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Revealed distributional preferences: Individuals vs. teams☆,☆☆

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ABSTRACT

We compare experimentally the revealed distributional preferences of individuals and teams in allocation tasks. We find that teams are significantly more benevolent than individuals in the domain of disadvantageous inequality while the benevolence in the domain of advantageous inequality is similar across decision makers. A consequence for the frequency of preference types is that while a substantial fraction of individuals is classified as inequality averse, this type disappears completely in teams. Spiteful types are markedly more frequent among individuals than among teams. On the other hand, by far more teams than individuals are classified as efficiency lovers.

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1. Introduction

Small group or small team decision making is ubiquitous. Boards decide on monetary policies and corporate strategies, families decide on holidays and purchases, governments decide on economic policies, and teams in trade unions and in companies shape wage negotiations. Some teams have a hierarchical structure, others aggregate preferences in a setting in which all team members are equal ex ante. For reasons of parsimony we focus on the latter case, as do most contributions to the quickly growing literature on differences in decision making between individuals and small teams (cf., Charness and Sutter, 2012 or Kugler et al., 2012, for instance). Teams with ex ante equal members that aggregate preferences to a single decision and do not face an internal conflict of interest in material terms are called unitary groups or *unitary teams*.[1]

Many decisions in unitary teams concern the distribution of an amount of money or some other resource between the team and another team or individual. In such decisions, the theoretical prediction for own-money maximizing team members is trivial. As soon as team members exhibit heterogeneous social preferences, however, the aggregation of these preferences into a joint team decision becomes relevant. The vast majority of the existing literature in economics infers results on the aggregation of social preferences within teams from the behavior of individuals in interactive games (e.g., Bornstein and Yaniv, 1998; Cox, 2002; Bornstein et al., 2004; Kugler et al., 2007). The general finding is that team decisions are closer to the rational own-money maximizing prediction than individual decisions. However, there is also a small number of results with the opposite finding of less selfish team decisions (e.g., Kocher and Sutter, 2007; Müller and Tan, 2013).

In games, (bounded) rationality, other-regarding preferences and beliefs (about the behavior, the expectations or the types of others) are often hard to disentangle. Hence, one has to be cautious in over-interpreting the above results when the intention is to study the aggregation of social preferences in small teams. To the best of our knowledge, only two papers use the simplest possible allocation task – the dictator game – to assess the differences between team and individual decisions. Cason and Mui (1997) do not find a significant difference between two-person teams and individuals (but report more other-regarding team choices when team members differ in their individual dictator game choices). Also using a dictator game, but with teams of three persons, Luhan et al. (2009) find that teams behave more selfishly than individuals. Given the inconclusiveness of existing results, additional evidence on the aggregation of social preferences within small teams seems desirable.

Furthermore, while the dictator game is a good starting point for establishing differences in social preferences between individuals and teams and for analyzing the aggregation of individual preferences in teams, it is not suitable to distinguish between different individual motivations for pro-social behavior and it gives no information on the presence of anti-social motives. There is good reason to believe – if one takes a closer look at some of the results in the literature on team decisions in interactive games (Charness and Sutter, 2012; Kugler et al., 2012) – that one should distinguish between different motivations. In particular, efficiency orientation seems to be amplified in team decision making, whereas inequality-averse choices seem to be less prevalent among teams than among individuals. Also, it seems important to find out whether teams and individuals differ in the relative frequency of anti-social motivations. It is exactly this disentangling of different motivations for pro-social behavior and the elicitation of anti-social motives of small teams vs. individual decision makers that is the object of interest in the current paper.

More specifically, we provide evidence from a controlled laboratory experiment, in which we use the double price-list technique developed by Kerschbamer (2013) to elicit the distributional preferences of subjects under two different decision-making regimes: an individual regime, in which subjects make their allocation decisions independently and in which each choice has consequences for the decision maker and one passive agent; and a team regime in which subjects assigned to groups of three must reach their allocation decisions unanimously with the help of communication and in which each choice has consequences for each group member and each member of a passive group. We employ a mixed within- and between-subjects design in two sets of sessions run in two consecutive weeks. In the first week all subjects are exposed to the individual regime. In the second week some subjects are again exposed to the individual regime, while the rest make their choices in the team regime. This design feature allows us to address the question how the revealed distributional preferences of individual team members (in the individual regime in week 1) translate into 'team preferences' (in the team regime in week 2). It also allows us to test whether individual choices in the allocation tasks remain stable over time – which turns out to be the case – and whether the randomization of the assignment of subjects to the individual and the team regime in week 2 was successful – which it was.

Our main finding is that the decision-making regime, i.e., whether decisions are made by individuals or by teams, has an economically strong and statistically significant impact on revealed distributional preferences in the allocation tasks. In other words, the type of the decision maker – individual or team – matters in the context of allocation decisions. In particular, teams are significantly more benevolent than individuals in the domain of disadvantageous inequality – that is, in decision making environments where the peer is ahead – while benevolence in the domain of advantageous inequality is similar across decision-making regimes. A consequence for the frequency of preference types is that, while a substantial fraction (15%) of individuals are classified as inequality averse, this type disappears completely in the case of team decision making. Spiteful types are also markedly more frequent among individuals than among teams. On the other hand, by far more teams

[1] The two terms are sometimes used interchangeably in the literature, sometimes not. We stick to the term "team" in the following.

than individuals are classified as efficiency lovers. The fact that team decision making results in a very high proportion (over 90%) of choices consistent with a taste for efficiency and at the same time eliminates choices consistent with inequality aversion, is in our view the single most interesting result of this study. It confirms the ad-hoc hypothesis from previous experiments that could, however, not rigorously test for specific individual motivations.

Motivated by the strong differences in the choices of individuals and teams, we open the 'black box' of decision making within teams to gain some insights into the process that aggregates individual preferences into team choices. Our two main findings in this respect are, first, that efficiency lovers – and, more generally, subjects with a positive benevolence in the domain of disadvantageous inequality – are, ceteris paribus, more assertive, in the sense that they are generally more successful in getting their team to adopt their preferred choices. And, second, as a content analysis of the chat logs reveals, certain types of arguments are significantly more – or less – persuasive than others during the team's communication. For instance, appeals to own income maximization are, somewhat surprisingly, detrimental to assertiveness, as are arguments in favor of strong altruistic behavior (that is, giving up own income to help the others).

The rest of the paper is organized as follows. Section 2 provides some details on the technique that we use for the elicitation of distributional preferences, as well as on the specifics of our design. Section 3 presents our findings regarding revealed distributional preferences of individuals and teams and the differences between the two. Section 4 focuses on decision making at the team level and Section 5 concludes the paper.

2. Experimental design

2.1. Elicitation of distributional preferences

The elicitation of distributional preferences is based on the methodology developed by Kerschbamer (2013). This procedure exposes subjects to a series of binary choices between allocations that involve an own payoff for the decision maker (individual or team) and a payoff for a randomly matched anonymous second entity, the passive agent (individual or team). In each of the binary decision problems one of the two allocations is symmetric (i.e., egalitarian – involving equal payoffs for the two agents) while the other one is asymmetric (involving unequal payoffs for the two agents). In half of the problems the asymmetric allocation is such that the decision maker is ahead, in the other half it is such that the decision maker is behind the passive agent in monetary terms. For both cases the test systematically varies the price of giving (or taking) by increasing the own material payoff of the decision maker in the asymmetric allocation while keeping the other payoffs constant.

We used the ten-items version of the procedure displayed in Table 1. With our parameterization the egalitarian allocation gives 20 points to both agents, at the exchange rate of 20 Euro-Cents per point (i.e., 5 points = 1 Euro). In five of the ten binary choices – labeled in Table 1 (but not in the experimental instructions) as *disadvantageous inequality block* (*DIB*) – the payoff of the passive agent in the asymmetric allocation is 30 points while the payoff of the decision maker increases from one choice to the next from 15 points in the first choice task to 25 points in the last one. In the other five binary choices – the *advantageous inequality block* (*AIB*) – the payoff of the passive agent in the asymmetric allocation is ten points while the rest is exactly as in the DIB – that is, the payoff of the decision maker in the asymmetric allocation increases again from one choice to the next from 15 points to 25 points.

Given this design, in each of the two blocks a rational decision maker switches at most once from the symmetric to the asymmetric allocation (and never in the other direction) and the switch points in the two blocks are informative about the

Table 1
Choices in the distributional-preferences elicitation task.

Disadvantageous inequality block (DIB)				
Left		Your choice (please mark)	Right	
You get	Passive agent gets		You get	Passive agent gets
15 points	30 points	Left ○○ Right	20 points	20 points
19 points	30 points	Left ○○ Right	20 points	20 points
20 points	30 points	Left ○○ Right	20 points	20 points
21 points	30 points	Left ○○ Right	20 points	20 points
25 points	30 points	Left ○○ Right	20 points	20 points
Advantageous inequality block (AIB)				
Left		Your choice (please mark)	Right	
You get	Passive agent gets		You get	Passive agent gets
15 points	10 points	Left ○○ Right	20 points	20 points
19 points	10 points	Left ○○ Right	20 points	20 points
20 points	10 points	Left ○○ Right	20 points	20 points
21 points	10 points	Left ○○ Right	20 points	20 points
25 points	10 points	Left ○○ Right	20 points	20 points

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Table 2
Choices in the elicitation task and revealed WTP.

Disadvantageous inequality block (DIB)					
In the DIB subject chooses LEFT for the first time in row	WTP^d			Proxy for WTP^d used	Counted as
1	+0.5	$\leq WTP^d$		+0.5	Benevolent
2	+0.1	$\leq WTP^d <$	+0.5	+0.3	Benevolent
3	+0.0	$\leq WTP^d <$	+0.1	+0.05	Benevolent
4	−0.1	$\leq WTP^d <$	−0.0	−0.05	Malevolent
5	−0.5	$\leq WTP^d <$	−0.1	−0.3	Malevolent
Never		$WTP^d <$	−0.5	−0.5	Malevolent

Advantageous inequality block (AIB)					
In the AIB subject chooses LEFT for the first time in row	WTP^a			Proxy for WTP^a used	Counted as
1		$WTP^a \leq$	−0.5	−0.5	Malevolent
2	−0.5	$< WTP^a \leq$	−0.1	−0.3	Malevolent
3	−0.1	$< WTP^a \leq$	−0.0	−0.05	Malevolent
4	+0.0	$< WTP^a \leq$	+0.1	+0.05	Benevolent
5	+0.1	$< WTP^a \leq$	0.5	+0.3	Benevolent
Never	+0.5	$< WTP^a$		+0.5	Benevolent

WTP^d for $WPT^d > 0$: $|WTP^d|$ = amount of own material payoff the decision maker is willing to give up in the domain of disadvantageous inequality in order to *increase* the other's material payoff by one unit.
WTP^d for $WPT^d < 0$: $|WTP^d|$ = amount of own material payoff the decision maker is willing to give up in the domain of disadvantageous inequality in order to *decrease* the other's material payoff by one unit (in this interpretation inequalities need to be reversed; for instance, subjects who never switch in the DIB reveal that they are willing to give up at least 50 Cents of their own income to decrease the income of the other player by 1 Euro).
WTP^a defined analogously for the domain of advantageous inequality,

decision maker's archetype and intensity of distributional preferences.[2] Specifically, when faced with the five binary choices in the disadvantageous inequality block (DIB), a rational decision maker who decides for the asymmetric allocation already in the first choice task reveals that he is benevolent in the domain of disadvantageous inequality. Why? Because he is willing to give up own material income to increase the material payoff of the passive agent. Specifically, the decision maker is willing to give up at least five points to increase the material payoff of the passive agent by ten points. In Table 2 we record this as "$WTP^d \geq 0.5$", since this choice pattern reveals that in the domain of disadvantageous inequality the decision maker is willing to give up at least half a point in order to increase the other's material payoff by one point. Here, WTP stands for "willingness to pay" (for an income increase of the passive agent), and the superscript indicates the domain (d stands for disadvantageous and a for advantageous inequality). By contrast, a rational decision maker who decides for the asymmetric allocation for the first time in the fourth choice or later (or chooses the egalitarian allocation throughout the DIB) reveals malevolence in the domain of disadvantageous inequality. Strict malevolence means that the decision maker is willing to give up own income to decrease the material payoff of the passive agent – in Table 2 strict malevolence manifests itself in a negative WTP. For instance, the entry "WTPd < −0.5" in the sixth row of the DIB of Table 2 means that the decision maker is willing to give up at least five points to decrease the material payoff of the passive agent by ten points. This is inferred from the choice of the symmetric allocation (yielding twenty points for both agents) in the last row of the DIB of Table 1 where the asymmetric allocation would have implied a payoff of 25 points for the decision maker and a payoff of 30 points for the passive agent. Note that we count the absence of benevolence as weak malevolence ($WTP^d = -0.0$) and the absence of malevolence as weak benevolence ($WTP^d = +0.0$). That is, a decision maker who decides for the symmetric allocation in the first two choice tasks of the DIB and for the asymmetric allocation in the other three choice tasks is classified as benevolent, while a decision maker who decides for the asymmetric allocation for the first time in the fourth row is classified as malevolent. This is so because the former decision maker could have decreased the income of the passive agent at no cost (by switching later) but decided not to do so, while the latter could have increased the income of the passive agent at no cost (by switching earlier) but decided not to do so.

Turning to the binary decisions in the advantageous inequality block (AIB), a rational subject who is (at least weakly) benevolent in the domain of advantageous inequality decides for the asymmetric allocation for the first time in the fourth choice or later, while switching earlier (or favoring the asymmetric allocation all the time) is inconsistent with weak benevolence (and therefore counted as malevolence) in this domain. Again, benevolence is associated with a positive WTP and malevolence is associated with a negative WTP.

Below we will sometimes work with the proxies of the WTP measure of distributional preferences shown in the fifth column of Table 2. Combining the information about benevolence (or malevolence) of a decision maker in the two domains allows classifying subjects into *archetypes of distributional preferences*. Specifically, we define the following types:

[2] The procedure relies only on minimal assumptions regarding the rationality of agents. In terms of axioms on preferences the assumptions are ordering (completeness and transitivity) and strict (own-money) monotonicity – see Kerschbamer (2013) for details. In the main text, agents whose preferences satisfy those two basic axioms are referred to as "rational".

- EFF: a decision maker who reveals benevolence in both domains is classified as efficiency loving;
- IAV: a decision maker who reveals malevolence in the DIB and benevolence in the AIB is classified as inequality averse;
- SPI: a decision maker who reveals malevolence in both domains is classified as spiteful;
- ILO: a decision maker who reveals benevolence in the DIB and malevolence in the AIB is classified as inequality loving.[3]

Note that according to this classification selfish decision makers are assigned to one of the four distributional preference types according to their 'impartial view' expressed in their choice behavior in the third row of the two decision blocks in Table 1 (where the decision maker decides between two allocations that differ only in the payoff of the passive agent). Specifically, a decision maker who decides for the asymmetric allocation in the third row of the DIB and for the symmetric allocation in the third row of the AIB reveals benevolence in both domains and is therefore classified as EFF. By contrast, a decision maker who decides for the symmetric allocation in the third row of both blocks reveals malevolence in the domain of disadvantageous inequality and benevolence in the domain of advantageous inequality and is therefore classified as IAV. Similarly, a decision for the symmetric allocation in the third row of the DIB and for the asymmetric allocation in the third row of the AIB reveals malevolence in both domains (justifying classification as SPI), while a decision for the asymmetric allocation in the third row of both blocks reveals benevolence in the domain of disadvantageous inequality and malevolence in the domain of advantageous inequality (justifying classification as ILO).[4]

2.2. Sessions and treatments

The experiment was run over two weeks in December 2010 at the University of Innsbruck. All sessions were computerized using *z*-tree (Fischbacher, 2007). With ORSEE (Greiner, 2004), we recruited 198 students from various academic backgrounds. We ran twelve sessions with 12–18 subjects in each session, depending on subject turnout.

In week 1 we elicited the distributional preferences of all subjects using the incentivized procedure outlined in Section 2.1, so that we were able to characterize each subject by a two-dimensional preference index (WTP^d and WTP^a), or alternatively by a distributional preference type (EFF, IAV, SPI or ILO). When making their choices, subjects knew that they would receive two cash payments for this task, one as an active person and one as a passive person.[5] After having made their choices in the distributional preference tasks, subjects took the Machiavelli personality test (Christie and Geis, 1970), which consists of 20 questions aimed at measuring a person's assertiveness and ability to impose his or her opinion on others, on a scale between 20 and 100. Subjects also took a ten-question version of the Big-5 personality questionnaire (Gosling et al., 2003), which analyses personality along five fundamental traits termed extraversion, agreeableness, conscientiousness, neuroticism and openness. No payment was made in week 1 – subjects were rather informed already in the recruiting mail that the experiment would consist of two parts distributed over two consecutive weeks and that they would receive their total payment at the end of the second week, provided they attended both parts.

In week 2 we implemented two decision-making regimes. In the individual regime subjects simply repeated the procedure of week 1 for the elicitation of distributional preferences. In the team regime subjects were randomly assigned to groups of three and we elicited distributional preferences at the team level. Specifically, teams were asked to make the ten binary choices of the elicitation task, deciding on payoff allocations each implying a payoff for each team member (the same for each member) and a payoff for each member of a so-called "passive team" (again, the same for each member). Team members knew that they would receive two payments from this task, a payment as a member of the active team as well as a payment as a member of the passive team, similar to the individual regime of week 1 as described above. In both regimes at the end of the week 2 session each subject received two cash payments per week, one as an active person and one as a passive person. For each of these cash payments, one of the ten binary choices was randomly selected by the computer and implemented.

The rule for decision making within teams was that all ten choices had to be unanimous. Specifically, each team member was initially exposed to the ten binary choices and was asked to submit his or her proposals for the ten team decisions. Once each of the three team members had done so for each of the decision tasks, the proposal of each member was shown on a new screen, so that everyone could identify the cases of disagreement. After that, a chat room was opened for five minutes, in which the team members could communicate in order to achieve a unanimous decision. The chat content was unrestricted, except that subjects were explicitly told not to identify themselves in any way and neither to use offensive language nor to threaten others. At the end of the first chat round, each member was again asked to submit a proposal for the team decisions. If unanimity was reached at this stage, the ten choices were implemented and the team waited for the rest of the session. If unanimity was not reached, the updated decisions submitted by each member were shown again, and

[3] The category ILO is introduced for completeness only; we do not expect to find many of them (although there is some evidence in Fershtman et al. (2012), for this type). Note that in the literature spiteful subjects are sometimes called "competitive" or "status seeking", while inequality averse subjects are sometimes called "egalitarian". Also note that subjects who reveal benevolence in both domains could be labeled "altruistic" instead of "efficiency loving". See Kerschbamer (2013) for a discussion and for references.

[4] We also tried an alternative classification distinguishing between the five types 'strongly efficiency loving', 'strongly inequality averse', 'strongly spiteful', 'strongly inequality loving', and 'selfish'. Qualitatively, the results reported in Sections 3 and 4 are very similar with this alternative classification.

[5] We employed the double role assignment protocol as used by Andreoni and Miller (2002), for instance, in their dictator games. This means that in our protocol each decision making entity (individual or team) makes distributional choices, and each entity receives two payoffs, one as an active decision maker and one as a passive agent.

at the same time the team was given a second opportunity to chat, this time for three minutes. Exactly the same procedure was repeated for a maximum of five chat rounds. Subjects were informed at the beginning that in case that unanimity within a team was not reached before the end of the fifth chat round, all members of that team would receive a payment of zero, while the payment for the corresponding passive team would be randomly determined by the computer.

Asking for unanimity and implementing an unattractive default in case unanimity is not reached (before the end of the fifth chat round) induces a strong incentive to conform, of course. One could argue that this constellation alone induces a team effect by design. In our view this is not that obvious. Under a majority rule, the majority would be able to impose its will on the minority. If it does so in a context with heterogeneous preferences, this necessarily induces a team effect unless preference types have roughly the same frequency. This is not the case under unanimity where each team member has the vested power to refuse approval of decision profiles proposed by other team members. If all types of arguments and all types of proposals have the same chance of being approved by other team members then it could well be that in the aggregate teams exhibit the same distribution of choices as individuals. It is exactly the question whether this is indeed the case for choices involving income allocations, which is addressed in the current paper.

Our design allows us to make the following comparisons, which will form the core of our analysis:

(i) At a first stage, in order to test for successful randomization, we will compare the week 1 choices of subjects who were assigned (in week 2) to the individual regime to those of subjects assigned (in week 2) to the team regime. We call those two sets of observations IND1 and TEAM1, respectively.
(ii) To determine whether choices remain stable over time, we will compare the choices in week 1 and in week 2 of those subjects who were assigned to the individual regime in week 2. We call those two sets of observations IND1 (as above) and IND2, respectively.
(iii) To test for the presence of a treatment effect (individual regime vs. team regime) we will rely on two different sources of information. First, we will compare the week 2 choices in the individual regime to those in the team regime. These two sets of observations are called IND2 (as above) and TEAM2, respectively. Second, we will compare the choices in TEAM1 to those in TEAM2. Differences in this latter comparison potentially also reveal that team decision making changes revealed distributional preferences, in the sense that the same subjects reach different choices when they act individually and when they act as part of a team. However, while the comparison IND2 vs. TEAM2 compares individual and team decisions *between* subjects, the comparison TEAM1 vs. TEAM2 compares choices *within* subjects – once taken individually, once taken within a team. For this latter comparison, it is important to control for the effect of exposing the same subjects to the same task twice, as we do in comparison (ii) above.

We ran nine sessions for TEAM1 and TEAM2, and three sessions for IND1 and IND2, with the purpose of (roughly) equalizing the number of independent observations between the two decision-making regimes in week 2. In the end, we were able to collect 54 observations for the individual regime and 47 observations for the team regime (i.e., observations from 47 teams, or 141 subjects). These numbers exclude three subjects who made inconsistent choices, hence bringing the total number of subjects used in our analysis to 195. Sessions lasted for approximately 45 min in week 1 and in TEAM2 in week 2, and approximately 30 min in IND2 in week 2. The average total earning per subject was €16.80.

3. Revealed distributional preferences of individuals and teams

We begin by analyzing the differences between individual and team choices along the comparisons described in Section 2.2 (i.e., among IND1, IND2, TEAM1 and TEAM2). Later, in Section 4, we will delve into the specifics of the decision-making process within teams and the way that this translates individual preferences into team choices.

3.1. Revealed willingness to pay

Our first main finding is that willingness to pay in the domain of disadvantageous inequality depends strongly on the decision-making regime (individual regime vs. team regime), while willingness to pay in the domain of advantageous inequality does not. This is shown in Table 3. The two variables of interest, WTP^d and WTP^a, are the proxies for willingness to pay as defined in the last column of Table 2 – each of them can take on six possible discrete values in the interval

Table 3
Willingness to pay (WTP).

	IND1	TEAM1	IND2	TEAM2
WTP^d	0.087	0.103	0.108	0.184
WTP^a	0.150	0.201	0.191	0.216
N	54	141	54	141 (47 teams)

In the *within*-subjects comparison TEAM1 vs. TEAM2, we are using the team's decision as the decision of each individual subject (so that *N* = 141 for those tests).

Table 4
Distributional preference types.

	IND1	TEAM1	IND2	TEAM2
EFF	66.7%	78.0%	70.4%	93.6%
IAV	13.0%	8.5%	14.8%	0.0%
SPI	13.0%	10.6%	13.0%	4.3%
ILO	7.4%	2.8%	1.9%	2.1%
N	54	141	54	141 (47 teams)

In the *within*-subjects comparison TEAM1 vs. TEAM2, we are using the team's decision as the decision of each individual subject (so that $N = 141$ for those tests).

Table 5
Distribution of types in treatments IND1 and IND2 (individual choices only).

	Distribution of types, IND2			
	EFF	IAV	SPI	ILO
Distribution of types, IND1				
EFF	35	1	0	0
IAV	0	6	0	1
SPI	2	1	4	0
ILO	1	0	3	0

[−0.5, 0.5], where a higher value indicates higher willingness to pay for an increase in the income of the passive agent. Thus, a higher value of WTP^d (WTP^a, respectively) corresponds to more benevolence in the domain of disadvantageous inequality (advantageous inequality, respectively).

Comparing the four sets of observations, the first thing to note is the absence of significant differences between IND1 and TEAM1 along both dimensions of willingness to pay, revealing that the randomization into treatments has been successful ($p > 0.3$, Mann–Whitney *U*-tests). Moreover, choices remain constant over time given the small and statistically insignificant differences between IND1 and IND2 ($p > 0.2$, Wilcoxon signed-rank tests).

Turning to the main comparison of individual against team decision making, we find that the willingness to pay in the domain of disadvantageous inequality (WTP^d) is significantly higher when decisions are taken by teams compared to individuals ($p < 0.01$, Wilcoxon signed-rank test of TEAM1 vs. TEAM2; $p = 0.06$, Mann–Whitney *U*-test of IND2 vs. TEAM2). At the same time, the above tests applied to WTP^a reveal that the decision-making regime does not affect benevolence in the domain of advantageous inequality ($p > 0.4$, TEAM1 vs. TEAM2; $p > 0.5$, IND2 vs. TEAM2). Hence, we conclude that the willingness to pay in the domain of advantageous inequality is not affected by whether distributional choices are made by teams or individuals, while in the domain of disadvantageous inequality teams make more benevolent choices than individuals, leading to higher efficiency. This latter interpretation will be taken up in the following section, which discusses the distributional preference types that emerge in each treatment.

3.2. Revealed distributional preference types

Table 4 classifies the decision makers in each of the four sets of observations in distributional preference types. All of our findings are in line with the treatment differences documented in the previous section in the analysis of willingness to pay. The first thing to notice, by comparing the first two columns in Table 4, is that our randomization was successful, as documented by the insignificant differences in proportions between IND1 and TEAM1 ($p > 0.1$, χ^2-tests for all four types of distributional preferences).[6] Moreover, individual behavior remains constant over time, in the sense that the fact that subjects are exposed to the same set of decisions in two consecutive weeks does not have a significant impact on the distribution of revealed preference types (comparison between IND1 and IND2; $p > 0.3$, McNemar's tests for all four types). Table 5 supports this claim by showing that preference types remain predominantly constant over the two weeks at the individual level.[7]

On the contrary, the significant differences between TEAM1 and TEAM2 reveal that it matters a lot whether choices are made by individuals or by teams. In particular, McNemar's test results for within-subjects comparisons reveal that the same individuals are significantly more likely to make choices consistent with efficiency maximization in week 2 – when they decide as members of a team – than in week 1 when they decide as individuals ($p < 0.01$); and also that their choices in week 2 are significantly less often classified as inequality averse ($p < 0.01$) or as spiteful ($p = 0.05$) than in week 1.

[6] A χ^2-test comparing the entire distribution of types (all four proportions) between IND1 and TEAM1 yields $p = 0.3$.
[7] Notice also the very high Spearman rank correlation coefficients for types and choices between IND1 and IND2: $\rho = 0.80$ for the distribution of types; $\rho = 0.50$ for choices in the disadvantageous inequality block; $\rho = 0.53$ for choices in the advantageous inequality block; $p < 0.01$ for all correlation coefficients.

Table 6
Correspondence between types of team members and team types.

Types of team members	Team type	Mean # of stages to unanimity	*N*
3 × EFF	EFF (22)	1.41	22
2 × EFF, 1 × SPI	EFF (10)	2.30	10
2 × EFF, 1 × IAV	EFF (6)	2.17	6
2 × EFF, 1 × ILO	EFF (2), SPI (1)	1.33	3
1 × EFF, 1 × IAV, 1 × SPI	EFF (2), ILO (1)	3.0	3
1 × EFF, 1 × IAV, 1 × ILO	EFF (1)	2.0	1
1 × EFF, 2 × SPI	SPI (1)	2.0	1
1 × EFF, 2 × IAV	EFF (1)	2.0	1
Total	EFF (44), SPI (2), IL (1)	1.83	47

Given the previous comparisons, it is hardly surprising that we document strong and significant differences between the choices of individuals and teams in week 2 (see the last two columns of Table 4). These differences allow for a nice overview of our main findings regarding how decision making by individuals and by teams results in different distributions of types. In particular, the vast majority of teams (44 of 47, or 94%) are classified as efficiency loving. This percentage is markedly lower among individuals (with 70%), and the difference is statistically significant ($p < 0.01$, chi squared test). This result echoes the finding that teams display higher willingness to pay (benevolence) than individuals in the domain of disadvantageous inequality. A second striking finding is that there is not a single team that is classified as inequality averse! Although not higher than 15%, the share of inequality averse choices is significantly higher in treatment IND2 ($p < 0.01$, chi squared test). Spiteful types are also more common among individuals than among teams, although this time the difference is not quite significant (13% vs. 4%, $p = 0.13$), probably due to the low number of observations.

4. Decision-making process within teams

Having documented substantial differences in the final choices of individuals and teams, we now turn to the specifics of the process of team decision making which can give us insights into the sources of these differences. All 47 teams managed to reach a unanimous decision, so the default payment was never implemented. Two teams did not need to chat at all, because their initial choices happened to coincide. About half of the teams (21 of 47, or 45%) reached unanimity after the first chat opportunity (i.e., at the end of Stage 1). Fourteen teams reached unanimity after Stage 2, five teams needed a third chat round, three teams needed a fourth chat round, and two teams had to use all five chat rounds – but also managed to agree in the end.

4.1. Aggregation of distributional preferences

We begin this part of the analysis by giving an overview of the relation between the distributional preferences of team members (as elicited in TEAM1 in week 1) and the resulting team type (as elicited in TEAM2 in week 2).

As can be seen in Table 6, whenever at least two efficiency lovers are in the team, the team is always also of type EFF – with just one exception of a team that has an inequality lover and becomes SPI. This table is in more general terms indicative of the fact that will be discussed in detail in the analysis that follows: efficiency lovers appear to be in a better position to assert themselves within the team and convince their teammates to adopt their preferred distributional choices.

4.2. Assertiveness in the decision-making process

We measure a team member's assertiveness by means of his or her ability to influence the team's decision-making process so that the team's final choices differ as little as possible from the individual's initial proposals. For this purpose we create the variable *assert*, which is defined for each team member as the number of final team choices (out of 10) that are the same as the proposals submitted by that team member at the initial stage of the experiment in week 2 (i.e., before the start of the team interaction via the chat process). The idea is then to relate assertiveness to individual willingness to pay as well as to distributional types – as they have been elicited in week 1.

Beginning with types, a simple look at the mean number of own choices coinciding with those of the team reveals that efficiency lovers are, on average, much more successful than the rest in getting their proposals through within the team. Their average success rate is nine choices out of ten, in contrast to 7.58 choices for inequality averse individuals and 6.4 choices for spiteful types. Pairwise comparisons reveal that the difference between EFF and these two other types is statistically significant ($p < 0.05$, Mann–Whitney tests). Inequality lovers are actually almost as successful as EFF in getting their proposed choices to be adopted by the team (mean *assert* equals 8.75), but the fact that there are only four individuals classified as inequality lovers limits the power of statistical inference for this type.

Naturally, a team member's ability to impose his or her proposals is expected to depend on the distribution of types within teams. Since a team is made up of three members, having at least one more person of the same type is expected to substantially increase one's assertiveness within the team. In Table 7 we report results from two Tobit regressions that aim

Table 7
Assertiveness in the decision-making process.

Tobit regressions, marginal effects	Dependent variable: *assert* (right-censored at 10, left-censored at 0)	
	(1)	(2)
SPI	−2.065** (0.856)	
IAV	−0.820 (0.903)	
ILO	1.108 (1.351)	
At least one same	1.339** (0.551)	
WTP^d		4.225*** (1.094)
WTP^a		0.005 (1.138)
Female	0.039 (0.410)	0.269 (0.459)
Age	0.019 (0.051)	0.053 (0.044)
Machiavelli	0.007 (0.013)	0.009 (0.014)
Constant	7.452*** (1.726)	6.802*** (1.517)
Prob > F	0.000	0.001
Pseudo R^2	0.067	0.046

N = 141; standard errors in brackets, clustered by team.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

to explain assertiveness based on distributional preferences and some further controls. The dependent variable is *assert*. On the right hand side we place, in (1), the various distributional types – with EFF left out as the reference group. To control for the composition of teams in terms of preference types, we include an explanatory variable called *at least one same*: this variable is 1 for a subject if at least one other member of the team is of the same type. In (2), the explanatory variables are the two indices of willingness to pay, WTP^d and WTP^a. To account for interdependence between the three members within a given team, the regressions report standard errors clustered at the team level.

The results in column (1) of Table 7 reveal that the success rates of efficiency lovers are much higher as compared to spiteful types. In particular, the coefficient on SPI in column (1) is negative and highly significant, revealing that spiteful types are able to get through two choices less compared to efficiency minded individuals. Inequality averse types are also less successful at asserting their proposals than EFF, but more so than SPI. However, the difference to EFF is not significant, and neither is the difference to SPI (F test, p = 0.32). Hence, we conclude that spiteful types are less assertive than efficiency lovers in this experiment, but there is no difference across all other types. As expected, having at least one other person of the same type within the team substantially increases one's assertiveness: the coefficient of *at least one same* is larger than one, and it is significant.[8]

In column (2), we see that willingness to pay in the domain of disadvantageous inequality is a strong predictor of assertiveness, with more benevolent subjects (higher WTP^d) asserting, on average, a significantly higher number of proposals – the difference is more than four proposals. This result is not unexpected, in the sense that subjects with a high willingness to pay are more efficiency-minded, and we know that efficiency lovers are more assertive than spiteful subjects and not less assertive than the other two types. On the contrary, the coefficient of WTP^a is practically zero, and once again this dimension does not appear to matter in team decision making. The regressions control for gender, age, as well as for individual scores in the Machiavelli personality test. None of these variables has a significant impact on assertiveness.

We tried alternative specifications, for instance replacing *at least one same* in (1) with the number of same-type members in the team (i.e., 0, 1, or 2, depending on whether none, one or two other members revealed the same type). All the results remain qualitatively the same. We also tried regressions including the Big-5 traits elicited in week 1. The additional variables are all insignificant and do not change any of our results; therefore they are not reported here. Finally, we note that both specifications in Table 7 are robust to group fixed effects.

4.3. Content analysis

Having identified differences in assertiveness between types, we next ask the question of how these differences emerge through the process of intra-team communication. Hence, the final step in our analysis of preference aggregation within a team is the study of the chat content. For this purpose, we employed two research assistants who had to read the entire chat independently and to identify all arguments that belonged to a number of relevant categories. These categories, outlined in Table 8, had been previously determined by two members of the research team who independently read parts of the chat logs and identified relevant arguments and statements. This procedure for content analysis is standard practice in experimental work in economics (see, for example, Cooper and Kagel, 2005). A subject was classified by the two coders as having used the argument of a certain category if that argument was found in any round of his or her chat history. In that case, a value of one

[8] We have also estimated a specification in which we interact the variable *at least one same* with the various types. Our results (not reported in Table 7 for the sake of parsimony) indicate that having another team member of the same type is more important for spiteful types than for efficiency lovers: the effect is highly significant for both types, but the coefficient for SPI is much higher than for EFF (3.70 vs. 1.14).

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Table 8
Chat content, categories of arguments.

Category	Description	Relative frequency
A1	Majority: when two members have the same preference, the third member should follow	0.131
A2	Selfish: simply maximize own material payoff	0.160
A3i	Weak positive: willingness to give more to the passive team, provided this comes at no own cost	0.074
A3ii	Strong positive: willingness to give something up in order to increase the passive team's payoff	0.092
A4i	Weak negative: tendency to give less to the passive team, provided this comes at no own cost	0.025
A4ii	Strong negative: willingness to give something up in order to reduce the passive team's payoff	0.004
A5	Cake size maximization: maximize total payoff	0.074
A6	Pareto: increase payoff of both teams	0.025
A7	Fairness/egalitarianism: fairness-related arguments	0.050
A8	Conditional cooperation: place themselves in the position of the passive team, recognizing that cooperation among teams could maximize total earnings	0.064
A9	Unanimity at any cost: want to reach a unanimous decision quickly, exact choices are less important	0.064

Table 9
Content analysis.

Tobit regressions, marginal effects Dependent variable: *assert* (right-censored at 10, left-censored at 0)		
	(1)	(2)
SPI	−1.774**	
	(0.717)	
IAV	−0.744	
	(0.846)	
ILO	1.002	
	(1.235)	
At least one same	1.374***	
	(0.480)	
WTP[d]		3.992***
		(1.056)
WTP[a]		−0.210
		(1.138)
Female	0.085	0.155
	(0.041)	(0.458)
Age	0.035	0.053
	(0.054)	(0.040)
Machiavelli	0.002	0.009
	(0.012)	(0.013)
A1	1.760**	1.260*
	(0.802)	(0.671)
A2	−1.060*	−1.305**
	(0.560)	(0.526)
A3i	1.915	1.073*
	(1.215)	(0.564)
A3ii	−1.949**	−1.414**
	(0.835)	(0.569)
A4	−0.587	−0.392
	(2.071)	(1.727)
A5	0.663	0.708
	(0.964)	(0.822)
A6	0.407	−0.267
	(1.246)	(1.037)
A7	−1.157	−0.583
	(0.792)	(0.752)
A8	0.039	−0.546
	(0.927)	(0.685)
A9	1.365*	0.871
	(0.808)	(0.557)
Constant	7.315***	6.966***
	(1.711)	(1.421)
Prob > *F*	0.001	0.001
Pseudo R^2	0.100	0.081

N = 141; standard errors in brackets, clustered by team.
* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

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was assigned to that particular category for the subject in question; otherwise the assigned value was zero. The cross-coder correlation over all categories was 0.61. Finally, to create a single variable for each category and subject, we averaged the entries of the two coders so that the final value of the variable could be zero, one half (if only one of the coders classified that entry as an argument), or one (if both coders did so).[9]

Table 8 also shows the frequency with which the various types of arguments were used in the chats. The most commonly used argument is the maximization of own material payoffs (selfish argument), and it is employed by roughly one in six individuals regardless of type – with the exception of the four individuals classified as ILO, who never used this argument. The majority argument A1 is also used relatively often by individuals of all types. The positive arguments A3i and A3ii, on the other hand, are used almost exclusively by efficiency lovers, and so is the conditional cooperation argument. Also, as one might expect, efficiency lovers are the only ones who use arguments in favor of cake size maximization and Pareto efficiency. There are only five cases of weak negative and only one case of strong negative arguments, therefore for the remainder of the analysis we pool these two categories under a single "negative" category, called A4.

Table 9 replicates the two regressions of Table 7, adding the ten types of arguments as explanatory variables. The first thing to note is that all the findings presented in Section 4.2 are robust to this change in specification.[10] With respect to the success of the various types of arguments, one observes the following. First, somewhat counter-intuitively, selfish arguments (category A2) are associated with lower assertiveness. It appears to be the case that openly advocating a purely selfish choice criterion limits one's success in convincing the rest of the team. An interesting pattern emerges for positive arguments (categories A3i and A3ii). Statements in favor of altruistic behavior toward the passive team are associated with lower assertiveness if they suggest the sacrifice of own payoffs (strong positive attitude), but with higher assertiveness if they involve a costless improvement (weak positive attitude) – although the latter effect is only weakly significant in the second specification. The other categories of "distributional" arguments (i.e., statements referring explicitly to choice criteria for the payoff allocation, such as negative attitude, welfare maximization, Pareto efficiency, and fairness) all have insignificant coefficients, but we do find that certain "non-distributional" arguments matter: subjects who play the "majority card" (A1) are, on average, more successful at convincing their team to adopt their initial proposals, and so are those who urge for unanimity (A9) in order to avoid implementation of the default allocation (which yields zero income for the team members).

5. Conclusion

This paper has compared revealed distributional preferences of individuals and teams, focusing in particular on the question how the revealed distributional preferences of team members shape a team's allocation decisions. We have found strong differences between individuals and teams in revealed distributional preferences. Specifically, teams are significantly more benevolent than individuals in the domain of disadvantageous inequality, while benevolence in the domain of advantageous inequality is similar across decision-making regimes. A consequence for the frequency of preference types is that teams never make choices that are consistent with any form of inequality aversion, while a substantial fraction (15%) of individuals are classified as inequality averse. Spiteful types are also markedly more frequent among individuals than among teams. On the other hand, teams are far more often classified as efficiency lovers. The fact that team decision making results in a very high proportion (over 90%) of choices consistent with a taste for efficiency and at the same time eliminates choices consistent with inequality aversion, is in our view the single most interesting result of this study. Our analysis of the communication within teams (via chat) has shown that efficiency lovers are more assertive, meaning that they are better in implementing their preferences even when other team members have divergent individual preferences. Moreover, our chat analysis has revealed that some arguments are more persuasive than others. In particular, an interesting finding has been that appeals to own-money maximization make it less likely to get one's way, indicating that convincing others to follow a particular suggestion needs more socially acceptable arguments.

Given the strong differences between individuals and teams in revealed distributional preferences it seems important to address the question whether distributional preferences, as measured by the test employed in the current paper, have explanatory value for actual behavior. That this is indeed the case is shown in two recent studies: Balafoutas et al. (2012) investigate in a standard lab experiment the relationship between distributional archetypes (as assigned by the test used in the current paper) and competitive behavior. They find that distributional archetypes differ systematically – and in an intuitively plausible way – in their response to competitive pressure, in their performance in a competitive environment and in their willingness to compete, and that controlling for the effects of distributional preferences, as well as for risk attitudes and some other factors, closes the large gender gap in competitive behavior found in other studies. Hedegaard et al. (2011) use the same test to examine in a large-scale internet experiment the impact of distributional concerns on the contribution behavior in a standard (linear) public goods game. They find that distributional archetypes differ systematically in their

[9] An alternative procedure would have been to assign a value of one to a particular argument if at least one of the two coders classified it as such. To check robustness, we repeated the analysis in this section using this alternative method. This led to only a few minor changes in the results.

[10] Given that different types of subjects use certain arguments more frequently than others, the correlation between the distributional preference type dummies or willingness to pay and the chat categories could in principle lead to multicollinearity problems. Therefore, to check robustness, we estimated versions of the regressions in Table 9 in which we omitted the type dummies and WTP^d, WTP^a, effectively leading to no change in the significance levels of the chat coefficients. In addition, we estimated OLS versions of Table 9 regressions, which allow us to formally test for – and reject – the presence of multicollinearity on the basis of the very low variance inflation factors for all independent variables.

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contribution behavior, and that accounting for the differences explains roughly half of the gap between actual behavior of subjects in the lab and the theoretical benchmark derived under the assumption of common knowledge that players are rational and selfish. Together these findings clearly indicate that distributional preference types as discussed in the current paper have explanatory value for actual behavior.

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