual choice at the individual level.¹² Overall, the majority of groups – about 57 % – do not exhibit choice shifts. Approximately 24 % of groups show risky shifts, and 18 % exhibit cautious shifts. The average size of the shifts is more than one step in our lottery task for cautious ($M = -1.97$, $SD = 1.13$) and risky shifts ($M = 1.91$, $SD = 1.04$). When comparing male and

¹²A figure illustrating the distribution of pairs of group choice and average individual choices (median, respectively) is depicted in Appendix A in Figures A5 and A6.

Table 5 Comparison of group and (median) individual choice

Group level				Individual level									
	Cautious shift	No shift	Risky shift	Cautious shift			No shift			Risky shift			
				M	W	Total	M	W	Total	M	W	Total	
FFF & FFM	Freq.	17	49	19	16	57	73	20	89	109	8	65	73
	Mean	-1.82		1.63	-2.38	-1.98	-2.07				1.25	1.88	1.81
	SD.	(1.13)		(1.01)	(1.41)	(1.26)	(1.29)				(.46)	(1.1)	(1.06)
FMM & MMM	Freq.	13	45	21	43	10	53	94	11	105	57	21	78
	Mean	-2.15		2.17	-2.4	-2.1	-2.34				2.46	2.52	2.47
	SD	(1.14)		(1.02)	(1.33)	(1.29)	(1.31)				(1.36)	(1.21)	(1.32)
Total	Freq.	30	94	40	59	67	126	114	100	214	65	86	151
	Mean	-1.97		1.91	-2.39	-2	-2.18				2.31	2.03	2.15
	SD.	(1.13)		(1.04)	(1.34)	(1.26)	(1.3)				(1.35)	(1.15)	(1.24)

Notes: The left side of the table displays the frequencies and sizes of the choice shifts when switching from GC to IC at the group level, sorted by the gender composition of the groups. The right side displays the distribution of choice shifts between men and women at the individual level. Cautious shift: GC – IC < 0, No shift: GC – IC = 0, Risky shift: GC – IC > 0.

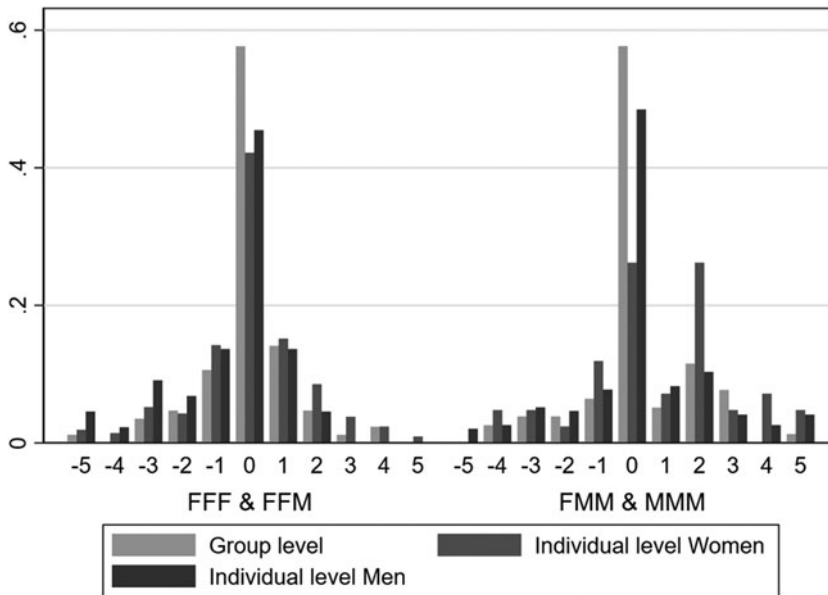


Fig. 3 Distribution of choice shifts at the group and individual level by group composition

Notes: The figure shows the difference between GC and median IC at the group level and the difference between GC and IC at the individual level for both women and men. The distribution for female-dominated groups is displayed on the left, and that for male-dominated groups on the right.

female-dominated groups, we observe two main patterns: (i) male-dominated groups are more likely to exhibit risky shifts, and (ii) the size of these shifts is larger in male-dominated groups (more than 2.17 steps in the lottery task on average).

At the individual level, average choice shifts and their standard deviations are larger than at the group level. While there are no significant differences in the size of the cautious shifts between male- and female-dominated groups, the risky shifts are significantly larger in male-dominated groups.¹³ This is true for both men and women. Notably, over 70% of women exhibit choice shifts in male-dominated groups compared to about 55% of men in female-dominated groups.

The distribution of the choice shifts depicted in Fig. 3 reveals that most shifts are small, but a small proportion of groups and individuals exhibit extreme risky (5) or cautious shifts (−5). Interestingly, women in male-dominated groups most often exhibit risky shifts of two steps in the lottery task, while no consistent patterns are observed for men in female-dominated groups.

4.4. Potential decision mechanism

In the previous subsection, we provided evidence of gender-specific group polarization, showing that male-dominated groups take more risks than they would individually, while no such shift occurs for female-dominated groups. A natural question is why this is the case. In the previous section, we demonstrated that the risky shift comes in addition to a purely mechanical effect – an increase in risk tolerance for male-dominated groups since men exhibit higher risk tolerance on average than women in our sample. We have also provided evidence that the effect is not driven by a preference effect on

¹³This result holds in total and also for men and women separately – Wilcoxon rank-sum test: All participants: $z = -3.484$, $\text{Prob} > |z| = .001$; men only: $z = 2.667$, $\text{Prob} > |z| = .008$; women only: $z = -2.491$, $\text{Prob} > |z| = .013$.

individual preferences, that is, by the potential effect that individual preferences change according to the social context.¹⁴

Until now, we have analyzed the choice shift from individual to group choice relative to the average individual choice $GC - \overline{IC}$ and the median individual choice $GC - \widehat{IC}$. These are two plausible and straightforward benchmarks for group decision-making mechanisms. The first assumes that all group members have equal weight in the decision-making process. The second assumes that the group choice reflects the outcome of majority voting, aligning with the preference of the median individual, provided that the assumptions of the median voter theorem hold. In this subsection, we explore additional potential consensus-making mechanisms to rule out that the observed choice shift is driven by a mechanical effect resulting from a different underlying consensus-making mechanism. Specifically, we examine the following mechanisms:¹⁵

- a) Central tendency schemes: Average IC and Median IC¹⁶
- b) Coalition-based schemes: Low and High Majority Coalition, Minimum Range Coalition
- c) Dictator schemes: Minimum IC in group, Maximum IC in group, Leader

All mechanisms build on the assumption that the decision of group g (GC_g) results directly from aggregating the group members' individual decisions represented by the vector $IC_g = (IC_{g,1}, IC_{g,2}, IC_{g,3})$, where $IC_{g,m}$ is group member m 's individual choice. The central tendency schemes assume that GC_g equals the arithmetic mean or median of IC_g , respectively. The coalition-based schemes predict that two group members form a coalition and that the arithmetic mean of their ICs forms the group choice. The coalition can be formed in three ways. For the Low (High) Majority Scheme, we define the coalition as the median voter plus the subject with the IC equal or below (above) the median. The Low (High) Majority Scheme can serve as a potential benchmark for the hypothesis that lower (higher) risk-taking is the socially accepted group choice; this might, for example, be the case in female(male)-dominated groups. For the Minimum Range Coalition Scheme, the two group members with the smallest distance between their individual choices will form a coalition, and the GC equals the arithmetic mean of their ICs.¹⁷ The Dictator Schemes assume that one group member who stands out from the group (minimum or maximum IC) dominates the discussion so that the final GC will equal his or her IC. Finally, we also look at group leaders. For the treatment IF, we collected data on whether the other group members perceived a person within a group as driving the group decision¹⁸ (further details will be discussed in the [Subsection 4.4.2](#)). In the Leader Scheme, the GC is assumed to reflect the leader's IC.

¹⁴We showed that there are no significant differences in IC between treatments (IF and GF) nor between group types (FFF, FFM, FMM, MMM). This is particularly important for the GF treatment, in which individuals made the group decision before the individual choice. See [Section 4.1](#). We cannot say whether simply individual preferences for IC and GC differ. However, we could use satisfaction with group choice as an indication. There, we see that $|GC - IC|$ is negatively correlated with satisfaction, which could indicate that IC can at least be used as a point of reference. See Appendix B for an analysis of satisfaction with the group choice.

¹⁵We build on the social decision schemes Nieboer (2015) used, which have received some empirical support. We add a minimum IC dictator since we are interested in how male- and female-dominated groups differ. In addition, we look at low and high-majority coalitions, building on the decision-theoretic basis for choice shifts by Eliaz et al. (2006) and a leader scheme, which is discussed in more detail below.

¹⁶These two have been analyzed in the previous section and are included for completeness.

¹⁷In all three cases, the Coalitions scheme will equal the arithmetic mean if all ICs are the same.

¹⁸We asked each participant if they had perceived that one group member led their group and, if so, who. Each participant in the group was allocated a letter (ABC) to identify the other group members. Additionally, we asked about participants' subjective risk tolerance, their risk tolerance in relation to others, and whether they believe other people should generally take less, equal, or more risks than themselves. The exact questions can be found in Appendix C. We specify a group leader as the person who received the majority of votes within a group. Generally, a person in that case can also be voted by only one person, if no one else has voted for a leader. On average, each leader received 1.625 votes.

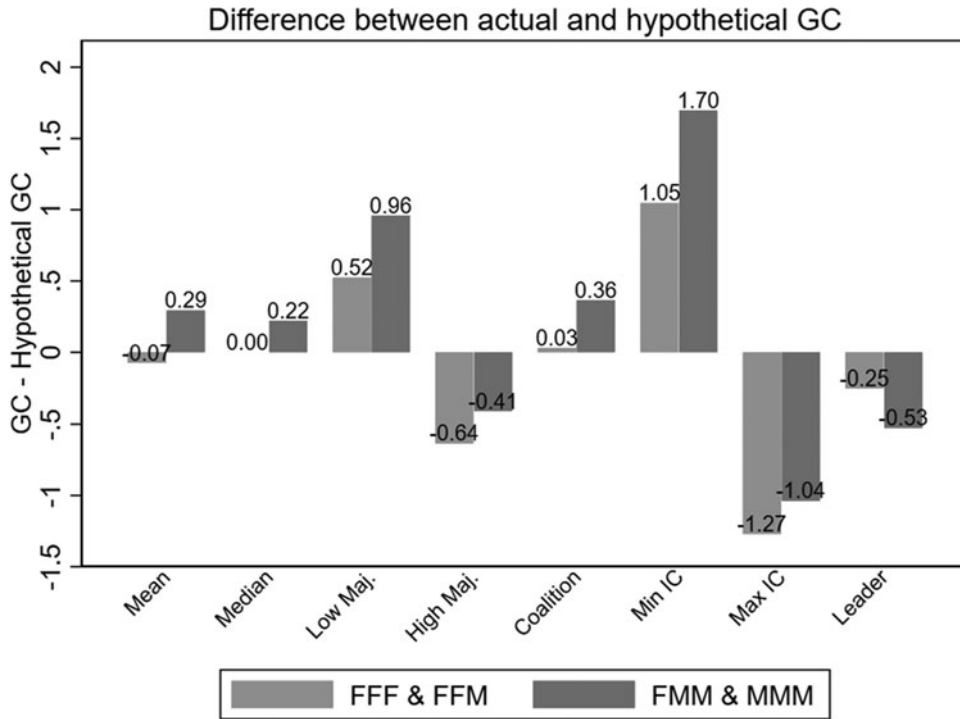


Fig. 4 Potential consensus-making mechanisms

Notes: Differences between observed group choice and hypothetical group choice according to different consensus-making mechanisms by female and male-dominated groups. A positive number shows a risky, while a negative shows a cautious shift relative to the respective consensus-making mechanism.

4.4.1. Choice shifts relative to potential consensus-making mechanisms

Next, we investigate choice shifts relative to the potential consensus-making mechanisms described above. We examine the differences between observed group choices and hypothetical group choices constructed for each group according to different consensus-making mechanisms, that is, $GC_g - GC_g^c$, where $c = \{\text{Mean, Median, Min IC, Max IC, Low Majority, High Majority, Minimum Range Coalition, Leader}\}$. Positive values indicate a risky shift relative to the potential consensus-making mechanism, while negative values indicate a cautious shift. Figure 4 shows that, for all mechanisms except the Leader scheme, choice shifts are larger for male-dominated groups compared to female-dominated groups. Specifically, male-dominated groups exhibit a larger risky shift under the Mean, Median, Min IC, and Low Majority schemes and a smaller cautious shift under the Max IC and High Majority schemes. In the Leader scheme, we find the opposite – a smaller cautious shift for female-dominated groups. Potential explanations for this result are discussed in the following subsection. On average, the median IC seems to align most closely with the observed group choices. Nevertheless, a risky shift for male-dominated groups can be observed.

Table 6 shows that, for all consensus-making mechanisms except the Leader scheme, male-dominated groups consistently demonstrate a significant additional risky shift compared to female-dominated groups. In the case of Max IC and High Majority Coalition, male-dominated groups exhibit smaller cautious shifts. In the Leader scheme, the results are qualitatively and quantitatively similar, but the sample size ($N = 39$) is too small to detect a statistically significant effect.

Table 6 OLS regressions with the difference between actual and hypothetical group choice as dependent variable (group level)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	GC – avg. IC	GC – median IC	GC-min IC	GC-max IC	GC-low. maj.	GC-high maj.	GC-coalition	GC-leader
Male-dominated groups	.562** (.22)	.616*** (.22)	.919*** (.23)	.802*** (.25)	.661*** (.22)	.571** (.23)	.676*** (.23)	.658 (.62)
Mechanism	-.175* (.09)	-.374*** (.07)	-.427*** (.08)	-.545*** (.09)	-.248*** (.08)	-.309*** (.09)	-.362*** (.08)	-.707*** (.17)
Constant	2.385** (1.06)	2.85*** (1.06)	3.893*** (1.11)	3.647*** (1.21)	2.823*** (1.04)	2.592** (1.11)	2.963*** (1.1)	3.042 (2.74)
No. of obs.	164	164	164	164	164	164	164	39
Adj. R2	.04	.141	.182	.204	.078	.077	.106	.274
Prob > chi2/F	.052	0	0	0	.004	.005	.001	.007

Notes: Regression at the group level, standard errors are given in parenthesis, significance level: *p < .1, **p < .05, ***p < .1.

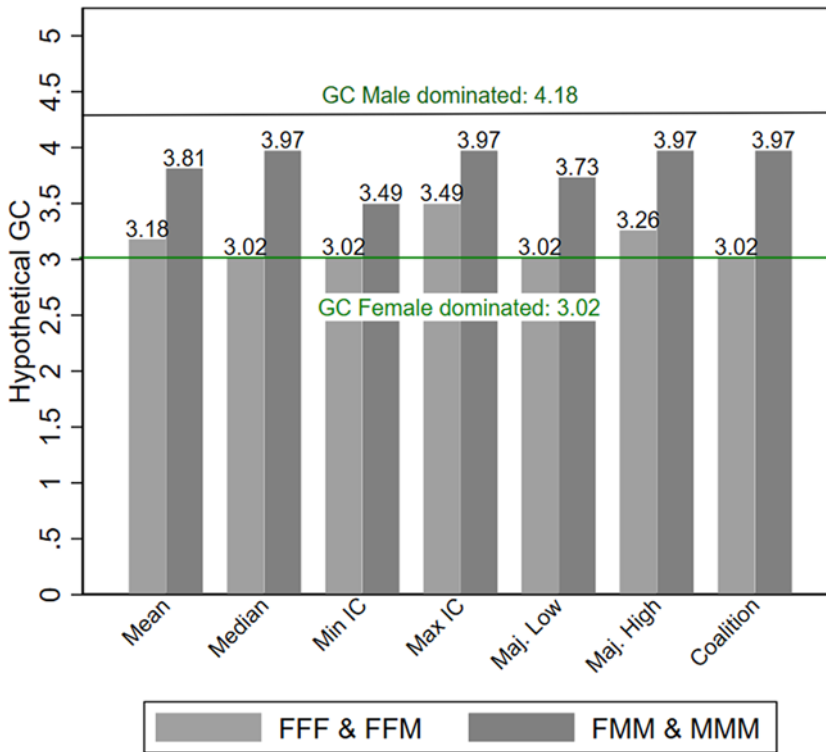


Fig. 5 Simulated group choice according to potential consensus-making mechanisms

Notes: The figure shows hypothetical group choices based on simulated groups based on the average ICs of men and women. The green bars represent the actual average group choices observed for female and male-dominated groups. The comparison highlights that male-dominated groups tend to have higher group choices than those predicted by any consensus-making mechanisms, whereas female-dominated groups tend to align with or fall below these predictions.

To further rule out a purely mechanical effect, we simulate hypothetical groups based on the average ICs of men and women. Figure 5 illustrates this comparison, showing that the observed average GC in male-dominated groups exceeds all consensus-making mechanisms considered. In contrast, for female-dominated groups, the observed GC is equal to or below these mechanisms. This confirms that the effect extends beyond a purely mechanical effect.

4.4.2. Leader

In treatment IF (79 groups in total), we included additional questions to identify whether group decisions were driven by a single individual. Table 7 shows that group leader were identified in many groups, with their occurrence evenly distributed across group types. In FMM, most leaders are male (nine men vs. two women), whereas leadership is evenly split between men and women in FFM (five men vs. five women).

An important question is whether leaders exhibit different risk characteristics than non-leaders and whether these characteristics differ between male and female-dominated groups. Table 8 shows that leaders are generally more risk-taking than non-leaders. In male-dominated groups, this difference is marginally significant for the experimentally elicited risk preference (IC, row 1) and highly significant for subjective risk tolerance (row 2). Leaders in male-dominated groups also perceive themselves as more risk tolerant relative to others, that is, their subjective risk tolerance relative to others is, on average, higher than for non-leaders in these groups (row 3). For female-dominated

Table 7 Distribution of leaders across group types

	Gender composition				
	FFF	MMM	FMM	FFM	
No leader	9	8	10	13	40
Leader	10	8	11(9/2)	10(5/5)	39

Notes: The table shows the number of groups, with and without leaders, sorted by group gender composition.

Table 8 Comparison of individual risk preferences and subjective risk tolerance between leaders and non-leaders

	Male-dominated groups		Diff.	Female-dominated groups		Diff.
	Non-leader	Leader		Non-leader	Leader	
Individual choice (IC)	3.674 (1.888)	4.526 (1.577)	-.852* (.464)	2.971 (1.701)	3.238 (1.998)	-.267 (.419)
Subjective risk tolerance	3.185 (.983)	2.526 (.697)	.658*** (.237)	2.99 (.876)	3.238 (.944)	-.248 (.212)
Subjective risk tolerance relative to others	3.154 (.965)	2.737 (.933)	.417* (.242)	3.127 (.961)	3.143 (.854)	-.015 (.226)
Recommendation risk-taking	1.848 (.592)	1.789 (.535)	.058 (.147)	1.683 (.544)	2.048 (.384)	-.365*** (.125)

Notes: Regressions at the group level, standard errors in parenthesis, significance level: *p < .1, **p < .5, ***p < .1. IC represents the individual choices in the incentivized risk experiment. Subjective risk tolerance, subjective risk tolerance relative to others and recommendation risk-taking are hypothetical self-assessments. Higher numbers indicated higher risk-taking (the original questions in the questionnaire are recoded to allow for an easier interpretation of results).

groups, we do not find statistically significant differences in risk preferences or subjective risk tolerance between leaders and non-leaders.¹⁹ However, leaders in female-dominated groups believe that others should generally take less risk (row 4).

5. Conclusion

The growing political focus on gender diversity has spurred studies examining its economic impact and the influence of an increasing proportion of women in decision-making bodies on decision-making. In this paper, we examine how gender diversity affects group decision-making, focusing on risk-taking, a key aspect of many economic and political decisions.

Using a simple lottery choice experiment with monetary incentives, we find that risk-taking increases as the share of male group members rises, resulting in greater risk-taking in male-dominated groups compared to female-dominated groups. The main result of this paper is gender-specific polarization in group decision-making. A clear choice shift pattern emerges when we account for the group composition: male-dominated groups exhibit risky shifts, taking more risks than the average and median individual preferences of group members would suggest. In contrast, female-dominated groups show no significant shift in risk preferences.

To better understand the mechanisms behind these choice shifts, we examined eight potential consensus-making processes. This approach allowed us to rule out the possibility that the observed choice shift is due to a mechanical effect resulting from the underlying consensus-making processes. Our findings provide three key insights.

First, while the median group choice is closest to the actual group choice, male-dominated groups display an additional risky shift compared to female-dominated groups.

¹⁹These results also hold if we only look at female group leaders.

Second, the results for the majority mechanism align with theories such as the conformity and responsibility hypotheses, indicating that group members conform to the majority preferences. However, the majority preferences differ in male and female-dominated groups, leading to different choice shifts. Specifically, our findings support the assumption that men in male-dominated groups tend to adjust their choices to higher levels of risk when deciding in the group context.

Third, leaders in male and female-dominated groups differ in their risk preferences and subjective risk tolerance. Leaders in male-dominated groups are more risk-taking than non-leaders, while we find no such difference in female-dominated groups. This result is consistent with the findings of Ertac and Gurdal (2012), who show that men are generally more willing to lead groups and that those who choose to lead tend to take more risks on behalf of the group than those who are not. For women, they find no differences. Additionally, we find that leaders in female-dominated groups generally recommend others to take less risk. This result aligns with our observation of a general trend of cautiousness in female-dominated groups. Furthermore, it supports the findings of Eckel and Grossman (2002), who show that women are stereotyped as more risk-averse than men and that beliefs about gender differences are greater than the actual gender differences in risk aversion.

While our evidence is rather clear-cut, it may be sensitive to the elicitation method. Filippin and Crosetto (2016) showed that gender differences in risk-taking are particularly pronounced for elicitation methods involving a safe option, as in our study. Without such an option, gender differences are minimized, which could also reduce the effect of group composition on decisions. Additionally, the direction of group shifts seems to depend on the elicitation method. While we do not observe a general shift in our data, other studies with monetary incentives did. Pairwise choices, elicitation of willingness-to-pay, and the Holt-Laury method have generated cautious shifts in previous studies (Baker et al., 2008; Masclet et al., 2009; Pahlke et al., 2012; Shupp & Williams, 2008). In contrast, the investment game of Gneezy and Potters (1997) has generated risky shifts (Nieboer, 2015; Sutter, 2009). It remains an open question for future research to determine the impact of gender composition under these alternative elicitation methods. The behavior of gender-balanced groups, which was not considered in our study, also warrants further investigation.

Our findings are important in several ways. First, we contribute to the literature on group decision-making by demonstrating that the gender composition of a group impacts decision-making under risk. Second, we contribute to the literature on choice shifts by showing that gender is a crucial determinant. The differences between groups of varying gender composition might help explain the mixed evidence on choice shifts in the literature. Finally, our results have important implications for policymakers. The systematic impact of gender composition on group decision-making suggests that political and firm-level actions to increase gender diversity can be expected to change decision-making under risk in the group context.

In our experimental design with groups of three participants, a larger share of women reduced risk-taking in groups, but a majority of females was needed to significantly reduce the risk-taking of groups and prevent risky shifts. Choice shifts can be problematic in several ways. In particular, risky shifts can be expected to have undesired effects and potentially harm society. Risky shifts may be regarded as excessive risk-taking since the risk taken by the group exceeds that of the individual group members, creating a potentially undesired bias toward higher risk-taking. Consequently, this could induce decision-making bodies to take excessive financial risk, contribute to financial crises, or lead to risky, unethical decisions, resulting in a moral decline within companies or institutions (Armstrong et al., 2004). However, in certain contexts, higher risk-taking is desirable and can lead to better outcomes, such as greater creativity (Glover & Sautter, 1977) and innovation (Reynolds et al., 2009). In general, group polarization in decision-making may not be desirable in a multitude of situations as it can give rise to a detachment of a group from its' context (den Nieuwenboer & Kaptein, 2008), and both excessive risk-taking and risk avoidance may be harmful to an organization or the society (Harjoto & Laksmana, 2018).

Supplementary material. The supplementary material for this article can be found at <https://doi.org/10.1017/eec.2024.4>.

Replication packages. A replication package for all results presented in this paper, including data and Stata code can be accessed here: https://osf.io/2wp4z/?view_only=fd895c321c564b169f4374338d34b774.

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