The Bitterness of Unshared Victory in Competitive Environments

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Abstract

We investigate experimentally whether social preferences or preferences over beliefs of others motivate choices in competitive environments. In each pair of participants, one is chosen to be a winner of a prize. Next, participants assess the appeal of a sequence of monetary transfers to themselves and the other. We find that the winners feel dissatisfied when others are unsure or unaware of their "victory." The losers become ignorant of the earnings of the winners and concentrate on their own payoff. Only participants with liberal leanings show this behavioral pattern. Conservative participants do not react to the information possessed by others.

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1 Introduction

Many experimental studies attempt to understand what can explain the deviations from selfish rational choice in games and non-strategic environments. There are two broad classes of explanations: distributional concerns/social preferences (e.g. Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999; Frank, 1985) and intentionality/preferences over beliefs (e.g. Battigalli and Dufwenberg, 2007; Dufwenberg and Kirchsteiger, 2004; Falk and Fischbacher, 2006). In the models with social preferences, the payoffs of others enter the utility function, whereas in models where intentions or beliefs of others matter, preferences depend on beliefs about some knowledge, expectations or attitudes of others. It is often the case that the same behavior can have plausible explanations in both paradigms. For example, cooperation in sequential Prisoner's Dilemma can be explained by inequity averse preferences (Fehr and Schmidt, 1999), reciprocity (Falk and Fischbacher, 2006) or guilt aversion (Dufwenberg, 2002). Moreover, it has been shown that *only* models which include both social preferences and intentionality or preferences over beliefs can consistently explain choices in some games (Falk, Fehr, and Fischbacher, 2008). In addition, many studies suggest that preferences also depend on the context or framing of the choice task (e.g. Burnham, McCabe, and Smith, 2000; Dufwenberg, Gächter, and Hennig-Schmidt, 2011; Ellingsen, Johannesson, Mollerstrom, and Munkhammar, 2012; Vostroknutov, Tobler, and Rustichini, 2012).

Given such extensive evidence of different types of preferences exhibited by people in the lab, it is therefore important to be able to tell the motives behind the observed choices, as different motives can lead to different behavior in similar environments. In this paper we propose a simple and novel experimental design to disentangle social preferences and preferences over beliefs using Likert-type scale assessments of monetary allocations. Our design makes it possible to estimate what social preferences and/or preferences over beliefs participants have when confronted with pairs of monetary payoffs.

In the experiment, participants are presented with a sequence of monetary transfers, or pairs of payoffs to themselves and one other participant, and are asked to assess each transfer on the Likert scale from –7 (very unappealing) to +7 (very appealing). At the end of the experiment, one of the transfers is randomly chosen as payment for each pair of participants. To keep things simple and decrease the influence of framing on the assessments, we deliberately prime our participants to see the task in the light of competition with one other person in the lab. We achieve this by proposing to each pair of participants to simultaneously draw one ball each from the urn before assessing the transfers (without replacement).[1] The urn contains one red ball that gives the prize of €20 and one or two green balls which

[1]The draw is performed by the computer.

give nothing. Therefore, the participant who draws the red ball is the "winner." This setup creates the feeling of competition among the participants, thus giving us control over the way they feel about the transfers. There are three treatments which differ by the *amount of information available to the participant who did not get €20* (losers). In the perfect information treatment, there is common knowledge about who received €20 in the pair (one red and one green ball in the urn). In the asymmetric information treatment, the loser believes that the other participant has €20 with probability $\frac{1}{2}$ (one red and two green balls in the urn). In the treatment with unawareness, the loser is not aware that the other participant has received €20.[2]

By introducing information asymmetries into our design we are able to perform the between subjects comparison of the three treatments in order to see how *the beliefs of the loser* influence the assessments of the winner. Given that the winner always has perfect information about the transfers, any treatment effects can *only* be attributed to her preferences over beliefs of the loser.[3] Thus, our design makes it possible to tell whether the winners (losers) in the competitive environments enjoy (dislike) their position just because of higher (lower) winnings or because of what others believe of them.

There are three main results. First, we find that the winners, apart from enjoying their higher payoff, are also displeased when the loser in the pair does not have perfect information about them having €20. In their eyes, the situation when the loser is either unaware of €20 or believes that the winner has it with probability $\frac{1}{2}$ undermines their winning position thus making them less satisfied. Even though the winners still enjoy their payoffs, the information asymmetry decreases their marginal utility. We call this effect *"the bitterness of unshared victory."* In reality, the desire to persuade others that you are the winner can lead to serious inefficiencies. For example, Charles, Hurst, and Roussanov (2009) provide evidence that low-income households spend disproportionately high share of their income on *visible goods* which leads to underinvestment in health insurance and education as compared to rich households.

Second, we find that the participants without €20 also make different assessments depending on the information structure of the treatment. In particular, *the knowledge* that the

[2]There is no deception in the experiment as the information regarding other receiving €20 does not influence the payoffs of the participants in any way. Unawareness was studied in one other experiment by Mengel, Tsakas, and Vostroknutov (2013). The important distinction between the two designs is that the participants in the experiment of Mengel, Tsakas, and Vostroknutov (2013) are *aware of their unawareness,* whereas in our experiment they are *unaware of their unawareness* (see Halpern and Rêgo (2009) for discussion).

[3]Alternative interpretation might be that the winner behaves differently in perfect and asymmetric information treatments because in the latter the chance of winning was lower (which makes her more "lucky"). This hypothesis would also predict no difference between perfect information and unawareness treatments since the probability of winning €20 is one half in both of them. However, we observe *large* differences between these treatments which is consistent with our hypothesis.

other participant *might* have €20 (perfect and asymmetric information treatments) makes them much less concerned with competition, as compared to unawareness treatment where they have no idea that €20 even exists. We hypothesize that this happens because the losers cannot "win" (make more money than the other) which makes them less concerned with competition and more concerned with their own payoff.[4] This finding suggests that putting low effort in contests when the chances of winning are small (Tullock, 1980; Chowdhury and Sheremeta, 2011) might not be the result of strategic equilibrium play but rather of the change in preferences themselves. If this is indeed the case, then stereotypes and negative public messages can make certain economic groups turn away from competition by influencing their preferences. This effect can, for example, explain the gender gap observed in the workplace (Bertrand and Hallock, 2001) and laboratory experiments (Niederle and Vesterlund, 2007), and suggest cultural rather than economic methods of solving the gender gap problem by, for example, emphasizing the success stories.

Third, we show that the assessments are highly sensitive to personal "mindset." In particular, we find that the participants with liberal views and the conservative participants tend to assess the transfers in very different ways. Only liberals show the behavioral patterns described above: they are sensitive to what others believe about them, or about them having €20. Conservatives, on the other hand, do not react to the information structure of the treatments. This is consistent with the general view that liberals tend to be other-regarding whether conservatives – individualistic.

Our experimental design is similar to one of Tricomi, Rangel, Camerer, and O'Doherty (2010). In this study, $50 was randomly given to one of the two participants (like in our treatment with perfect information) before they started assessing the transfers. However, in this study the paired participants met each other at the time when $50 was assigned. This could have evoked the sharing frame instead of competitive one, as it is in our anonymous setup. As a result, Tricomi et al. (2010) observe participants' negative reaction to advantageous inequality, while we do not.

Several studies examine the influence of incomplete information on behavior in bargaining games (e.g. Mitzkewitz and Nagel, 1993; Rapoport and Sundali, 1996; Güth and van Damme, 1998; Straub and Murnighan, 1995). These studies use Ultimatum games to look at the effects of information asymmetries. In short, Proposers in Ultimatum game become greedier when they know that the Responder does not know the size of the pie. This line of research is different from our study in that Ultimatum game in most cases evokes sharing frame, while we look at the competitive one. Moreover, it is unclear what drives

[4]The transfers give each participant maximum €10. Therefore, it is impossible to win if the other participant has €20.

the change in the behavior of the Proposers, since the strategic reasons (Responders might change their behavior in incomplete information settings) are confounded with possible changes in preferences. There are no strategic interactions in our design, which allows us to make clear conclusions about the nature of the observed patterns. Dana, Weber, and Kuang (2007) study Dictator games where Receivers can be unsure of whether low offer is a result of intentional choice by the Proposer or a random event that is not under Proposer's control. The authors find that the large majority of Proposers act selfishly in the imperfect information case, as compared to the baseline where all information is common knowledge.

Both Ultimatum and Dictator game evidence suggests that high offers are the result of the desire to be *seen* fair rather than of the preference for equality: participants act selfishly once fairness judgement is hard to make due to information asymmetry. Like in our experiment, this points towards the importance of preferences over beliefs of others in explaining choice when information is imperfect.

This paper is organized as follows. Section 2 describes the experimental design. Section 3 discusses information structures that we use in our treatments. Section 4 reports on the analysis of the data. Section 5 concludes, followed by Appendices A through D with the decsription of the variables, additional regressions and instructions.

2 Experimental Design

The experiment has two stages nd the questionnaire. In the first stage, participants are randomly matched into pairs and one of the participants in each pair is given €20 with some probability while the other participant gets nothing.[5] In the second stage, participants are presented with the sequence of *transfers*. For each pair, a transfer is two monetary outcomes, one for each participant. A typical transfer can be, for example, a €2 own payoff and a €3 payoff for the other. The amounts of money in the transfers range from €0 to €10. The participants evaluate each transfer on the scale from –7 (very unappealing) to +7 (very appealing). There are in total 41 transfers, which are the same for all participants. In order to avoid any sequence-dependent effects, the transfers are presented to the participants in four different random orders (see Appendix C for details). At the end of the experiment, one transfer is randomly chosen as the payment for each pair. In addition, each participant receives €3 as a show-up fee. Thus, after the experiment each participant gets €20 (if it was awarded to her), the payment for one transfer and the show-up fee.

The treatments differ in the mechanism of awarding €20 at the first stage. There are

[5]It is also possible that neither participant get €20. The exact mechanism of awarding €20 is described in the next paragraph.

three treatments: with perfect information (PERF); with asymmetric information (ASYM); and with unawareness (UNAW). As was mentioned above, either *one* participant in the pair or *nobody* gets €20. In the PERF treatment, one of the two participants in each pair is given €20 and there is common knowledge about who got it. In the ASYM treatment, the receiver of €20 has perfect information. Namely, she knows that the other participant got nothing. However, the participant who did not receive €20 holds a (correct) belief that the other got it with probability $\frac{1}{2}$. In the UNAW treatment, the receiver of €20 has perfect information, but the participant who got nothing does not even suspect that the possibility of anyone getting €20 exists.[6]

The information structures in the PERF and ASYM treatments are implemented using the urns with colored balls. In the PERF treatment, each pair of participants are told that they will simultaneously draw one ball each from the urn that contains *two* balls: one red and one green (the draw is done by the computer). Whoever draws the red ball gets €20 and the other gets nothing. In the ASYM treatment, each pair of participants are told that they will draw one ball each (without replacement) from the urn that contains *three* balls: one red and two green. Participants do not see the color of the ball of their pair. Whoever draws the red ball gets €20. Figure 1 shows how the urns are presented to the participants.[7] In both treatments, computer chooses the balls for participants with probability $\frac{1}{2}$ (PERF) or $\frac{1}{3}$ (ASYM).

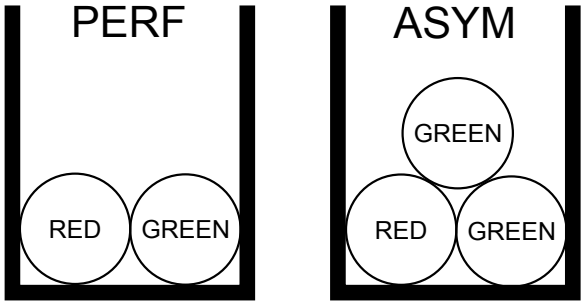

Figure 1: *The pictures of the urns in the PERF and ASYM treatments as presented to the participants.*

In the UNAW treatment, no urns are presented to the participants (see Appendix D.3). Rather, there are two different sets of instructions. The instructions for the aware partic-

[6]There is no deception used in the UNAW treatment. The instructions given to participants differ (see Appendix D.3). Half of the group of participants in each session receives instructions where it is mentioned that €20 will be given to them and that the other participant in the pair does not have the part of the instructions mentioning €20 (instructions are otherwise identical). Notice that the instructions without €20 do not deceive participants in any way. They are told that they will be paid according to one of the transfers they evaluate, which is exactly what happens. As long as participants' payments are concerned, nothing in the instructions is deceptive.

[7]In the experiment, the balls are actually of the appropriate colors.

ipants specify that they will be given €20. Moreover, it is stated that the other participant in the pair will have no information at all about €20, but otherwise her instructions are the same. The instructions for the unaware participants just describe the second stage of the experiment.

All experiments were run at Maastricht University in May and November 2012. Roughly two thirds of the participants were students from the School of Business and Economics and one third from the other faculties. On average, each participant received €15 for the experiment. Overall, 116 people participated in the PERF treatment in 4 sessions; 192 people in the ASYM treatment in 6 sessions; and 126 people in the UNAW treatment in 4 sessions. No pilots or other sessions were run.

3 Information Structures

In this section, we discuss the information structures created by our ball assignment procedure. In the PERF treatment, each pair has common knowledge about the receiver of €20. In the ASYM treatment, the receiver of €20 knows that the other got nothing *and* he knows that the other *believes* that he received €20 with probability $\frac{1}{2}$. The participant who received nothing does not know whether the opponent got €20 or not. She can only deduce that this happens with probability $\frac{1}{2}$. Second-order beliefs are also probabilistic. With probability half, she believes that the opponent has a green ball and thus his first-order beliefs are the same as hers. Thus, her second-order beliefs just mirror her own first order beliefs. With probability half, she believes that the opponent has drawn the red ball and thus knows that she has a green ball. Figure 2 shows the information structures of the two treatments.

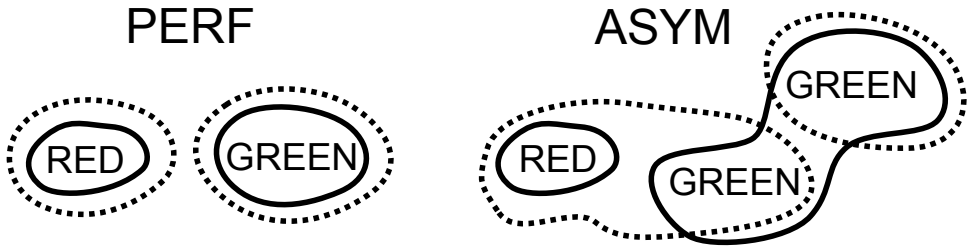

Figure 2: *The information structures in the PERF and ASYM treatments. Solid line represents the information sets of the participant who drew the red ball and received €20. Dashed line shows the information sets of the participant who drew a green ball.*

Notice that the participant who draws the red ball always knows that event "The other participant drew a green ball" has occurred. Thus, the receiver of €20 always knows that the other participant got nothing. Both the paper instructions and the guidelines on the screen make sure that the participants understand the information structure of the experiment well

(see Appendix D).

In the UNAW treatment the situation is similar. The participant who gets the instructions that include €20 knows that the other participant got nothing *and* he also knows that the other participant *is not aware* that he has €20. The participant who has the instructions without the mentioning of €20 is *unaware* of all that. The instructions in this case do not explicitly mention that *all participants received the same instructions*. However, the opposite is not mentioned either. Given that the majority of economic experiments have the same instructions for everyone, we assume that the participants without €20 believe that their opponents did not receive any additional money. The instructions for those who received €20 mention that the other participant in the pair is unaware of €20.

The three treatments can be ordered according to the amount and *kind* of information available to the participants without €20. In the PERF treatment the information is perfect, participants without €20 know that their opponents have €20. In the ASYM treatment participants without €20 know that there is a half-half chance that the opponent has €20. In the UNAW treatment, the idea of anyone having €20 does not even cross participants' minds. At the same time, the winners of €20, know with certainty that the opponent has got nothing in all three treatments. The second-order beliefs of the winners differ across treatments: in the PERF treatment they know that the other knows they have €20; in the ASYM treatment they know that the other only believes that they have €20 with probability $\frac{1}{2}$; in the UNAW treatment they know that the other is unaware that they have €20.[8] Therefore, if the receivers have *only* distributional concerns, then there should be no significant differences in their assessments of the transfers across all three treatments. However, if they *do* care about the beliefs of the opponent, then we should observe differences in the assessments between treatments.

In addition to creating information asymmetries, the assignment of €20 plays another role. In PERF and ASYM treatments random assignment of €20 makes the participants think in terms of competition with one another, the same way as people "compete" with each other when buying lottery tickets. The participant who draws the red ball wins and the other loses. This directs our participants towards sticking to the same competitive heuristics when assessing the transfers. Without such priming we could have had some participants applying the sharing frame and some competitive frame (see discussion in the Introduction).

[8]Here it is important to note the distinction between unawareness and probability 0 event. In the latter case the other is aware that €20 possibility exists, but just attaches 0 probability to it. However, under unawareness the other never even thinks about €20 (see Feinberg (2009) for discussion).

4 Results

4.1 Aggregate Results

First, we look at the aggregate results by considering all the treatments together. We look at a random effects GLS regression of the form[9]

$$\mathtt{a}_{it} = \beta_{0\ \mathtt{has20}_i,\mathtt{mmore}_{it}} + \beta_{1\ \mathtt{has20}_i,\mathtt{mmore}_{it}}\mathtt{self}_{it} + \beta_{2\ \mathtt{has20}_i,\mathtt{mmore}_{it}}\mathtt{other}_{it} + \varepsilon_{it}. \tag{1}$$

Dependent variable $\mathtt{a}_{it}$ is the assessment made by participant i about choice t, normalized to interval $[0, 10]$.[10] The regression has two continuous independent variables, $\mathtt{self}_{it}$ and $\mathtt{other}_{it}$, which correspond to the amounts of money that the participant i sees in period t. The notation $\beta_{1\ \mathtt{has20}_i,\mathtt{mmore}_{it}}$ means that we consider coefficient β_1 on variable $\mathtt{self}_{it}$ to be dependent on dummy variables $\mathtt{has20}_i$ and $\mathtt{mmore}_{it}$: the latter is 1 if the participant received €20 and the former is 1 if the participant sees more money for herself than for the other.[11] The regression includes four different sets of coefficients, one for each combination of values of $\mathtt{has20}_i$ and $\mathtt{mmore}_{it}$. We estimate them by using the full set of interactions of constant, $\mathtt{self}_{it}$ and $\mathtt{other}_{it}$ with all possible combinations of dummies $\mathtt{has20}_i$ and $\mathtt{mmore}_{it}$. After the estimation, β_0, β_1 and β_2 coefficients can be calculated for each of the four conditions $\{(0,0),(0,1),(1,0),(1,1)\}$ by finding linear combinations of the appropriate interaction terms.[12] In particular, model (1) has nine interaction terms.

Figure 3 reports the coefficients β_1, β_2 and β_0 for all combinations of $\mathtt{has20}_i$ and $\mathtt{mmore}_{it}$. To understand what these coefficients mean let us first benchmark these results against inequity averse preferences (Fehr and Schmidt, 1999) of the form:

$$F(\mathtt{self},\mathtt{other}) = c_0 + c_1\,\mathtt{self} - c_2(\mathtt{other}-\mathtt{self})\mathbb{1}_{\mathtt{mmore}=0} - c_3(\mathtt{self}-\mathtt{other})\mathbb{1}_{\mathtt{mmore}=1}. \tag{2}$$

First, observe that if the participants were inequity averse and included €20 in their social utility, then for participants with €20 only advantageous inequality part of the utility (c_3) would be active.[13] This implies that the estimates of β_1 and β_2 should not depend on $\mathtt{mmore}$ whenever $\mathtt{has20} = 1$. However, we see that they are very different: when $\mathtt{mmore} = 0$

[9] Each participant is a "group" in the random effects model.

[10] This is needed to interpret the coefficients of the regression since the monetary payoffs in all transfers lie in the same interval.

[11] See Appendix A for the detailed descriptions of all variables.

[12] Here and on all following figures condition $(0,1)$ means $\mathtt{mmore} = 0$ and $\mathtt{has20} = 1$ etc.

[13] Notation $\mathbb{1}_{\mathtt{mmore}=0}$ means a function that is 1 when $\mathtt{mmore} = 0$ and 0 otherwise.

coefficient β_1 is around 1 and when `mmore` $= 1$ it is around 0.4; β_2 is –0.25 when `mmore` $= 0$ and 0 when `mmore` $= 1$. We see that the coefficient estimates depend on dummy `mmore` and not on `has20`. Therefore, we can conclude that participants do not take €20 into account when assessing the transfers. However, it should be noted that having €20 has influence on overall "satisfaction" which is reflected in the change of the constant (see right part of Figure 3).

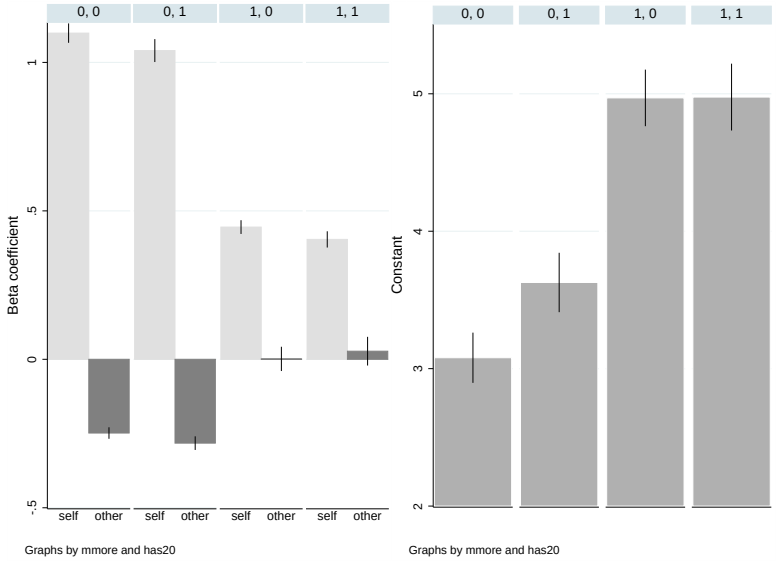

Figure 3: *Coefficients from the random effects GLS regression* (1). *The coefficients differ depending on the regime.* $(0,0)$*:* `mmore` $= 0$, `has20` $= 0$; $(0,1)$*:* `mmore` $= 0$, `has20` $= 1$; $(1,0)$*:* `mmore` $= 1$, `has20` $= 0$; $(1,1)$*:* `mmore` $= 1$, `has20` $= 1$;*. 12 regressors; 17794 observations; 434 groups (also independent observations);* $R^2 = 0.55$*. Vertical spikes are two standard errors.*

Now, if we assume for a moment that €20 is not included in the social utility, Could inequity aversion preferences explain our observations then? Qualitatively, in the case of `mmore` $= 0$ we can rewrite F as $c_0 + (c_1 + c_2)$`self` $- c_2$ `other` which corresponds roughly to $c_2 = 0.2$ and $c_1 = 0.9$. For `mmore` $= 1$ we can rewrite F as $c_0 + (c_1 - c_3)$`self` $- c_3$ `other`, which roughly corresponds to $c_3 = 0$ and $c_1 = 0.4$.[14] The large and significant difference in c_1 (0.9 versus 0.4) shows that inequity aversion does not fit our data particularly well. Another important discrepancy between our results and inequity aversion model is in the estimates of the constants. In particular, whether participant has more than other or less should have no influence on the constant in (2). However, in our case there is a large difference between constants: from around 3.5 in case `mmore` $= 0$ to around 5 for `mmore` $= 1$.[15] These findings

[14] In a similar experiment Tricomi, Rangel, Camerer, and O'Doherty (2010) find c_3 to be significantly positive. This might be due to different framing of their experiment where each pair of participants met before the game, which could have induced sharing frame instead of competitive one as in our case of anonymity.

[15] In model (1) we pool data for all three treatments. Nevertheless, the same general pattern appears in each

justify the use of the general formulation where coefficients β_0, β_1 and β_2 depend on `mmore` and `has20` as in model (1).

4.2 Preferences and Personality

The observations and the utility function presented above provide a general picture of how the participants react to the monetary transfers they assess. However, the aggregate results do not allow to detect possible heterogeneity in preferences. To see whether the preferences revealed through assessments depend on personality traits we gave our participants the Moral Foundations Questionnaire (MFQ) created by Haidt and Joseph (2004). This is an instrument based on Likert-type questions that provides the estimates of the saliency of personality traits on five dimensions: Harm-Care, Fairness-Reciprocity, Ingroup-Loyalty, Authority-Respect and Purity-Sanctity.[16] It was shown that the MFQ scale correlates with personality traits and social attitudes. For example, Graham et al. (2011) provide evidence for the internal and external validity of the MFQ by demonstrating the improved predictive power of the MFQ as compared to other scales and by showing that the MFQ can predict people's attitudes towards various social groups.[17] Hirsh, DeYoung, Xu, and Peterson (2010) showed that MFQ scores are correlated with two broad mindsets: *liberals* and *conservatives*. Liberal ideology is associated with preference for equality, empathy and the acceptance of the outgroup, whether conservatism is linked to resistance to change and acceptance of inequality. Hirsh et al. (2010) find that self-reported liberals score significantly higher on Harm and Fairness scales whether conservatives showed higher scores in Ingroup, Loyalty and Purity domains.

As Hirsh et al. (2010) we hypothesize that the expression of the political views reflects people's personal and emotional needs. Participants with different political views might have different preferences when it comes to assessments of transfers. We found that students from the School of Business and Economics (SBE) scored significantly higher on some questions from the Ingroup, Loyalty and Purity dimensions whether students from all other social sciences (non-SBE) scored higher on Fairness scale. Table 1 shows the questions for

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treatment if looked at separately except may be constants in UNAW treatment (see Appendix B, Figure 8). This allows us to safely refute the inequity aversion model for our data.

[16] See Appendix E for the description of the questions.

[17] In general, Likert-type assessments were successfully used in many psychological studies. For example, Loewenstein, Thompson, and Bazerman (1989), among others, tested inequity aversion model using the same techniques as we do. Recently, several neuroeconomic studies found strong correlation between self-assessments of satisfaction and the activation in the reward centers of the human striatum (Aharon et al., 2001; Knutson et al., 2001, 2005a; Rustichini, Tobler, Vostroknutov, 2012). This suggests that people are able to express their preferences through simple Likert-type scale questions.

which the difference in scores was significant.[18] Notice that SBE students show higher scores in dimensions associated with conservatism and all other students show higher scores in dimension associated with liberalism.[19] Therefore, we expect these two groups of students to reveal preferences consistent with conservative and liberal mindsets. In the rest of the paper we analyze the assessments of the two groups separately.

Question / Assertion	**Dimension**	**SBE**	**Non-SBE**	***p*-value**
Whether or not some people were treated differently than others (relevant/irrelevant)	FAIRNESS	3.37	3.64	0.084
Whether or not someone was denied his or her rights (relevant/irrelevant)	FAIRNESS	3.68	4.00	0.051
Whether or not someone conformed to the traditions of society (relevant/irrelevant)	LOYALTY	2.16	1.86	0.032
Respect for authority is something all children need to learn (agree/disagree)	LOYALTY	3.68	3.38	0.067
If I were a soldier and disagreed with my commanding officers orders, I would obey anyway because that is my duty (agree/disagree)	LOYALTY	2.6	2.1	0.003
Whether or not someone did something disgusting (relevant/irrelevant)	PURITY	2.62	2.29	0.017
Whether or not someone acted in a way that God would approve of (relevant/irrelevant)	PURITY	1.27	0.89	0.005
It is more important to be a team player than to express oneself (agree/disagree)	INGROUP	2.8	2.4	0.009

Table 1: *The mean assessments for selected questions from the MFQ and the p-values for the corresponding Wilcoxon rank-sum tests. The scores range from 1 to 5 (see Appendix E for details). The Wilcoxon tests were run for the two groups: SBE students (319 participants) and non-SBE students (115 participants). The table lists all questions with* $p < 0.1$.

4.3 A Utility Model

Before we get to the main results of the paper we need to construct a utility model for the observed changes in assessments. We propose a simple model that reconciles our findings.

[18]The differences in scores of all other questions were insignificant.

[19]There are several plausible explanations for why SBE students are more conservative: exposure to many economics courses where selfish rational paradigm of the decision making is emphasized; self-selection to study economics given the belief that economists are conservative; or both.

We start with looking separately at two subsets of participants: those who were exposed to economics and business courses and the rest. We create a new dummy $\texttt{sbe}_i$ (stands for School of Business and Economics) which is 1 for students from Economics and Business majors.[20]

To proceed, we extend model (1) to include 3 more dummies: $\texttt{sbe}_i$, $\texttt{treat}_2$ and $\texttt{treat}_3$. The latter two indicate ASYM and UNAW treatments. The random effects model can be summarized in the following way (we shorten subindex $\texttt{has20}_i, \texttt{mmore}_{it}, \texttt{sbe}_i, \texttt{treat}_2, \texttt{treat}_3$ to $\texttt{h,m,s,t}$):

$$\texttt{a}_{it} = \beta_{0\,\texttt{h,m,s,t}} + \beta_{1\,\texttt{h,m,s,t}}\texttt{self}_{it} + \beta_{2\,\texttt{h,m,s,t}}\texttt{other}_{it} + \varepsilon_{it}. \tag{3}$$

This model also includes the full set of interactions of constant, $\texttt{self}_i$ and $\texttt{other}_i$ with all possible combinations of dummies $\texttt{has20}_i$, $\texttt{mmore}_{it}$, $\texttt{sbe}_i$, $\texttt{treat}_2$, $\texttt{treat}_3$ so that β_0, β_1 and β_2 coefficients for any values of dummies can be constructed. Apart from two main independent variables there are in total 65 interaction terms.

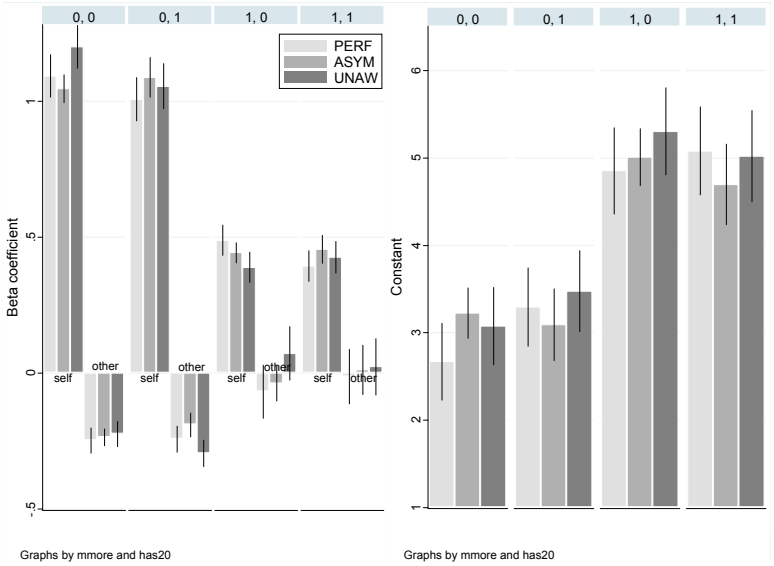

Figure 4: *Estimated coefficients from the random effects GLS regression* (3) *for SBE participants by treatment,* `mmore` *and* `has20`*. 68 regressors; 13079 observations; 319 participants (also independent observations);* $R^2 = 0.56$*. Vertical spikes are two standard errors.*

Figures 4 and 6 show the resulting coefficients separately for $\texttt{sbe}_i = 1$ and $\texttt{sbe}_i = 0$.[21] First, consider Figure 4 that shows the coefficients for Business and Economics participants.

[20]To be more specific, $\texttt{sbe}_i = 1$ if student's major is Business, Economics, Finance or Econometrics. $\texttt{sbe}_i = 0$ if major is Law, Accounting, European Studies, Arts and Culture, Social Sciences, Life Sciences, Psychology or Sociology.

[21]See Table 3 in Appendix B for the coefficient values, their significance levels, and significance levels of their differences.

It shows a pattern similar to Figure 3 above. However, there are important differences. Notice that there are absolutely no treatment effects. Moreover, the possession/lack of €20 as well as information structure of the treatments have no effect on the estimates of the coefficients. The only variable that makes a difference is `mmore`.

As was mentioned above, we analyze our data separately for two groups of subjects because of the conviction that SBE participants have preferences that are closer to selfish than those of non-SBE participants. Figure 4 as compared to Figure 6 supports this view since we detect no treatment differences in the former and significant treatment differences in the latter. This implies that SBE participants essentially ignore the endowment and all information regarding €20 and simply assess the transfers according to their (not selfish but rather spiteful) preferences. These findings are also consistent with the general view of liberals (non-SBE) and conservatives (SBE) as other-regarding and individualistic respectively.

In what follows we will use Figure 4 as a benchmark case and use it to develop a simple utility model of choice (for SBE), which we later generalize to understand the motivations behind the assessments of the non-SBE participants. To achieve this let us make several observations about the effects of having more than other on the assessments of SBE participants as shown in Figure 4.[22]

Observation 1. *Estimates of β_0, β_1 and β_2 depend only on `mmore`.*

Observation 2. *Seeing a transfer with higher amount for themselves makes participants significantly more "satisfied" overall: the β_0 estimates are significantly higher in all treatments and regardless of having €20 or not.*

Observation 3. *When participant has more than the other he is indifferent to how much the other has ($\beta_2 = 0$).*

Observation 4. *When `mmore` $= 1$, the drop in sensitivity to own payoff (β_1) in comparison with `mmore` $= 0$ is **large** and cannot be reconciled by simply subtracting disadvantageous inequality term like in the inequity aversion model (see discussion in Section 4.1).*

Observation 5. *When `mmore` $= 0$ participant dislikes higher payoff of other which points towards some sort of aversion to the difference between own payoff and other's payoff.*

To explain all these observations we propose a utility model below. For notational con-

[22]Since we use assessments as the proxy for utility, in what follows we will use both term interchangeably.

venience let x denote $\texttt{self}_{it}$ and y denote $\texttt{other}_{it}$. Consider

$$U(x,y) = c + \rho x + (\lambda - \zeta x)\mathbb{1}_{\texttt{mmore}=1} - \alpha(y-x)\mathbb{1}_{\texttt{mmore}=0}. \tag{4}$$

Here c is a constant;[23] $\rho \geq 0$ is real (or personal consumption) sensitivity to own payoff; $\lambda \geq 0$ represents the increase in utility due to having more than other; $\zeta \geq 0$ is the drop in sensitivity to own payoff when having more than other; $\alpha \geq 0$ is the sensitivity to difference between other's payoff and own when other has more. When $\texttt{mmore} = 1$ the utility becomes

$$U(x,y) = c + \lambda + (\rho - \zeta)x,$$

and when $\texttt{mmore} = 0$ it is

$$U(x,y) = c + (\rho + \alpha)x - \alpha y.$$

The utility obviously replicates Observation 1 by construction; λ reconciles Observation 2; when $\texttt{mmore} = 1$ utility does not depend on y (Observation 3); ζ solves the problem pointed out in Observation 4; $\alpha(y-x)$ term creates envy towards other's payoff (Observation 5). This utility function is perfectly consistent with the competitive frame that we imposed on our participants.

The role of the first additional term in the utility $(\lambda - \zeta x)$ is to model the effect of satisfaction from having higher payoff (λ) and decrease in sensitivity to own payoff (ζ). The former part is intuitively clear, however, the decrease in sensitivity is not that obvious. Why would participants enjoy their own payoff less when they are on top? One explanation might stem from the nature of the competitive environment of the experiment. If we assume that participants see being on top as their main goal, then, once the goal is reached, they have no reason to be particularly concerned with their own payoff. To put it in a different way, when they are *not* on top, they are *overly* concerned about their payoff as the goal is still not reached. This explanation is reminiscent of diminishing marginal utility: when participants are deprived of what they want (being on top) they care about own payoff much more than when they achieve their goal.

The second additional term is intuitively clear: participants dislike others having more than them.[24] We would like however to test if this functional form (difference between the

[23] We need a constant to fit this utility function to the data.

[24] There exists extensive empirical and experimental literature on negative feelings and stress related to low social status (e.g. Charles, Hurst, and Roussanov, 2009; Luttmer, 2005). In several neuroeconomic studies (Zink et al., 2008; Rustichini et al., 2012) it is shown that, even with small monetary rewards, having less money than others evokes strong activation in the reward circuitry of human brain. Many evolutionary psychology studies also confirm that low social status leads to poor health and elevated levels of stress hormone cortisol (for overview see Cummins, 2005).

two payoffs times coefficient) fits the best to our data. Figure 5 shows β_1 and β_2 coefficients (on $\texttt{self}_{it}$ and $\texttt{other}_{it}$) from ten OLS regressions on the assessments of SBE participants with $\texttt{mmore} = 0$ from all three treatments. Regressions are numbered from 1 to 10, where nth regression includes only assessments in which $|\texttt{other}_{it} - \texttt{self}_{it}| \leq n$. As one can see the sum of the coefficients ($\beta_1 + \beta_2$) is constant in all 10 cases. This is *only* consistent with the assessments being dependent on the difference $\texttt{other}_{it} - \texttt{self}_{it}$.

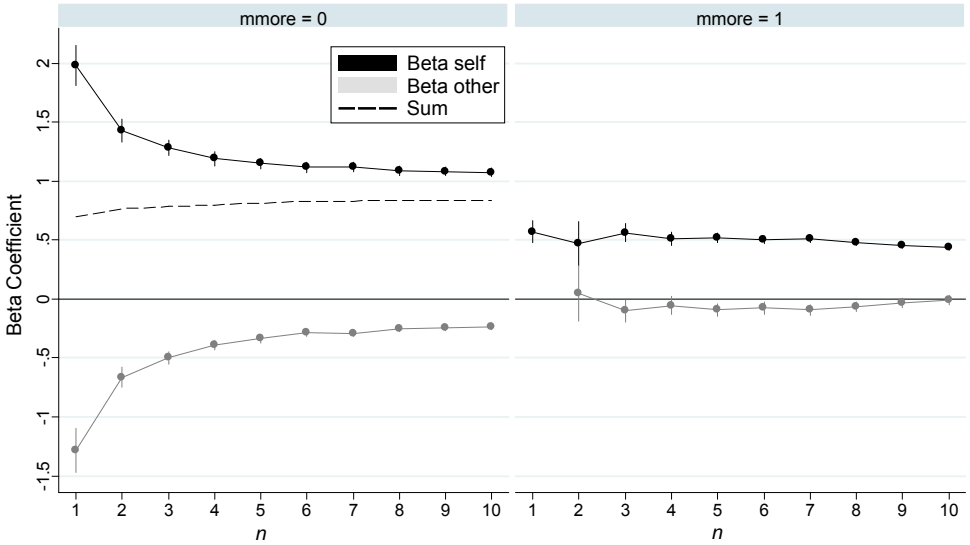

Figure 5: *β_1 and β_2 coefficients from ten OLS regressions of assessment (for each mode of* `mmore`*). For $n = 1..10$ the nth coefficients come from the regression which only takes into account the transfers with $|other_{it} - self_{it}| \leq n$. 68 regressors; 13079 observations; 319 participants (also independent observations); $R^2 = 0.56$. Vertical spikes are two standard errors.*

To illustrate quantitatively how the utility (4) fits our data we ran a simple OLS regression on all data from SBE participants and obtained the following estimates: $c = 3.15^{***}$, $\lambda = 1.84^{***}$, $\alpha = 0.24^{***}$, $\rho = 0.84^{***}$, $\zeta = 0.40^{***}$ ($* * *$ stands for $p < 0.01$; $R^2 = 0.56$).

4.4 Treatment Effects

In this section we look at the treatment effects among non-SBE participants, who assess transfers differently from the SBE participants. Figure 6 shows coefficients from the regression (3) for non-SBE participants. One can see that there are big treatment differences in the coefficients in all four regimes defined by the values of `mmore` and `has20`. For example, when $\texttt{mmore} = 1$ and $\texttt{has20} = 0$ (condition $(1,0)$) we can clearly see that the coefficient on the own payoff is significantly less in UNAW treatment than in PERF and ASYM treatments. Similarly, in condition $\texttt{mmore} = 1$ and $\texttt{has20} = 1$ (condition $(1,1)$) the coefficient on the own payoff in PERF treatment is significantly different from ASYM and UNAW treat-

ments. The constants in UNAW treatment are significantly higher than those in PERF and ASYM treatments, but only when `mmore` $= 0$.

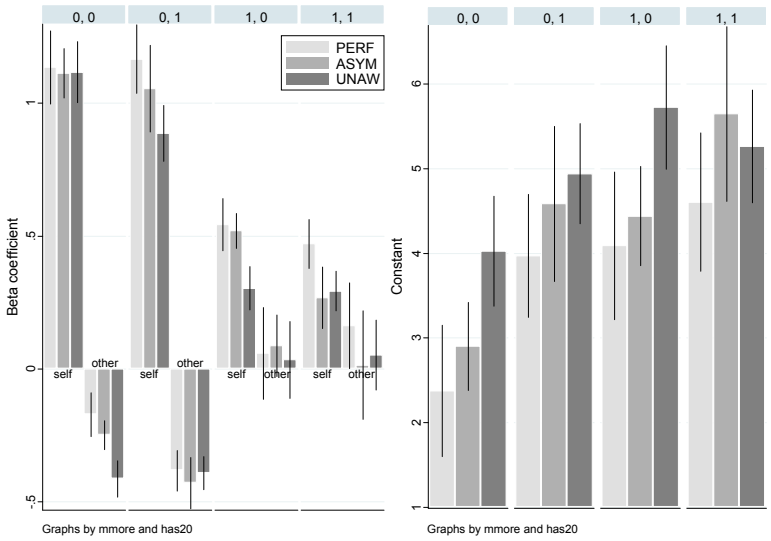

Figure 6: *Estimated coefficients from the random effects GLS regression* (3) *for non-SBE participants by treatment,* `mmore` *and* `has20`*. 68 regressors; 4715 observations; 115 participants (also independent observations);* $R^2 = 0.56$*. Vertical spikes are two standard errors.*

Notice that Observations 3, 4, 5 hold for non-SBE participants as well as for the SBE participants. Therefore, their preferences are similar to those of SBE participants in that they do not care about others' payoff when they have more; the sensitivity to own payoff falls when they receive €20; and they dislike others having more payoff when they have less. To some extent Observation 2 also holds, but only for participants who do not receive €20: the constants in each treatment are significantly higher in condition $(1, 0)$ than in condition $(0, 0)$.

Unlike SBE participants, non-SBE ones also react to the information structure regarding the knowledge about €20 that the other participant has. In particular, in condition $(1, 0)$ the coefficient on own payoff is the same in PERF and ASYM treatments, but it is significantly less in UNAW treatment. Similarly in condition $(0, 0)$ the coefficient on other's payoff is significantly less in UNAW treatment than in PERF and ASYM treatments where it is the same. For both conditions $(1, 0)$ and $(0, 0)$ the same distinction holds for the constant. The fact that participants assess transfers in the same fashion in PERF and ASYM treatments but differently in UNAW treatment (we are only looking at participants who did not receive €20) suggests that they react to the *knowledge that €20 exists*: in PERF treatment they know that other has €20 and in ASYM treatment they know that other has €20 with probability

$\frac{1}{2}$, whereas in UNAW treatment they are unaware about the possibility of €20.

Observation 6. *The assessments of non-SBE participants who did not receive €20 are affected by knowing that the other might have €20 (probabilistically or not).*

When non-SBE participants have €20, the situation is rather different. In condition $(1,1)$ the coefficients on own payoff are the same in ASYM and UNAW treatments, but is significantly higher in PERF treatment.[25] Moreover, now there are no treatment differences in the constants as it is the case when participants do not receive €20. This observations suggest that the participants who have €20 react differently to the *amount of information that the other participant has on their having €20*. In PERF treatment, the participants know that there is common knowledge about €20, whereas in ASYM and UNAW treatment they know that the other is either unaware about €20 or is not completely sure whether they have it or not.

Observation 7. *The assessments of non-SBE participants who did receive €20 are affected by the imperfection of knowledge of the other about €20.*

To explain these treatment differences and the direction of the observed change we propose a theory that consists of two parts: one for the participants with €20 and another for the participants without. We hypothesize that participants with €20 care about others knowing that they have "won." Since payoffs in the transfers change from €0 to €10, having €20 guarantees that the participant has more money than her pair regardless of the transfer chosen for payment. In particular, participants with €20 feel *bitterness of unshared victory* when they know that the other player either is not aware that they have €20 or considers the possibility that they do not have €20. This results in them being less sensitive to their own payoffs which are not as satisfying as when the other knows about €20. We can adjust the utility model (4) to reflect this by introducing an additional term:

$$U_{\texttt{has20}}(x,y) = U(x,y) - \nu x \mathbb{1}_{\texttt{treat}\neq PERF}. \tag{5}$$

In this model the participant dislikes the situation when the other does not know that she has €20 and more so as her payoff in the transfer grows ($\nu > 0$).

Participants without €20 dislike their position when they are aware about the existence of €20 in PERF and ASYM treatments, as compared to UNAW treatment. This can influence their attitude towards both own and the other's payoffs as well as the overall satisfaction. Participants can be less sensitive to the other's payoff when they know that the other has €20 with some probability (or for sure) as compared to UNAW treatment. The reason for

[25] Similar, but not that pronounced relationship holds for the condition $(0,1)$.

this might be the impossibility to win if the other has €20, which makes the participants more indifferent to the other's payoff. For the same reason, the participants can become more sensitive to own payoff when they know that the other might have €20, because, given that they cannot win, they concentrate more on what they have and ignore what the other has. Knowing that the other might have €20 can also make the overall satisfaction lower because this decreases the chances to win.

We can express this idea as the following utility function:

$$U_{\texttt{no20}}(x,y) = U(x,y) + (\mu(x+y) - \delta)\mathbb{1}_{\texttt{treat}\neq UNAW}. \tag{6}$$

Here $\mu > 0$ represents the change in the sensitivity to own and the other's payoff and $\delta > 0$ is an overall decrease in satisfaction when the participant knows that the other might have €20.

On Figure 7 we plot the predicted relationships between assessment and own/other's payoffs from the model (3).

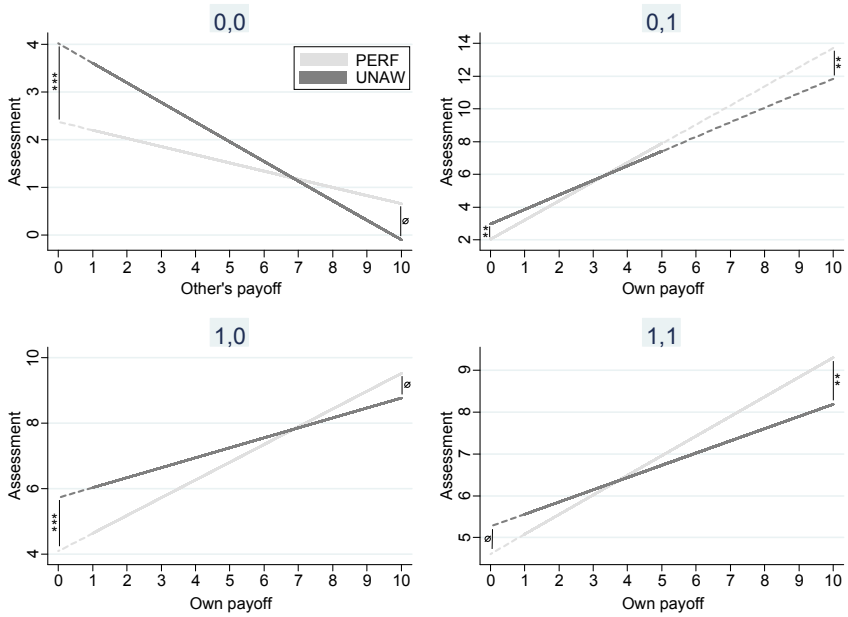

Figure 7: *Assessments predicted by model* (3) *for four cases depending on* `mmore` *and* `has20`*. Solid lines show actual assessments predicted by the model. Dashed lines are extrapolations for missing dependent variable values.* ∅ - $p > 0.1$; * - $p < 0.1$; ** - $p < 0.05$; *** - $p < 0.01$.

It is easy to see that in cases $(1,1)$ and $(0,1)$, where participants have €20, we observe decreased sensitivity to own payoff in UNAW treatment as compared to PERF treatment (ASYM treatment looks like UNAW treatment). Moreover, participants with €20 feel less satisfied in UNAW treatment as the fitted line for PERF treatment is everywhere lower than

that for UNAW treatment.[26] These observations are in line with the proposed utility (5).

In conditions $(1,0)$ and $(0,0)$, where participants do not have €20, we can see only partial consistency with the utility (6). In particular, we observe decreased sensitivity to the other's payoff only in condition $(0,0)$ and increased sensitivity to own payoff only in condition $(1,0)$. In Figure 6 we see that in both cases the overall satisfaction (constant) is lower in PERF and ASYM treatments as compared to UNAW treatment (δ). From fitted values in Figure 7 we can conclude that participants are less satisfied in PERF and ASYM treatments (ASYM looks like PERF in these cases) than in UNAW treatment.[27] This is qualitatively in line with the proposed utility (6).

Let us summarize these finding in the following observations.

Observation 8. *When participants reeive €20 they feel less satisfied when they know that the other is unaware (UNAW treatment) or unsure (ASYM treatment) whether they have €20 or not as compared to PERF treatment. Moreover, they become less sensitive to their own payoff because their "victory" is not total without their pair knowing about it.*

Observation 9. *When participants do not have €20 they feel less satisfied when they know that the other participant might have €20 (in PERF and ASYM treatments) as compared to UNAW treatment. Moreover, they become less sensitive to the others' payoff and more sensitive to their own payoff because the chance of sure loss (if the other has €20) turns their attention to what they have.*

Overall, we found that in competitive frames the winners care not only about the final transfer but also about others knowing that they have won. This suggests that beliefs about the (imperfect) knowledge of others enter preferences directly. Thus, in situations with incomplete information, preferences over beliefs of others should be taken into account.[28]

5 Conclusion

We report on an experiment in which participants evaluate transfers to themselves and one other person on a Likert-type scale ranging from very unappealing to very appealing. Before the evaluations, one of the two participants in each pair receives €20, which is decided

[26] In condition $(1,1)$ the difference between PERF and UNAW treatments is insignificant when own payoff is 0. In condition $(0,1)$ this difference is significant. Nevertheless, the relationship between the two fitted lines is very similar in both conditions.

[27] The difference between predicted assessments in UNAW and PERF treatments is insignificant at own/the other's payoff of 10.

[28] Here we consider beliefs of others regarding the final payoff transfer, and not beliefs about others' expectations, like, for example, in guilt aversion models.

by a random draw. This primes the participants to consider the transfers in the competitive frame. There are three treatments which differ from each other by the amount of information that the participant *without* €20 has about whether or not his pair has received €20. In the perfect information treatment, it is common knowledge who has €20. In the asymmetric information treatment, the participant without €20 believes that the other participant has €20 with probability $\frac{1}{2}$ and the receiver of €20 knows this. In the unawareness treatment, the receiver of €20 knows that the other is unaware about the existence of €20 (which is true).

We find that the receivers of €20 dislike the situations where the other is not aware about their €20 or is unsure whether they have €20 or not. Receivers show decreased sensitivity to their own payoff which we call "the bitterness of unshared victory." The joy of winning (having more money than the other) for the receivers comes partially from knowing that others acknowledge them as winners. Participants who did not receive €20 feel less satisfied overall when they know that the other participant might have €20, as compared to the case when they are unaware of €20. Moreover, when they know that the other might have €20 (for sure or with probability $\frac{1}{2}$) they become less sensitive to the other's payoff and more sensitive to their own payoff. We assume that the participants concentrate more on their own payoff when it is impossible for them to win, which is the case when the other has €20.

Additionally, we find that there is a rather large heterogeneity in how the participants assess the transfers. In particular, participants who were exposed to economics courses disregard all treatment differences and behave according to spiteful preferences. The participants who did not have economics training show significant difference in reactions to the information structure of their treatments. We hypothesize that learning about selfish rational paradigm in economics classes makes participants less concerned about others' payoffs or knowledge.

Our study establishes that simple social preferences models are not enough to explain behavior in the competitive environments with incomplete information: preferences over beliefs play a role in these cases. In the future experiments we plan to build on this research and detect the behavioral manifestations of preferences over beliefs in games with incomplete information.

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Appendix

A Definitions of Variables

Variable	Range	Definition
$\texttt{a}_{it}$	$[0, 10]$	Normalized assessment of participant i in period t
$\texttt{self}_{it}$	$[0, 10]$	Amount of money that participant i can obtain in period t
$\texttt{other}_{it}$	$[0, 10]$	Amount of money that the other $(-i)$ can obtain in period t
$\texttt{treat}_2$	$0/1$	Is 1 if ASYM treatment
$\texttt{treat}_3$	$0/1$	Is 1 if UNAW treatment
$\texttt{sbe}_i$	$0/1$	Is 1 if participant i majors in Economics or Business
$\texttt{has20}_i$	$0/1$	Is 1 if participant i received €20
$\texttt{mmore}_{it}$	$0/1$	Is 1 if in period t participant i had more than the other
$\texttt{per}$	$[1, 41]$	Choice period

Table 2: The variables used in the regressions.

B Additional Results

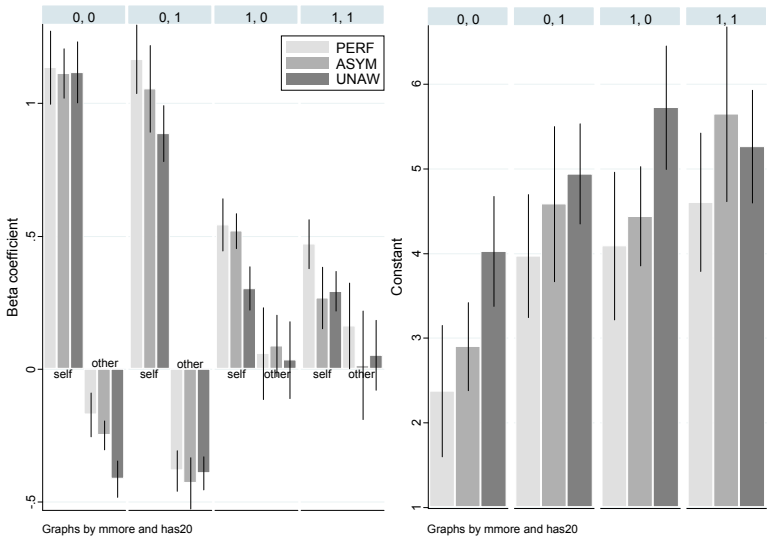

Figure 8: *Estimated coefficients from the random effects GLS regression* (1) *with added treatment dummies for all participants. 36 regressors; 17794 observations; 434 participants (also independent observations);* $R^2 = 0.56$. *Vertical spikes are two standard errors.*

	t1	dif1-2	t2	dif2-3	t3	dif3-1
sbe = 0 has20 = 0						
mmore = 1						
β_1 (self)	0.54***		0.52***	***	0.30***	***
β_2 (other)	0.05		0.09		0.03	
β_0 (const)	4.09***		4.44***	***	5.72***	***
mmore = 0						
β_1 (self)	1.13***		1.11***		1.12***	
β_2 (other)	–0.17***		–0.24***	***	–0.41***	***
β_0 (const)	2.37***		2.90***	***	4.02***	***
sbe = 0 has20 = 1						
mmore = 1						
β_1 (self)	0.47***	***	0.26***		0.29***	***
β_2 (other)	0.16***		0.01		0.05	
β_0 (const)	4.60***		5.64***		5.26***	
mmore = 0						
β_1 (self)	1.16***		1.05***	*	0.88***	***
β_2 (other)	–0.38***		–0.42***		–0.39***	
β_0 (const)	3.97***		4.58***		4.94***	**
sbe = 1 has20 = 0						
mmore = 1						
β_1 (self)	0.48***		0.44***		0.38***	**
β_2 (other)	–0.06		–0.03	*	0.07	**
β_0 (const)	4.85***		5.01***		5.30***	
mmore = 0						
β_1 (self)	1.09***		1.04***	***	1.19***	*
β_2 (other)	–0.24***		–0.23***		–0.22***	
β_0 (const)	2.66***	**	3.22***		3.07***	
sbe = 1 has20 = 1						
mmore = 1						
β_1 (self)	0.39***		0.45***		0.43***	
β_2 (other)	–0.01		0.01		0.02	
β_0 (const)	5.08***		4.69***		5.02***	
mmore = 0						
β_1 (self)	1.00***		1.09***		1.05***	
β_2 (other)	–0.24***	*	–0.19***	***	–0.29***	
β_0 (const)	3.29***		3.09***		3.47***	

Table 3: *The coefficients from the random effects GLS model* (3). *The* **t#** *columns correspond to three treatments (1 = PERF; 2 = ASYM; 3 = UNAW);* **dif*n*-*m*** *columns show the significance levels of the difference in coefficients between treatment n and m.* 68 regressors; 17794 observations; 434 participants (also independent observations); $R^2 = 0.56$. * is $p < 0.1$; ** is $p < 0.05$; *** is $p < 0.01$.

C Details of the Design

Table 4 shows the transfers presented to the participants. There are four cohorts. Each has the same transfers only in different randomized order. The transfers contain the pairs of the following types: 1) $\{(x, 10-x) : x = 0..4\}$; 2) $\{(x, 0) : x \leq 9 \text{ and odd}\}$; 3) $\{(x, x) : x = 1..5\}$; 4) $\{(x, 3) : x = 4..6\}$; 5) $\{(x, 2) : x = 3..7\}$ and 6) all the reverses except for case 3.

Period	Self1	Other1	Self2	Other2	Self3	Other3	Self4	Other4
1	3	2	0	1	9	0	3	3
2	3	4	6	3	6	3	0	7
3	10	0	0	7	3	5	0	10
4	7	0	0	10	10	0	1	9
5	0	5	5	0	3	7	0	9
6	0	10	9	0	0	3	1	0
7	2	5	3	7	5	3	7	2
8	4	2	3	4	6	2	3	2
9	4	3	2	2	0	1	2	2
10	2	2	0	9	2	6	6	4
11	6	3	4	3	3	4	10	0
12	1	9	3	2	5	2	3	7
13	7	3	2	8	7	2	4	4
14	1	1	1	9	3	3	1	1
15	3	5	3	6	3	6	0	3
16	4	6	0	5	2	2	9	1
17	2	7	2	4	0	7	3	0
18	6	2	3	3	1	1	2	4
19	0	9	2	3	4	4	5	3
20	3	6	4	4	4	3	8	2
21	2	4	2	6	2	4	7	3
22	6	4	2	7	5	5	2	3
23	5	5	4	6	2	8	2	7
24	2	3	0	3	4	2	5	2
25	7	2	6	4	8	2	3	4
26	5	0	5	5	0	9	2	5
27	9	0	6	2	5	0	7	0
28	5	3	10	0	3	0	4	3
29	3	3	8	2	7	0	3	5
30	0	3	7	2	4	6	6	3
31	0	7	1	0	1	0	9	0
32	8	2	1	1	2	7	2	6
33	0	1	5	3	2	3	0	1
34	4	4	9	1	2	5	5	0
35	1	0	3	5	6	4	6	2
36	9	1	3	0	7	3	4	2
37	3	0	7	3	9	1	2	8
38	3	7	2	5	0	5	0	5
39	2	6	5	2	1	9	4	6
40	2	8	7	0	0	10	3	6
41	5	2	4	2	3	2	5	5

Table 4: Transfers in 41 periods in the 2$^{\text{nd}}$ stage of the experiment.

D Instructions

D.1 PERF Treatment

General Information

You are participating in a decision making experiment. If you follow the instructions carefully, you can earn a considerable amount of money depending on the random choices of the computer. Your earnings will be paid to you in CASH at the end of the experiment. You receive €**3** for participation.

This set of instructions is for your private use only. **During the experiment you are not allowed to communicate with anybody.** In case of questions, please raise your hand. Then we will come to your seat and answer your questions. Any violation of this rule excludes you immediately from the experiment and all payments. The funds for this experiment are provided by the Marie Curie grant from the EU.

Part I

Throughout the experiment you are matched with one other participant in this room. In the first part of the experiment you and your pair, the other, will draw one ball each from an urn. This draw will be done by the computer for you. The urn contains two balls: one red and one green. Therefore, if you draw the red ball, this means that the other has drawn the green ball and vice versa. The person who drew the red ball (you or the other) gets €**20**. The person who drew the green ball gets nothing. Therefore, you have a 50% chance of getting €**20**. If you draw the red ball, this money will be given to you in the end of the experiment regardless of the subsequent choices that you might take.

The person you are paired with, the other, is given the same instructions. Thus, if you draw the red ball he/she will know that you received €**20** since there are only two balls in the urn. Symmetrically, if you draw the green ball you can deduce that the other has drawn the red ball and received €**20**.

This is the end of the first part of the experiment.

Part II

In the second part of the experiment you will see a sequence of *transfers* to you and the other, your pair. A transfer is two monetary amounts: the amount of money that you can get and the amount of money that the other can get. For example, you can observe the following transfer:

You	Other
€3	€2

This means that you will receive €**3** and the other will receive €**2**, *if this transfer is chosen*. You will observe around 40 transfers and only one of them will be randomly chosen by the computer. The amounts of money in this randomly chosen transfer will be given to you and the other. Since the information is symmetric in this experiment, the other will also observe the exact same transfers as you.

When observing a transfer you will be asked to assess it. You will be presented with the scale ranging from –7 to +7. –7 represents *Very Unappealing* transfer and +7 represents *Very Appealing* transfer. You are free to choose any number you like. These assessments will have no effect no the payments you get in the experiment. Neither will your choices affect the payments of other participants.

This is the end of the instructions for part II of the experiment. To summarize, your payments in this experiment are: 1) €**3** for participation; 2) €**20**, if you draw a red ball in the first part and 3) the monetary transfer that is randomly drawn from the sequence of the transfers you observe.

If you have any questions please raise your hand and we will come to answer it. If you have no questions please remain seated. The experiment will start once everyone has finished reading the instructions.

D.2 ASYM Treatment

General Information

You are participating in a decision making experiment. If you follow the instructions carefully, you can earn a considerable amount of money depending on the random choices of the computer. Your earnings will be paid to you in CASH at the end of the experiment. You receive €**3** for participation.

This set of instructions is for your private use only. **During the experiment you are not allowed to communicate with anybody.** In case of questions, please raise your hand. Then we will come to your seat and answer your questions. Any violation of this rule excludes you immediately from the experiment and all payments. The funds for this experiment are provided by the Marie Curie grant from the EU.

Part I

Throughout the experiment you are matched with one other participant in this room. In the first part of the experiment you and your pair, *the other*, will draw one ball each from an urn. This draw will be done by the computer for you. The urn contains three balls: one red and two green. Each ball has the same probability of being drawn. The person who draws the red ball (you or the other) gets €**20**. The person who draws the green ball gets nothing. Therefore, you have a 33% chance of getting €**20**. If you draw the red ball, this money will be given to you in the end of the experiment regardless of the subsequent choices that you might make.

If you draw the red ball, then the other has drawn the green ball, because there is only one red ball in the urn. In this case you ***know*** that the other's payment was €**0**. However, if you draw the green ball, then you ***will not know*** which ball did the other draw, red or green. Thus, you ***will not know*** whether the other received €**20** or not. The other is given the same set of instructions. Thus, if you draw the red ball he/she ***will not know*** that you received €**20** since he/she will have the green ball and think that you might have red or green ball. If you draw the green ball then he/she ***might know*** that you have €**0**, if he/she draws the red ball.

This is the end of the first part of the experiment.

Part II

In the second part of the experiment you will see a sequence of *transfers* to you and the other, your pair. A transfer is two monetary amounts: the amount of money that you can get and the amount of money that the other can get. For example, you can observe the following transfer:

You	Other
€3	€2

This means that you will receive €**3** and the other will receive €**2**, *if this transfer is chosen*. You will observe around 40 transfers and only one of them will be randomly chosen by the computer. The amounts of money in this randomly chosen transfer will be given to you and the other. Since the information is symmetric in this experiment, the other will also observe the exact same transfers as you.

When observing a transfer you will be asked to assess it. You will be presented with the scale ranging from –7 to +7. –7 represents *Very Unappealing* transfer and +7 represents *Very Appealing* transfer. You are free to choose any number you like. These assessments will have no effect no the payments you get in the experiment. Neither will your choices affect the payments of other participants.

This is the end of the instructions for part II of the experiment. To summarize, your payments in this experiment are: 1) €**3** for participation; 2) €**20**, if you draw a red ball in the first part and 3) the monetary transfer that is randomly drawn from the sequence of the transfers you observe.

If you have any questions please raise your hand and we will come to answer it. If you have no questions please remain seated. The experiment will start once everyone has finished reading the instructions.

D.3 UNAW Treatment

General Information

You are participating in a decision making experiment. If you follow the instructions carefully, you can earn a considerable amount of money depending on the random choices of the computer. Your earnings will be paid to you in CASH at the end of the experiment. You receive €**3** for participation.

This set of instructions is for your private use only. **During the experiment you are not allowed to communicate with anybody.** In case of questions, please raise your hand. Then we will come to your seat and answer your questions. Any violation of this rule excludes you immediately from the experiment and all payments. The funds for this experiment are provided by the Marie Curie grant from the EU.

Experimental Setup

Throughout the experiment you are matched with one other participant in this room, *the other*. Before the experiment begins you receive €**20**. This money will be given to you

confidentially in the end of the experiment together with your other earnings and regardless of the subsequent choices that you might take. The other *does not receive* any money before the experiment.

The person you are paired with, the other, does not know that you have received €**20**. Moreover, he/she *does not know* that the possibility of receiving €**20** even exists. This is implemented through different set of instructions that the other reads. In particular, his/her instructions are *exactly the same as yours* except they are missing the part "Experimental setup" that you are reading right now. So, the other's instructions have only two parts: 1) "General Information" and 2) "Experimental Instructions" that follows on the other side of the page.

Part II

In the second part of the experiment you will see a sequence of *transfers* to you and the other, your pair. A transfer is two monetary amounts: the amount of money that you can get and the amount of money that the other can get. For example, you can observe the following transfer:

You	Other
€3	€2

This means that you will receive €**3** and the other will receive €**2**, *if this transfer is chosen*. You will observe around 40 transfers and only one of them will be randomly chosen by the computer. The amounts of money in this randomly chosen transfer will be given to you and the other. Since the information is symmetric in this experiment, the other will also observe the exact same transfers as you.

When observing a transfer you will be asked to assess it. You will be presented with the scale ranging from –7 to +7. –7 represents *Very Unappealing* transfer and +7 represents *Very Appealing* transfer. You are free to choose any number you like. These assessments will have no effect no the payments you get in the experiment. Neither will your choices affect the payments of other participants.

This is the end of the instructions for part II of the experiment. To summarize, your payments in this experiment are: 1) €**3** for participation; 2) €**20**, if you draw a red ball in the first part and 3) the monetary transfer that is randomly drawn from the sequence of the transfers you observe.[29]

If you have any questions please raise your hand and we will come to answer it. If you have no questions please remain seated. The experiment will start once everyone has finished reading the instructions.

[29]You, in addition, receive the aforementioned €**20** (the other does not have this footnote in the instructions).

E Moral Foundations Questionnaire

Part 1. When you decide whether something is right or wrong, to what extent are the following considerations relevant to your thinking? Please rate each statement using this scale:

0	1	2	3	4	5
not at all relevant	not very relevant	slightly relevant	somewhat relevant	very relevant	extremely relevant

1. Whether or not someone suffered emotionally
2. Whether or not some people were treated differently than others
3. Whether or not someone's action showed love for his or her country
4. Whether or not someone showed a lack of respect for authority
5. Whether or not someone violated standards of purity and decency
6. Whether or not someone was good at math
7. Whether or not someone cared for someone weak or vulnerable
8. Whether or not someone acted unfairly
9. Whether or not someone did something to betray his or her group
10. Whether or not someone conformed to the traditions of society
11. Whether or not someone did something disgusting
12. Whether or not someone was cruel
13. Whether or not someone was denied his or her rights
14. Whether or not someone showed a lack of loyalty
15. Whether or not an action caused chaos or disorder
16. Whether or not someone acted in a way that God would approve of

Part 2. Please read the following sentences and indicate your agreement or disagreement:

0	1	2	3	4	5
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

1. Compassion for those who are suffering is the most crucial virtue.
2. When the government makes laws, the number one principle should be ensuring that everyone is treated fairly.
3. I am proud of my countrys history.
4. Respect for authority is something all children need to learn.
5. People should not do things that are disgusting, even if no one is harmed.
6. It is better to do good than to do bad.
7. One of the worst things a person could do is hurt a defenseless animal.
8. Justice is the most important requirement for a society.
9. People should be loyal to their family members, even when they have done something wrong.
10. Men and women each have different roles to play in society.
11. I would call some acts wrong on the grounds that they are unnatural.
12. It can never be right to kill a human being.
13. I think its morally wrong that rich children inherit a lot of money while poor children inherit nothing.
14. It is more important to be a team player than to express oneself.
15. If I were a soldier and disagreed with my commanding officers orders, I would obey anyway because that is my duty.
16. Chastity is an important and valuable virtue.

*The Moral Foundations Questionnaire (full version, July 2008) by Jesse Graham, Jonathan Haidt, and Brian Nosek. For more information about Moral Foundations Theory and scoring this form, see: `www.moralfoundations.org`

Moral Foundations Questionnaire: 30-Item Full Version Item Key, July 2008

–Below are the items that compose the MFQ30. Variable names are IN CAPS
–Besides the 30 test items there are 2 catch items, MATH and GOOD
–For more information about the theory, or to print out a version of this scale formatted for participants, or to learn about scoring this scale, please see: www.moralfoundations.org

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PART 1 ITEMS (responded to using the following response options: not at all relevant, not very relevant, slightly relevant, somewhat relevant, very relevant, extremely relevant)

MATH - Whether or not someone was good at math [This item is not scored; it is included both to force people to use the bottom end of the scale, and to catch and cut participants who respond with last 3 response options]

Harm:
EMOTIONALLY - Whether or not someone suffered emotionally
WEAK - Whether or not someone cared for someone weak or vulnerable
CRUEL - Whether or not someone was cruel
Fairness:
TREATED - Whether or not some people were treated differently than others
UNFAIRLY - Whether or not someone acted unfairly
RIGHTS - Whether or not someone was denied his or her rights
Ingroup:
LOVECOUNTRY - Whether someones action showed love for his or her country
BETRAY - Whether or not someone did something to betray his or her group
LOYALTY - Whether or not someone showed a lack of loyalty
Authority:
RESPECT - Whether or not someone showed a lack of respect for authority
TRADITIONS - Whether or not someone conformed to the traditions of society
CHAOS - Whether or not an action caused chaos or disorder
Purity:
DECENCY - Whether or not someone violated standards of purity and decency
DISGUSTING - Whether or not someone did something disgusting
GOD - Whether or not someone acted in a way that God would approve of

PART 2 ITEMS (responded to using the following response options: strongly disagree, moderately disagree, slightly disagree, slightly agree, moderately agree, strongly agree)

GOOD It is better to do good than to do bad. [Not scored, included to force use of top of the scale, and to catch and cut people who respond with first 3 response options]

Harm:
COMPASSION - Compassion for those who are suffering is the most crucial virtue.
ANIMAL - One of the worst things a person could do is hurt a defenseless animal.
KILL - It can never be right to kill a human being.
Fairness:
FAIRLY - When the government makes laws, the number one principle should be ensuring that everyone is treated fairly.
JUSTICE Justice is the most important requirement for a society.
RICH - I think its morally wrong that rich children inherit a lot of money while poor children inherit nothing.
Ingroup:
HISTORY - I am proud of my countrys history.
FAMILY - People should be loyal to their family members, even when they have done something wrong.
TEAM - It is more important to be a team player than to express oneself.
Authority:
KIDRESPECT - Respect for authority is something all children need to learn.
SEXROLES - Men and women each have different roles to play in society.
SOLDIER - If I were a soldier and disagreed with my commanding officers orders, I would obey anyway because that is my duty.
Purity:
HARMLESSDG - People should not do things that are disgusting, even if no one is harmed.
UNNATURAL - I would call some acts wrong on the grounds that they are unnatural.
CHASTITY - Chastity is an important and valuable virtue.