Institutional Change under Unequal Benefits of Cooperation[1]

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WORK IN PROGRESS

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Abstract

This paper examines experimentally whether and how individuals change a formal rule that mandates a low level of contribution into a rule that demands a high level of contribution. Such a rule change increases both individual and group welfare. We pay specific attention to the role of an unequal division of benefits from the team collective and social value orientations. Our results show that a rule change attempt is driven by material motives: on average, high earners try to change the formal rule more often than low earners within a team. However, individual social values moderate these attempts: high earners with prosocial motives are less inclined to initiate a change, even though a change would make them and their team better off. This is possibly explained by inequality aversion among prosocial individuals, as a rule change would increase inequality of benefits within a team.

Keywords: cooperative environment, inequality, social values, laboratory experiments.

1. Introduction

A work team functions better when its individual members cooperate to attain group goals (Tyler and Blader 2000). However, whenever individuals cooperate in order to achieve a collective outcome, they face a social dilemma (Sell and Wilson 1999; Van Lange et al. 2013). Because the benefits of the team production are available to everyone in the team, whether or not members contribute to the team collective, individuals can free ride on the contributions of other team members (Olson 1965).

Cooperation may fail because the reward for free riding is higher than the reward for cooperating, regardless of the behavior of other team members. Nonetheless, all team members receive lower earnings if they all free ride than if all cooperate (Smithson and Foddy 1999). A large body of research shows that when contributing towards the team collective is voluntary, free riding prevails (Fehr and Schmidt 1999; Winter, Rauhut, and Helbing 2012). An imbalance between individual self-interest and collective welfare can "easily turn into a nasty war of worker against worker" (Adler 2003:381) bringing about feelings of uncertainty about the (future) cooperative actions of team members (Yamagishi 1986).

Individuals, who realize "the futility of voluntary based cooperation", may be more likely to attempt a structural change in order to diminish the undesirable consequences of free riding and promote mutual cooperation (Yamagishi 1986:111). Earlier research typically focused on structural changes such as the implementation of sanctioning systems (Fehr and Gächter 1999; Gürerk, Irlenbusch, and Rockenbach 2006; Van Miltenburg et al. 2014; Yamagishi 1986). In this paper we study individual attempts to change an existing organizational formal rule which regulates individual contributions to a collective outcome. In particular, we investigate the likelihood of an individual attempt to change a rule from low to high levels of manadatory

contribution, thereby enhancing group welfare. In doing so we aim to complement this earlier research by studying if individuals are able to to change the exisiting formal rules governing their behavior, instead of investing in new forms of achieving cooperation or a redistribution of benefits.

Cooperative behavior can be enhanced by collective agreements on performance goals (Kerr and Tindale 2004) in the form of explicit organizational rules. In a more formalized environment, where the enforcement level of cooperative behavior is high, contributions towards the team collective are essentially made mandatory instead of voluntary (Sewell 1998). A strongly formalized organizational environment thus brings about the efficient acquisition of collective goals through rule following (Joyce, Pike, and Butler 2013), subsiding the social dilemma individuals face. As cooperation is "the willful contribution of personal efforts to the completion of interdependent jobs" (Wagner 1995:152), the formal constraint to cooperate replaces the 'willful' with 'mandatory'. In this sense, we define such a rule as a rule that demands a high level of contribution.

We study the process of endogenous rule change from low to high levels of manadatory contribution while considering two forms of individual heterogeneity; (i) differences in individual earnings; and (ii) differences in individual social value orientations.

Regarding the former, our line of thought is that just as on the society level, inequality of earnings is also prevalent within organizations, taking for instance the form of horizontal pay dispersion (Shaw 2014). This refers to a situation where individuals receive unequal benefits from the team collective, leading to high earners and low earners within the team (Trevor, Reilly, and Gerhart 2012). Real life examples are the pay disparities between temporary staff and team members with a permanent position (Kalleberg 2000), for instance the different hourly wages

amongst package delivery employees (Klein 1999). These pay disparities within a team can influence an individual's preference for cooperation (Noussair and Tan 2011). Therefore, we investigate how differences in individual earnings influence a rule-change attempt towards a rule that demands a high level of contribution.

Furthermore, teams consist of individuals who have heterogeneous preferences for cooperation, which are a reflection of their social value orientations (Dijkstra 2013). In an earlier study we found that prosocial individuals (i.e., who value cooperation) are more willing than proselfs to initiate a rule change towards a rule that mandates a high level of contribution (Author DATE). This result was obtained in an environment where all individuals benefit equally from the team's production. The question remains, however, whether the role of such a prosocial value on rule change will be different in the presence of unequal benefits from cooperation.

We designed a laboratory experiment which aims at addressing two main questions: (i) whether and how inequality of earnings (i.e. being a high earner or a low earner) influences the attempt to change an existing organizational rule that mandates a low level of contribution into a rule that demands a high level of contribution, and (ii) whether this effect is moderated by individual social value orientations. We believe that an experimental approach is the best way to address these questions because it allows us to clearly isolate the effect of different formal rules from social values and individual differences in earnings. This way we are able to eliminate possible confounding variables that usually make causal inferences difficult in both natural settings and case studies (Jackson and Cox 2013).

2.1. Unequal benefits and rule-change attempts

Research indicates that an individual's support for an organization's rule regulating cooperation depends on his or her income position (Fisher et al. 1995; Nishi and Christakis 2015; Olson 1965). For instance, in an environment where a rule mandates a low level of contribution to a team project, high earners contribute more than low earners to such a public good (Fisher et al. 1995). Team members thus contribute proportionally to their expected benefits from the team (Reuben and Riedl 2013). The immediate result is that in unequal environments cooperation often fails due to the unequal contributions (Ledyard 1995). Because low and high earners within a team have difficulties to agree on an equal level of contributions (Noussair and Tan 2011), it is thus likely that also the attempt to change this environment towards an environment where a rule demands a high level of contribution depends on an individual's earnings.

However, because a rule that demands a high level of contribution enforces not only cooperative behavior, but also maximizes individual economic well-being, such a rule could appeal to both high and low earners. If one assumes that individuals are self-interested and motivated to maximize material gain (Miller 1999), it can be argued that both high and low earners will attempt to change a rule towards a high level of contribution.

This way of reasoning, however, does not account for the fact that the gains from a high level of contribution benefit the high earners more than the low earners. If the allocation of the benefits is based on an unequal division, those who earned more when a rule mandates a low level of contribution will receive even larger benefits under a rule that demands a high level of contribution (Barber and Simmering 2002).[1]

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[1] We illustrate this by an example of a team of five members in an environment with a rule that mandates a low level of contribution, where two high-income team members earn 12 % more

Furthermore, challenging the rules can have material costs for individuals (Morrison 2006), for instance fines from management. The initiation of a rule change could thus be viewed as a second order public goods dilemma (Ostrom 1990). While a first order dilemma entails initiating and maintaining cooperation in an environment where a rule mandates a low level of contribution, the second order dilemma relates to who will then bear the costs of a rule change to a rule that demands a high level of contribution (Yamagishi 1986). Just as the collective team outcome, a change to a new rule is a public good from which all team members benefit, irrespective of their contributions to it.

Thus, to study the likelihood of a rule-change attempt, one ought to take into account an individual's consideration of these costs on the one hand, and the incentives related to the gain in absolute income on the other hand. The result of this individual consideration would more likely lead to a rule change initiated by high earners than low earners, as the former will benefit more from the rule change, which in turn may also compensate for the costs of challenging the rules.

(€2240 each) compared to three low-income members (€2000 each). A change towards a rule that mandates a high level of contribution ensures an increase of the collective benefits because contributions are made compulsory, implying that the high earners get 12% more from every unit of increased team production. If the team-based-performance benefits for this team of five members is €1000 if all fully cooperate (under rule that mandates a high level of contribution), each of the two high earners receives an additional €213 while each of the three low earners receives €190. Moreover, this rule change increases the existing gap from €240 to €263, because (€2240 + €213) – (€2000 + €190) = €263. The increase of absolute income resulting from this rule change is thus larger for high earners than for low earners.

This expectation is in line with findings from case studies that individuals who are entitled to a higher income from a cooperative effort, are more willing to provide this effort (Gaspart et al. 1998; White and Runge 1995). Hence, our first hypothesis reads:

Hypothesis 1: High earners are more inclined than low earners to attempt a change of a rule that mandates a low level of contribution into a rule that demands a high level of contribution.

2.2. The moderating effect of individual social values

Research indicates that individuals have additional, sometimes dominating, motives that guide their behavior (Miller 1999). One such motive is an individual's preferred distribution of own and other's outcomes (van Dijk and De Cremer 2006), i.e. an individual's social value orientation (Van Lange 1999). An individual's social value orientation can be categorized as either proself, corresponding to the pursuit of maximizing own outcomes, or prosocial, corresponding to maximizing both joint outcomes and equality of outcomes (Van Lange 1999). Since these values co-exist with the material motives underlying one's behavior, the question is whether the effect of earnings on rule change attempts depends on individual value orientations.

The main concern of proself individuals is to maximize their own earnings. In an organizational environment with a rule which mandates a low level of contribution, the proself low- and high-earners can enhance their own outcomes by free-riding on the contributions of others. However, in line with the arguments provided above, high earners maximize their earnings if this rule is changed into a rule that demands a high level of contribution. This suggests that for the proself high-earners, the material motives are in line with their value orientations, hence the same can be expected as in hypothesis 1.

The picture looks however different for prosocial individuals. In order to theoretically formulate our expectation it is important to stress that *two* desired outcomes relate to prosocial value orientations: (i) enhancing joint outcomes, and (ii) equality in outcomes (Van Lange 1999). Research shows that the promotion of joint outcomes and the promotion of equal outcomes are two distinct components "neither reducible to the other" (Batson et al. 1995:630). In what follows we aim to clarify how both desired outcomes may moderate the effect of earnings on a rule change attempt.

On the one hand, in an organizational environment with a rule that mandates a low level of contribution, prosocial low- and high-earners might first experience a conflict between this environment and their value orientation of promoting joint outcomes. Prosocials show a greater concern for the collective interest compared to the proselfs, and thus may feel more uncertain about the (future) cooperative actions of their team members and experience more fear to be exploited (Yamagishi 1986). In an earlier study (Author DATE) we found evidence that prosocial individuals are the ones who attempt to change a rule mandating a low level of contribution into a rule that demands a high level of contribution. Following this research one might expect that both low and high earners with prosocial values will attempt such a change, thus 'resolving' the first value-rule conflict.

However, as argued above, the gains from a rule that demands a high level of contribution are biased to benefit the high earners more: the increase of earnings resulting from such a rule change is larger for high earners than for low earners. A rule change towards a high level of contribution will increase the existing gap on earnings, thereby introducing a choice between an environment with possibly less cooperation and a more modest level of inequality (rule mandating a low level of contribution), and an environment with more cooperation but also

a higher level of inequality (rule demanding a high level of contribution). Hence, from the perspective of both low- and high-earning prosocials, resolving the first conflict by a rule change would also mean aggravating the second conflict.

There is ample evidence that individuals with a prosocial value orientation desire equal outcomes more than the maximization of joint outcomes (Van Lange et al. 2013). For instance, prosocial individuals forestall on maximizing both their own outcome and the joint outcome in favor of an equally distributed outcome in interdependent situations (such as a team project) (Eek and Gärling 2006). Similarly, they sometimes even reduce the overall collective good when they are presented with a choice to benefit themselves, the group, or other group members as individuals (Batson et al. 1995). This indicates that prosocial individuals put more weight on equality than on maximizing joint outcomes.

Therefore, when a rule change not only implies enhancement of joint outcomes, but also increases the level of inequality, we expect that prosocial high-earners are less inclined to initiate this change. Hence, we propose that the effect of earnings on a rule change attempt towards a rule that demands a high level of contribution depends on individual value orientations. More specifically, we hypothesize that:

Hypothesis 2: High earners with a prosocial value orientation are less inclined to attempt a change of a rule which mandates a low level of contribution into a rule that demands a high level of contribution.

3. METHOD

3.1. Research Design

We test our hypotheses with data collected in a laboratory experiment in two consecutive public goods games (PGG1 and PGG2) (Fehr and Gächter 1999). After PGG1 and before PGG2, participants had the possibility to attempt to change the rule. Before PGG1 we measured participants willingness to take risks and their social value orientation. We explain each measure in more detail in the next section.[2]

Because the collective team outcomes within organizations can be viewed as a public good to which team members may contribute or not (Croson 1995), the choice for a PGG as experimental paradigm seems warranted. Each PGG consisted of 10 rounds, for which

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[2] We also measured the existing social norm concerning contributions in a PGG, and participants received feedback on the prevalent norm. To measure the social norm we conducted a method adapted from Krupka and Weber (2013), who identify the norm using a coordination game. For more details, see (Author, DATE). Though social norms are not a focus of this study, we report here some descriptives. The mean norm reported by the prosocials was slightly lower than the one of proselfs ($M = 5.29$, $SD = 2.56$ and $M = 5.68$, $SD = 2.37$ respectively), but a Mann-Whitney U-test revealed that the distributions in the two groups (prosocials and proselfs) did not differ significantly ($z = -.923$, $p = .356$). The norm was also equally supported by low and high earners (no difference between high, $M = 5.37$, $SD = 2.26$, and low earners, $M = 5.61$, $SD = 2.62$, Mann-Whitney U test $z = -.591$, $p = .554$). Additionally we measured participants' emotions. These results are part of another (working) paper on the influence of guilt on institutional change and are not reported here.

participants were randomly and anonymously assigned to a team of five. In both PGG's

participants were in the same team, of which they were informed. We thus allowed for repeated

interactions with the same group, to mirror a team's interaction. Participants knew that both

public good games consisted of 10 rounds. Meta analysis shows that 10 rounds is a common

number of periods applied in a PGG (see table 1 in Zelmer 2003), and participants are able to

cooperate during these rounds, even if they know that a PGG is finite (Andreoni 1988). In every

round, each participant received an endowment of 10 points, to either keep for themselves or

contribute to the team project. In each of the 10 rounds of PGG1 and of PGG2 the total

contribution to the team collective was made public to the members, whereas individual

contributions were not visible to other team members.

The experiment had a 2 x 2 x 2 between subjects design. The first experimental treatment

to which participants where randomly assigned was the *contribution rule*. We presented a formal

rule for the mandatory minimum contribution in each round in PGG1, which we varied as either

a rule mandating a low level of contribution or a rule mandating a high level of contribution.

These rules were strictly enforced; participants were unable to contribute less than the rule called

for. More specifically, the two formal rules were: (1) *rule 2*, where a minimum contribution of 2

points (out of 10 possible points) was mandatory in each round; and (2) *rule 8*, where a minimum

contribution of 8 points (out of 10 possible points) was mandatory in each round. Participants in

the *rule 2* treatment thus were enforced to contribute 2 points and could decide to either keep or

contribute the remaining 8 points of their endowment. The participants in the *rule 8* treatment

were enforced to contribute 8 points, and could decide to either keep or contribute the remaining

2 points of their endowment. By introducing a minimal level of contribution in *rule 2* and

allowing for some freedom in *rule 8,* we did justice to the fact that in organizational

environments the formalized control (Sewell 1998) is either at least somewhat present (*rule 2*), or not omnipotent (*rule 8*). Because we are interested in a rule change which promotes cooperation, hence from a low to a high level of contribution, our empirical analysis is primarily based on the *rule 2* treatment.

Furthermore, we implemented inequality of earnings by introducing heterogeneous payoffs within each team of participants. This variation is the second experimental treatment *unequal earnings* to which participants where randomly assigned. In each round of both PGG's, the individual earning from the team project was either (10 points – points contributed to the team project) + 0.3*(total team contribution), or (10 points – points contributed to the team project) + 0.5*(total team contribution). We thus created low and high earners by implementing a different marginal per-capita of return (MPCR) for each type, which relates to different personal benefits from a public good. This differentiation of earnings was common knowledge amongst all (five) team members, whereas the individual income was private information.

Our third independent variable of interest was individual social value orientation, i.e. if an individual is prosocial or proself. Because this is a stable individual trait and not a treatment to which participants can be randomly assigned, we measured individual's social value orientation before the start of the experiment. We discuss this measure below.

Directly after PGG1 all participants were presented with the option to change the rule in place before a second public goods game (PGG2) would start. Each team member could initiate a call to vote, at a cost, to replace *rule 2* with *rule 8*, or vice versa, depending on the *contribution rule* treatment. Hence in a team of five there could be zero to five calls to vote. The initiation of a vote costed 10 points for each member calling it. This ensured that the expression of a dissent view (i.e. an attempt to change) actually reflected possible costs in real world scenarios of

attempting to change an existing rule. If no one called for a vote, the minimum contribution rule that was in place during PGG1, would also apply to PGG2. If at least one member indicated 'yes' on call to vote then the voting procedure (majority vote) for that team started: if a majority of the team voted in favor of a change, then the rule on the minimum contribution level changed for that team. The call to vote is our dependent variable *rule change attempt*. As argued above, we examine the influence of individual earnings and social value orientations on such an attempt.

3.2. Participants and procedure

The experiment was conducted in June 2015 at the CREED Laboratory of the University of Amsterdam. Participants were recruited on voluntary basis from the CREED student participant pool, consisting of approximately 2000 individuals. All Dutch speaking students received an invitation to sign up and participation was on a first-come, first-serve basis. No participant took part in more than one session. A session in the main experiment lasted approximately 60 minutes. A total of 140 individuals (70 men and 70 women, $M_{age} = 21.50$, $SD = 2.86$) participated in one of 20 sessions in the main experiment, allocated to one of 28 teams of five members each.

To avoid ties in the decision making after a rule change attempt, we implemented two conditions for each *unequal earnings* treatment: one where in each group of five, 3 individuals were high earners and 2 were low earners, and one with a reversed structure (3 low earners and 2 high earners). Participants did not know how many low- or high-earning team members constituted each team. The main reason for not revealing this information was to prevent change attempts based on the existence of a majority of like-minded team members, as it would be a possible confound for our independent variables of interest.

Each session followed the same protocol. Upon arrival, participants were randomly seated at separated computer cubicles. The experimenter made clear that conversation or otherwise making contact throughout the session was prohibited. This was done to minimize the possibility that participants could identify their team members, or could communicate and negotiate during the PGG's and with respect to our dependent measure. First, participants completed questions measuring their risk attitudes and were randomly and anonymously paired for the social value measure. In the next step they participated in the social norm measure and received feedback on the prevalent norm.[3] Then they were randomly assigned to a team of five to participate in the first public good game (PGG1) (anonymous matching), and remained in this team for the second PGG. Participants were unaware during PGG1 that a second game would follow. They were however informed that the experimental session consisted of multiple tasks and rounds.

All received the same general instructions[4] during the experiment; before they could proceed they had to indicate if they understood these instructions. The instructions regarding the mandatory minimum contribution in each round of PGG1 varied depending on the treatment *contribution rule*. In PGG2, the rule on the minimum mandatory contribution was determined by the result of the voting procedure, if an attempt to change the exisiting rule took place. The instructions with respect to a participant's earnings varied in both PGG's depending on whether that participant was randomly assigned the role of a high- or low-earner (second treatment *unequal earnings*). Each session concluded with a short questionnaire on the participants' socio-

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[3] See van Breemen and Gërxhani (2016) for more details on how social norms were measured.

[4] See Appendix A for a translated version.

demographic characteristics. Hereafter they were thanked for their cooperation. The

experimenter called each participant separately to the back of the room to receive their payment

without disclosure of the payments to other participants.

Payoffs

Earnings in the experiment were in "points" and were exchanged for Euros at a rate of 1 Euro per

100 points; payoffs were based on their decisions on several tasks. First, one of their decisions

for the social value orientation measure was chosen randomly for payment. Second, they

received a bonus for providing the modal answer to the norm measure. Third, the participants

received the points that they earned during PGG1 and PGG2 (points kept for themselves +

returns from the team collective), and they lost points if they attempted to change the rule (asked

for a call to vote). Participants were paid in cash privately at the end of each session; on average

they earned €21.40 including a €7 show-up fee.

3.3. Measures

Social values

We assessed participants' social value orientations using the most commonly used technique, the

Triple Dominance Measure (TDM) (Van Lange et al. 1997). The measure consists of nine items,

each containing three distinct outcome distributions with points for oneself and for an

(anonymous) paired other.[5] Each outcome distribution represents a particular social value

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[5] We used anonymous RING matching, such that for participant 1 "the other" is participant 2, for

2 it is 3, and so forth. For the last participant "the other" is participant 1.

orientation. Consider for example the first outcome distribution, the choice between alternative A, B, and C in figure 1.

[Figure 1 about here]

Option A represents the competitive orientation, that is maximizing the difference between own outcomes and other's outcomes. Option B represents the self-interested orientation, i.e. maximizing own outcomes, and option C represents the prosocial orientation because it reflects an equal distribution of outcomes (Van den Bergh, Dewitte, and De Cremer 2006). As a result, the TDM groups individuals into one of three categories -prosocial, self-interested, or competitive- if at least six out of nine choices can be consistently attributed to one of these values, otherwise they are uncategorized.

We combined the self-interested and competitive categories into a single category ("proselfs") in concurrence with earlier research (Eek and Gärling 2008). This decision is based on the idea that both self-interested and competitive participants seek to enhance their own outcomes, either in an absolute sense (self-interested) or in a relative or comparative sense (competitive) (Van Lange et al. 1997). As a result, we have proself and prosocial categories as well as a group of participants who are uncategorized. We further categorized some participants in this last group as proself if they had made at least six choices consistent with either self-interested or competitive motivations (thus making six consistent choices for the combined category).

In line with earlier research (Stouten, De Cremer, and Van Dijk 2005), participants who still remained uncategorized are not considered in our analyses. Of the 140 participants, 16

participants could not be classified as either proself or prosocial. From the remaining 124

participants, 68 (55%) were classified as having a proself value orientation and 56 (45%) as

having a prosocial value orientation (67 men and 57 women, $M_{age} = 21.53$, $SD = 2.96$).

Earnings

As mentioned above, we created inequality of earnings by varying the marginal per-capita of

return (MPCR), thereby introducing high and low earners within each team. The variable

earnings indicates if participants are high earners (received benefits from the public good equal

to 0.5*team contribution), or low earners (received benefits from the public good equal to 0.3*

team contribution).

Rule-change attempt

After PGG1, participants were given the opportunity to change the *contribution rule* by initiating

a call to vote for a change of the existing rule to a rule that mandates a high level of contribution

(a change of minimum contribution from 2 to 8 points) or to a rule mandating a low level of

contribution (a change of minimum contribution from 8 to 2 points). Voting took place if at least

one team member called for a vote. Responding to the variable 'call to vote' with a yes/no

indicates whether or not they attempt a rule change.

Actual rule change

Depending on the *contribution rule* treatment, participants voted for a change of the existing rule

(*rule 2* or *rule 8*). A vote for a rule change (yes/no) is thus determined by voting for the opposite

rule to the one determined by the treatment. For an actual change of the rule, a majority vote (3

out of 5 members) was necessary. We thus limited the collective choice rules (Ostrom 2005) to a majority rule (Bravo 2011). An actual rule change is subsequently defined as the switch from the rule determined by the treatment to the opposing rule.

Risk measure

An individual's willingness to take risks may positively influence the likelihood of organizational rule breaking (Morrison 2006). In order to control for this in our analyses we assessed the participants' general willingness to take risks. We asked the participants to answer the question "How willing are you to take risks, in general?" on a 11-point Likert scale ranging from 0 (not at all) to 10 (very much) (Dohmen et al. 2011), where a higher score indicates a higher willingness to take risks.

4. RESULTS

4.1. Descriptives

Demographics

We found no significant differences with respect to our participants' gender and age in relation to their social value orientation, their answer on the norm measure, or their willingness to take risks. Also no differences were found for contributions in the PGG, and for our dependent variable rule-change attempt.

Earnings: majority and minority composition

As explained above there were two conditions for each *unequal earnings* treatment: one where in each group of five, 3 individuals were high earners and 2 were low earners, and one with a reversed structure (3 low earners and 2 high earners). We tested whether this difference in group

composition influenced our measures, but found no significant differences for social value orientation, the norm measure, and the risk measure. Also, the group composition had no significant influence on contributions in the PGG, and on our dependent measure the rule change attempt.

Cooperation

The degree of cooperation is defined by the level of the contributions to the team collective (contributions in PGG1). Full cooperation is thus defined as contributions of the maximum amount possible, i.e. 10 points each round. We examine the level of cooperation in the environment with a rule that demands a low level of contribution by looking at the contributions to the team project. Figure 2 shows the average contributions for all ten rounds of PGG1 in the *rule 2* treatment, depending on whether the participants are low- or high-earners. The mean contributions of the 14 teams in this treatment (i.e. minimum contribution of 2 points) range from 2.65 to 6.23 points (out of 10 points).[6] This figure shows that full cooperation (defined as contributions of the maximum amount possible, i.e. 10 points each round) fails. Consistent with earlier research (e.g. Ledyard 1995), contributions to the team project start at around half of the endowment indicating some level of cooperation, but steadily decrease over time, showing that free-riding becomes prevalent across all teams.

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[6] Taking all 10 rounds into account, a t-test reveals no significant differences between the contributions of low and high earners ($p = 0.386$); separate t-tests for each round also reveal no significant differences between the contributions of high and low earners.

[Figure 2 about here]

4.2. Analyses

First, we test whether a rule change from a low level of mandatory contribution to a high level of

mandatory contribution is more likely initiated by high earners than low earners (H1), as well as

whether such an individual attempt is moderated by individuals' social value orientations (H2).

In the *rule 2* treatment, 53.3% of the participants attempted a rule change.[7] Out of 14 teams,

only in one team no change attempt was made. We test both hypotheses for individuals in all 14

teams in one logistic regression model. Table 1 provides the results of the logistic regression on a

rule-change attempt (i.e. call to vote yes/no) of earnings (high- versus low-earners), social value

orientation (prosocials versus proselfs), the interaction term between earnings and social value

orientation, and the control variables risk, gender and age. None of the controls have a significant

effect on the call to vote.

[Table 1 about here]

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[7] As mentioned earlier, we conducted our analysis only for the environment with a rule that

demands a low level of contribution (*rule 2*). Before doing so, we tested the implicit assumption

that an individual attempt to change a rule that demands a low level of contribution into a rule

that mandates a high level of contribution is more likely than the opposite change. A Mann-

Whitney U test on call to vote (i.e., rule change attempt) confirms that attempts are more likely

to occur in the *rule 2* compared to the *rule 8* treatment (53.3% vs. 17.2% of the participants

attempted a rule change respectively, $z = - 4.209$, $p < .001$, one-tailed).

The results show that 'earnings' is a strong and significant predictor ($p = .008$) of a rule change attempt. The odds ratio of 10.24 indicates that the likelihood for high earners to attempt a change of the rule is more than 10 times higher than the likelihood for low earners to make such an attempt. This result provides support for our first hypothesis that high earners are more inclined than low earners to attempt a rule change from a rule that demands a low level of contribution to a rule that mandates a high level of contribution. There is no main effect of social value orientation.

Furthermore, the model shows that the interaction between earnings and an individual's social value orientation has a negative significant effect on rule-change attempts ($p = .015$). This implies that the difference between high and low earners in initiating a rule change depends on whether they are proself or prosocial. To examine this more in detail, we plotted the interaction in a bar graph (Figure 3).

[Figure 3 about here]

This figure shows that the overall effect that high earners are more likely to attempt a rule change differs for prosocial individuals: prosocial-high earners are *less* inclined to attempt a rule change than proself-high earners. We thus find support for our second hypothesis predicting that prosocially-oriented high earners are less inclined to attempt a rule change from a a low level of mandatory contribution to a high level of mandatory contribution.

Next, we take the analyses a step further by empirically exploring the consequences of an actual rule change on individual income, collective welfare, and the resulting level of inequality.

To do so, we shift our focus from the causes of the rule change to the effects of the new rule mandating a high level of contribution (PGG2). Earlier in the paper, we argued that from an individual's perspective, a rule mandating a high level of contribution ensures maximum earnings for all team members by limiting free-riding, thus increasing the team production and team welfare. We examine the average individual earnings for all ten rounds of PGG1 (*rule 2*) and of PGG2 (*rule 8*) for teams where a rule change took place, depending on the participants' position with respect to earnings.

Due to the presence of unequal benefits, in PGG1 (rule 2) high-earners earned on average 172.48 points ($SD = 19.99$) while low earners earned 126.50 points ($SD = 14.86$) (Mann-Whitney U test, $z = -6.241$, $p < .001$). In PGG2 (rule 8), high-earners of the 13 teams where an actual change towards a rule with high contribution levels took place, earned on average 227.08 points ($SD = 5.88$), while low earners earned 142.75 points ($SD = 4.29$) (Mann-Whitney U test, $z = -6.389$, $p < .001$). Hence, in teams where a rule change took place (from rule 2 to rule 8), both high earners and low earners benefited significantly (Wilcoxon Signed Ranks test, $z = -6.297$, $p <.001$, $z = -4.350$, $p < .001$ respectively). As expected, a rule change increased individual benefits for both high and low earners, thereby also increasing collective welfare.

However, the gap between high and low earners in PGG1 was 36.35%, whereas in PGG2 it increased to 59.07%. This means that though a rule change led to more cooperation and increased individual and collective welfare, it did also increase the existing inequality.

5. CONCLUDING DISCUSSION

In this paper we examined whether and how individuals change a formal rule demanding a low level of contribution to a rule mandating a high level of contribution. We have studied this

process of endogenous rule change by incorporating differences in individual benefits from cooperation in a team (low- and high-earners) and differences in individual social value orientations (prosocial versus proself). We find evidence that high earners were more inclined than low earners to attempt a rule change from a low level of contribution to a high level of contribution. Though both high and low earners benefit from this rule change, those that benefit the most (i.e. the high earners) initiated the attempt. In this sense, the 'responsibility' for the second order public goods dilemma (Yamagishi 1986) rested upon the high-earning team members. This result is also in line with research stating that individuals with the largest shares have an interest in increasing (team) cooperation and thus total productivity (Olson 1965; Ostrom 2008). In our setup, a binding way to increase cooperation was a change of the rule.

An important finding of our study is that the impact of rule-change attempts depends on an individual's social value orientation: prosocial-high earners were less inclined than proself-high earners to attempt a change to a rule mandating a high level of contribution. This result supports previous research which indicates that prosocial individuals consider equality of outcomes as their first and foremost concern, even more so than larger joint outcomes (Eek and Gärling 2006; Van Lange et al. 2013). This research relates to cooperation in situations where a social dilemma is present, as in our first public goods game. Our finding shows that when the benefit allocations are unequal, a prosocial-value orientation also decreases the likelihood of a rule change towards more cooperation i.e. the second order social dilemma in our experiment. Though it may appear counterintuitive at first sight, this finding is in line with the argument that prosocials can choose options that may (somewhat) harm collective outcomes, especially when the desire for equality in outcomes is "to some degree incompatible with long-term collective outcomes" (Van Lange 1999:348).

Our overall findings contribute to the literature on institutional conditions (i.e. [informal] punishment, rewards, and sanction mechanisms) that foster cooperation in social dilemma situations (Fehr and Gächter 1999; Gürerk et al. 2006; Ostrom 2005; Yamagishi 1986). Our contribution lies in the investigation of whether and how individuals initiate a formal rule change to ensure cooperation, therefore adding knowledge to solutions of second order public dilemma's beyond social norms and (other) sanction mechanisms.

Furthermore, our results demonstrate the importance of simultaneously considering social values and inequality of earnings when analyzing social dilemma's. We show that although material motives matter, they are moderated by one's social values. It is through this joint consideration and its effect on formal institutional change that we also contribute to the new institutionalism literature in economic sociology (Nee and Ingram 1998).

A potential limitation of our study is that our participants had only one option for a rule change: it was a choice between either an environment with a rule demanding a low level of contribution or one with a rule mandating a high level of contribution. It is feasible, however, that team members will debate, negotiate, or together design a rule which regulates the level of cooperation (Ostrom 2008). A related limitation is that we applied a single decision-making structure, namely majority voting. Although majority voting is one of the most common formal mechanisms to install or change a rule, there is a great variety of voting systems (Walker et al. 2000). Future research could for example investigate to what extent different decision-making structures affect an individual rule-change attempt, or explore the endogenous formation of a new rule by giving participants the possibility to negotiate a level of contribution.

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Table 1. Rule-change attempts (from a rule demanding a low level of contribution to a rule mandating a high level of contribution).

	B	SE	OR	CI (OR)
Earnings = High earner	2.327**	.874	10.242	[1.848, 56.765]
Social value = Prosocial	1.494	.802	4.454	[.925, 21.433]
Earnings * Social value	-3.087*	1.275	.046	[.004, .555]
Risk	-.415	.221	.660	[.428, 1.018]
Age	-.123	.129	.884	[.686, 1.138]
Gender = Female	-.158	.619	.854	[.254, 2.876]
Constant	4.224	3.058	68.282	

$\chi 2 = 11.476$, df $= 6$, $p = .075$

Nagelkerke R^2	23.2%
Hosmer & Lemeshowtest	*p = .538*
Classification	65%

Notes: The results are presented for the *rule 2* treatment of a logistic regression (odds ratio *Exp(B)*) on a rule-change attempt (call to vote yes/no) of earnings, social value orientation, the interaction term between the two, risk, gender, and age. $N = 60$. Reference categories are Earnings = Low earner, Social value = Proself, and Gender = Male.
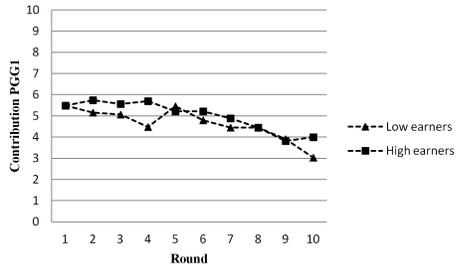
* $p < .05$, ** $p < .01$ (two-tailed tests).

Figure 1. Item 1 of the Triple Dominance Measure capturing participants' social value orientations.

	A	B	C
You get	480	540	480
The other gets	80	280	480

Figure 2. Mean contributions per round in PGG1 for low and high earners in an environment with a rule that demands a low level of contribution (*rule 2* treatment).

Figure 3. Interaction effect of earnings and social value orientation for rule change attempts in an environment with a rule that demands a low level of contribution.
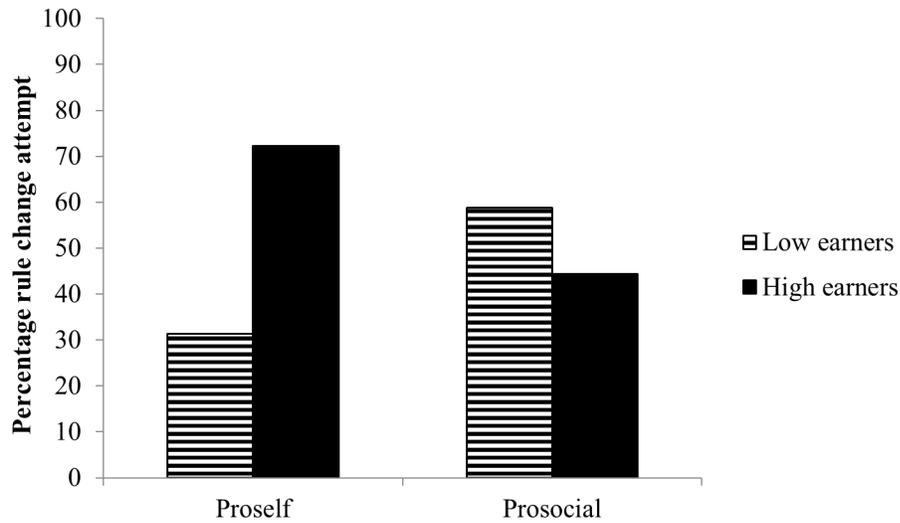
Note: Bars represent the distribution of rule-change attempts (call to vote yes/no) in percentages for participants with prosocial and proself value orientations depending on their earnings (low or high earners) in the *rule 2* treatment.