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A hybrid game with conditional and unconditional veto power

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Abstract

In the hybrid game, one proposer confronts two responders with veto power: one responder can condition his decisions on his own offer but the other cannot. We vary what the informed responder knows about the offers as well as the uninformed responder's conflict payoff. Neither variation affects behavior: proposers always favor informed responders, who frequently accept minimal offers.

Keywords: Ultimatum; Yes/No game

JEL Classification: C72; C92

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1 Introduction

Establishing and maintaining a joint venture often requires the agreement of insiders, who are better informed, and outsiders, who find it difficult to judge how much they can gain compared to insiders. The game we study captures this situation by relying on ultimatum bargaining so that our experimental results can be related to the existing extensive literature.

The hybrid game features one proposer (X) and two responders (Y and Z). The proposer suggests how to divide a monetary pie between himself, Y, and Z. Each responder votes for or against the proposal, where voting for (against) the proposal will be referred to as 'acceptance' ('rejection'). The proposal is implemented when both responders accept. Responder Y, like in an ultimatum game (UG), knows his offer before voting on X's proposal. Conversely, responder Z, like in a "Yes or No-game"(Y/N), does not know his offer when deciding between acceptance and rejection. By experimentally implementing the hybrid game we can investigate (i) whether the proposer aims at a power coalition with the informed responder Y by offering him more than what he offers to Z, (ii) whether Y's vote depends only on his own offer or on both offers, and (iii) whether Z always accepts, thus "buying a pig in a poke" (Gehrig et al. 2007), even when he expects to get less than the informed responder. We answer these questions by running treatments differing in whether or not Y knows the offer to Z, and whether Z's conflict payoff is nil or positive.

A few experiments extend the UG to more than two players, mostly including a dummy (see the recent review by Güth and Kocher forthcoming). Closest to our study, Riedl and Výrasteková (2003) consider a three-person UG with two responders, varying one responder's payoff when the other rejects. We complement this literature by considering hybrid game experiments involving an informed (or UG) responder as well as an uninformed (or Y/N) responder who, by accepting, "buys a pig in a poke" .

2 Experimental design and procedures

The experiment was programmed in Fischbacher's (2007) z-Tree and conducted in the laboratory of the Max-Planck Institute of Economics in Jena. Participants were undergraduate students from Jena University. After being seated at separate computer terminals, they received written instructions (reported in the Appendix). The experiment started after each participant had correctly answered 4 control questions and experienced 1 practice trial.

Overall, we conducted 11 sessions. In each session, it is common knowledge that a triple—X, Y, and Z—can share 120 ECU (with 10 ECU = €3). The decision process is as follows. X proposes an assignment (x, y, z), with $x, y, z > 0$ and $x + y + z = 120$, suggesting x to himself, y to Y, and z to Z. Responder Y indicates for each possible proposal whether he accepts or rejects it. Responder Z decides between acceptance and rejection without knowing X's proposal, but being aware of the pie size. If both responders accept, earnings correspond to the proposal. Otherwise, conflict payoffs result. Since we employ the strategy method for Y and want to limit the number of Y's decisions, we impose $y, z \in \{10, 20, 30, 40, 50\}$.

After choices are made and before giving any feedback, we elicit beliefs about others' behavior. Beliefs are incentivized by paying €1 for each correct guess.

What Y knows about the proposal when deciding as well as what Z earns in case of conflict depends on the treatment. In the baseline, with full-information (FI) and nil-conflict payoffs (nC), Y knows the entire assignment (x, y, z), and rejection by at least one responder yields 0-payoffs to all. To investigate how behavior changes when not informing Y about z, we run the partial information/nil-conflict payoffs (PI-nC) treatment where Y knows only y. To assess the effect of a positive conflict payoff to Z, we implement the FI-C treatment where (differently from the baseline) Z earns a positive conflict payoff (15 ECU). This renders the hybrid game a social dilemma game: under common knowledge of selfishness, Z expects the lowest offer ($z = 10$) and, because his conflict payoff is higher, he opts for rejection.

Table 1 summarizes the characteristics of the treatments as well as the numbers of participants and groups per treatment. Each participant was exposed to one treatment only.

Each session lasted about 60 minutes. Average earnings (including a €2.50 show-up fee) were €20.95, €12.20, and €10.80 for X, Y, and Z, respectively.

Table 1: Treatments

Treatment	Y knows z	Conflict payoffs	Participants	Groups
FI-nC	yes	(0, 0, 0)	114	38
PI-nC	no	(0, 0, 0)	87	29
FI-C	yes	(0, 0, 15)	111	37

Table 2: Average allocations per treatment (standard deviations in parentheses)

	FI-nC	PI-nC	FI-C
x	66.32 (19.62)	63.11 (19.66)	62.43 (19.06)
y	30.00 (10.13)	32.41 (9.12)	31.35 (10.58)
z	23.68 (11.72)	24.48 (12.70)	26.22 (11.14)

3 Proposer behavior

Table 2 and Figure 1 summarize allocation proposals. On average, proposers keep slightly more than half of the pie in all treatments although the equal split $(40, 40, 40)$ is always the mode (23.68% in FI-nC, 27.59% in PI-nC, 27.03% in FI-C). In all treatments the second most frequent proposal is $(60, 30, 30)$ which, in FI-nC, is as frequent as $(70, 30, 20)$ and $(90, 20, 10)$. In the baseline treatment, X does not seem to fear rejection from Y as long as y, though low, exceeds z. The elicited expectations confirm that all 38 proposers in FI-nC expect their own proposal to be accepted by Y.[1] The game theoretic solution $(100, 10, 10)$ is rarely observed (7.89% in FI-nC, 6.90% in PI-nC, and 10.81% in FI-C).

Figure 2 illustrates the distributions of offers to each responder separately. The modal offer to Y (top panes) is 40 in all treatments. Although $y = 20$ is less frequent in PI-nC and FI-C than in FI-nC, Fisher exact tests fail to reject the hypothesis that y-allocations differ between treatments (p-value ≥ 0.548 for both FI-nC vs. PI-nC and FI-nC vs. FI-C). The modal offer to Z (bottom panes) is 10 when conflict payoffs are 0 (FI-nC and PI-

[1] The same holds in the other two treatments where all proposers (but one in FI-C) expect Y to accept their offer.

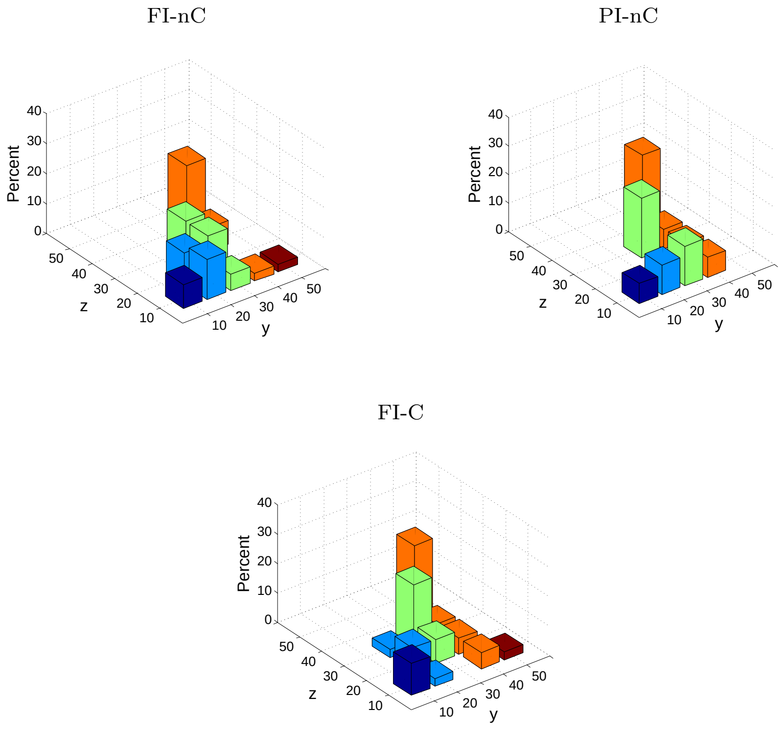

Figure 1: Distributions of X's offers.

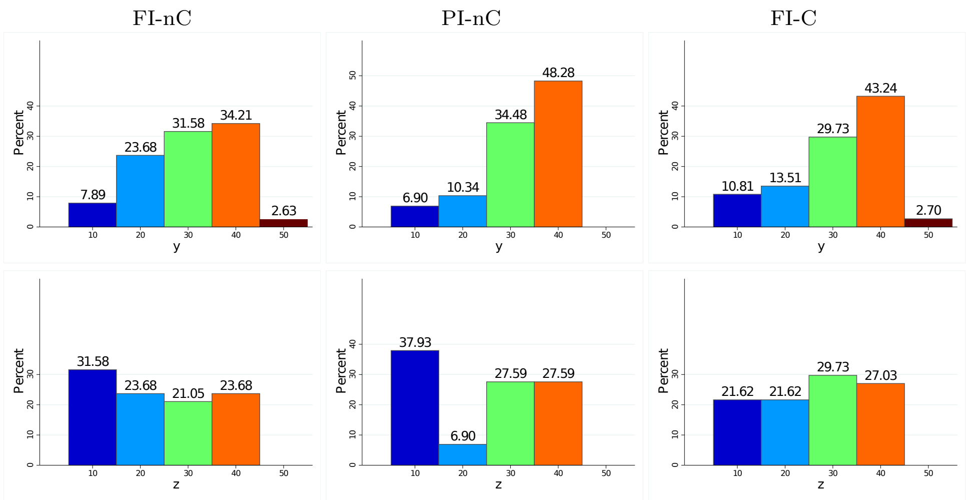

Figure 2: Distributions of offers to Y and Z.

nC), whereas it is 30 when Z has a positive conflict payoff (FI-C). However, according to a Fisher exact test the differences in z between treatments are insignificant (p-value ≥ 0.339 for both comparisons).

These findings indicate that X's behavior does not depend on whether Y knows the entire allocation or only his own share, nor on Z's conflict payoff. Rather, (two-sided) Wilcoxon signed-rank tests show that in all treatments X gives significantly more to Y than to Z (p-value ≤ 0.004 always).

4 Y-responder behavior

Figure 3 illustrates the ultimatum responders' average acceptance rates in each treatment. Starting with the treatments where Y can condition on both y and z, the two top graphs show that, for any given z, Y's acceptance rates increase monotonically in y. The equal split is always accepted. On average, more than 55% of Y-responders accept minimal offers of 10 and 20.

For constant own offers $y > 10$, acceptance rates tend to be inverse U-shaped: they increase in z for $z \leq y$, and decrease in z for $z > y$. A series of pairwise Wilcoxon signed-rank tests show that in FI-nC, for $y = 30$, 40, 50, acceptance rates are significantly higher when $z \geq 20$ than when $z = 10$ (all p-values ≤ 0.045). The same pairwise comparisons in FI-C are significant at the 10% level, except when $y = 40$ or 50 and $z = 20$. These results suggest that Y-responders condition their decisions on the share offered to Z. Additionally, this does not depend on Z's conflict payoff being 0 or 15: (two-sided) Wilcoxon rank-sum tests reveal that there is no significant difference in acceptance rates between FI-nC and FI-C for basically each possible offer (all p-values > 0.289, except for the offer assigning 50 to Y and 20 to Z yielding p-value $= 0.04$).

Turning to the treatment where Y learns only y, the bottom graph of Figure 3 shows that, while offers $y \geq 30$ are always accepted, $y = 10$ and $y = 20$ are accepted significantly less often.[2] It is worthy of note that low offers are more frequently accepted in PI-nC than in FI-nC.

The average expected allocations of Y-responders are (66.32, 29.21, 24.27), (70.34, 26.21, 23.45) and (67.30, 28.11, 24.59) in FI-nC, PI-nC, and FI-C,

[2] According to paired tests of proportions, the difference in acceptance rates between $y = 10$ and $y = 20$ is significant at the 5% level; so it is the difference between $y = 20$ and $y = 30$.

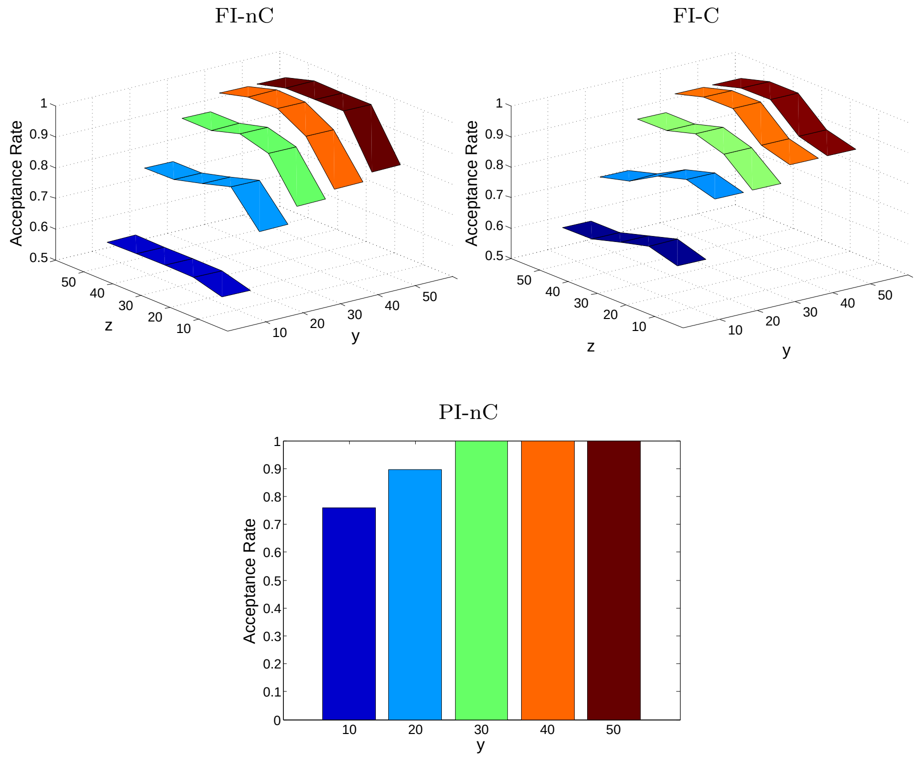

Figure 3: Y-responders' acceptance rates.

respectively, which are close to the average actual allocations. Thus, Y-responders anticipate that X offers more to them than to Z. Moreover, in all treatments, almost all Y-responders expect Z to accept (97.37% in FI-nC, 100% in PI-nC, 89.19% in FI-C).

5 Z-responder behavior

Only 1 out of 38 (29) Z-responders rejects in FI-nC (PI-nC). Notwithstanding the social dilemma, all 37 Z-responders accept in FI-C. On average, Z-responders expect X to propose (68.84, 28.95, 24.21) in FI-nC, (66.90, 31.03, 22.07) in PI-nC, and (67.03, 28.92, 24.05) in FI-C. All expected allocations are in line with those actually proposed. Except for two Z-responders in FI-C, all others expect Y to accept X's offer. In sum, Z-responders "buy the pig in the poke" although they rightly expect to be assigned the lowest share of the pie.

6 Conclusions

The experimental implementation of the hybrid game (where one of two responders has unconditional veto power) revealed interesting behavioral regularities. First, in line with Gehrig et al. (2007), Y/N responders with unconditional veto power almost never reject, even though they expect meager offers. Surprisingly, universal acceptance is observed also when the Y/N responder's positive conflict payoff triggers a social dilemma. Second, in contrast to standard ultimatum experiments, ultimatum responders frequently accept low offers, and acceptance rates are generally very high. In particular, acceptance rates increase in own offers and are inverse U-shaped in what is offered to the other responder. Third, proposers demand, on average, more than half of the pie as if anticipating the unusually high acceptance rates of low offers by ultimatum responders.

We can think of at least two explanations for the exceptionally high ultimatum responders' acceptance rates. First, "let-down-aversion": ultimatum responders think that all Y/N responders expect them to accept, and thus refrain from rejecting low offers because they may suffer more from disappointing the other responder than from accepting a greedy proposal. Second, "solidarity toward the defenseless partner": ultimatum responders anticipate acceptance by Y/N responders, and thus refrain from rejecting low offers because rejection would cause the fellow member, otherwise willing to "buy a pig in the poke", to end up with conflict payoffs.

Our hybrid game casts doubts on some very 'robust' results from the ultimatum game, and illustrates the importance of enriching the standard game to either confirm previous findings or detect new behavioral patterns.

Appendix. Experimental instructions

This appendix reports the instructions (originally in German) that we used for the FI-nC treatment. The instructions for the other treatments were adapted accordingly.

INSTRUCTIONS

Welcome! You are about to participate in an experiment funded by the Max Planck Institute of Economics. Please switch off your mobile and remain quiet. It is strictly forbidden to talk to the other participants during the experiment. It is very important that you follow these rules. Otherwise we must exclude you from the experiment and from all payments. Please read the instructions which are identical for all participants carefully. Whenever you have a question or a concern, please raise your hand and one of the experimenters will come to your aid.

You will receive €2.50 for participating in this experiment. Beyond this you can earn more money, depending partly on the decisions that you take during the experiment and partly on the decisions of other participants. The show-up fee and any additional amounts of money you may earn will be paid to you in cash at the end of the experiment. Payments are carried out privately, i.e., with the others unaware of the extent of your earnings. During the experiment we shall speak of ECUs (Experimental Currency Unit) rather than euros. The conversion rate between them is 10 ECUs = 3 euro.

Detailed information on the experiment

In this experiment you will be placed in a group of three people (a triple). You and the other two participants will interact just once. Each one of you will be randomly assigned to one of three roles: X, Y, or Z. Your role will be told to you at the beginning of the experiment. Each triple can share 120 ECUs.

Role X

X has the right to propose the distribution of the 120 ECUs. In particular, X chooses the distribution (x, y, z) meaning that X wants to keep x ECUs for him/herself and to give y ECUs and z ECUs to Y and Z, respectively. More specifically, X can choose any of the 25 distributions reported in the table below by clicking on the corresponding box. When a cell is selected, the program automatically reports, below the table, the amount X is deciding to keep for him/herself.

y \ z	10	20	30	40	50
10	○	○	○	○	○
20	○	○	○	○	○
30	○	○	○	○	○
40	○	○	○	○	○
50	○	○	○	○	○

In this case, X keeps for him/herself: $120 - y - z$

Consider, for instance, the first row of the table (where $y = 10$). If X checks the first cell in this row, i.e., $y = 10$ and $z = 10$, X chooses to give 10 ECUs to Y and 10 ECUs to Z and to keep $120-10-10 = 100$ ECUs for him/herself. Similarly, consider the last row of the table (where $y = 50$). If X checks the last cell in this row, i.e., $y = 50$ and $z = 50$, X chooses to give 50 ECUs to Y and 50 ECUs to Z and to keep $120-50-50 = 20$ ECUs for him/herself.

Role Y

Y must decide for each possible distribution of the 120 ECUs, if (s)he accepts or rejects it. Thus, Y will face the following table:

y \ z	10	20	30	40	50
10	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject
20	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject
30	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject
40	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject
50	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject	○ Accept ○ Reject

For each possible distribution of the 120 ECUs, Y must specify if (s)he accepts or rejects it by clicking on the corresponding box (thus Y is required to make 25 decisions). For example, clicking on "Accept" in the first cell of the first row, Y states that (s)he is willing to accept a distribution where (s)he gets 10 ECUs, Z gets 10 ECUs, and X gets $120 - 10 - 10 = 100$ ECUs. Similarly, clicking on "Reject" in the second cell of the first row, Y states that (s)he rejects a distribution where (s)he gets 10 ECUs, Z gets 20 ECUs, and X gets $120 - 10 - 20 = 90$ ECUs.

Role Z

Without knowing which one of the 25 possible proposals X has chosen, Z must accept or reject it. Thus, Z will have to choose one of the following two options by clicking on the corresponding box:

○ Accept ○ Reject

Your experimental payoff

After X, Y, and Z have made their choices, their profit is determined as follows:

- If both Y and Z have accepted the distribution X has actually chosen, then each member of the triple gets what X has proposed, i.e., X earns $x = 120 - y - z$, Y earns y, and Z gets z.
- If either Y or Z (or both) has rejected the distribution X has actually chosen, then each member of the triple gets nothing.

Your final payoff

At the end of the experiment, your experimental payoff will be converted into euros and paid to you in cash, together with the show-up fee of €2.50. In other words, X will collect in cash the amount x + €2.50, Y the amount y + €2.50, and Z the amount z + €2.50 if both Y and Z have accepted X's proposal. Otherwise, everybody will collect only €2.50.

Before the experiment starts, you will have to answer some control questions to ensure your understanding of the rules of the experiment. Once everybody has answered all questions correctly, the experiment will start. One practice round will be held so that you may familiarize yourself with the experimental setup. Your choice in this round will NOT be relevant for your final payoff.

Please remain quietly seated during the whole experiment. If you have any questions, please raise your hand now. When you have finished reading the instructions and if there are no questions, please click "OK" on your computer screen.

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