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Abstract

We assess in the laboratory the impact of promises on group decision-making. The gift-exchange game provides the testing ground for our experiment. When played between groups, inter-group cooperation and reciprocity represent a condition for efficiency in overall decision making. We find that promises have a significant positive effect on aggregate profits. We interpret these findings as if promises act as a trigger of social conformity, according to which groups adopt socially more desirable behavior even without face-to-face communication or discussion.

JEL codes: D81, D83

Keywords: group decision, promise, gift-exchange game, efficiency, social conformity

1. Introduction

Most important decisions are taken by small groups even if their consequences affect individuals. Group behavior depends on a variety of factors among which group structure and decision procedures are widely studied in economic experiments. Laboratory studies have focused on the role of risk (Charness et al., 2007; Rockenbach et al., 2007; Zhang and Casari, 2012), decision timing (Maciejovsky et al., 2013), information processing (Fahr and Irlenbusch, 2011) strategic reasoning (Cason and Mui 1997; Charness et al., 2010; Cooper and Kagel, 2005; Kocher and Sutter, 2005; Luhan et al. 2009), coordination (Charness and Jackson, 2009; Feri et al., 2010), self-serving bias (Goncalo and Duguid, 2008; Kugler et al., 2007), and dynamics of decision-making (Mason et al., 2016; Song, 2009).

To test group decision-making in the lab, economists have largely used game theoretical settings to measure unambiguously if choices conform to rational behavior. Most evidence shows that in interactive settings aggregation into groups reinforces individuals' inclination to act as selfish, in-group-oriented decision-makers (Bornstein and Yaniv, 1998; Charness and Sutter, 2012; Kugler et al., 2012). This behavior is known as the discontinuity effect (Wildschut et al., 2003) according to which intergroup relations tend to be more competitive than interpersonal relations.

Evidence is less clear cut when social interaction is characterized by the presence of incomplete contracts as in the gift-exchange game, which allows testing how social norms of reciprocity can implement efficient outcomes that do not emerge in competitive equilibria (Fehr et al., 1993). This sequential game simulates an employment contract in a principal-agent relationship, in which the principal is required to choose how much to transfer to the agent. Then, the agent chooses a costly effort level that determines the overall return. While the most common finding for individuals is that subjects exhibit strong reciprocity, research on groups shows that communication processes, deliberation processes and group identity represent important factors in approaching efficiency (Ambrus et al., 2015; Brady and Wu 2010; Kocher and Sutter, 2007).

Among the reasons inducing cooperation, the order of proposals in the gift-exchange game has been shown to play a significant role in affecting profits. In the standard gift exchange game, the principal is the first to propose the contract and the agent has to decide if to reciprocate (Akerlof, 1982). This sequence is not generally applicable to real world. For example, in charity and fundraising the introduction of promises of conditional gifts made by agents is often used to promote cooperation. The effect of ordering inversion with individuals has been analyzed in the field by Landry et al. (2012) and Carpenter (2017) and in the lab by Charness et al. (2013), which provide evidence that agent-first ordering increases aggregate profits. In contrast, Bracht and

Feltovich (2009) and Charness and Dufwenberg (2010) show that bare promises have limited impact on efficiency.

To examine the effect of promises in group decision, we submit to four-member groups a modified version of the gift-exchange game in which agents make non-binding promises before principals' decisions. To focus on promises, we adopt the unanimity rule for intra-group decisions and exclude any other form of formal or informal communication within or between groups. We also compare different procedures of collective choice to verify the robustness of intra-group agreement with respect to factors that are relevant in bargaining modeling (Banks and Duggan, 2000; Miller and Vanberg, 2015; Song 2009).

Our main finding is that promises increase significantly the gifts made by agent groups and trigger positive reciprocity by principal groups by increasing overall efficiency. Groups behave less opportunistically than rational models usually assume. We interpret these findings as if promises would reinforce the inclination to cooperate and to reciprocate. Our result is consistent with the better-than-average bias according to which intra-group interaction led to socially more desirable behavior.

The paper is organized as follows. Section 2 briefly summarises the background literature, while Section 3 describes the experimental design and procedures. Results and discussion are given in Section 4 and Section 5 concludes.

2. Background Literature

The gift-exchange game was proposed by Akerlof (1982) to simulate the contract between principals and agents. In its simple form, the game is represented by a one-to-one interaction that can be played single shot or iterated. In the first move, the principal is assigned an endowment and is required to select the amount of wage (w) to transfer to the agent. Then, the agent chooses a costly effort level (f) that determines the principal's return. This model has been mostly applied to labour relations. Workers' effort is indeed not completely enforceable since it is not commonly explicitly included as a clause in work contracts. The gift-exchange game has been also investigated in the area of social preferences to assess the determinants of reciprocity and fairness. Laboratory studies show that agents do not necessarily act as selfish decision-makers but, rather, tend to increase their effort levels according to the amount offered by the principal. That is, agents acting as second mover do not necessarily minimize their costs as predicted by rational money-maximization but reciprocate the gift received from the first-mover principal.

The positive correlation between wages and effort was first reported by Fehr et al. (1993), whose findings support preferences for fairness in that higher transfers are reciprocated by higher

effort levels and consequently outcomes are more efficient than market-clearing ones. These results were confirmed in a variety of experiments both in the lab and in the field (Abeler et al., 2010; Bellemare and Shearer, 2009; Brown et al., 2004; Charness and Kuhn, 2010; Fehr et al., 1997; Fehr et al., 2007). Other studies reported negative reciprocity which was shown to be stronger when hurtful choice is intentional (Kube et al., 2006; Offerman, 2002). Laboratory tests of the gift exchange-game were also extended to multi-agent design. In the field of labour market, Charness and Kuhn (2007) in a one-employer-two-workers treatment and Maximiano et al. (2007) in a one-employer-four-workers treatment found very similar results to the bilateral gift-exchange game.

However, less attention has been paid to situations in which both roles are played by groups and provided evidence is far from being conclusive. Kocher and Sutter (2007) compared individual and group behaviour in the gift-exchange game in order to determine if group decisions are closer than individuals to the standard postulate of rationality. By introducing communication within groups, they show that face-to-face communication induces more efficient decisions than individuals and groups with computer-mediated communication. Brady and Wu (2010) extend this result to two-person groups by testing different patterns of communication and showing that small changes in decision-making procedures have significant impact on aggregate profits.

Among the other factors affecting reciprocity in the gift-exchange game, promises are shown to be very effective in increasing efficiency with individuals by Charness et al. (2013). In particular, wages proposed by workers are higher than those proposed by principals, although when the principal makes the first proposal the rate of acceptance by agents do not change. To explain these findings, Dufwenberg and Gneezy (2000), Charness and Dufwenberg (2006) and Battigalli and Dufwenberg (2007) postulate the presence of guilt aversion, Ellingsen and Johannesson (2004) that of preferences for consistency ("keeping one's word") and Vanberg (2008) for promise keeping per se. When applied to promises exchanged between groups, one would expect that these inners factors have relatively little impact. Guilt or moral values play a major role in individual decision, as generally any kind of moral obligation or inner pressure to reciprocate. If groups are more self-centered than individuals in competitive games (Bornstein and Yaniv, 1998; Cox, 2002; Luhan et al. 2009), it should be more difficult to keep promises without explicit communication or forms of group identity reinforcing the tendency to focus on aggregate efficiency (Charness et al., 2007). This effect is also consistent with the responsibility-alleviation argument (Charness, 2000; Charness and Jackson, 2009), according to which the shift of responsibility to an external authority dampens impulses towards moral sentiments such as honesty or loyalty and leads to exhibit a lower degree of reciprocity.

On the other hand, the procedure of collective choice may affect group decision-making, even with anonymous settings in which social influence acts through spontaneous mechanisms known under the heading of conformity and herding. Group members tend to conform to the group to which they belong or because they prefer it (Bernheim and Exley, 2015) or believe that others have better knowledge as for informational cascades (Anderson and Holt, 1997; Bikhchandani et al., 1992). In this light, promises may act as a trigger of social conformity. Being part of a group reinforce the strength of a promise because members are motivated to perceive themselves as more cooperative than the average tendency. This bias, commonly known as "better-than-average", motivate the inclination to self-evaluate by comparing ourselves to others and it was shown to impact collective decisions in the dictator game by Cason and Mui (1997), in which intra-group interaction led to higher reciprocity and socially more desirable behavior. In the gift-exchange game the tendency to cooperate in presence of promises may be motivated by similar psychological mechanisms.

The present study was undertaken to test these contradictory views. To focus on the impact of promises we introduced in our design simple procedures of group decisions. Firstly, groups make only unanimous decisions, which are expected to promote a more careful examination of the decision to be taken than alternative voting rules (Miller, 1989). Secondly, we analyze only two procedures of intragroup choice. In the baseline treatment, all members are asked to submit their own choice, while in the proposer treatment, which is a modified version of the Baron and Ferejohn bargaining game (Baron and Ferejohn, 1989; Miller and Vanberg, 2015), one group member, casually chosen, act as proposer and the other members are asked to vote his proposal. The comparison between the two treatments is expected to highlight the specific mechanisms behind conformity, which is supposed to play a greater role with the presence of a proposer. To our knowledge, there is no laboratory evidence that analyses this effect among groups without mechanisms of legal enforcement or intra-group communication and this is the distinctive feature of this paper.

3. Experimental design

In our experiment, subjects play a version of Kocher and Sutter's (2007) one-shot gift-exchange game divided in two groups acting as principal and agent with slight modifications. The main objective is to assess the impact of promises on group decisions. Since groups with more than three members have been found to perform better on economic decision-making (e.g., beauty-contest game; see Sutter 2005), we decided to analyse four-person groups to emphasize the effect of collective decision-making procedure.

At the beginning of each session, participants are randomly assigned to one group and groups are randomly matched into pairs. Subjects' identities as well as their decisions remain totally anonymous.

The game is played in two periods. In the first period, the principal group is assigned an endowment of 480 experimental points and it is required to select the amount $w \in [30; 300]$, in steps of 30 units, to transfer to the agent group. This implies that only the values 30, 60, 90, 120, 150, 180, 210, 240, 270 and 300 are feasible. In the second period, the agent group is informed about the transfer of the principal group and chooses a costly effort level $f \in [0.1; 1]$ to be determined in steps of 0.1 (only values 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 and 1.0 are feasible).

The value of f determines agent group's costs according to the cost function c(f) shown in Table 1.

Table 1. Factor f and cost c(f) for the agent group

F	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
c(f)	0	3	6	12	18	24	30	36	45	54

Groups' final earnings are determined as follows:

$$\text{Principal Group} = [(E - w)\, f]$$

$$\text{Agent Group} = [w - c\,(f)]$$

Earnings are divided equally among group members and converted to euros for individual payments just after the experiment.

To examine the effect of promises and decision procedures, we conduct four treatments: baseline (B), proposer (P), baseline promise (BP) and proposer promise (PP).

In the baseline treatment (B), each member of the principal group submits a proposal for the transfer w. Collected proposals are communicated to the other group members. Then, the four proposals are separately and randomly voted by all members. If one of the four individual submitted proposals is unanimously accepted, it is the transfer w chosen by the principal group. If there is no consensus after the fifth round, the experiment ends and all the participants receive only the show-up fee. The chosen transfer is communicated to the agent group that chooses with the same procedure the effort level f, which is communicated to the principal group and the game ends.

In the proposer treatment (P), the computer randomly selects a proposer among the four members of the principal group, who submits a proposal for transfer w. The proposer's offer is separately and randomly voted by the other three members. If the submitted proposals is unanimously accepted, it is the transfer chosen by the principal group. In case that there is no consensus after the fifth round, the experiment ends and all the participants receive only the show-

up fee. The chosen transfer is communicated to the agent group that chooses with the same decision procedure with the proposer the effort level f, which is communicated to the principal group and the game ends.

In the baseline promise (BP) and in the proposer promise (PP) treatments, the agent group is allowed to promise an effort level f before the principal group chooses the transfer w. After the principal group has chosen the transfer w, the effort level f, which can be equal or different from the promised one, is chosen by the agent group and the game ends. The intra-group decision procedures in the two promise treatments are, respectively, the same of the baseline (B) and the proposer (P) treatments.

In all treatments, interaction within groups is restricted. Subjects are only allowed to vote the transfer/effort proposals following a computerized random order, without any form of direct or indirect communication. At the beginning of the experiment, participants received a written copy of the instructions and they are asked to follow along as the instructions are read aloud. No reference is provided to the potential strategies for the gift-exchange game. Finally, in order to avoid reputational effects, we underline the fact that each group takes only one decision in this experiment and that there was no further decision or repetition. Total earnings from the experiment and show-up fees are paid privately in cash right after the end of the experiment.

4. Results and discussion

Sessions were conducted at the LabSi Laboratory of the University of Siena between February 2017 and February 2018. Participants were recruited with the software HROOT (Hamburg Registration and Organization Online Tool) (Bock et al., 2014) and all sessions were computerized by using z-Tree software (Zurich Toolbox for Ready-made Economic Experiments) (Fischbacher, 2007). All participants provided consent prior to the start of the experiment and participated in only one session, treatment and role. None of the subjects participated in similar experiments before.

A total of 256 undergraduate students (57% females; median age: 23.14, SD: 3.65) took part in the study (64 subjects for each of the four treatment). Each session lasted about half an hour and each subject earned on average about €7.5, with one experimental point being equivalent to €0.10 and a show-up fee of €5.

Results are analysed using Ri386 3.3.3, developed by the R Foundation for Statistical Computing (R Core Team, 2017). Differences are tested for statistical significance by using a Wilcoxon two-sample test for unpaired observations.

Data comprises 8 experimental sessions for each treatment. Table 2 summarizes the main descriptive results for transfer (w) and effort level (f) by treatment.

Table 2. Transfer w and effort f by treatment

Treatment	N. of Subjects	Transfer w		Effort Level f	
		Mean	std.dev	Mean	std.dev
Baseline (B)	64	56	25	0.11	0.04
Proposer (P)	64	113	81	0.16	0.09
Baseline Promise (BP)	64	124	49	0.35	0.19
Proposer Promise (PP)	64	139	36	0.46	0.28
Total	256	108	59	0.27	0.22

The first result is that promises increase both f and w. When the agent group is allowed to promise an effort level before the principal group's choice (BP and PP treatments), we observe significantly higher effort levels f than B and P treatments ($p <. 01$ and $p < .05$, respectively). Also transfers w increases with promises, though only comparison between BP and B treatments is statistically significant ($p <. 05$).

Table 2 also shows that the presence of proposers increases both transfers and efforts in both treatments, though differences are not statistically significant either for B vs. P ($p = .24$ for f and $p = .21$ for w) or for BP vs. PP ($p = .49$ for f, and $p = .71$ for w).

However, the positive impact of the proposer is corroborated by the analysis of the difference between the chosen effort level f and the promised one. Agent groups choose effort levels nearer to the promised ones in PP than in BP, with the distance between the two statistically significant ($p < .05$) (Table 3 and Figure 1). As tabulated, the promised f is higher in BP than PP which is exactly the opposite of the final effort level f. This additional result suggests that the difference between chosen and promised efforts is reduced by the presence of the proposer, but only for chosen f. In other words, when effort levels remain at promise level, the effect of the proposer is reduced. As a result, possibly social conformity effects may arise from final decisions and particularly when the group has already interacted in some way. This is in line with the idea that belonging to groups increases cooperation and reciprocity.

Table 3. Actual versus promised effort levels by treatment

Treatment	**Chosen f mean(*sd*)**	**Promised f mean(*sd*)**
Baseline Promise (BP)	0.35 *(0.19)*	0.60 *(0.19)*
Proposer Promise (PP)	0.46 *(0.28)*	0.56 *(0.16)*

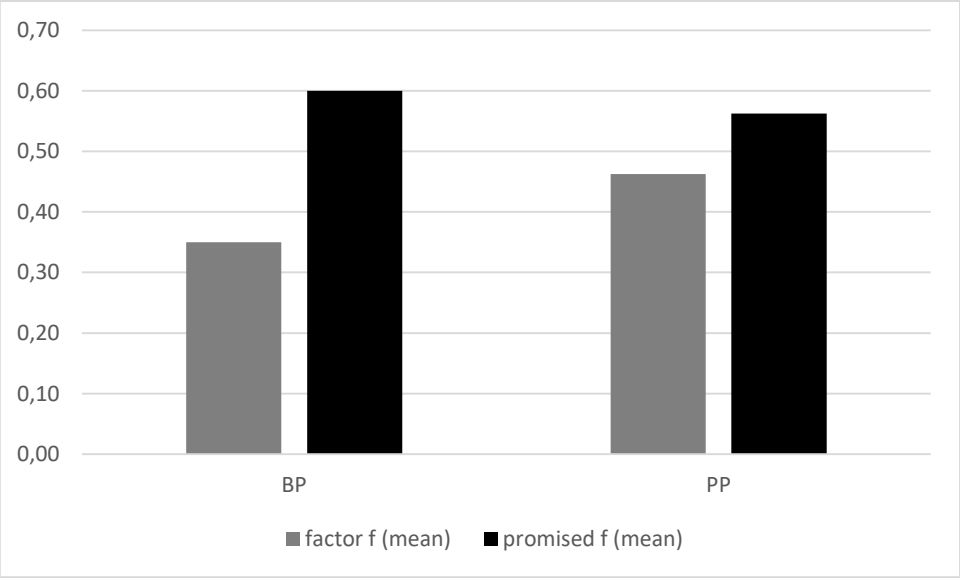

Figure 1. Actual versus promised effort levels by treatment

The joint effect of promises and proposer is the key factor increasing overall efficiency as shown by the analysis of the level of reciprocity, which is greater when higher levels of w are associated with higher levels of f. Figure 2 shows that principal groups reciprocates promises and reciprocity is higher for both promise (BP and PP) than no-promise (B and P, respectively) treatments for each transfer w jointly available. This increase is particularly evident when a proposer is present with or without promises (B vs. P and BP vs. PP).

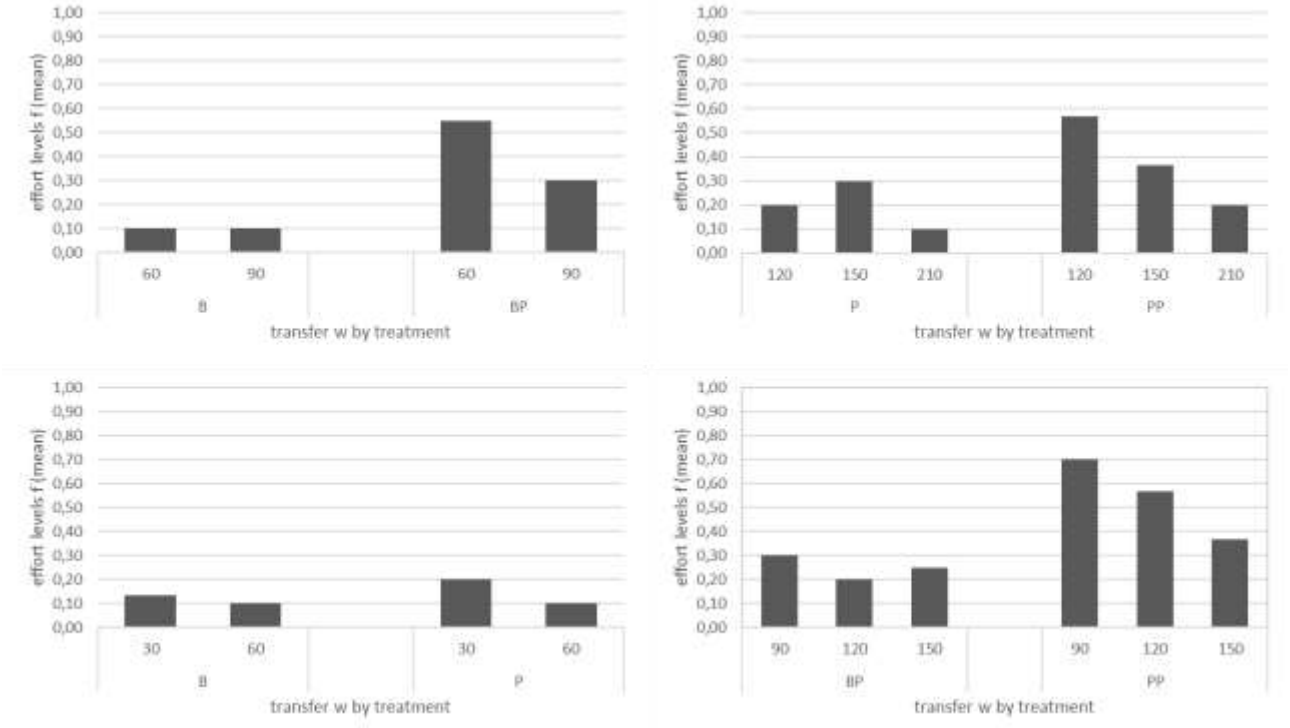

Figure 2. Association between transfers w (absolute values) and effort levels f (mean) by treatment

Average earnings are greater for BP than for B (and the difference is significant for both groups, $p < .05$,) and for PP than for P (that is significant only for the principal group, $p < .1$) (Table 4).

Table 4. Earnings by treatment

Treatment	N. of Subjects	Principal Group Earnings		Agent Group Earnings	
		Mean	std.dev	Mean	std.dev
Baseline (B)	64	12.00	4.28	13.97	6.38
Proposer (P)	64	15.19	9.70	27.66	20.46
Baseline Promise (BP)	64	32.06	19.45	28.31	13.46
Proposer Promise (PP)	64	40.69	27.01	30.38	11.55
Total	256	24.98	20.50	25.08	14.77

Across treatments, procedure of choice also affects the speed of agreement. The number of rounds needed to reach unanimity are increasing in treatments with promises and proposers for both effort levels and transfers (Table 5) to confirm that subjects carefully examine decisions.

Table 5. Number of rounds to reach unanimous agreement by treatment

	Round of unanimous agreement for transfer w					**Round of unanimous agreement for effort f**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Baseline (B)	3	4	1	0	0	7	1	0	0	0
Proposer (P)	2	1	1	4	0	6	1	0	1	0
Baseline Promise (BP)	3	3	0	2	0	3	3	0	2	0
Proposer Promise (PP)	1	2	2	0	3	2	3	0	1	2

The impact of proposers is even more evident in the agents intra-group dynamics. The proposed transfers are greater with the proposer both in the first and in the last round (Table 6). The same applies for efforts, except for the comparison between B versus P, in both rounds, and BP versus PP, in the first round.

Table 6. Round proposals in first and last rounds by treatment

Treatment	First round		Last Round	
	Transfer w mean(*sd*)	**Effort f mean(*sd*)**	**Transfer w mean(*sd*)**	**Effort f mean(*sd*)**
Baseline (B)	86 (59)	0.22 (0.19)	83 (54)	0.22 (0.18)
Proposer (P)	128 (80)	0.14 (0.07)	113 (81)	0.16 (0.09)
Baseline Promise (BP)	132 (77)	0.57 (0.26)	132 (64)	0.39 (0.26)
Proposer Promise (PP)	169 (48)	0.53 (0.14)	139 (36)	0.56 (0.16)

The presence of proposers causes the other group members to agree both on effort levels and on transfers, as if it would trigger a sort of social influence according to which individuals tend to conform to the proposed offer.

To summarize, our main result is that promises reinforce the tendency to cooperate by both types of groups involved in the game. Promises increase significantly the gifts made by agent groups and trigger positive reciprocity by principal groups by enhancing overall efficiency. In our experiment, which is characterized by incomplete contracts, groups behave less opportunistically than rational models usually assume and social interaction lead to cooperative behavior. This finding is made evident by the comparison between treatments although it is more relevant in the baseline treatment. Promises per se act as a powerful tool to prevent group members to behave too selfishly and enhance their tendency to cooperate.

The other distinctive feature of our design, the introduction of the proposer, markedly increases both w and f and makes promised and chosen effort nearer, even if the high volatility in the P treatment affects negatively statistical significance. Actually, proposers act as catalyzers for other group members that chooses higher values of w and f, which is supportive of the effect of conformity on other group members. This pattern of interaction creates a tendency to cooperate and to reciprocate that is typical of processes of social comparison. Once triggered by the proposer, promises causes other individuals to adhere to social norms of cooperation and creates a virtuous effect that reinforces the tendency to increase aggregate efficiency, as it also corroborated by the higher level of reciprocity in PP treatments.

These results raise the question why groups are able to take advantage of promises to behave so efficiently. Charness and Sutter's (2012) survey of group decision-making singles out three factors as explanations for groups outperforming individuals. Groups would be better in a) seeking answers by using multiple brains, b) putting in other people's shoes, and c) behaving less behaviorally and focusing just on payoffs. In our scenario, all these factors do not play a prominent role because group decisions are taken independently and without interaction, discussion is not

allowed and there is not any form of group identity. Moreover, factors inducing promise keeping in individual interaction, such as guilt aversion or mere preference for promise-keeping, does not directly apply to collective decisions. What is reinforced by groups belonging is the consensus-making mechanism (Bornstein and Yaniv, 1998; Song, 2009) through which group members reach a common decision. In our case, the unanimity rule facilitates social influence among group members and make people motivated to perceive themselves as more favourable than what they believe to be the average tendency. As postulated by Social Comparison Theory (Cason and Mui, 1997), intra-group interaction leads to higher reciprocity and socially more desirable behavior. Being engaged in a group decision process makes them to choose more cooperatively even without face-to-face communication or discussion.

5. Conclusions

Since now, experimental literature on group decisions has mostly addressed the research question if decision made by groups differ systematically from the decisions of individuals who include them. The most common result is that groups behave more rationally but also more selfishly than individuals. Our experiment was intended to analyse how promises without explicit interaction or communication affects group decisions. To provide evidence on this issue we test if promises make group decisions more or less efficient in the gift-exchange game in which acting as strictly maximizing decision-makers implies sub-optimal outcomes. We find that groups decisions lead to higher social welfare when agent groups can make promises before playing the game, because they increase agents' effort and principals' reciprocity and consequently aggregate profits. The other element to affect efficiency is the decision procedure, which is a version of the Baron-Ferejohn bargaining model, in which the proposer makes the first promise and the other group members decide unanimously if to accept it or not. The combination of promise and proposer reinforces the inclination to cooperate and to reciprocate.

Our experiment has some limitations and possible extensions. Setting a maximum number of rounds is a termination rule that can have a significant effect on players' behavior, which could be induced to adhere to group decisions for selfish reasons. Another limitation can derive from the even number of group members, that are more likely to reach an agreement the groups with odd members (Luhan et al. 2009). Thus, a natural extension is to study the effect of alternative decision rule and different group sizes. It can also be worthwhile to test if there is difference from the field. As discussed by Gneezy and List (2006), positive reciprocity effects detected in lab experiments can wear off very quickly in the field. For example, Kube et al. (2006) generate longer-term effects

of reciprocity in the field, especially for negative reciprocity. Finally, we expect that the introduction of face-to-face interaction increases group identity and make our findings more robust. We believe that the analysis of the effects of different communication patterns on groups is an important path for future research in order to improve our understanding of groups decision-making.

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Appendix. Sample experimental instructions (translated from Italian) – PP treatment

Instructions Proposer Promise (PP) treatment

Welcome at the experiment and thank you for your participation
Please do not talk to other participants in the experiment from now on

You are about to participate in an experimental study on decision-making. You will earn a show-up fee of 5 Euros just for having participated. Additionally, during the experiment, you can earn a sum of money, whose exact amount depends on the decisions you will make during the experiment. Your total earnings from the experiment and the show-up fee will be paid to you privately and confidentially in cash right after the end of the experiment.

Types of participants
You will be randomly assigned to a group type (A or B) and pairs of A and B groups will be formed randomly as well. Each group will be composed by four members. You will not learn during the experiment nor afterwards, which participant you are paired with. Your identity as well as your decisions will remain completely anonymous.

Initial endowment
Each A group member receives an initial endowment of 480 experimental points. B group members do not receive an initial endowment.

Phases of the experiment
The experiment consists of three phases. In Phase 1, group B takes a decision, whereas, in Phase 2, group A takes a decision. Finally, in Phase 3, group B takes a second decision which can be the same or different than its decision in Phase 1. As a result, group A takes only one decision, whereas group B takes two decisions. After this, there will be no further decision or repetition.

Phase 1: Group B chooses a factor
For each group B, the computer randomly selects a proposer among the four members of the group. The proposer submits a factor f. The factor f must come from the range 0.1 to 1.0 and can only be determined in steps of 0.1. This means that only the values 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 and 1.0 are feasible. The factor f is important for the final earning of group A. At the same time, it causes a cost c(f) for group B. As displayed in Table 1, the higher the chosen factor, the higher the costs for group B.

Table 1. Factor f and cost c(f) for group B

f	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
c(f)	0	3	6	12	18	24	30	36	45	54

The proposer's factor f is communicated to the other group B members. Then, the proposal is separately and randomly voted by the other three members. If the submitted proposer's factor is unanimously accepted, that proposal is the factor f chosen by group B and the first phase is completed; otherwise, there will be a second round. In the second round, the proposer submits another proposal for factor f (the proposal can be the same as the previous round). Again, the submitted proposer's factor is separately and randomly voted by the other three members. If the submitted proposer's factor is unanimously accepted, the first phase is completed; otherwise, there will be a third round. Group members have up to five rounds to reach unanimity on their proposer's factor. In case that there is no consensus on group B factor after the fifth round, the experiment ends and the participants only receive the show-up fee.

The factor f, which is selected in this phase, can be the same or different than group B decision in phase 1.

Phase 2: Group A chooses a transfer

Group A is informed about the factor f selected by their paired group B in phase 1 (this factor f can be the same or different than group B decision in phase 3). Then, for each group A, the computer randomly selects a proposer among the four members of the group. The proposer submits a transfer w. This transfer determines how many experimental points of the initial endowment of group A is transferred to group B after phase 2. The transfer chosen by group A must be between 30 and 300 and can only be determined in steps of 10. This means that only the values 30, 60, 90, 120, 150, 180, 210, 240, 270 and 300 are feasible.

The proposer's transfer w is communicated to the other group A members. Then, the proposal is separately and randomly voted by the other three members. If the submitted proposer's transfer is unanimously accepted, group B receives that selected transfer w and the second phase is completed; otherwise, there will be a second round. In the second round, the proposer submits another proposal for transfer w (the proposal can be the same as the previous round). Again, the proposer's transfer w is separately and randomly voted by the other three members. If the submitted proposer's transfer is unanimously accepted, the second phase is completed; otherwise, there will be a third round. Group members have up to five rounds to reach unanimity on their proposer's transfer. In case that there is no consensus on group A transfer after the fifth round, the experiment ends and the participants only receive the show-up fee.

Phase 3: Group B chooses a factor

Group B is informed about the transfer w selected by their paired group A in phase 2. Then, group B chooses a factor f, which can be the same or different than its decision in phase 1. Again, the factor f must come from the range 0.1 to 1.0 and can only be determined in steps of 0.1. This means that only the values 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 and 1.0 are feasible. The factor f is important for the final earning of group A. At the same time, it causes a cost c(f) for group B. As displayed in Table 1 (above), the higher the chosen factor, the higher the costs for group B.

For each group B, the computer randomly selects a proposer among the four members of the group. The proposer submits a factor f, which can be the same or different than group B decision in phase 1. The proposer's factor f is communicated to the other group B members. Then, the proposal is separately and randomly voted by the other three members. If the submitted proposer's factor is unanimously accepted, that proposal is the factor f chosen by group B and the third phase is completed; otherwise, there will be a second round. In the second round, the proposer submits another proposal for factor f (the proposal can be the same as the previous round). Again, the submitted proposer's factor is separately and randomly voted by the other three members. If the submitted proposer's factor is unanimously accepted, the third phase is completed; otherwise, there will be a third round. Group members have up to five rounds to reach unanimity on their proposer's factor. In case that there is no consensus on group B factor after the fifth round, the experiment ends and the participants only receive the show-up fee.

Results and earnings

The results in experimental points after the two phases will be calculated according to the following rules:

- for the result of group A, its initial endowment (480 experimental points), the chosen transfer w and the factor f that is chosen in phase 3 by group B are relevant. To arrive at the resulting experimental points, the difference between the initial endowment and the transfer has to be

multiplied by the factor chosen in phase 3. The experimental points will be then equally divided among the four group members. Mathematically,

$$\textbf{Result for each group A member in experimental points} = \frac{(480 - w) * f}{4}$$

- for the result of group B, the transfer from group A and the cost of the chosen factor f are relevant. To arrive at the resulting experimental points, one has to calculate the difference between the transfer w and the costs c(f). The experimental points will be then equally divided among the four group members. Mathematically,

$$\textbf{Result for each group B member in experimental points} = \frac{w - c(f)}{4}$$

The result in experimental points will be converted to Euros according to the following conversion rate:

1 experimental point = 0.10 Eurocents

Total earnings of every participant consist of the results converted to Euros and the show-up fee.

Summary

Group B proposer submits in phase 1 a factor f between 0.1 and 1.0. Each factor is associated with a cost c(f) (Table 1). The submitted proposer's factor f is separately and randomly voted by the other three members. Group members have up to five rounds to reach unanimity on their proposer's factor. If one of the submitted proposer's factor is unanimously accepted, that proposal is the factor f chosen by group B and the first phase is completed.

Group A proposer submits in phase 2 a transfer between 30 and 300. The submitted proposer's transfer w is separately and randomly voted by the other three members. Group members have up to five rounds to reach unanimity on their proposer's transfer. If one of the submitted proposer's transfer is unanimously accepted, group B receives that selected transfer w and the second phase is completed.

Group B proposer submits in phase 3 a factor f between 0.1 and 1.0. The factor f can be the same or different than group B decision in phase 1. Each factor is associated with a cost c(f) (Table 1). The submitted proposer's factor f is separately and randomly voted by the other three members. Group members have up to five rounds to reach unanimity on their proposer's factor. If one of the submitted proposer's factor is unanimously accepted, that proposal is the factor f chosen by group B and the third phase is completed.

The result of group A depends on the chosen transfer w and the factor f that is determined by group B in phase 3. The result of group B depends on the transfer w from group A and the cost of the chosen factor f in phase 3. The group result in experimental points will divided equally among the four group members and it will be converted to Euros at the end of the experiment.

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