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The Anatomy of Distributional Preferences with Group Identity

Daniel Müller*

September 4, 2019

Abstract

The increasing diversity of societies raises questions about the consequences for redistributive preferences. This paper assesses the impact of social identity on distributional preferences in a modified dictator game. I estimate individual-level utility functions with two parameters that govern the trade-offs between equity and efficiency and giving to *self* and to *other*. Subjects on average put less weight on income of the out-group. The out-group treatment also changes the distribution of equity-efficiency concerns. However, the experiment also uncovers a large individual heterogeneity of preferences. An analysis of GARP violations reveals that choices in both treatments overwhelmingly stem from well-behaved, yet systematically different underlying utility functions. Hence, the evidence presented here suggests that the rational choice approach is a useful tool for understanding the effect of social identity on preferences.

Keywords: Social identity, inequality, distributional preferences, GARP, rationality, in-group–outgroup bias.

JEL classification: D30, H30, H80.

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"Too often, customary practices and discrimination on the basis of gender, ethnicity, race, religion, social status, or class are the root sources of pervasive inequality in many countries."
Attributed to Said Musa.

1 Introduction

Determinants and consequences of inequality have recently attracted great attention from economists and the general public alike, as evidenced for instance by the heated debate surrounding Thomas Piketty's (2017) influential book (Piketty, 2015; Mankiw, 2015; Auerbach and Hassett, 2015; Weil, 2015). Those who consider inequality to be too high argue that it is a threat to social cohesion, that it harms opportunities and that it potentially undermines the fairness of political institutions. There is also reason to believe that governments should not only be concerned with the distributional implications of policies for political and social reasons, but also because inequality could have negative long-run effects on economic growth and because it might have *direct* adverse effects on social welfare and individual well-being.[1] Distributional preferences are not only an essential factor in shaping economic inequality in a society, but also in determining preferences in many economic policy areas such as income and wealth taxation, social security benefits and the health care system. It is consequently of paramount importance to understand how individuals trade-off equity and efficiency concerns on the one hand, and giving to *self* and to *other* on the other hand.

At the same time there is accumulating evidence that preferences of individuals cannot be fully understood in isolation, instead they are affected by the social context. In particular, it is now known that people care in economically relevant ways about the social group they identify themselves with.[2] The human tendency to identify as part of a social group seems to be at the heart of many societal problems such as discrimination, ethnic tensions and conflict and might also play an important part in explaining "American Exceptionalism" – the significant differences in welfare states between the US and Continental Europe (Alesina, Glaeser, and Sacerdote, 2001; Lee, Roemer, and Van der Straeten, 2006; Lee and Roemer, 2006). These findings suggest that it is important to understand the effect of social identity on distributional preferences in order to comprehend economic policies

[1] Regarding the former point, an important early study was conducted by Persson and Tabellini (1994). Ostry, Berg, and Tsangarides (2014) and Cingano (2014) provide more recent evidence. Regarding the latter point, the studies by Alesina, Di Tella, and MacCulloch (2004) and Graham and Felton (2006) for example find evidence that individual well-being is negatively affected by societal inequality. Ferrer-i Carbonell and Ramos (2014) provide a survey of the literature.

[2] Evidence not only comes from the laboratory, but also from empirical and theoretical work. Influential laboratory studies are by Chen and Li (2009), Charness, Rigotti, and Rustichini (2007), Goette, Huffman, and Meier (2006) and Bernhard, Fehr, and Fischbacher (2006).

and inequality, and also to juxtapose political and economic outcomes in socially more and less heterogeneous societies. All these issues are likely to become more important in the nearer future in the wake of globalization in general and surging international migration in particular.

Although Chen and Li (2009) have shown that people are "more altruistic" towards fellow group members, in general little is known about how distributional preferences are affected through in-group – out-group considerations. In particular, the existing literature has not decomposed these preferences into the weight on other people's income relative to one's own and the strength of the preference for efficiency over inequality. Changes in both components can in principle cause preferences for redistribution to shift. First, if people put less weight on the income of the out-group relative to that of the in-group, they in turn also prefer less redistribution in more heterogeneous societies. Second, an increased acceptance of inequality also leads to lower demand for redistribution. Nevertheless, comprehending which of the two channels explains the empirical observation is important because they potentially lead to different policy implications. If voters care less about the income of others and if the out-group is poorer on average, then they will support less redistribution no matter what. If, however, people demand lower redistribution because they are more efficiency–seeking (in other words, they react more strongly to the price of giving), this would imply that they might in principle still support redistributive measures as long as they are not too costly. For example, locals might oppose higher taxes in the presence of immigration because they care less about the incomes of immigrants, or because they consider taxation to be too inefficient. Thus, in the former case support for redistributive measures could be established as long as the policy is efficiently implementable. Both mechanisms are obviously distinct and require different responses from policy makers. At the same time, both effects can coexist and magnify each other, increasing the political consequences of the in-group – out-group bias.

In addition, a basic – but important – question to be asked is whether discrimination between the in- and the out-group is the outcome of a maximization process, or whether it should be considered a cognitive bias.[3] First evidence comes from Guala and Filippin (2017), who find that choices are subject to framing effects. Other studies have simply (often implicitly) *assumed* either a utility representation of preferences or that such behavior is 'irrational'. The answer to this question has, however, obvious important implications for academic scholars and for political decision-makers alike. Evidence confirming the 'bias hypothesis' would suggest that i) the rational choice approach to group identity predominantly used among economists (Akerlof and Kranton, 2000; Chen and Li, 2009) is misguided and ii) if policy makers wish to eradicate discriminatory behavior, 'soft' policy nudges might be a useful tool for changing behavior as they usually aim at correcting errors in decision-making.

[3] An alternative approach is to model in–group favoritism as belief-based, see Bénabou and Tirole (2011) for example.

Regarding i), the question whether discriminatory behavior can be modeled via a utility function has far-ranging implications for the study of group identity and discrimination in the social sciences as it is decisive for whether the tools of economic theory may be brought to the analysis of group identity. Being able to build on established theoretical models obviously has great advantages. Evidence supporting the 'bias hypothesis' would on the other hand imply that researchers would have to potentially come up with a completely new theoretical tool kit not based on the maximization of a well-behaved utility function, hence aggravating the academic endeavor.

Regarding ii), the finding of "rational discriminatory choice" would allow welfare analysis of different policies as such an analysis requires utilities as inputs. Assume, for example, that the government plans a tax reform. Then, a utility representation of the in-group – out-group bias could in principle be used to compensate those who are against the reform, because they believe that out–group members might overly profit and thus in this way buy their support. Such an undertaking obviously requires knowledge of the costs and benefits of all involved parties which in turn involves measuring utilities over the distribution of incomes. To sum up, understanding theoretically as well empirically the effect of group identity on preferences is therefore also of fundamental importance for the implementation of anti-discrimination policies.

This paper contributes to these discussions as it provides evidence for the causal impact of group identity on distributional preferences at the individual–level. In a controlled laboratory environment, I vary whether the recipient in a modified dictator game is from the in– or the out–group.[4] Group identity is thereby exogenously induced using preferences for Klee or Kandinsky paintings. This mechanism is purposefully designed to be orthogonal to the variable under study and has the great advantage of providing tight control over the notion of identity that field studies usually do not allow.[5] I gather a rich dataset from modified dictator games in which subjects repeatedly make decisions on how to distribute money between *self* and *other* with different linear budgets.[6]

Consequently, this paper makes two main contributions. First, it aims to answer the question

[4]Evidence for the external validity of experimental measures of distributional preferences in the political domain is provided by Fisman, Jakiela, and Kariv (2017) and Kerschbamer and Müller (2017).

[5]I consider the use of randomly induced group membership a distinct advantage over field experiments and over studies using natural groups. The use of preferences for Klee or Kandinsky paintings was pioneered by Tajfel, Billig, Bundy, and Flament (1971) and is now standard in the literature. In a meta study, Lane (2016) finds that the average degree of discrimination in laboratory studies with artificially induced group membership is higher than in cases in which the subject pool is divided by ethnicity or nationality but lower than in experiments with socially or geographically distinct groups. The fact that most of the participants in my experiment have some training in economics, a subject with a focus on consequences, also suggests the assumption that I am measuring a lower bound.

[6]The experimental design draws on a graphical representation of budget sets, as pioneered by Fisman, Kariv, and Markovits (2007) and Choi, Fisman, Gale, and Kariv (2007a), in which subjects indicate their preferred allocation by clicking on a computer screen.

whether distributional preferences with group identity can best be understood using a rational choice approach - the most prominent approach in the economics literature (Akerlof and Kranton, 2000; Chen and Li, 2009; Shayo, 2009; Chen and Chen, 2011); or whether it makes more sense to think of them as framing effect, mistakes or heuristics (Guala and Filippin, 2017). While economists typically think of choices as stemming from maximization behavior, social psychologists, often implicitly, assume that the in-group – out-group effect is irrational; that is, it is a cognitive bias or a framing device (Tajfel, 1981). Like Andreoni and Miller (2002), I treat giving to *self* and to *other* as two different goods.[7] The GARP theorem then allows a judgment to be made whether choices are rational in either treatment in the sense that they are the outcome of a maximization process – if choices satisfy GARP, they can be described by a complete and transitive preference ordering. As it turns out, subjects display a high degree of rationality *in both treatments*: Overall, the average CCEI score is 0.96, with no significant differences between the two treatments. Hence, the data suggests that choices in both treatments overwhelmingly – but not exclusively – stem from well-behaved, yet systematically different underlying social preferences.

Second, this paper dissects the causal impact of social identity on distributional preferences at the *individual level*. I estimate constant elasticity of substitution (CES) utility functions that allow for the decomposition of preferences into the weight on *other's* income relative to the *self* and an equity-efficiency trade-off. Previous estimates are so far, for statistical reasons, based on pooled estimations that are likely to mask a wide array of different individual behaviors.[8] I document several empirical findings. First, it turns out that subjects display considerable heterogeneity in their distributional choices in the presence of social groups. Second, most participants in my experiment are mildly social and relatively efficiency-minded. Third, subjects put, on average, less weight on income of the out-group. Fourth, the distribution of individual equity-efficiency trade-offs is also affected by the treatment. In particular, the treatment changes the tails of the distribution as the variance of the data-generating process decreases in the out-group treatment. Hence, looking at the average not only neglects large individual differences, but also tends to underestimate the impact of the treatment. These findings can be taken as evidence that the common approach of treating preferences as homogeneous, and pooling data in empirical estimations, is likely misguided. The current study is to the best of my knowledge the first to look directly at how the equity-efficiency trade-off varies with an in-group – out-group treatment.

Finally, I correlate behavior in the experiment with information about political attitudes from

[7] See also Sippel (1997) and Harbaugh, Krause, and Berry (2001).

[8] Several studies have recently found strong evidence for individual heterogeneity in behavior. See Choi et al. (2007a), Harrison and Rutström (2009) and Bruhin, Fehr-Duda, and Epper (2010) for studies on risk preferences and Fisman et al. (2007), Cappelen, Hole, Sørensen, and Tungodden (2007), Kerschbamer and Müller (2017) and Hedegaard, Kerschbamer, Müller, and Tyran (2019) for studies that show heterogeneity in social preferences.

the post-experimental survey. It turns out that the degree of selfishness and not the equity-efficiency trade-off - as in Fisman, Jakiela, and Kariv (2017) for an American sample - predicts self-placement on a political left–right scale. People who classify themselves as more right–leaning behave more selfishly in the experiment. This finding hints at deeper underlying ideological differences in the political system in Continental European countries and in the United States. I also document heterogeneous treatment effects. I do not find any evidence that the treatment effect depends on the political orientation of the subjects. Additionally, the data reveal gender effects across both treatments. Females are (slightly) less selfish, (significantly) more inequality averse and react more strongly to the manipulation of group identity. This result confirms and extends the findings of Andreoni and Vesterlund (2001), who study gender differences in altruism. They find, like I do, that men are more sensitive towards the price for giving.

This paper proceeds as follows. Section 2 relates the current paper to the literature and discusses the concept of social identity, while Section 3 depicts the experiment in more detail. Section 4 discusses the concept of rationality used here and presents the corresponding empirical results of this experiment. Section 5 describes individual-level distributional preferences with group identity and Section 6 assesses the connection to political preferences and potential gender effects. Finally, Section 7 concludes.

2 Relation to the Literature

The notion of identity - "a person's sense of self" - has recently gained much attention in the social sciences. In economics this interest has been triggered mainly by the work of Akerlof and Kranton (2000), although the concept has been important in social psychology since at least the 1970s (Tajfel, Billig, Bundy, and Flament, 1971; Tajfel and Turner, 1979). The literature to date offers considerable evidence that social identity can impact preferences and political behavior.[9] Early empirical evidence about the nexus of race and preferences for redistribution goes at least back to Orr (1976). More recently, Luttmer (2001) employed survey data to show that preferences for welfare spending are also determined by the racial composition of local welfare recipients. Enos (2016) shows that the presence of a black minority affected turnout of whites in Chicago and simultaneously increased the vote share for conservatives. Looking at Sweden, Eger (2009) finds evidence that the amount of immigration decreases support for the welfare state. The papers by Fong and Luttmer (2009), Klor and Shayo (2010) and Fong and Luttmer (2011) provide evidence for political-economic consequences of social heterogeneity using lab and survey experiments. All

[9]For the sake of brevity, I do not attempt to review the complete literature. Please see Stichnoth and Van der Straeten (2013) and Costa-Font and Cowell (2015) instead for (non-experimental) surveys on the impact of ethnic diversity on redistributive spending.

three works suggest that an increase in social heterogeneity will lead to less redistribution.

Because of the empirical difficulties apparent in measuring the influence of social identity, many researchers have turned to laboratory experiments, which allow for tight control over the notion of identity. Group membership is usually induced via preferences for Klee or Kandinsky paintings, creating groups that are meaningless, thus balancing group characteristics along the relevant dimensions. This paradigm was developed in social psychology (Tajfel, Billig, Bundy, and Flament, 1971) and is now routinely used to study in-group – out-group biases, as for example in Chen and Li (2009). They study the effect of group identity on a wide range of social preferences using this procedure. Because they use a variety of different economic games, the number of dictator game choices they elicit is limited. They conclude that people are "more altruistic" to members of their own group. Other influential experimental papers on identity are Bernhard, Fehr, and Fischbacher (2006) and Goette, Huffman, and Meier (2006), who study third party norm enforcement and cooperation with induced and natural groups and Charness, Rigotti, and Rustichini (2007), who study a battle of the sexes game and the prisoner's dilemma. Chen, Li, Liu, and Shih (2014) examine the effect of identity on coordination and cooperation. Eriksson, Mao, and Villeval (2017) show that most participants in a laboratory experiment with minimal group identities are willing to pay to preserve not only their own self-image but also the image of other group members.[10]

Three papers that are more directly related to my experiment. First, Porter and Adams (2015) conduct a dictator game to study motives for inter-generational transfers. Their experiment manipulates whether the recipient is a stranger or a parent of the participants. Their experimental design allows them to estimate pooled CCEI scores and utility functions.

Second, Kranton, Pease, Sanders, and Huettel (2016) employ minimal and natural (Democrats versus Republicans) groups to make sense of seemingly contradictory findings of inequity aversion on the one hand and harmful conflicts among different groups on the other hand. The authors study several different allocation games. They continue by estimating mixture models of Chen and Li (2009) type of utility functions and then classify people into four different types (inequality–averse, selfish, income–maximizing and dominance–seeking) based on posterior probabilities of the mixture model.[11] It is important to note that neither Porter and Adams (2015) nor Kranton et al.

[10]For more recent experimental studies on group identity see, for example, Tsutsui and Zizzo (2014), Chen and Lue (2015), Landa and Duell (2015), Harris, Herrmann, Kontoleon, and Newton (2015), Chen and Li (2015), Hett, Kröll, and Mechtel (2016), Gioia (2017) and Paetzel and Sausgruber (2018).

[11]While working on this paper, I became aware of the work of Bhatia (mimeo) who pursued a similar idea. A draft of his experiment is however not available online. Instead, he kindly sent me a personal copy. It is from this draft that I am familiar with his experimental design. He elicits 33 choices per subject, not employing a graphical design. We now know, however, that fewer than approximately 50 decisions per individual does not deliver enough statistical information in order to reliably estimate utility functions and not enough power to reject random clicking behavior from rational choices, see the online appendix of Fisman, Kariv, and Markovits (2007). Hence, his dataset

(2016) allow i) a judgment to make on whether choices can be rationalized by well-behaved utility functions, ii) estimation of individual-level utility functions and iii) preferences to be decomposed in an equity-efficiency trade-off and the weight on *self* relative to *other*.

Lastly, Guala and Filippin (2017) study in a laboratory experiment whether different framing of decision tasks can affect choices in dictator games with group identity. They elicit choices in several mini-dictator games. They find that the effect of social identity changes or disappears when dominated options are added. Hence, their work is related to the important debate whether identity preferences stem from maximizing behavior.

3 The Experiment

3.1 Procedural Details

Seven sessions (four "in-group" and three "out-group" with 12 to 20 participants each and 116 subjects in total) were run at the MLab of the University of Mannheim, Germany, in April and May 2016. A session lasted approximately 45 minutes and payments were between 4 and 18 euros with an average of 8.3 euros.[12] No one took part in more than one session. Participants were invited using ORSEE (Greiner, 2015) and the experiment was programmed in z-Tree (Fischbacher, 2007). One round was randomly drawn for every subject to be paid out. Every participant received money in their role as dictator as well as money as a passive recipient. In addition, subjects received potential earnings from the identity inducement stage. The recipient was either from the in- or the out-group, depending on the treatment. The payments however, were not organized in pairs, i.e., the participants would not necessarily receive money from the same person they give money to as a decision-maker (dictator) which was known. In addition, no feedback was given between each decision in the experiment. Subjects were informed about their payments only after the experiment. All payments were expressed in experimental tokens with ten tokens equaling one euro. Anonymity was strictly respected during the whole experiment and it was emphasized that no participant would receive any information about choices expressed by others or payments made to others. There was a short exit survey at the end of the experiment asking subjects for their age, gender, political attitudes and whether they thought the experiment was easy to understand. The average age was 22.7 years and 60% of the participants were male. A translated version of the instructions can be found in the appendix.

ultimately also does not allow the questions tackled by the current paper to be answered.

[12]The hourly student wage is about 8.5 euros.

3.2 Identity Inducement

This part of the experiment was identical in both treatments. Subjects first indicated their preferences over five different pairs of Klee and Kandinsky paintings and were then told, based on their previous choices, whether they belong to the Klee or the Kandinsky group.[13] The program thereby ensured that both groups were equally large in every session. Therefore, in principle, it was possible to become, for example, a member of the the Klee group although actually preferring Kandinskys paintings in a majority of decisions. In the case of a tie, participants were randomly assigned a group membership. If anything, this approach should make group identification weaker and hence deliver a more conservative estimate of the treatment effect.

This stage was followed by a quiz, in which subjects were asked to guess who had painted three additional paintings (either Klee or Kandinsky). Subjects would earn one euro per painting if the majority of the persons in their group correctly guessed its painter. Moreover, they would get an extra euro if their group had more correct answers than the other group. During the entire quiz stage subjects were allowed to communicate with members of their own group via a chat program. Communication during the experiment exclusively pertained to the paintings and the painters.

3.3 Modified Dictator Game

The main part of the experiment consisted of a series of modified dictator games with varying prices for giving. In using these modified dictator games, I am relying on similar graphical representations of linear budgets sets as in the pioneering work of Fisman, Kariv, and Markovits (2007) - for social preferences, and Choi, Fisman, Gale, and Kariv (2007a) for risk preferences. Every decision task consists of clicking on the preferred distribution of money between *self* and *other* on a computer screen. In addition, for every click, there was a box indicating the precise numbers of tokens allocated to *self* and to *other*. Once the preferred allocation was indicated, it needed to be confirmed by clicking the OK button. Choices were not confined to the budget line. Instead, it was possible to click anywhere in the budget set (but not outside). For every decision task the computer randomly drew both intercepts from a uniform distribution between 10 and 100 tokens (independently for every decision task and across subjects). Hence, the modified dictator game studied here varies the price for giving such that $B = p_s\pi_s + p_o\pi_o$, whereas B denotes the budget, π_s (π_o) the amount given to *self* (*other*) with corresponding price p_s (p_0). The traditional version of this game fixes $p_0 = p_s$. The (absolute value of the) slope of the budget set, $\frac{p_o}{p_s}$, can be interpreted as the relative price for giving. Repeated choices with different intersecting budget sets allows for evaluation of the consistency of choice data with GARP. Figure 1 depicts several example budget lines in my

[13] In this part, I basically follow Landa and Duell (2015). Screenshots of the experiment can be found in the appendix.

experiment.

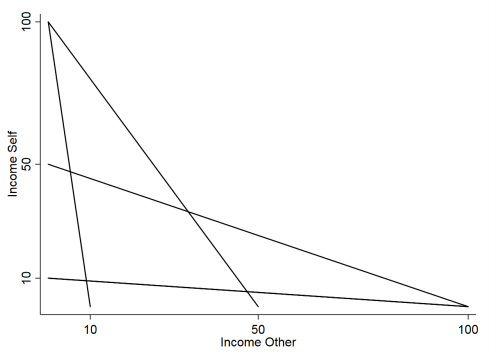

Figure 1: Some example budget lines.

Every subject made 50 choices in this part of the experiment.[14] The treatment varied whether the recipient was from the in-group or from the out-group. Small pictures of a Klee or Kandinsky painting on each axis visually indicated the group membership of the decision maker and the recipient.[15] The treatment effect is identified from between-subject variation, in other words, every subject participated in only the in-group or the out-group treatment.[16]

There are several advantages to such a modified dictator game. First, it allows many allocative choices to be elicited per subject with varying prices for giving (i.e. different slopes of the budget set). Moreover, the choice of a portfolio given a budget constraint delivers more statistical information than a binary choice. This fact allows the use of a cogent econometric methodology designed to disentangle behavior into two conceptually different and economically important trade-offs: the equity-efficiency and the *self* versus *other* trade-off. Second, the intuitive graphical representation of budget sets allows a large number of choices to be gathered per participant. Previously, small datasets induced researchers to pool data, thus ignoring individual heterogeneity and also preventing econometric estimations at the individual-level and proper modelling of the error term. This paradigm thus enables a more rigorous test of distributional preferences. Third, in general, exper-

[14] As Fisman et al. (2007) show in their web appendix, a smaller number of choices per individual does not in general yield the power to distinguish rationality from random clicking behavior.

[15] A screenshot can again be found in the appendix.

[16] In principle one could also identify the effect of group identity within-subject, which would for example allow the estimation of individual utility functions where the two parameters are both estimated as a function of a treatment dummy. I did however opt against this design because it would require at least, say, 100 choices per individual, which appears to be a relatively large number. Moreover, a within-subject design might be more prone to experimenter demand effects and a between-subject design can thus be considered more conservative (Charness, Gneezy, and Kuhn, 2012).

iments that reveal violations of rationality, potentially give us little sense of how important these violations are or how frequently they occur. The current modified dictator game allows Afriats (1972) Critical Cost Efficiency Index (CCEI) to be calculated as a continuous measure of rationality. CCEI scores offer the key advantage of being closely connected to economic theory, which makes them directly economically interpretable. Specifically, they tell us by how much the budget line needs to be reduced in order to eliminate a violation of the Generalized Axiom of Revealed Preferences (GARP). The CCEI scores thus allow me to precisely quantify the severity of violations. For more information, please consult Choi, Fisman, Gale, and Kariv (2007b).

3.4 Hypotheses

In this section, several hypotheses related to the experiment are derived. First, the current experiment breaks new ground regarding the measurement of GARP violations (CCEI scores). The experiment of Guala and Filippin (2017) suggests that choices in experiments with group identities might be subject to framing effects, which in turn is in line with the hypothesis that people do not exhibit maximizing behavior. On the other hand, studies that measure CCEI scores in experimental games without group identity find that subjects behave on average quite rational, see Andreoni and Miller (2002) and Fisman, Kariv, and Markovits (2007) for example. With very little further evidence I presuppose that subjects are rational in either treatment.

Hypothesis 1 (Treatment Effect on Utility Maximization): *The treatment does not affect utility maximization.*

Next, previous findings indicate that people behave "more altruistically" towards the in–group than the out–group. Chen and Li (2009) present evidence from various different experimental games to support this hypothesis. Thus, considering the average treatment effect on the degree of pro–socialness, which I define as the weight on *other* relative to *self*, I hypothesize the following:

Hypothesis 2 (Treatment Effect on Pro–Socialness): *The average degree of pro-socialness is higher in the in–group than in the out–group treatment.*

Regarding the concern for efficiency relative to equality, there is very little evidence that would allow some hypothesis to be derived. Given the findings of Alesina, Glaeser, and Sacerdote (2001), who find a negative correlation between the size of the welfare state and ethnic fractionalization across countries, I presume that the average concern for equality decreases in the out–group treatment. This conjecture is summarized in Hypothesis 3:

Hypothesis 3 (Treatment Effect on Efficiency Concerns): *The concern for efficiency over equality increases in the out–group treatment on average.*

While standard economic analysis usually assumes representative agents, there is by now overwhelming evidence that people differ in their preferences, including the domain of social preferences (Fisman, Kariv, and Markovits, 2007). While individual heterogeneity in preferences with artificial group identity has not been previously documented in a manner before, it seems reasonable to assume that the findings to date also transfer to the context of the in–group – out–group bias. I thus conjecture the following:

Hypothesis 4 (Individual Heterogeneity of Distributional Preferences): *There is individual heterogeneity in distributional preferences independent of the in–group – out–group treatment with behavior spanning from selfishness to pro–social attitudes on the one hand and from inequality aversion to a strong efficiency–focus on the other hand. At the same time, there is no reason to expect these behaviors to be correlated within-subject.*

Regarding potentially heterogeneous treatment effects with respect to gender, the evidence in Chen and Li (2015) suggests that females might be more prone to react to group identities as they increase their effort more than men do in reaction to groups in a coordination game. This leads to the conjecture that females might also react more strongly to the treatment manipulation in the experiment. Hypothesis 5 summarizes these thoughts:

Hypothesis 5 (Treatment Effect and Gender): *Females react more strongly to the treatment than do men.*

Finally, the evidence in Fisman, Jakiela, and Kariv (2017) suggests right-wingers are more efficiency–seeking. Moreover, anecdotal evidence suggests that membership in social groups plays a more important role for right–wingers than for leftists. These two conjectures are summarized in Hypothesis 6 a) and b).

Hypothesis 6 a) (Treatment Effect and Political Preferences): *Right–wingers are more efficiency–seeking, but not necessarily more selfish than left-wingers.*

Hypothesis 6 b) (Treatment Effect and Political Preferences): *Right–wingers react more strongly to group manipulation.*

4 Rationality

Eliciting a large number of allocative decisions with varying prices for giving allows the tools of demand analysis to be brought to the study of distributional preferences. GARP posits that if a consumption bundle $\pi = (\pi_s, \pi_o)$ is strictly revealed preferred to $\pi' = (\pi'_s, \pi'_o)$, then π' cannot be strictly revealed preferred to π. This statement is generally seen as a basic criterion of rationality in

decision-making as it rules out preference cycles. Afriat's theorem (Afriat, 1967) then tells us that if the choice data satisfy GARP one can treat them as coming from some well-behaved (continuous, concave and strictly monotone) utility functions.

However, GARP is a binary criterion in the sense that choice data either satisfy GARP or not. Since people are prone to make errors, a continuous measure of rationality is more desirable. Afriat's (1972) Critical Cost Efficiency Index (CCEI) provides such a measure. It measures the degree to which each budget line has to be adjusted in order to remove all violations of GARP. This index lies naturally between zero and one, where a CCEI score equal to one indicates no violation of GARP. This score can be interpreted as the amount of money a decision maker wastes.[17]

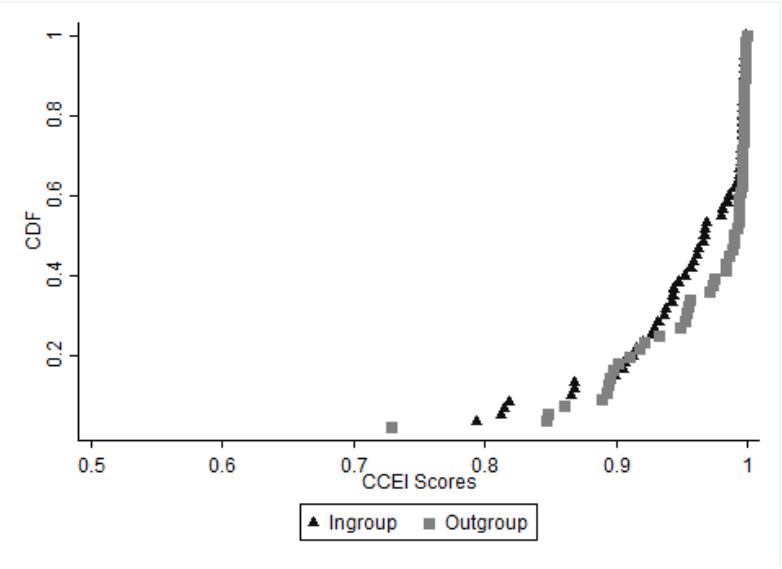

Figure 2: Empirical distribution function of CCEI scores for both treatments.

The two cumulative distribution functions (CDF) of the CCEI scores for each treatment are depicted in Figure 2. The scores are mostly close to one with a majority of subjects having scores above 0.9 in both treatments, with a total average of 0.96.[18] There are also no apparent differences between the two treatments, which is confirmed by a Kolmogorov-Smirnov (KS) test of the equality

[17]There are also other indices such as the 'money pump' index' by Echenique, Lee, and Shum (2011) or the 'minimum cost index' by Dean and Martin (2016). The CCEI is however most widely used in the empirical literature and computationally relatively simple which is why I stay with this index. For a more detail treatment of revealed preference analysis, please consult Chambers and Echenique (2016), Crawford and De Rock (2014) and Smeulders, Cherchye, Spieksma, and De Rock (2013).

[18]However, while scores are high, they are not equal to one. This suggests that behavior can best be described as 'almost-maximizing', a term coined by Fisman, Kariv, and Markovits (2007).

of distributions ($p \approx 0.23$) as well as a non-parametric χ^2 test of the equality of means ($p \approx 0.19$). I summarize this in

Result 1 (Treatment Effect on Utility Maximization): *The treatment does not affect utility maximization. Instead, subjects are close to utility maximization in both treatments.*

Obviously, *not rejecting* is not the same as *accepting* the null hypothesis. It is thus instructive to have an idea of how large the difference between the distribution of in-group and out-group scores could be such that the KS and the χ^2 test would detect a difference. To that end, I conduct simulations that control the treatment effect and then repeatedly calculate p-values of the two non-parametric tests based on simulated random samples. The main lesson from this exercise is that I can approximately rule out any effect of the in-group–out-group treatment on CCEI scores that is larger than 0.03, or 3 percentage points. This simulation thus shows that the tests conducted above are in fact quite powerful. Thus, potential treatment differences are likely small.[19]

Regarding the definition of rationality, I follow Fisman et al. (2007) and adopt a CCEI score of 0.8 as a – random, but nevertheless useful – threshold for rational behavior. Only three subjects have scores below 0.8, which suggests the conclusion that choices in both treatments overwhelmingly stem from well-behaved utility functions. Additionally, six subjects do not always click on the budget frontier, that is, they violate monotonicity. Consequently in what follows, I drop eight out of the total 116 subjects (one subject has a CCEI score below 0.8 and clearly also does not click on the budget frontier).[20]

A note on the power of the GARP test is appropriate here. There are several pieces of evidence indicating that the GARP test used here has sufficient power to reject maximizing behavior. First, Fisman, Kariv, and Markovits (2007) present in the web appendix of their paper the results of extensive Monte Carlo simulations that show that 50 - but not 25 - individual decisions are sufficient to distinguish random- from maximization behavior with sufficient confidence. Their tests build on Bronar's (1987). Since the current paper uses the same experimental paradigm as Fisman et al. (graphical representation of linear budget sets including a similar range of payments etc.), the conclusions from their Monte Carlo simulations also hold in this context. Second, I also conduct

[19] The details are provided in the appendix, including figure 9 which depicts the distribution of the p-values for the KS-test for different treatment effect sizes.

[20] Fisman et al. (2007) allow for a confidence interval of five tokens. I find that nine subjects make at least one choice that is more than five tokens away from the budget frontier. I keep three of those subjects (subject id's 43, 55 and 68) because this violation, with the maximum distance to the frontier slightly above five tokens, clearly seems to be an outlier relative to the other 49 choices they each make. I drop the other six subjects (id's 18, 22, 27, 59, 69 and 101) and also subjects 35 and 49 who both have a CCEI score below 0.8. The general picture does however not change much if I allow for a tighter confidence interval. For instance, almost 75% of subjects do not make a single choice outside a confidence interval of 2.5 tokens. Overall, more than 91% of the choices are within a one token confidence interval.

a *pooled* GARP analysis in which all observations made in one treatment are lumped together. I find average scores of 0.55 in the out-group treatment and 0.59 in the in-group treatment. Both scores are low, which shows that pooling choices made by different subjects leads to *rejections* of maximizing behavior – and hence also highlights the importance of accounting for individual heterogeneity.

5 Distributional Preferences with Group Identity

5.1 Econometric Framework and Individual-level Distributional Preferences

The analysis of the degree of rationality revealed that choices in the experiment can overwhelmingly be rationalized by well-behaved utility functions. Hence, I go on to describe the behavior of the remaining subjects $i = 1, ..., 108$ with constant elasticity of substitution (CES) utility functions of the form

$$U_i(\pi_s, \pi_o) = [\alpha_i \pi_s^{\rho_i} + (1 - \alpha_i)\pi_o^{\rho_i}]^{\frac{1}{\rho_i}} \quad , \tag{1}$$

where π_s is the income to *self* and π_o is income for *other*. The parameter α_i determines the weight i puts on *self* relative to *other*. If $\alpha = 0.5$, *self* is as important as *other* and $\alpha = 1$ implies full selfishness. The parameter ρ describes the curvature of the indifference curve in the (π_s - π_o) space. Hence ρ determines the equity-efficiency trade-off. In particular, if $\rho > 0$, preferences are geared towards maximizing pay-offs, and if $\rho < 0$ reducing inequality is more important. For $\rho \to -\infty$ preferences tend towards maxi-min, for $\rho \to 0$ indifference curves take the Cobb-Douglas form, and if $\rho = 1$ preferences become utilitarian (efficiency-minded).

The CES demand function is given by

$$\pi_{s,i}^n(p_s^n, p_o^n, B) = \left[\frac{\frac{\alpha_i}{1-\alpha_i}^{\frac{1}{1-\rho_i}}}{\frac{\alpha_i}{1-\alpha_i}^{\frac{1}{1-\rho_i}} + \frac{p_o}{p_s}^{\frac{-\rho_i}{1-\rho_i}}} \right] \frac{B}{p_s^n}, \tag{2}$$

where B is the budget and $n = 1, ..., 50$ denotes the decision problem. With $u_i = \frac{\alpha_i}{1-\alpha_i}^{\frac{1}{1-\rho_i}}$ and $v_i = \frac{-\rho_i}{1-\rho_i}$ one obtains the following econometric specification:

$$\frac{p_s^n \pi_s^n}{B} = \frac{u_i}{u_i + \frac{p_o^n}{p_s^n}^{v_i}} + \varepsilon_i^n. \tag{3}$$

The error term ε_i^n is assumed to be normally distributed; u_i and v_i can be estimated as censored Tobit model via non-linear least squares or maximum likelihood.[21]

[21] I report only non-linear LS results here. Results from maximum likelihood estimations are effectively the same

Table 1 summarizes the number of tokens held and passed in the experiment in addition to the estimates of α, ρ, the CCEI scores and the final profit by treatment. Subjects in the in-group treatment hold, on average, almost seven tokens less than in the out-group. This is substantiated in the estimated average α, which is clearly lower in the in-group treatment (0.73 versus 0.8). The mean values for ρ on the other hand, differ less in the two treatments, with ρ being higher in the out-group (0.48 versus 0.52).[22] The higher efficiency focus in the out-group is also reflected in the higher final profits in this treatment: subjects in the out-group treatment earn on average 50 cents more.[23]

Figure 3 depicts the empirical CDF of α by treatment. It is noteworthy that the distribution of α differs significantly between the two treatments: the values of α cover the whole interval between $\frac{1}{2}$ and 1. The CDF of the out-group treatment is visibly to the right of that of the in-group until $\alpha \approx 0.9$, where the two functions approach each other. Hence, it seems that the number of relatively selfish individuals is hardly affected by the treatment.[24] A non-parametric χ^2 test (null hypothesis equality of means) shows a p-value of $p < 0.01$ and thus confirms the earlier conclusions. A non-parametric Kolmogorov-Smirnov test rejects equality of distributions ($p \approx 0.01$). I summarize these results as follows:

Result 2 (Treatment Effect on Pro–Socialness): *Subjects behave more pro–social (i.e. they put more weight on the income of the other person) in the in–group treatment.*

Figure 4 plots the CDF of ρ by treatment. The first thing to note is the relatively high average focus on efficiency relative to equality as all parameters are positive across both experimental conditions.[25] Second, nevertheless, there is once again a visible heterogeneity in behavior across

and are available upon request. Moreover, I also estimated the model in terms of demand for absolute levels (as opposed to shares). There, however, it turns out that the error term is heteroscedastic and the model fit is worse. This finding resembles that of Andreoni and Miller (2002). Like them, I do not present further results from this exercise.

[22] Note that $\alpha \in [0, 1]$ whereas the value of ρ is not restricted to be positive, hence the effect size of α is also clearly more important relative to the scale of both parameters.

[23] In order to test for session effects, I first run regressions with α (ρ or the CCEI scores, respectively) as dependent variable and session dummies as independent variables, separate for each treatment. Second, I run the same regression only with the number of participants in a session as independent variable instead of session dummies (again, separate by treatment). It turns out that in none of the six regressions is the p-value of the F-test of joint explanatory power below 10%. This conclusion remains the same when looking at the t-statistics.

[24] In particular, the fraction of people with $\alpha > 0.9$ ($\alpha > 0.91$) is 23% (22%) for the in-group treatment and 32% (25%) for the out-group.

[25] These results can be explained by the fact that the subject pool of the University of Mannheim mostly consists of students studying business, economics and related subjects, who are known to be more efficiency-oriented than in other majors (Fehr, Naef, and Schmidt, 2006). By all means, Fisman, Kariv, and Markovits (2007) find $\rho \in [-1, 0]$ for a considerable fraction of students at the UC Berkeley. Moreover, note that ρ is not identified for a large α. The conclusions do however not change if I exclude subjects with $\alpha > 0.95$. The results are not presented here, but are

	In-group	Out-group
Tokens Hold	53.0	59.8
	(24.2)	(23.4)
Tokens Pass	11.7	6.0
	(15.2)	(10.5)
Hold-Rate	0.81	0.90
	(0.2)	(0.2)
Pass-Rate	0.19	0.10
	(0.2)	(0.2)
α	0.73	0.80
	(0.15)	(0.12)
ρ	0.48	0.52
	(0.22)	(0.15)
CCEI	0.96	0.97
	(0.05)	(0.05)

Table 1: Summary statistics of giving behavior by treatment. Standard deviations (bootstrap adjustment for estimated parameters used) in brackets below. There are 58 subjects in the in-group and 50 subjects in the out–group treatment making a total of 2,900 and 2,500 choices, respectively.

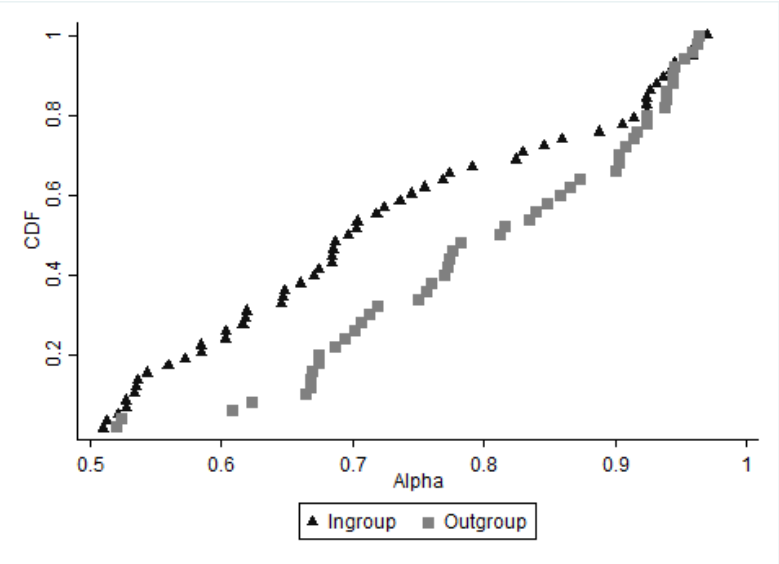

Figure 3: Empirical distribution function of α for both treatments.

subjects. Third, eye-balling suggests a small treatment effect on the mean of the distributions and a larger effect on the variance. Specifically, the variance decreases in the out-group treatment relative to the in-group: The out-group CDF is clearly below the in-group CDF until $\rho \approx 0.55$ and then lies above it. This impression is confirmed by the summary statistics as the standard deviation of ρ is 0.22 in the in-group and 0.15 in the out-group and by Bartlett's test for equal variance ($p < 0.01$). A χ^2 test of equality of means exhibits a p-value of $p = 0.05$, suggesting that the mean inequality aversion is statistically significantly higher in the in-group treatment. The difference in point estimates however seems economically less relevant than the differences between the mean α, in particular because α is restricted to the unit interval whereas ρ is not. A Kolmogorov-Smirnov test for equality of distributions displays a p-value of $p = 0.058$, weakly suggesting the treatment also changed the *data-generating process* of ρ. The Wilcoxon rank sum test on the other hand does not detect significant treatment effects regarding ρ ($p = 0.17$). Table 2 provides an overview of the different statistical tests for treatment differences in both parameters. Both effects potentially support a decrease in redistribution in heterogeneous societies. Result 3 summarizes these findings.

Result 3 (Treatment Effect on Efficiency Concerns): *The out–group treatment increases the variance of the distribution of equity–efficiency trade–offs.*

Moreover, the experiment reveals vast differences in behavior, with potentially important con-

available upon request.

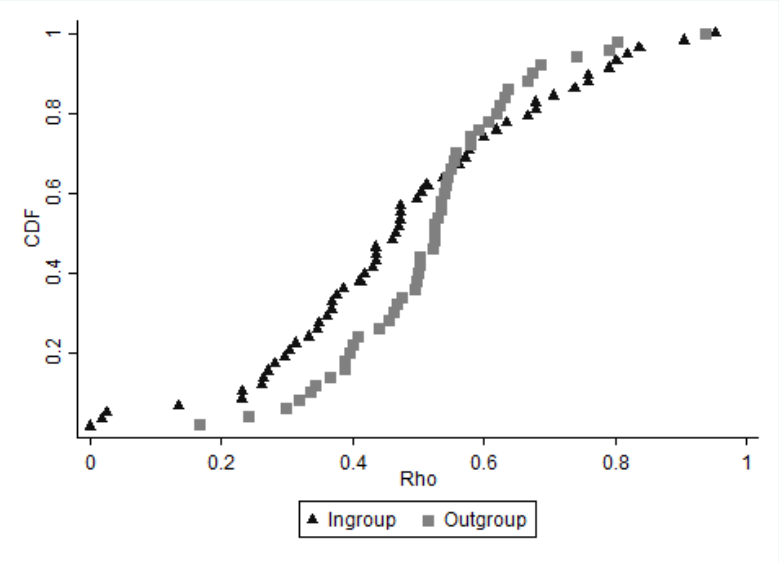

Figure 4: Empirical distribution function of ρ for both treatments.

	α	ρ
Equality of Mean	< 0.01	0.05
Wilcoxon-Mann-Whitney	< 0.01	0.17
Kolmogorov-Smirnov	0.01	0.06

Table 2: Test for treatment effects. Table depicts p-values, H0: no treatment effect. $N = 108$.

sequences, something the average treatment effect would miss. It is also noteworthy that the within-subject correlation between α and ρ is close to zero with a correlation coefficient of -0.06 ($p = 0.53$), highlighting the fact that both concepts are not only theoretically but also empirically distinct. This result is summarized in:

Result 4 (Individual Heterogeneity of Distributional Preferences): *On the one hand, there is a large degree of individual heterogeneity in distributional preferences. On the other hand, efficiency concerns and pro–social attitudes are uncorrelated at the individual level.*

Finally, I also validate that the treatment differences in α and ρ are not driven by different error distributions. To do so, I calculate the prediction error of hold rates, that is the difference between the actual rate of tokens held in each decision situation and the predicted hold rate based on the

price ratio and the estimated individual CES utility function. A reason for concern would be given if these distributions differ significantly. It turns out that this is not the case: non-parametric tests do not yield any evidence that allows the rejection of the null hypothesis of no difference between both distributions ($p = 0.74$) and of no difference in means ($p = 0.94$). Figures 10 and 11 in the appendix plot the two distributions of the prediction errors and visually support this conclusion. Moreover, it seems fair to say that the CES utility functions fit the data well in both treatments, as the average absolute prediction error of the hold rate is just 0.04 with a standard deviation of 0.07.

6 Additional Results

In this section I assess i) the correlation of political and distributional preferences and ii) heterogeneous treatment effects regarding gender and political attitudes. Regarding the former point, Table 3 presents results from regressions using political attitudes as dependent variable (measured on a 1 to 10 scale whereas higher values mean more right–wing attitudes) and α and ρ as independent variables. Columns (1) and (2) use α as main left-hand side variable; columns (3) and (4) use ρ and columns (5) and (6) include both parameters. In each case, regressions are run with and without control variables. It turns out that more selfish people are more right-leaning. The individual equity-efficiency trade-off, on the other hand, does not predict political preferences. A coefficient of around 2, as in columns (1) and (2), implies that if a subject moves from being completely social ($\alpha = \frac{1}{2}$), to being entirely selfish ($\alpha = 1$), this subject would ceteris paribus be on average one point more right-leaning. The inclusion of a set of control variables does not affect the conclusions in any case although economics and business students express somewhat more right-wing attitudes than do other participants.[26]

Next, heterogeneous treatment effects in gender and political attitudes are examined. First, while gender differences in preferences have received considerable attention (Croson and Gneezy, 2009), there is very little knowledge about potential differences in the in-group – out-group bias. One might thus wonder whether females react more or less strongly to the treatment. Second, anecdotal evidence suggests that right-wing voters hold stronger feelings towards their own social group and may, as a result, also react more strongly to social heterogeneity.

[26] Note that, since α and ρ are *estimated* parameters, conventional standard errors will not be correct and need to be adjusted to account for the additional uncertainty. I do so by following Ogden and Tarpey (2005). Their approach works as follows: First, obtain a bootstrap sample of α and ρ based on $\hat{\alpha}$ and $\hat{\rho}$ and their corresponding standard errors estimates. Second, obtain a bootstrap sample of y (political preferences). Third, calculate the coefficient $\hat{\beta}_\alpha$, $\hat{\beta}_\rho$, of the corresponding regression. Lastly, repeat the previous steps B times. The bootstrapped standard error is then the standard deviation of $\hat{\beta}_1, ..., \hat{\beta}_B$.

Political Preferences	(1)	(2)	(3)	(4)	(5)	(6)
α	2.268**	1.838*			2.323**	1.973*
	(1.13)	(1.09)			(1.14)	(1.17)
ρ			0.539	0.162	0.653	0.463
			(0.75)	(0.77)	(0.75)	(0.79)
Out-group		-0.535*		-0.380		-0.570*
		(0.30)		(0.30)		(0.31)
Female		-0.260		-0.325		-0.208
		(0.33)		(0.35)		(0.35)
Econ–Business		0.578*		0.715**		0.557
		(0.35)		(0.33)		(0.35)
Age		-0.044		-0.047		-0.042
		(0.03)		(0.03)		(0.03)
Religion		-0.414		-0.371		-0.408
		(0.31)		(0.31)		(0.31)
Trust		-0.351		-0.351		-0.356
		(0.22)		(0.22)		(0.22)
Constant	3.472***	5.888***	4.935***	7.146***	3.105***	5.526***
	(0.88)	(1.21)	(0.45)	(1.07)	(1.05)	(1.51)
Observations	108	103	108	103	108	103
R^2	0.040	0.185	0.004	0.164	0.045	0.188

Table 3: OLS regression, standard errors in brackets below. Dependent variable is the political left-right self-assessment from 1 to 10 (higher values mean stronger right-wing attitudes). *, ** and *** indicate significance at the 10%, 5% and 1% level respectively. Standard errors are adjusted for the fact that α and ρ are estimated parameters using the bootstrap approach of Ogden and Tarpey (2005). The bootstrap is conducted with 4999 repetitions. *Outgroup* is a dummy that indicates the out-group treatment; *Female* is a dummy that indicates female participants; *Econ-Business* is a dummy that indicates business and economics students; *Religion* is a dummy that indicates whether a subject identifies with a religious organization and *Trust* measures trust in the government on a five-point scale (higher values mean more trust).

These conjectures are assessed in Table 4. In columns (1)-(4), α serves as the dependent variable, in columns (5)-(8) the dependent variable is ρ. The first regression in each block, columns (1) and (5), includes all possible covariates but not interaction effects. The next columns study the interaction effect of gender and the treatment and then the interaction of political attitudes and the treatment. Finally, the last columns in each block, namely columns (4) and (8), include both interaction effects as well as the full set of control variables. The results show that females are (weakly) less selfish (α is lower) and (strongly) more inequality-averse (ρ is lower) than are males. Moreover, it also appears that women adjust ρ (but not α) more strongly than do men in reaction to the treatment in the direction of less inequality aversion. This can be seen in the interaction term in columns (2) and (6). The empirical CDFs by gender for both parameters are depicted in the appendix in Figures 14 and 15. These observations lead me to conclude:

Result 5 (Treatment Effect and Gender): *Hypothesis 5 is partly confirmed. Females do indeed react more strongly to the treatment than do men regarding the equity-efficiency trade-off, but not regarding the degree of pro–socialness.*

Looking at heterogeneous effects with respect to political attitudes, it turns out that the interaction between political attitudes and the treatment indicator that indicates how much more strongly more right-leaning participants react to the treatment is not statistically significant and is small in magnitude. As columns (3) and (7) in Table 4 show, this coefficient is, for both α and ρ, virtually zero and not statistically significant, with very tight confidence intervals. Moreover, recoding political self-assessment to take on three different values (left, center, right), again does not affect the results significantly. Hence, I find no evidence for heterogeneous treatment effects with respect to ideological orientation. The other control variables do not change the results and are themselves not significant in the regressions with the exception of age in columns (5) and (8). It is also noteworthy that politically extreme individuals, left and right, do not differ in their reaction relative to more moderate individuals.[27] I summarize these findings in Results 6 a) and b).

Result 6 a) (Treatment Effect and Political Preferences: *Hypothesis 6a) cannot be confirmed. On the one hand, right–wingers are more selfish than left–wingers. There is, on the other hand, no evidence to support the hypothesis that they are more efficiency–seeking.*

Result 6 b) (Treatment Effect and Political Preferences: *Hypothesis 6 b) cannot be confirmed. There is no evidence for heterogeneous treatment effects with regards to political attitudes.*

[27] Figures 12 and 13 in the appendix depict the CDFs of both α and ρ by left- versus right-leaning political attitudes and treatment.

Dependent Variable	α				ρ			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Out-group	0.089***	0.070**	0.176**	0.055	0.050	-0.011	0.007	-0.139
	(0.03)	(0.04)	(0.08)	(0.10)	(0.04)	(0.04)	(0.11)	(0.13)
Female	-0.044	-0.087**		-0.073*	-0.100**	-0.194***		-0.196***
	(0.03)	(0.04)		(0.04)	(0.04)	(0.05)		(0.06)
Econ-Business	0.076***			0.069**	0.023			0.033
	(0.03)			(0.03)	(0.04)			(0.04)
Age	-0.002			-0.001	-0.004**			-0.004*
	(0.00)			(0.00)	(0.00)			(0.00)
Religion	0.022			0.034	-0.018			0.006
	(0.03)			(0.03)	(0.04)			(0.04)
Trust	0.001			0.004	0.010			0.009
	(0.02)			(0.02)	(0.02)			(0.03)
Out-group × Female		0.044		0.064		0.166**		0.187**
		(0.05)		(0.05)		(0.07)		(0.07)
Politic			0.030***	0.013			0.006	-0.008
			(0.01)	(0.01)			(0.01)	(0.02)
Out-group × Politics			-0.017	0.003			0.008	0.024
			(0.02)	(0.02)			(0.02)	(0.02)
Constant	0.735***	0.754***	0.564***	0.648***	0.568***	0.544***	0.445***	0.633***
	(0.07)	(0.02)	(0.06)	(0.10)	(0.10)	(0.03)	(0.08)	(0.15)
Observations	103	106	108	103	103	106	108	103
R^2	0.20	0.14	0.14	0.23	0.12	0.15	0.02	0.17

Table 4: OLS regression, robust standard errors in brackets. *, ** and *** indicate significance at the 10%, 5% and 1% level respectively. *Outgroup* is a dummy that indicates the out-group treatment; *Female* is a dummy that indicates female participants; *Econ-Business* is a dummy that indicates business and economics students; *Religion* is dummy that indicates whether a subject identifies with a religious organization and *Trust* measures trust in the government on a five-point scale (higher values mean more trust).

7 Concluding Remarks

The current paper estimates the causal impact of group identity on distributional preferences at the individual level using a controlled laboratory experiment. The data shows that people put on average more weight on income of in-group members and also that the variance of the distribution of efficiency concerns increases in the out-group treatment. However, the results also reveal sizable heterogeneity of distributional preferences with behavior spanning the whole spectrum from social to selfish and with different shades of equity-efficiency trade-offs between Cobb-Douglas and utilitarian indifference curves. In particular, the treatment effect on the equity-efficiency trade-off is more subtle, as the *variance* of the data–generating process changes.

Moreover, I find that the degree of selfishness predicts political preferences in the sense that right–wingers are more selfish, even after controlling for a battery of covariates. Thus, the current paper also delivers empirical evidence that corroborates the external validity of fairness experiments in general and this specific graphical approach to elicit allocative choices in particular. Since Fisman, Jakiela, and Kariv (2017) and Fisman, Jakiela, Kariv, and Markovits (2015) find that the equity-efficiency trade-off and not the weight on *self* predicts the political decisions of Americans, this finding raises new and intriguing questions about the underlying political differences in the United States and Europe. I also uncover heterogeneous treatment effects as females (and social individuals) seem to react more strongly to the treatment. However, the effect, maybe surprisingly, does not depend on political orientation. To the best of my knowledge, these findings have not yet been documented before.

As a second contribution, this paper shows that most subjects exhibit only small GARP violations (high CCEI scores) *across both treatments*. Namely, subjects behave as if they (almost-) maximize a social utility function. Thus, this experiment contributes to the debate on how preferences with group identity can best be understood theoretically. While there is a plethora of empirical evidence showing that groups mean something to people, there is little evidence as to whether the rational choice approach to group identity is fruitful or if this behavior should be viewed as a form of bias or irrationality. The former approach models behavior via a (social) utility function, as for example in Chen and Li (2009). The latter approach assumes that it would be wrong to think of these choices as being the outcome of a maximization process at all and hence other approaches are needed to tackle this problem. My data support the rational choice approach to distributional preferences with group identity. Previous experiments in this area were not designed to test the experimental choice data for consistency with utility maximizing behavior as such a test requires a large number of choices from every participant with varying budget sets and prices. The current dataset is unique in the sense that it is, to the best of my knowledge, the only one that allows CCEI scores to be calculated and thus to judge the frequency and severity of GARP violations to

be judged.

At first glance, the current results seemingly contrast with those of Guala and Filippin (2017) – GF henceforth – who find that the effect of group identity weakens or disappears when dominated allocations are added to the choice menu. It is important to note that GF do not challenge the notion of rationality in the sense of a complete and transitive preference ordering of subjects. Instead, this study finds that variations in the set of feasible payoff pairs alter choices. However, it might also be that changes in the choice set affect *which* utility function people maximize. Consequently, choices might be both optimizing and context-dependent at the same time. Indeed, this view is supported by the results presented in Fisman, Jakiela, and Kariv (2015), who generalize the experiments of Bardsley (2008) and List (2007) and find that choices are still largely consistent with GARP – but different across treatments.

Furthermore, there are several other potential explanations for the findings made by GF and the current paper. First, it might be that the graphical - instead of numerical - representation of allocations is more intuitive which in turn reduces the cognitive load of subjects and thus the measurement error. Second, it might be that group identities in GF were not salient enough. In their main table, 12 out of 18 possible direct comparisons between the in-group treatment and the neutral control condition are not significantly different at the 10% level (the other comparisons go in either direction). Moreover, it might be that the comparison of the in-group with a neutral control condition, as in GF, does not deliver sufficiently strong identity effects. The evidence presented in Grosskopf and Pearce (2017) points exactly in that direction, as it suggests that the in-group–out-group bias is mainly driven by out-group negativity and not by in-group favoritism, which in turn could explain the petty effect of group identity found in GF.

Additionally, it is noteworthy that, in the same way that GF do not show that people are irrational, the current paper does not show that subjects are *fully* rational. Instead, no participant exhibits a CCEI score of exactly 1 (although the average score is in fact close to 1), with some participants displaying scores significantly lower. Additionally, six subjects showed severe violations of monotonicity. This means subjects are well described as "almost-maximizing" (Fisman, Kariv, and Markovits, 2007).

On a more general level, the current experiment implies, as Alesina, Glaeser, and Sacerdote (2001) argue, that social heterogeneity can be one of the reasons for the observed differences in the size of welfare states across countries and continents. The current experiment suggests two potential channels. First, people value the income of the out-group less than that of the in-group. Hence, if voters expect the out-group to profit from a redistributive policy, then, ceteris paribus, they will be more opposed to that policy. Second, the results also showed that the distribution of equity–efficiency trade-offs changed, which in turn could also decrease the desire to redistribute income or wealth. Taken together, the findings in this paper suggest that social heterogeneity influences the

demand for redistribution and hence plays an important role in shaping economic policies.

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A Appendix

A.1 Screenshots

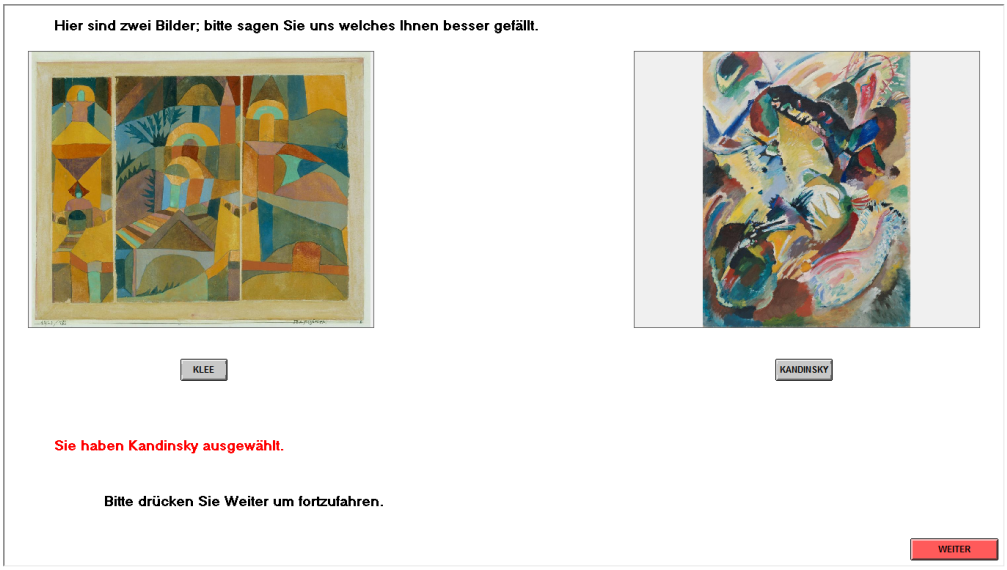

Figure 5: Screenshot identity inducement.

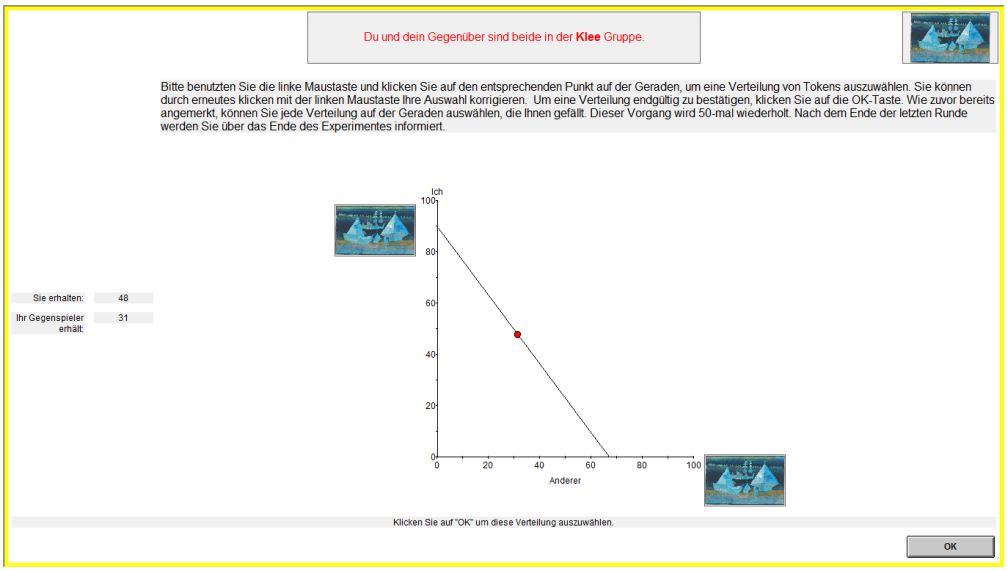

Figure 6: Screenshot Modified Dictator Game - In-group.

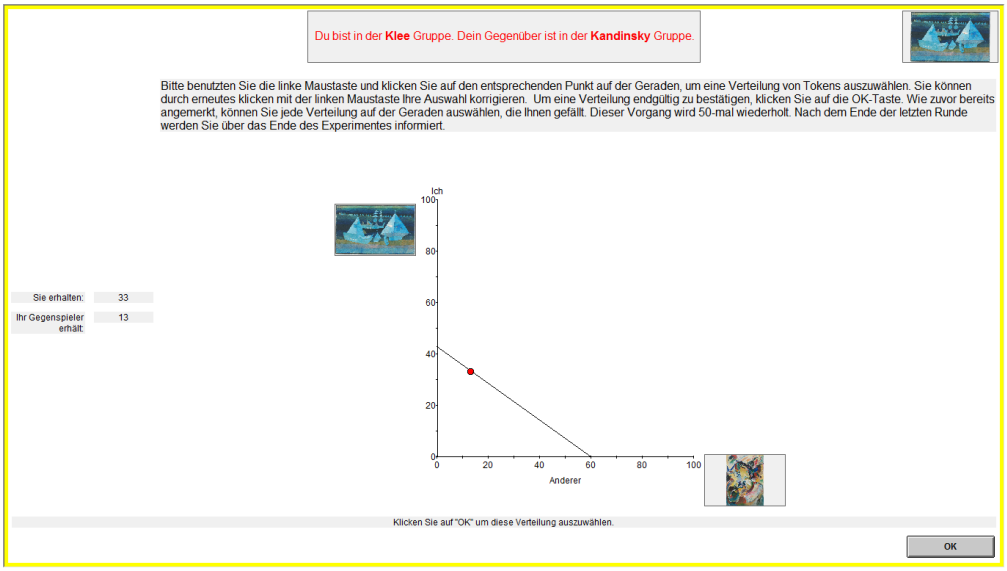

Figure 7: Screenshot Modified Dictator Game - Out-group.

A.2 Classification of Subjects into Types

In order to provide a more detailed account of the prevalence of distributional preferences, I classify subjects into different types. In particular, I classify subjects as "social" if $\alpha < 0.6$, as "mildly social" if $\alpha > 0.6$ and $\alpha < 0.9$; and, finally, as "selfish" if $\alpha > 0.9$. Regarding the equity-efficiency trade-off, I classify subjects as "neutral" if $\rho < \frac{1}{3}$; as "mildly efficiency-seeking" if $\rho > \frac{1}{3}$ and $\rho < \frac{2}{3}$; and as "strongly efficiency-seeking" if $\rho > \frac{2}{3}$. This classification in total leads to nine different potential distributional types.

First, Figure 8 provides a scatterplot of the distribution of the degree of pro–socialness, α, and the equity–efficiency trade–off, ρ. The correlation between both parameters is statistically indistinguishably form zero with a correlation coefficient of -0.06 ($p = 0.53$).

Next, Table 5 displays the empirical frequency of each of the nine distributional types, as defined above. All cells but one are populated by some individuals. The most frequent type is the mildly–social and mildly efficiency–seeking type. Moving to political attitudes, Table 6 displays the average answer to the ideological self-classification (measured on a one to ten scale with higher values indicating more right–wing ideological attitudes) for each distributional type. The prevalence of right–wing attitudes is visibly more increasing from the first to the last column, that is, when moving from "social" to "selfish". A less clear–cut pattern emerges when moving from the first to the last row, that is, in order of increasing efficiency-focus.

Looking at Table 7, it can be seen that the share of females in each type is almost monotonically decreasing with higher efficiency–focus. Moreover, moving from the first column to the last, the share of females in each cell decreases, but somewhat less clear-cut then when moving from top to bottom.

ρ \ α	Social	Mildly Social	Selfish	Sum
Neutral	4.6	8.3	2.8	15.7
Mildly efficiency-seeking	6.5	34.3	26.9	67.6
Strongly efficiency-seeking	2.8	13.9	0	16.7
Sum	13.9	56.5	29.7	100

Table 5: Frequency of Types in per cent.

ρ \ α	Social	Mildly Social	Selfish	Sum
Neutral	4.2	5	7	5.1
Mildly efficiency-seeking	5	4.9	5.7	5.1
Strongly efficiency-seeking	5.7	5.3	-	5.3
Sum	4.9	5.0	5.8	5.2

Table 6: **Political attitudes** by type. Higher values mean more right-wing ideological self-classification.

ρ \ α	Social	Mildly Social	Selfish	Average
Neutral	0.60	0.78	0.00	0.59
Mildly efficiency-seeking	0.43	0.50	0.18	0.37
Strongly efficiency-seeking	0.00	0.20	-	0.17
Average	0.40	0.47	0.16	0.37

Table 7: **Share of females** by distributional type.

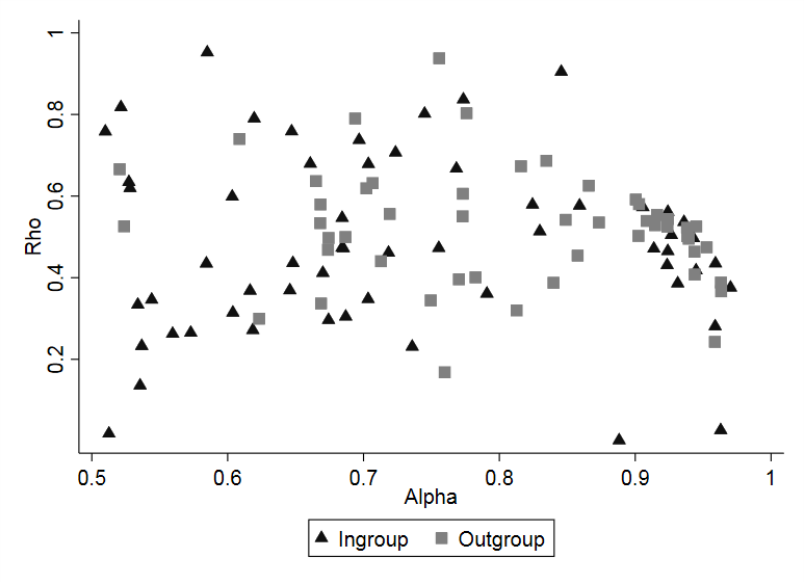

Figure 8: Scatterplot of ρ and α.

A.3 Power of Test on Treatment Differences in CCEI Scores

This sub-section describes the simulation, mentioned in Section 4, that was conducted in order to assess the power of non-parametric tests in more detail. It works as follows:

i) Draw 56 iid "out-group observations" (which equals the number of out-group scores in the actual experiment). These 56 observations are drawn from a normal distribution with a mean of 0.95 (the empirical mean in the actual experiment) and a standard deviation of 0.05 (the empirical standard deviation).

ii) Draw 60 iid "in-group observations" (which equals the actual number of in-group CCEI scores observed in the experiment) from a normal distribution with a standard deviation of 0.05 and a mean of $0.95 - d$ whereas $d \in \{0, 0.01, 0.02, 0.03, 0.04, 0.05\}$.

iii) Replace all random draws that are larger than 1 with a value of exactly 1 (the resulting distribution mimics the empirical CDF of the scores well).

iv) Calculate the p-value of the Kolmogorov-Smirnov and the χ^2 test for the null hypothesis of no difference between both distributions.

v) Save the two p-values.

vi) Repeat i) - v) 1,000 times for each value of d.

Figure 9 plots the result. As it can be seen there, virtually all p-values are below 0.05 for $d > 0.03$ which highlights the fact that even small treatment effects in the area of 3 percentage

points can be ruled out in the data of the current experiment. In fact, even differences as small as $d = 0.02$ have a decent chance to be detected at standard significance levels (although that chance is lower than 90%). Table 8 displays the summary statistics.

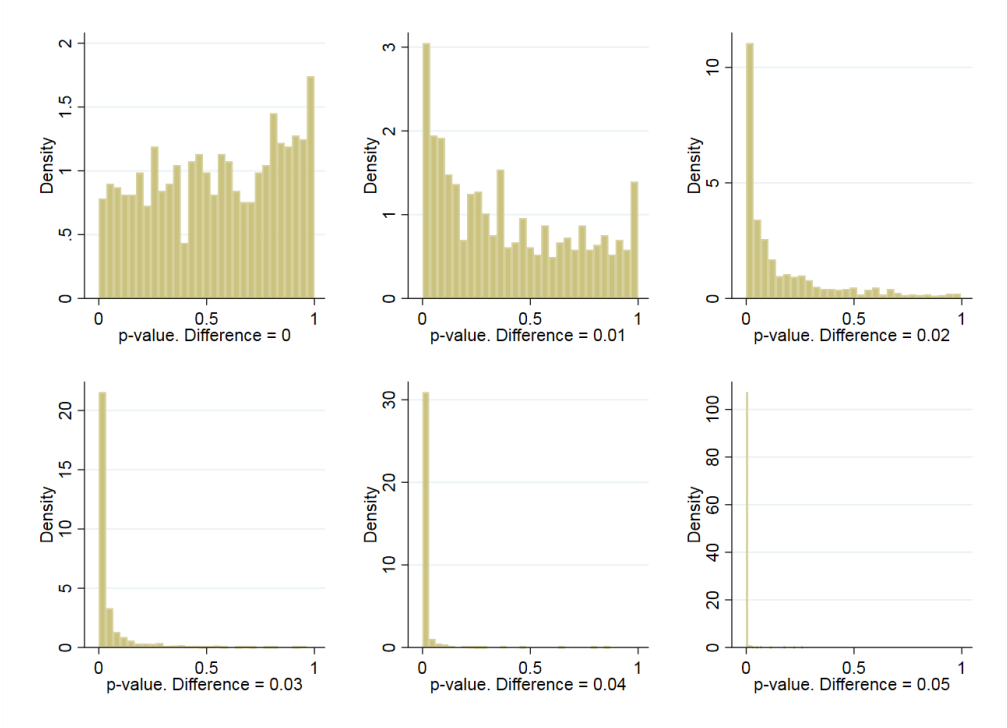

Figure 9: P-values from simulation of Kolmogorov-Smirnov tests. H_0: no difference between both distributions. The actual difference in means d is increasing from 0 (top-left corner) to 0.05 (bottom-right corner). Every panel in this figure is based on $1,000$ KS-tests with $N = 116$ observations in each draw.

	$d = 0$		$d = 0.01$		$d = 0.02$		$d = 0.03$		$d = 0.04$		$d = 0.05$	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
χ^2	0.54	0.29	0.45	0.31	0.24	0.27	0.08	0.15	0.02	0.07	0.00	0.04
KS	0.56	0.28	0.40	0.31	0.17	0.23	0.05	0.11	0.01	0.05	0.00	0.01

Table 8: Table shows means and standard deviations of p-values of Kolmogorov-Smirnov and χ^2 tests. Every mean is based on 1,000 draws of $N = 116$ samples. Null hypothesis: no difference. Actual difference in means is given by d.

A.4 Prediction Error

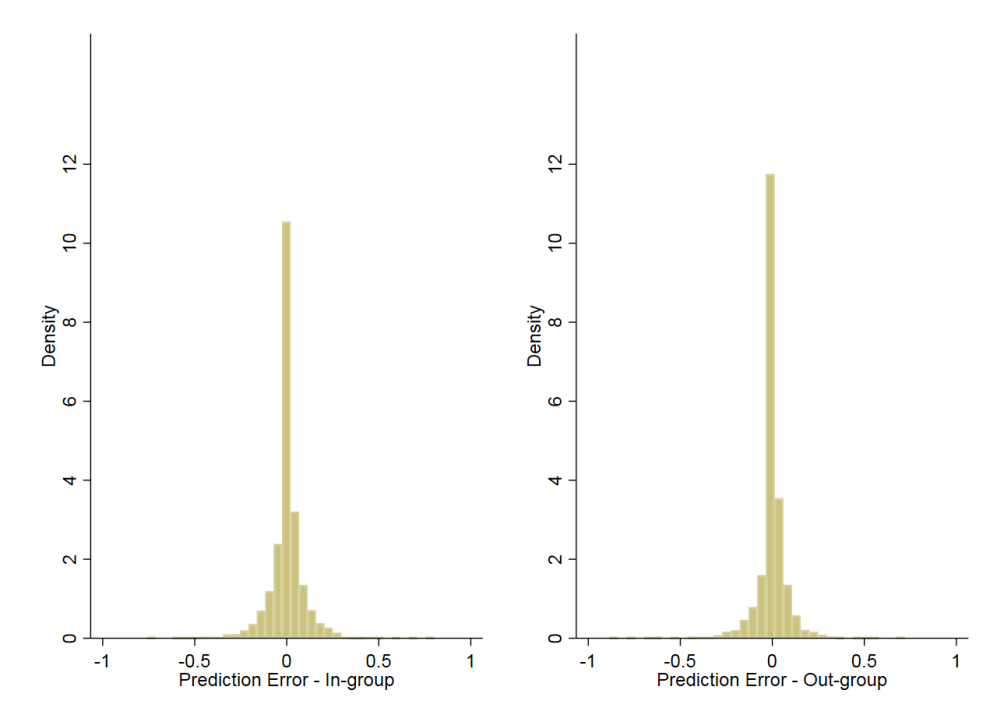

Figure 10: Prediction error of hold rate by treatment. Both distributions are not statistically significantly different from each other.

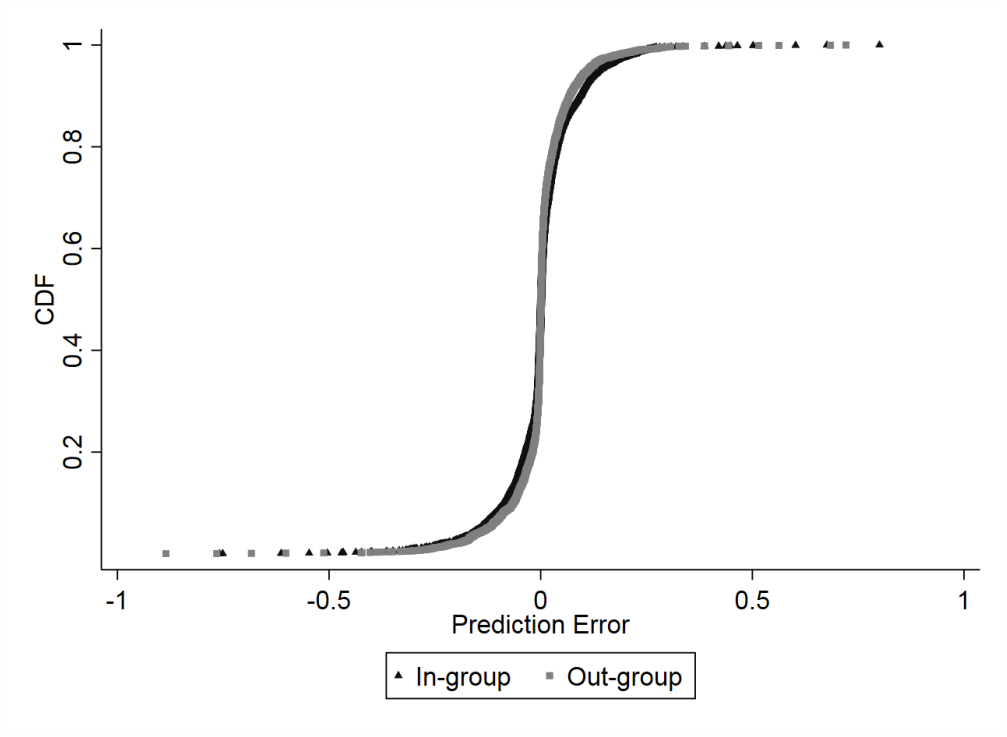

Figure 11: CDF of the prediction error by treatment.

A.5 Additional Figures

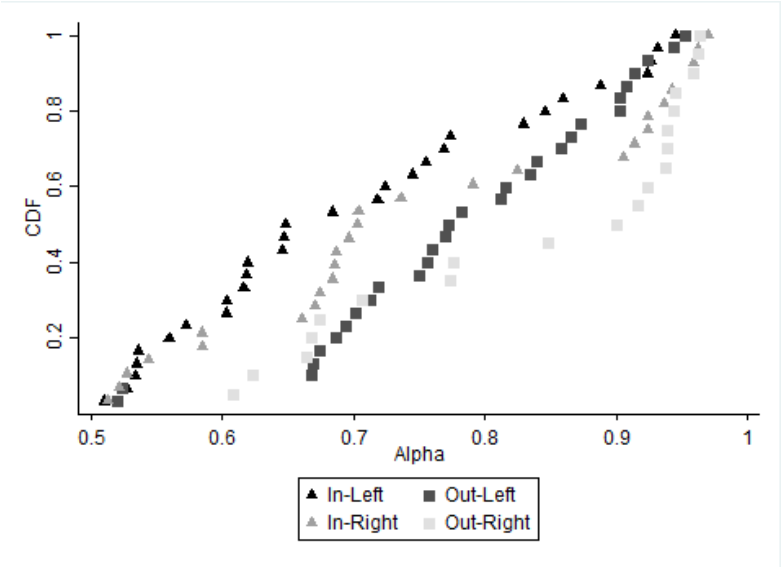

Figure 12: CDF of α by left- versus right-leaning voters and treatment.

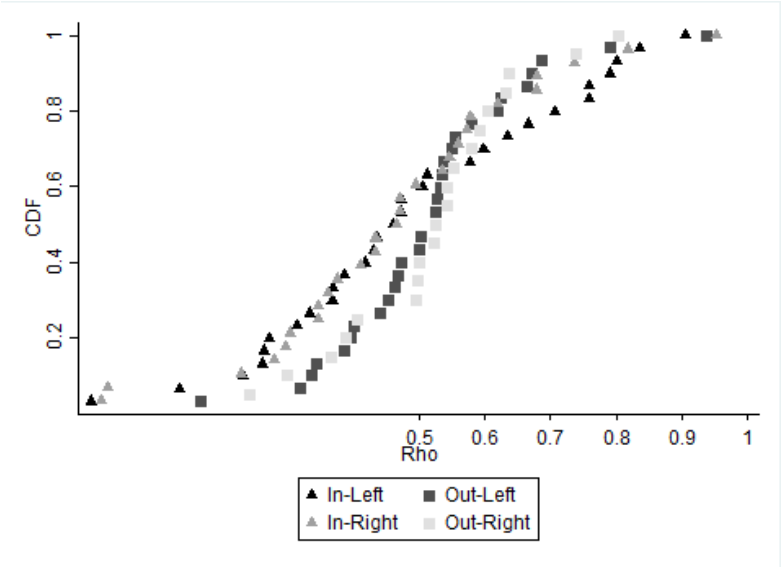

Figure 13: CDF of ρ by left- versus right-leaning voters and treatment.

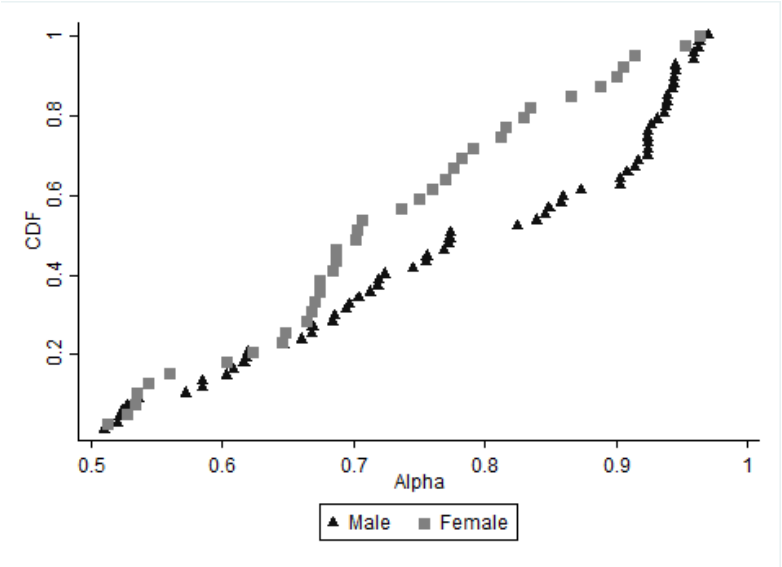

Figure 14: CDF of α by gender.

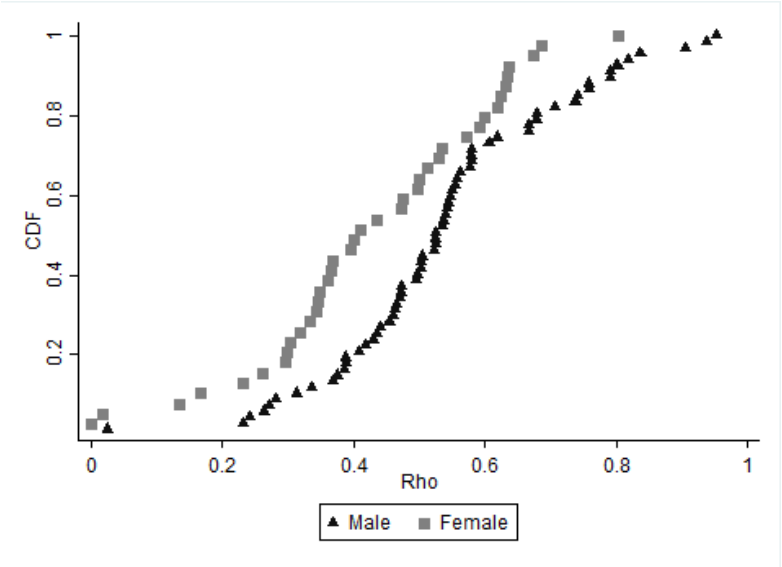

Figure 15: CDF of ρ by gender.

A.6 Translated Instructions

Introduction

In this experiment you will make a series of decisions. Your payment at the end of the experiment will depend on your own decisions as well as on the decisions of the other participants. Please follow the instructions carefully since every decision you make may influence your payment.

This experiment consists of two parts. Your overall payment will be determined by your payments in each part of the experiment as well as a participation reimbursement of two euros. We will start with a short introductory phase and the first part of the experiment. Afterwards you will get further instructions for the second part of the experiment. After the instructions have been read I will answer any question you may have. In case there are any further questions during the experiment feel free to raise your hand.

Part 1: Assignment to Painter-groups

In part 1 of the experiment five pairs of paintings of the two artists Paul Klee and Wassily Kandinsky will be presented. You will be asked which of the paintings you prefer and based on your preferences you will be categorized as KLEE or KANDINSKY. You will be informed about your category. Your identity as KLEE or KANDINSKY and the identities of all others will remain the same for the rest of the experiment.

As a next step you will be asked to name the painter (Klee or Kandinsky) of three other paintings. After you made your first guess there will be the opportunity to exchange ideas about the painter's identity with other KLEEs in case you are one yourself or with other KANDINSKYs in case you are one yourself. You will communicate using a chat program and one can only see the messages of ones group members. It will not be possible to read the messages of the other group. Please do not reveal your identity or other personal information. Before you submit your final answer you are allowed to change your first guess.

Lets assume you are a KLEE and at least half of all KLEEs have given the correct answer. Then you and all other KLEEs receive 1 euro independent of whether your final answer was correct or not. If you are a KLEE and at least half of all KLEEs have given the wrong answer than you and all other KLEEs receive 0 euros even if your own answer was correct.

Furthermore, if you are a KLEE and you and all the other KLEES have given in total more correct answers considering all three questions than all KANDINSKYs, you and all other KLEEs receive another euro.

If you are a KANDINSKY and you and all the other KANDINSKYS have given in total more correct answers considering all three questions than all the KLEEs, you and all the other KANDINSKYs will receive another euro.

We will now begin with the first part of the experiment. After the first part is finished you will

receive instructions for the second part of the experiment

Part II: Dictator Game

In this second part of the experiment you will face 50 decision problems. All decision problems are constructed similarly: Each time you will be asked how many tokens you want to keep for yourself and how many tokens you want give to another participant of the group. The only thing you know about the other participant is that he is [not] part of your [Klee/Kandinsky] group [but is part of the [Klee/Kandinsky] group]. In each decision you will have to choose a point on a line in a chart. The line represents all possible distributions and each point on the line represents a different distribution of tokens between you and the other participant from the [Klee/Kandinsky] group. Remember that 10 tokens equal 1 euro. An example of such a decision problem is depicted in the Figure 1.

[Example Figure 1]

Each new decision problem starts with the computer choosing a new line that intersects the horizontal axis representing your income or the vertical line representing the other participants' income between 10 and 100 tokens. All the lines will be chosen randomly. They are independent of each other and are also independent from the decision problems of other participants. For example in Figure 2 point A represents a distribution in which you will receive y tokens and the other participants will receive x tokens. A different distribution would be for example B in which you will receive yy tokens and the other participant will receive xx tokens.

[example Figure 2]

Please use the left mouse button and click on a point on the line to choose a distribution of tokens. You can change your choice by clicking on a different point on the line using the left mouse button. By pressing the OK button you submit your final answer. As mentioned earlier you may choose any distribution you like. This process is repeated 50 times. After the last round you will be informed about the end of the experiment.

Payments in Part 2

Your payments (additionally to the 2 euros reimbursement for the participation and possible profits from the first part of the experiment) will be determined in the following way. At the end of the experiment the computer will choose randomly one decision problem which means you will receive the number of tokens you choose in that situation during the second part of the experiment. Additionally, another participant from [your/the other] group will be assigned to you. This participant will receive the number of tokens you chose to give to other participant in the chosen decision problem from the second part of the experiment.

Therefore in this part of the experiment each participant will receive money from two different sources. On the one hand you will receive money based on your own decision in the randomly chosen decision problem and on the other hand you will receive money as a passive participant

based on the decision of another anonymous participant of [your/the other] group. Additionally, as mentioned before, you will receive money from the first part of the experiment in case you assigned the paintings to the painters correctly. At the end of the experiment the different payments will appear on the screen and the tokens will be transformed into euros. As mentioned before 10 tokens are worth 1 euro. You will receive your payments as soon as you have finished the experiment. In case there are no more questions you can start with the experiment.

[...]

This is the end of the experiment. We thank you for your participation. You will receive:
Xx tokens from your decision
Xx tokens from somebody else's decision
Plus 2 Euro for your participation
In total you will receive in tokens XX tokens or YY euros

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Daniel Müller

The anatomy of distributional preferences with group identity

Abstract
The increasing diversity of societies raises questions about the consequences for redistributive preferences. This paper assesses the impact of social identity on distributional preferences in a modified dictator game. I estimate individual-level utility functions with two parameters that govern the trade-offs between equity and efficiency and giving to self and to other. Subjects on average put less weight on income of the out-group. The out-group treatment also changes the distribution of equity-efficiency concerns. However, the experiment also uncovers a large individual heterogeneity of preferences. An analysis of GARP violations reveals that choices in both treatments overwhelmingly stem from well-behaved, yet systematically different underlying utility functions. Hence, the evidence presented here suggests that the rational choice approach is a useful tool for understanding the effect of social identity on preferences.

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