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Inherited Institutions: Cooperation in the Light of Democratic Legitimacy

Pascal Langenbach, Franziska Tausch *

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Abstract

We experimentally investigate whether the *procedural history* of a sanctioning institution affects cooperation in a social dilemma. Subjects inherit the institutional setting from a previous generation of subjects who either decided on the implementation of the institution democratically by majority vote or were exogenously assigned a setting. In order to isolate the impact of the voting procedure, no information about the cooperation history is provided. In line with existing empirical evidence, we observe that in the starting generation cooperation is higher (lower) with a democratically chosen (rejected) institution, as compared to the corresponding, randomly imposed setting. In the second generation, the *procedural history* only partly affects cooperation. While there is no positive democracy effect when the institution is implemented, the vote-based rejection of the institution negatively affects cooperation in the second generation. The effect size is similar to that in the first generation.

Keywords: Endogeneity · Voting · Institutions · Social dilemma · Public good · Inherited rules

JEL Classification: C92 · D02 · D71 · D72 · H41

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1 Introduction

From the perspective of political theory, democracy can be valued as a normative ideal about how groups should make decisions. Political economists have studied extensively how direct democratic decision-making affects policy choices and economic outcomes.[1] In addition, there is the long-standing behavioral claim, which can be traced back to the writings of Jean-Jacques Rousseau and Alexis de Tocqueville, that democratic participation per se leads to a higher degree of compliance with laws and regulations and thus enhances the effectiveness of these institutions (e.g., Dal Bó, Foster & Putterman, 2010, Persson, Esaiasson & Gilljam, 2013, Pateman, 1970). But does democracy matter in the long run? Laws are often persistent and remain in force for several generations. Hence, many institutional choices, even though initially democratic, have not been made by the people who live with them. In this paper, we study experimentally whether the effects of a democratic decision-procedure spill over to a later generation of citizens that did not participate in the institution-generating process.

Identifying the effects of democratic procedures independently of outcomes ultimately calls for the experimental method. Previous field experiments suggest that participation in the decision-making process shapes people's evaluation of an institution. Direct democratic decision-making can enhance ratings of procedural fairness and satisfaction with policy outcomes (Esaiasson, Gilljam & Persson, 2012, Olken, 2010, Persson et al., 2013). These results tie in with the vast psychological literature which reports that people's participation is an important element of a fair procedure (see, e.g., Lind & Tyler, 1988, Thibaut & Walker, 1975) and that the procedural fairness of legal authorities can increase people's compliance by enhancing the perceived legitimacy of the law (Tyler, 2006).

The research mentioned above mostly relies on participants' self-reported evaluations. Yet, economic experiments also show that a democratic institution-generating process influences individuals' immediate behavioral reactions to the institution. They find that in social dilemmas individuals behave more cooperatively if a centralized sanctioning institution which fines non-cooperative behavior is chosen by majority vote, as opposed to the same institution being exogenously imposed (Feld & Tyran, 2002, Tyran & Feld, 2006, Markussen, Putterman & Tyran,

[1] Empirical studies investigated the effects of direct democracy on tax morale (e.g., Blume, Müller & Voigt, 2009, Torgler, 2005), tax compliance (e.g., Pommerehne & Weck-Hannemann, 1996), constitutional stability (e.g., Elkins, Ginsburg & Melton, 2009), fiscal policy variables (e.g., Blomberg, Hess & Weerapana, 2004, Blume et al., 2009, Feld & Matsusaka, 2003, Matsusaka, 2000, Matsusaka, 1995), economic performance (e.g., Feld & Savioz, 1997, Blomberg et al., 2004), wage levels and employment policy (e.g., Matsusaka, 2009), and government effectiveness (e.g., Blume et al., 2009). Further, the focus of several studies has been democracy effects on life satisfaction (e.g., Blume et al., 2009, Frey & Stutzer, 2005, Stadelmann-Steffen & Vatter, 2012).

2014). This holds even if one controls for individuals' institutional preferences (Dal Bó et al., 2010, Kamei, 2016). Interestingly, purely non-deterrent sanctions, i.e., sanctions which are theoretically too low to prevent a homo economicus from free-riding, effectively enhance cooperation if they are democratically chosen (e.g., Feld & Tyran, 2002, Tyran & Feld, 2006). This is of high practical importance because non-deterrent centralized sanctioning schemes resemble many real-world legal sanctions (cf. Kamei, 2016, Putterman, Tyran & Kamei, 2011). Tax laws, for example, usually prescribe sanctions for non-compliance, but the fines and the probability of being caught are too low to deter a rational tax payer (Andreoni, Erard & Feinstein, 1998, Feld & Tyran, 2002). The positive effect of democratic decision-making on cooperation has also been found for other types of sanctioning institutions, such as peer-to-peer punishment (Markussen et al., 2014, Sutter, Haigner & Kocher, 2010) and third-party punishment (Baldassarri & Grossman, 2011, Grossman & Baldassarri, 2012, Marcin, Robalo & Tausch, 2016).[2]

The experimental research also shows a potential disadvantage of democratic decision-making. Putting an institution to the vote does not necessarily need to result in its adoption. The majority of subjects could vote against the potentially cooperation-enhancing institution. In this case, a negative democracy effect occurs: cooperation turns out to be even lower if a sanctioning institution is democratically rejected, as compared to when it is rejected by a random mechanism (Feld & Tyran, 2002, Tyran & Feld, 2006). Hence, whether the institution-generating process allows for democratic participation or not has immediate consequences for people's cooperative behavior.

In real-world settings, many institutions shall guide people's behavior for long periods of time. As a consequence, legal provisions are often perpetual and remain in force for more than one generation of citizens. For example, the grand civil law codifications, the *French Code Civil* and the *German Bürgerliches Gesetzbuch*, date from 1804 and 1900, respectively. And while there have been modifications over time, many provisions have not been changed. De Jong & Herweijer (2004) report that in the Netherlands statutes persist for forty years on average (cited in Ranchordás (2014), p. 175). Another type of legal provisions intentionally drafted to remain in force for several generations are written constitutions. Elkins et al. (2009) calculate that, on average, national constitutions last approximately 21 years in democratic countries and only 15 years in countries with an authoritarian regime (p. 137). Many constitutions, however, persist much longer. The US Constitution, for example, has already lasted for more than two hundred

[2] Marcin et al. (2016) find that democracy initially has a positive effect on cooperation; however, they observe that democratically chosen third parties punish significantly less than exogenously assigned ones. Therefore, after subjects have been repeatedly confronted with the stricter punishment implemented in the exogenous setting, cooperation levels are eventually higher.

years. Similar to the legal arena, in organizations many rules and regulations also exceed the life span of the current staff. The set of rules is not reconsidered each time new people are hired, but is automatically passed on to the next generation. Conceptually, the same holds for proposals that were democratically rejected. If this happens, the proposal will most likely not be put to the vote again any time soon after.

Later generations can, in principle, change or abolish any existing legal provision or enact a new one. Nonetheless, they very often refrain from doing so. Calabresi (1982) points to the problem that statutes even persist when their content is outdated. Yet, in many cases, not changing the law is reasonable. If the existing legal regime by and large fulfills the regulatory purpose, one should not re-enact the same law. Making only minor adjustments to a provision may be inefficient due to high bureaucratic or political costs. If the first generation chose an adequate policy for the later generation, there is no need to overturn the initial choice. Hence, we refrain from the normative question "[w]hether one generation of men has a right to bind another" (Jefferson, 1789), but investigate whether the fact that the previous generation used a democratic procedure matters for the effectiveness of the institutional setting in later generations.

So far, spillover effects of a democratic institution-generating process have only been studied within the individual. Kamei (2016) reports that participating in a democratic process also influences the cooperation of the same individual in a similar, yet non-democratic, situation. To the best of our knowledge, we are the first to provide experimental evidence on the effects of democratic decision-making on the cooperation of individuals who did not participate in the process themselves.

We use a laboratory experiment in which we can vary the *procedural history* of the institutional environment in a controlled way. Building on the design in Tyran & Feld (2006), we study a centralized sanctioning institution that fines individuals for non-cooperative behavior in a public-good game. Subjects are assigned to one of two generations and to one of two treatments. In the first treatment, group members in the first generation vote on the sanctioning institution, while in the second treatment a random mechanism determines the institutional setting. The sanctioning institution demands full contribution to the public good. If the subject contributes less than the social optimum, she is fined. However, the imposed fine is too low to deter a rational player. The second generation of subjects then inherits the institutional setting (whether the sanctioning institution exists or not) from the first generation. Second-generation subjects receive information about the institution-generating process in the previous generation before they play the public-good game. Since in both treatments the institution is exogenously imposed on the groups in the second generation, we can exclude that our results in the second generation are influenced by the self-selection of (un-) cooperative types into an institutional setting with(out)

punishment. Furthermore, we exclude social history effects by not providing any information on contributions in the first generation to the subjects in the second generation.

For the first generation our results confirm the positive and negative effects of democratic decision-making on cooperation: Compared to an exogenous choice mechanism, contributions to the public good are significantly higher when the institutional setting is democratically implemented and significantly lower when the institution is democratically rejected. In the second generation, however, cooperation is not influenced by the procedural history if the sanctioning institution is implemented. When it is democratically rejected by the first generation, though, the negative effect of democracy on cooperation also occurs in the second generation. This effect is similar in size to that in the first generation.

In our experiment, democratic procedures only have an inter-generational effect when the sanctioning institution is rejected. In this case, cooperation also breaks down in later generations. Hence, policy makers should be aware of the negative long-term consequences of a democratic rejection: Losing a vote on a cooperation-enhancing institution might reduce cooperation below the status quo ante. By contrast, the democratic adoption has no effect across generations. The democratic genesis of an institution in a previous generation does not enhance the effectiveness of the institution in a later generation. Our results suggest that people's direct participation is crucial for the cooperation-enhancing effect to occur. Consequently, laws and regulations have to be legitimized on a regular basis for the benefits of democratic participation to be reaped.

The paper is structured as follows. Sections 2 and 3 present the experimental design and procedures. Our predictions are discussed in Section 4 and Section 5 states the results. Section 6 discusses limitations and possible extensions of our study and concludes.

2 Design

At the beginning of the experiment, subjects are randomly and anonymously divided into groups of three. Within their groups subjects either play a one-shot standard linear public-good game or a public-good game with a sanctioning institution. The basic design and the parametrization is taken over from Tyran & Feld (2006): In the standard game, the endowment of each group member is $E_i = 20$ points. This endowment may be allocated either to a private good (c_i) or a public good (g_i), with $E_i = c_i + g_i$. Each subject's income from the public good is the sum of the contributions to the public good by all $j = 1, \ldots, n$ group members multiplied by a marginal per capita return of $a = 0.5$. Hence, in the standard public-good game, the payoff function of a subject i is defined as follows:

$$\Pi_i = (E_i - g_i) + a \cdot \sum_{j=1}^{3} g_j \quad . \tag{1}$$

The sanctioning institution prescribes that, in case a subject i does not contribute his or her full endowment to the public good, $s = 4$ points are automatically deducted from his or her payoff. In order to maintain a social dilemma, sanctions are chosen to be non-deterrent: they are so low that payoff-maximizing subjects still have an incentive to free-ride.[3] In the public-good game with the sanctioning institution, the non-deterrent sanction is included in the subjects' payoff function, which leads to

$$\Pi_i = \begin{cases} (E_i - g_i) + a \cdot \sum_{j=1}^{3} g_j - s, & \text{if } g_i < E_i \\ (E_i - g_i) + a \cdot \sum_{j=1}^{3} g_j, & \text{if } g_i = E_i \end{cases} \quad . \tag{2}$$

To study the cross-generational spillover effect of a democratic process on cooperation, we extend this experimental design and randomly assign the groups of subjects to one of two generations. Each group in the first generation is matched with a group in the second generation. Groups in the two generations make their decisions sequentially. First, the group members in the first generation interact in a public-good setting; then the group members in the second generation follow. We apply neutral wording throughout the experiment: Groups in the first generation are called 'A-groups', groups in the second generation 'B-groups'.

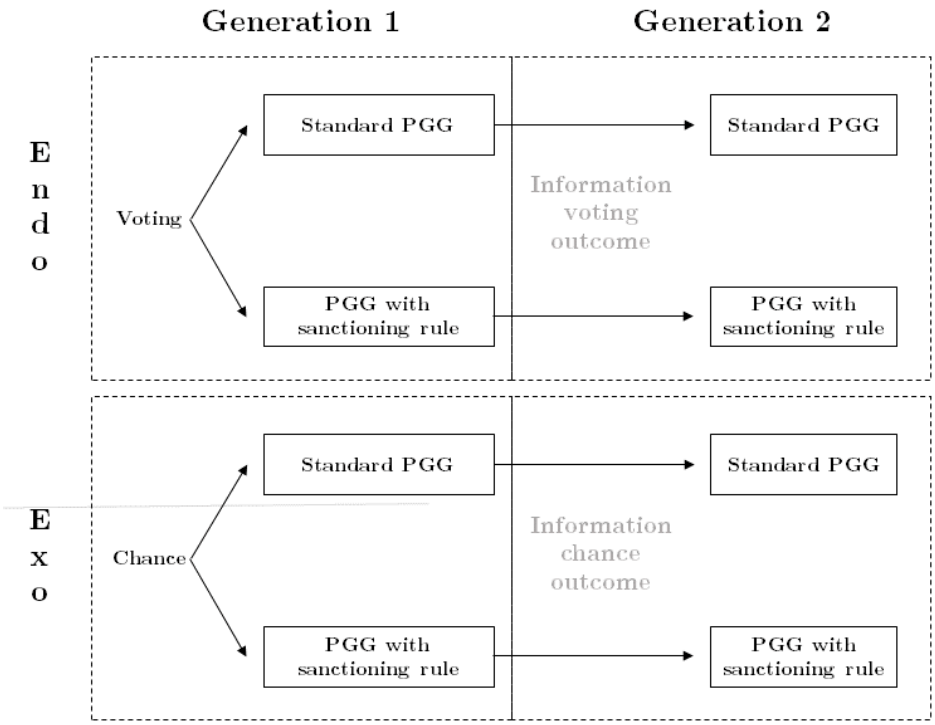
Whether a pair of matched groups plays the standard public-good game or the public-good game with the sanctioning institution is determined in the first generation. Groups in the second generation always play the same game as their matched group in the first generation. Consequently, subjects' endowments and payoff functions are identical in both generations.

Each pair of groups is randomly assigned either to the treatment with an endogenous choice about the sanctioning institution (Endo) or to the treatment where the institutional setting is exogenously determined (Exo). In the Endo treatment, group members in the first generation vote on whether they want to adopt the sanctioning institution. If the majority of group members (2 or 3) votes in favor of the sanctioning scheme, the group subsequently plays the public-good game with the sanctioning institution; otherwise the group plays the standard public-good game. Subjects learn whether the sanctioning institution is in effect and subsequently

[3] Such non-deterrent sanctions may nevertheless detain individuals from uncooperative behavior if they influence subjects' contribution norms, if they help to coordinate subjects' beliefs about others' contributions and therefore influence conditional co-operators (see Galbiati & Vertova, 2014, Galbiati & Vertova, 2008, Tyran & Feld, 2006), or if individuals are sufficiently averse against advantageous inequity (Engel, 2014).

make their allocation decision. In the Exo treatment, instead of the majority vote, a random mechanism determines whether the sanctioning institution exists. Figure 1 shows the sequence of the experiment which results in four possible treatment conditions: EndoRule, EndoNoRule, ExoRule, and ExoNoRule. In EndoRule, the majority of group members in the first generation voted in favor of the sanctioning institution, which is subsequently also implemented in the second generation. In EndoNoRule, the majority of group members in the first generation voted against the institution, so that the second generation also plays the standard public-good game. The treatment conditions ExoRule and ExoNoRule are defined in the same way, the only difference being that the vote is replaced by a random draw.

Fig. 1: Sequence of the experiment



As described, groups in the second generation make their contributions in the same setting as their matched group in the first generation. Before they play the public- good game, second-generation subjects learn whether the decision on the sanctioning institution in the first generation was made by vote or by a random mechanism. If a vote took place, subjects in the second generation do not learn the exact voting outcome, but only whether the majority voted in favor or disfavor of the sanctioning institution. Subjects in the second generation are not informed about the actual contributions in their matched group in the first generation. This allows us to focus on the effect of the institution-generating process, independently of the actual contributions in the first generation.

In real-world settings, people often know that democratic and non-democratic decision-making procedures exist. We presume that people would also compare themselves to people in a different institutional setting. Therefore, in our experiment, all subjects know that groups are either assigned to the Endo or the Exo treatment. We provide this information to make sure that in both treatments subjects in the second generation are aware that some groups are eligible to vote while others are not.

After subjects made their decisions in the public-good game, we implement a post-experimental questionnaire. We elicit subjects' beliefs about the sum of their other group members' contributions and about the sum of contributions in their matched group of the other generation. Subjects earn an additional 4 points for each correct belief. Additionally, they are asked to indicate their non-incentivized beliefs about the percentage of first-generation groups in the experiment who voted in favor of the sanctioning rule. In order to understand how subjects in the second generation perceive the institution-generating process, we further elicit how important it was (would have been) for subjects eligible (not eligible) to vote to decide about the sanctioning institution themselves, how satisfied they are with the way the decision about the sanctioning institution was made in their own group and in the matched group of the other generation, and how much they perceive the sanctioning institution to be an appropriate measure to raise contributions to the public good.[4]

3 Procedures

The computerized experiment was conducted in the EconLab at Bonn University. Subjects were recruited online with the system hroot (Bock, Baetge & Nicklisch, 2014) from the subject pool of the laboratory (more than 6000 subjects). In total, 300 subjects participated in 13 sessions. The number of observations per treatment condition are reported in Table 1.[5]

Subjects had a mean age of 23 years and with few exceptions were university students from diverse fields of studies, such as economics (32 percent), natural sciences (18 percent), law and political studies (15 percent), mathematics and informatics, psychology and medicine, and languages (6 percent each). The sample was gender-balanced: 50 percent of the subjects were female. A typical session lasted approximately 60 minutes. Earnings in the experiment were expressed in points, which were converted into Euro at the rate of 0.25 Euro per point at the end of the experiment. Average earnings were 10.12 Euro, including a 4 Euro show-up fee. The software implementation was done with z-Tree (Fischbacher, 2007). Experimental instructions

[4]For the exact questions, translated from German, see Appendix 7.3.

[5]Due to a low show-up, 2 sessions included 18 subjects, while the remaining 11 sessions included 24 subjects.

Table 1: Number of observations

Treatment	Vote (G1)	Punishment	G1	G2
EndoRule	✓	✓	48	48
EndoNoRule	✓	×	30	30
ExoRule	×	✓	42	42
ExoNoRule	×	×	30	30

Notes: The entries depict the overall number of independent observations for each treatment condition and generation (G1 and G2).

consisted of two parts which were sequentially provided to the subjects on paper. The first part described the standard public-good game, while the second part introduced the sanctioning institution and the group assignment procedure. To ensure that the participants understood the instructions, each part was followed by a set of control questions. The experiment only started after all subjects had correctly answered all questions. At the end of the experiment, subjects were asked to fill in their demographic characteristics. Appendix 7.2 contains a transcript of the instructions, translated from German.

4 Predictions

Assuming that individuals are rational and selfish, we should observe no contributions to the public good in both generations, irrespective of whether the sanctioning institution exists or not. The sanction for contributions below the social optimum is too low to deter a selfish individual from free-riding. Plenty of empirical evidence, however, suggests that people contribute to public goods. They do so conditional on their beliefs that others exhibit the same behavior (see Chaudhuri, 2011, for an overview of possible motivations), they may want to behave in line with their personal contribution norm in order to avoid emotional discomfort (Bowles & Gintis, 2006), they may experience a "warm glow" when doing something beneficial for the group (Andreoni, 1990), or they could have a preference for efficiency (Charness & Rabin, 2002).

On top of that, research has shown that the way a centralized institution that sanctions free-riding is adopted (or rejected) also affects contributions (see, e.g., Dal Bó et al., 2010, Feld & Tyran, 2002, Kamei, 2016, Markussen et al., 2014, Tyran & Feld, 2006). Three channels have been proposed to explain the effect of a democratic voting procedure on those individuals affected by the institutional outcome: signaling, selection, and a generic "endogeneity premium" (Dal Bó

et al., 2010, see also Tyran & Feld, 2006).

First, the voting outcome could convey a cooperation signal. A majority vote in favor of a potentially cooperation-enhancing institution may signal that individuals want to cooperate. If subjects are conditionally cooperative, i.e., if their willingness to cooperate is positively correlated with their beliefs about the others' cooperation behavior, they may increase their contributions to the public good when the institution is adopted (signaling effect). Secondly, (un)cooperative types may self-select into a particular institutional environment. Cooperative types are more likely to vote in favor of an institution that sanctions free-riding than uncooperative types. Consequently, cooperative types end up in a setting with a sanctioning institution more often when a democratic procedure instead of a random mechanism determines the institutional setting (selection effect). Thirdly, endogeneity could have an effect per se. When only considering individuals who are in favor of implementing the sanctioning institution and who know of each other's institutional preferences (which allows to eliminate the first two channels), cooperation is still found to be higher for a given punishment level when a democratic procedure determined the institutional setting (Dal Bó et al., 2010, Kamei, 2016, Marcin et al., 2016). High democratic legitimacy of the sanctioning institution because of one's own participation in the process may result in increased adherence to an apparent cooperation norm. If subjects anticipate the "endogeneity premium" for their group members, the effect may be reinforced through conditional cooperation.

All three channels mentioned above predict a higher contribution level when the implementation of the sanctioning institution is based on a vote among the individuals affected by the institution instead of a random mechanism. For the first generation, we thus expect to replicate the previously reported effects of democratic participation and predict that contributions are higher if the sanctioning institution is democratically implemented (EndoRule), as compared to exogenously imposed (ExoRule) [**P1a**].

If subjects vote against the sanctioning institution, signaling and selection work in the opposite direction. Non-cooperative subjects may self-select into an environment without sanctions in the endogenous choice setting. This could decrease cooperation, compared to an exogenous setting where cooperative and non-cooperative subjects are equally likely to end up in an environment without the sanctioning institution. Further, the rejection may provide a signal for the subjects' unwillingness to cooperate. If, for example, a law that prescribes higher punishment for tax fraud is collectively rejected, this will most likely influence what people think about the others' tax compliance. Hence, this may lead to lower contributions from conditional cooperators. In principle, the rejection of the institution might also receive democratic legitimacy because of the endogenous decision process. Those who would have contributed independently of the

sanctioning institution could feel bound to adhere to an apparent non-cooperation norm which comes with the rejection of the institution. Yet, in a related setting, Dal Bó et al. (2010) do not find a negative effect of a democratic process which results in the rejection of the institution that goes beyond selection and signaling. In line with the findings in Tyran & Feld (2006) and Feld & Tyran (2002), we predict that, in the first generation, cooperation is lower if the institution is rejected based on the subjects' votes (EndoNoRule) than if a random mechanism determines not to implement the institution (ExoNoRule) [**P1b**].

Irrespective of the treatment, subjects in the second generation do not participate in the institution-generating process. The institutional setting is always exogenously imposed on them. Hence, any selection effects are excluded by design. Further, the subjects in both treatments do not receive signals about the cooperativeness of their own group members. The only difference between the treatments is the information about the procedural history of the institutional setting. In the Endo treatment, second-generation subjects learn that their matched group in the first generation voted on the institutional setting and that the voting outcome also determined whether the institution was implemented in their own group. In the Exo treatment, second-generation subjects find out that the institutional setting was determined by a random draw in the first generation and that the outcome of the random draw will be subsequently implemented in their own group. Subjects in the Endo treatment thus receive a signal about the cooperativeness in the first generation, while in the Exo treatment no such signal is available. Previous experiments suggest that observing the behavior of unrelated individuals in the same decision environment (social history) affects behavior (see, e.g., Berg, Dickhaut & McCabe, 1995, Engel, Kube & Kurschilgen, 2014, Gürerk, 2013, Krupka & Weber, 2009).[6]

In particular Engel et al. (2014) investigate contributions in a repeated public-good game with punishment and counter-punishment. They show that providing information about uncooperative behavior of other groups reduces the individuals' contributions, compared to a setting with no information. Positive information about the cooperation of others, however, does not increase contributions.[7] This observed asymmetry may be related to the general psychological

[6] Krupka & Weber (2009) show in a binary dictator game that receiving information about the previous behavior of others leads to more pro-social decisions. Pro-social behavior increases further the more pro-social previous behavior subjects observe. Berg et al. (1995) find that the social history influences decisions in a trust game. For example, information about the previous behavior of the sender or receiver increases the correlation between the amounts sent and the amounts paid back by the receivers. Investigating a repeated public-good game with punishment, Gürerk (2013) finds that initial contributions increase when subjects are provided with detailed information about the behavior of other individuals in a previous experiment that shows the higher efficiency of an environment with punishment than without punishment.

[7] The information they provide includes mean contributions over time, the number of free-riders in the first

finding that people process negative information more than positive information (see Baumeister, Bratslavsky, Finkenauer & Vohs, 2001 for an overview). Higher attention devoted to the unfavorable contribution information may hence lead to stronger behavioral reactions. In our experiment, second-generation subjects in the Endo treatment are not informed about the social history — the actual contributions in the first generation — but they learn the voting outcome. Previous studies show that the voting outcome in the own group influences the subjects' beliefs about their group members' contributions (see, e.g., Tyran & Feld, 2006). In a similar vein, subjects in the second generation could use the voting outcome in the first generation as a proxy to assess the cooperativeness of their own group. Extrapolating from the findings discussed above, a voting outcome in favor of the sanctioning institution in the first generation may only have a small or no (positive) signaling effect on contributions in the second generation, while a voting outcome in disfavor of the institution in the first generation may have a stronger (negative) signaling effect.

Lastly, endogeneity per se may influence contributions. If the institution is adopted by majority vote, subjects in the second generation may perceive it as more legitimate, despite the fact that they could not themselves participate in the vote. Generally, fair decision procedures are found to enhance the satisfaction with and the acceptance of decisions (e.g., Lind & Tyler, 1988, Thibaut & Walker, 1975) and can increase the general compliance with laws and regulations (Tyler, 2006). Moreover, field studies suggest that the perceived legitimacy of an institution can increase even when people did not experience the fair procedure themselves, but rather observed it from a distance (see, e.g., Grimes, 2006, Tyler & Mitchell, 1994). If in our experimental setting individuals evaluate the democratic process as more fair, they may thus be more inclined to behave in line with the cooperation norm that is promoted by the implementation of the sanctioning institution despite of not having been actively involved in the process.

Hence, our predictions for the effect of the implemented sanctioning institution on cooperation levels in the second generation are ambiguous. While previous research partly suggests that there will be no positive effect (i.e., cooperation levels in EndoRule and ExoRule will be the same), a positive effect could — as discussed — nevertheless occur (i.e., contributions in EndoRule will be higher than in ExoRule) [**P2a**]. When the sanctioning institution does not exist in the second generation, we predict that cooperation is lower in EndoNoRule than in ExoNoRule [**P2b**].

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and last period, and the average amount of counter-punishment. The authors conjecture that their finding may be explained by ceiling effects when contribution levels without information are already high. Thus, they repeat the experiment with a less cooperative subject pool. The results reveal that initial contributions are not different when positive cooperation information is provided, as compared to no information. Yet, in the long run, social information tends to stabilize cooperation.

5 Results

We first summarize the subjects' voting behavior in the Endo treatment of the first generation. Then we report the immediate effects of the institution-generating process on the public-good provision in the first generation. Subsequently, we state our results on the effects of the procedural history on the subjects' contributions in the second generation. Throughout our analysis, we will investigate the effects of the voting procedure separately for the two cases of the sanctioning institution either being or not being implemented in the first generation.

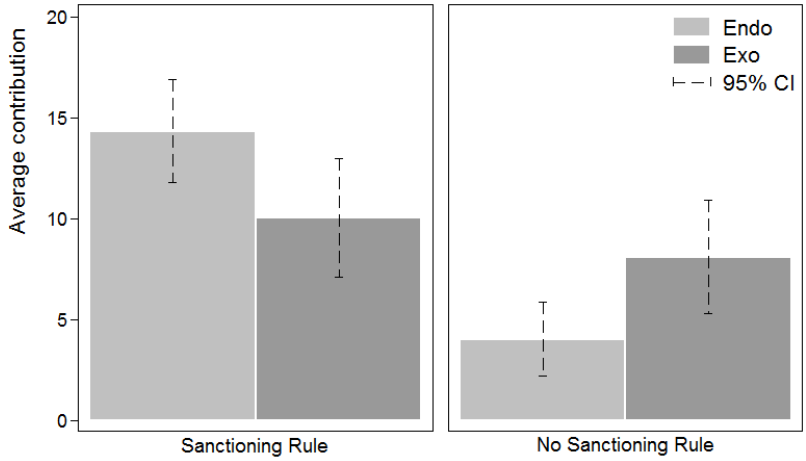
5.1 Generation One

Among the first-generation subjects in the Endo treatment, 53% vote in favor of the sanctioning institution. While 63% of the men cast a supportive vote, only 40% of the women do so. A test of proportions reveals that the percentage of women supporting the sanctioning institution is significantly smaller than the percentage of men (p=0.045). This finding is in line with previous research which reports gender differences in preferences for sanctioning institutions in social dilemmas (see Kamei, 2016, Putterman et al., 2011).[8]

Average contributions to the public good and the corresponding 95% confidence intervals (CI) are depicted in Figure 2 separately for the two treatments and the two institutional settings. Aggregating over all conditions, subjects contribute on average 49% of their endowment to the public good, with a majority of choices at the extremes of the zero or the maximum contribution.

[8] Putterman et al. (2011) find that, when subjects can decide about the design of a centralized sanctioning scheme in a public-good game, women are significantly less likely to vote for implementing such an institution. Further, they are less likely to vote for more efficient sanction parameters (maximum penalty and penalty-free contribution level). In a similar setting, Kamei (2016) confirms that women are reluctant to implement a centralized sanctioning institution with pre-determined parameters.

Fig. 2: Public-Good Contributions in Generation One



Supporting our first prediction, we observe that, when the sanctioning institution is implemented, contributions are higher if the institution-generating process is endogenous rather than exogenous. On average, subjects contribute 14.33 points in EndoRule and 10.05 points in ExoRule. The difference is statistically significant according to a Mann-Whitney (henceforth MW) test (p=0.028).[9]

Result 1. *Contributions are significantly higher with a democratically chosen sanctioning institution than with an exogenously imposed institution.*

We further confirm that, when the sanctioning institution is rejected, a democratic decision procedure has detrimental effects on cooperation. Average contributions to the public good in ExoNoRule are twice as high as in EndoNoRule with 8.10 and 4.03 points, respectively. The difference in contributions is statistically significant (p=0.031, MW test).

Result 2. *Contributions are significantly lower if the sanctioning institution is endogenously rejected, as compared to when a random mechanism determines that it is not implemented.*

The positive and negative effects of democracy on cooperation are robust to the inclusion of subjects' demographics in the analysis. Table A1 in Appendix 7.1 reports the results of linear regressions for the cases that the sanctioning institution is implemented and not implemented.

[9]All reported tests are two-sided. Appendix 7.1 (Tables A3 and A4) provides an overview of the average contribution levels in all treatment conditions, as well as an overview of the results of the MW tests comparing contributions between each pair of conditions.

In models (1) and (3), only the treatment variable is regressed on contribution levels, while in models (2) and (4) the subjects' gender, age, and a dummy for their course of study are also included. In line with the non-parametric analysis, we observe that the treatment coefficient is statistically significant and negative if the sanctioning institution is not implemented and statistically significant and positive if it is implemented.

Furthermore, we analyse whether the voting outcome affects the beliefs of the first-generation subjects about their other group members' contributions. Matching our results on actual contributions, beliefs are significantly higher if the sanctioning institution is endogenously chosen, as compared to exogenously imposed (EndoRule: 17.90, ExoRule: 13.39, p=0.003). If the sanctioning institution is endogenously rejected, the beliefs are lower than if the institution is rejected by a random mechanism. This latter difference, however, is statistically insignificant (EndoNo: 6.53, ExoNo: 8.65; p=0.155). The results suggest that the voting outcome provides a signal that leads subjects to adjust their beliefs about the others' contributions. A Spearman's correlation coefficient of 0.65 for beliefs and contributions among all first-generation subjects provides strong evidence for conditionally cooperative behavior: the more subjects expect others to contribute, the more they contribute themselves (p=0.000).

Next, we study whether the effects of the democratic procedure on cooperation are partly driven by selection because (un-)cooperative types self-select into the environment with(out) sanctions. To test this, we divide first-generation subjects in the Endo treatment into two groups: Those who voted in favor of the sanctioning institution (pro-voters) and those who voted against it (contra-voters). As stated before, pro-voters are more likely to play the public-good game with the sanctioning institution than contra-voters. In our experiment, approximately 88% of the pro-voters, but only 32% of the contra-voters end up in EndoRule. To show that selection causes parts of the treatment differences, we have to establish that pro- and contra-voters actually behave differently in a given institutional setting. Indeed, we find that pro-voters contribute significantly more in EndoRule than contra-voters (N=48, p=0.030, MW test) which suggests that pro-voters are generally more cooperative. In EndoNoRule, however, the two groups contribute similar amounts (N=30, p=0.929, MW test). Because pro-voters seem to be more cooperative when the rule exists, and because they are more likely to be in this condition, we conclude that selection effects may explain parts of the positive effect of the democratic procedure. However, since we observe no difference in cooperation behavior between pro- and contra-voters when the rule does not exist, the negative effect does not seem to be caused by selection.[10]

[10] Tyran & Feld (2006) find contribution rates not to be different between the two voter types in both settings, i.e., when the rule was democratically established and when it was democratically rejected. Yet, in line with our results, they further find that both types, pro- and contra-voters, contribute more in EndoRule than in

Lastly, we investigate the effectiveness of the sanctioning institution in increasing contributions. We compare the contributions in the settings with and without the sanctioning institution conditional on a particular institution-generating process. We treat ExoNoRule as the baseline of the standard public-good game without sanctions. While the mere existence of the non-deterrent sanctioning institution in ExoRule does not significantly improve contributions to the public good (ExoRule vs. ExoNoRule, p=0.528, MW test), contributions in EndoRule are significantly higher than in ExoNoRule (p=0.002, MW test).

5.2 Generation Two

For the subjects of the second generation, the institutional setting in which they interact is exogenously determined. Subjects are not informed about the contribution behavior of their predecessors. Yet, they know the procedural history of the institutional setting. In the Endo treatment, the procedural history also contains information about the institutional preferences of the subjects in the first generation. Average contributions and confidence intervals are depicted in Figure 3 for all four conditions. Similar to the first generation aggregating over all four conditions subjects contribute on average 45% of their endowment to the public good; again with a majority of choices at the extremes of a zero or a maximum contribution.

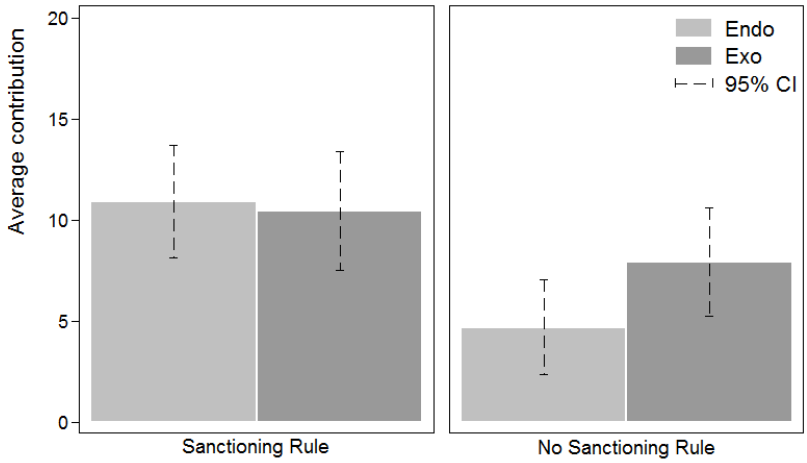
In order to determine whether a positive endogeneity effect carries over to the second generation, we compare contributions between EndoRule and ExoRule. With 10.94 and 10.45 points, respectively, contributions are almost the same in the two conditions (p=0.846, MW test). This suggests that second-generation subjects neither react to the positive cooperation signal of the voting outcome in the first generation (or do not perceive the voting outcome as a cooperative signal in the first place), nor does the democratic procedure per se increase contributions in the second generation. Thus, democratic legitimacy depends on the direct participation of the individuals in the institution-generating process. The mere fact that a democratic procedure was applied at some point in time is not sufficient to increase the effectiveness of the sanctioning institution in later generations.

Result 3. *Inheriting a sanctioning institution with a democratic procedural history does not enhance cooperation, as compared to inheriting an exogenously imposed institution.*

While the endogenous process does not have a positive effect on cooperation in the second generation when the sanctioning institution is implemented, we find strong evidence for a negative

EndoNoRule. In our experiment, this difference is significant for pro-voters (EndoRule: 15.83 vs. EndoNoRule: 4.00, N=41, p=0.002, MW test) and just not significant for contra-voters (EndoRule: 9.83, EndoNoRule: 4.04, N=37, p=0.108, MW test).

Fig. 3: Public-Good Contributions in Generation Two



effect in case the institution is rejected. Contributions are significantly lower in EndoNoRule, as compared to ExoNoRule (4.70 vs. 7.93, p=0.045). This effect may be driven by a conditionally uncooperative reaction to the non-cooperative signal of the first generation or by the desire of the individuals to adhere to the apparent non-cooperation norm.

Result 4. *Contributions are significantly lower if the inherited sanctioning institution was endogenously rejected by the previous generation than if the rejection was exogenous.*

The results are again robust to the inclusion of demographics in the analysis (see Table A2 in Appendix 7.1). We observe that the treatment coefficient is statistically significant and negative if the sanctioning institution is not implemented and insignificant if the institution is adopted.

We now investigate whether the information about the procedural history, in particular about the voting outcome in the Endo treatment, influences the subjects' beliefs about their group members' contributions. Note that subjects receive no signal about the cooperativeness of their group members, but only a signal about the cooperativeness of their matched first-generation group. In line with the differences in actual contributions, the subjects' beliefs are not significantly different between EndoRule and ExoRule (15.02 vs. 13.20, p=0.246, MW test) and significantly lower in EndoNoRule than in ExoNoRule (7.25 vs. 10.02, p=0.065, MW test). We find that cooperation is conditional on these beliefs, which is indicated by a Spearman's correlation coefficient of 0.52 (p=0.000). Hence, while subjects react with lower contributions to the negative signal of a democratic rejection of the sanctioning institution, they show no reaction to the positive signal that comes with the democratic adoption.

Concerning the effectiveness of the sanctioning institution, contributions in ExoRule are not different from those in ExoNoRule (p=0.433, MW test). Yet, unlike in the first generation, contributions in the second generation in EndoRule are also not different from those in ExoNoRule (p=0.331, MW test). Irrespective of the procedural history, the sanctioning institution does not significantly increase cooperation, as compared to an exogenous setting without sanctions.

As pointed out in the Design section, all subjects receive information about all treatment conditions. Therefore, all subjects know that some groups are eligible to vote, while others are not. In the Endo treatment, second-generation subjects are matched with a group of first-generation subjects who could vote, while in the Exo treatment subjects in both generations were not allowed to vote. If second-generation subjects compare themselves mainly to their matched group in the first generation, subjects in the Endo treatment could feel unfairly treated and could feel a stronger desire to have the chance to vote themselves than the subjects in the Exo treatment. A strong, but unfulfilled, voting desire could create dissatisfaction, which might in turn influence cooperation. This could explain why we do not observe a positive effect in case the institution is democratically adopted. To exclude this channel, we identify whether the subjects' judgments about their vote ineligibility in the second generation differ between treatments. We elicited the subjects' evaluation of the procedure with two measures in the post-experimental questionnaire. First, we asked subjects how important it would have been for them to vote on the sanctioning institution themselves. Secondly, we asked how satisfied they were with the process that determined the institutional setting for their group. We observe a significant correlation between the two measures: a high voting desire is associated with low satisfaction (Spearman's Rho=-0.38, p=0.000). Yet, the voting desire is not statistically different between EndoRule and ExoRule (p=0.238, MW test) and even slightly lower in EndoNoRule, as compared to ExoNoRule (p=0.095, MW test). There is either no significant correlation between the subjects' voting desire and contribution levels (Spearman's Rho = 0.01, p=0.946). While the satisfaction measure is positively correlated with contributions (Spearman's Rho = 0.15, p=0.072), differences in satisfaction between EndoRule/ExoRule and EndoNoRule/ExoNoRule are insignificant (p=0.126 and p=0.988, respectively, MW tests).[11] We conclude that our design does not trigger a higher voting desire or higher dissatisfaction in the Endo treatment than in the Exo treatment.

[11]Concerning the subjects' satisfaction about the process in their matched first-generation group, we find that subjects are more satisfied in EndoRule than in ExoRule (p=0.000, MW test) and we observe no significant differences in case the rule is rejected (p=0.417, MW test).

5.3 Inter-Generational Analysis

So far, we focused on the intra-generational comparisons in contribution levels and beliefs between the several conditions. Now we turn to the inter-generational analysis. We find that in EndoRule contributions are significantly lower in the second generation than in the first generation (p=0.077, MW test). Comparing contributions in all other conditions between generations yields insignificant results (p≥0.825, MW tests). We observe the same pattern in the subjects' beliefs about their other group members' contributions: beliefs are significantly lower in EndoRule in the second generation than in the first generation (p=0.018, MW test) while for all other treatment conditions differences are insignificant (p≥0.510, MW tests).

Finally, we assess whether second-generation subjects extrapolate from their beliefs about the cooperativeness of the first generation to their own generation. In all four treatment conditions, we observe that beliefs about the own group are highly correlated with those about the matched group of the first generation (Spearman's Rho ≥0.564, p=0.000). Differences in the beliefs about the matched group between the Endo treatment and the Exo treatment are statistically insignificant in case the sanctioning institution is implemented (EndoRule: 15.41, ExoRule: 13.48, p=0.133, MW test) and significant in case the institution is rejected (EndoNoRule: 6.30, ExoNoRule: 11.01, p=0.003, MW test). Further, subjects in the Endo treatment tend to generalize from the voting outcome in their matched first-generation group to the expected voting preferences among all first-generation subjects. Our questionnaire reveals that subjects in EndoRule have significantly higher beliefs about the percentage of groups in the first generation that adopted the sanctioning institution than subjects in ExoRule (p=0.000, MW test). Accordingly, subjects in EndoNoRule have significantly lower beliefs than subjects in ExoNoRule (p=0.016, MW test).

6 Discussion and Conclusion

Our experimental results suggest that the democratic genesis of an existing sanctioning institution is irrelevant for cooperation if people do not participate in the institution-generating process themselves. The fact that an institution was initially adopted democratically is not sufficient. Thus, democratic institutions are in need of constant legitimization. The procedural history is crucial, however, when a cooperation enhancing institution is rejected. A vote against the institution leads to a decrease in cooperation in later generations also. Hence, our results underline the need for political groups or organizational leaders to be thoughtful when proposing new laws or rules. The democratic rejection of an institution may entail negative long-term effects on cooperation.

Our study was designed to identify clearly the behavioral effect of the institution-generating process apart from indirect effects through changes in cooperation levels in previous generations. Though the interpretation of our findings seems straightforward, some restrictions of our design need to be considered when extrapolating to real-world settings.

First, we chose to exclude social history effects by not providing explicit information about cooperation behavior in the first generation to the subjects in the second generation. This allows us to identify the effects of the procedural history apart from the social history (of observing previous contributions). However, people usually observe how the previous generation succeeded in the existing institutional setting. As cooperation in the first generation is higher with an endogenous institution, social history effects could lead to higher contributions in later generations. Thus, it is plausible that democratic decision-making has an indirect effect on later generations, as it affects the social history later generations are confronted with. Likewise, the negative effect of voting may even be stronger in the second generation if information about low cooperation levels in the first generation was provided.

Secondly, we study a one-shot interaction to exclude subjects' concerns about future behavior and payoffs. While many interactions in the real world are quasi one-shot, many others are repeated. Effects that are initially small may increase the more often individuals interact. Engel et al. (2014) even report the surprising result that a positive social history only has a long-term effect on contributions in a repeated public-good game and no effect at all in the first interaction. It may therefore be possible that effects of the procedural history arise and become stronger over time.

Finally, in the interest of clear identification, we totally separate generations, i.e., we have two different groups of subjects in the two generations.[12] Hence, we do not investigate the situation in which the two generations overlap, which in reality they obviously do in part. A set-up with overlapping generations would allow for newcomers to adapt to the behavior of their peers. Since a democratically chosen institution increases cooperation in the first generation, conditionally cooperative newcomers may increase their own contributions. If senior members drop out successively, cooperation could still remain higher even when all members who had initially voted on the institution left the group.

We took the initial step in testing the effects of a democratic procedural history for people's compliance and cooperation independent from the social history. While our experiment is a rigorous empirical test for the inter-generational effect of democratic decision procedures

[12]See also the thought experiment of Jefferson (1789): "[...*L*]et us suppose a whole generation of men to be born on the same day, to attain mature age on the same day, and to die on the same day, leaving a succeeding generation in the moment of attaining their mature age all together."

on cooperation, we leave it to future research to investigate cooperation levels when the aforementioned restrictions are relaxed. Moreover, given our finding that institutions are in constant need of legitimization in order to reap the direct benefits of democratic procedures, future studies should determine through which channels other than a vote an existing institution could be legitimized.

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7 Appendix

7.1 Additional Tables

Table A1: Generation 1 Contributions – Robustness

	(1)	(2)	(3)	(4)
VARIABLES	G1 Rule	G1 Rule	G1 NoRule	G1 NoRule
Endo	4.29**	5.44***	-4.07**	-3.28*
	(1.91)	(1.90)	(1.64)	(1.83)
Male		-4.01*		-1.45
		(2.10)		(2.05)
Age		0.10		0.48
		(0.28)		(0.32)
Law/Political Sciences		-13.17		7.84
		(9.45)		(7.22)
Economics		-8.53		6.53
		(9.15)		(7.23)
Maths/Informatics		-13.62		9.50
		(10.55)		(7.78)
Psychology/Medicine		-1.74		6.97
		(9.73)		(8.03)
Natural Sciences		-7.62		7.29
		(9.23)		(7.19)
Languages		-15.97		5.84
		(10.13)		(8.23)
Philosophy/Theology		-8.29		6.63
		(10.46)		(7.78)
Other		-8.52		3.36
		(9.29)		(7.23)
Constant	10.05***	18.37*	8.10***	-8.79
	(1.40)	(10.03)	(1.16)	(10.67)
Observations	90	90	60	60
R-squared	0.054	0.208	0.096	0.189

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Endo is a treatment dummy and Male is a gender dummy. The reference category for the field of study dummy is "Nothing", indicating that a subject has never studied.

Table A2: Generation 2 Contributions – Robustness

	(1)	(2)	(3)	(4)
VARIABLES	G2 Rule	G2 Rule	G2 NoRule	G2 NoRule
Endo	0.49	0.66	-3.23*	-3.48*
	(2.01)	(2.10)	(1.73)	(1.87)
Male		-0.66		0.48
		(2.24)		(2.11)
Age		0.04		-0.04
		(0.17)		(0.15)
Law/Political Sciences		0.75		6.18
		(7.34)		(7.55)
Economics		-1.36		1.32
		(7.20)		(7.56)
Maths/Informatics		-1.81		4.80
		(7.95)		(7.64)
Psychology/Medicine		1.99		-2.00
		(8.29)		(7.43)
Natural Sciences		4.60		3.36
		(7.42)		(7.30)
Languages		3.85		3.39
		(7.78)		(8.44)
Philosophy/Theology				-5.95
				(10.03)
Other		-0.22		1.91
		(7.92)		(7.67)
Constant	10.45***	8.97	7.93***	6.41
	(1.47)	(7.85)	(1.22)	(8.35)
Observations	90	90	60	60
R-squared	0.001	0.066	0.057	0.198

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Endo is a treatment dummy and Male is a gender dummy. The reference category for the field of study dummy is "Nothing", indicating that a subject has never studied.

Table A3: Average Contributions per Treatment Condition and Generation

Treatment condition	Cooperation
ExoNoRuleG1	8.10
ExoRuleG1	10.05
EndoNoRuleG1	4.03
EndoRuleG1	14.33
ExoNoRuleG2	7.93
ExoRuleG2	10.45
EndoNoRuleG2	4.7
EndoRuleG2	10.94

Table A4: Mann-Whitney Tests Comparing Contributions

Treatment conditions		p-value
ExoNoRuleG1	ExoRuleG1	0.528
ExoNoRuleG1	EndoRuleG1	0.002
ExoNoRuleG1	EndoNoRuleG1	0.031
ExoRuleG1	EndoNoRuleG1	0.014
ExoRuleG1	EndoRuleG1	0.028
EndoNoRuleG1	EndoRuleG1	0.000
ExoNoRuleG2	ExoRuleG2	0.433
ExoNoRuleG2	EndoRuleG2	0.331
ExoNoRuleG2	EndoNoRuleG2	0.045
ExoRuleG2	EndoNoRuleG2	0.010
ExoRuleG2	EndoRuleG2	0.846
EndoNoRuleG2	EndoRuleG2	0.005
ExoNoRuleG1	ExoNoRuleG2	0.982
ExoRuleG1	ExoRuleG2	0.825
EndoNoRuleG1	EndoNoRuleG2	0.930
EndoRuleG1	EndoRuleG2	0.077

7.2 Instructions

General Instructions for Participants

You are about to take part in an economic experiment. Please read the following instructions carefully. You can earn money in this experiment. Your earnings depend on your decisions and the decisions made by the other participants. At the end of the experiment, all sums of money which you have earned through your decisions will be added up and paid to you in cash immediately. In addition, you will receive a flat fee of 4 euro for showing up on time.

During the experiment, we will speak not of euro, but of points. Your entire income will therefore initially be calculated in points. The points you earn will be converted into euro at the end of the experiment, at a rate of:

1 point = 0.25 euro

All your decisions in this experiment are anonymous. You will not be told who the other participants are with whom you have interacted.

All participants will receive exactly the same information.

No talking is permitted during the experiment. Disobeying this rule will lead to exclusion from the experiment and from all payments. If you have any questions, please ask us by raising your hand. A member of our team will come to your seat.

On the following pages, we will describe the exact procedure of the experiment.

Information on the Exact Procedure of the Experiment

At the beginning of the experiment, you are randomly divided into **groups of 3 members each**. You make your decisions within this group of three.

Each participant starts off with **20 points**. These 20 points are referred to from now as the **points endowment**. Your task is to divide the 20 points between a group account and a private account.

In making your decision, you must use up all 20 points. In other words, the points you place in the group account and the private account must add up to 20.

You will receive an income from both your group account and your private account. Your income from both accounts is calculated in different ways.

Your **points income from the private account** depends on how many of your 20 points you have placed in your private account. You will receive an income from your private account which corresponds **exactly** to the number of points invested. So if, for instance, you have placed 20 points in your private account, you will receive an income from your private account of 20 points. If you have invested 6 points, your income from your private account will be 6 points. Nobody apart from you receives an income from your private account.

Your **points income from the group account** depends not only on how many points you yourself have placed in the group account, but also on how many points the other two group members have placed in the group account. Your income from the group account is calculated according to the following formula:

Income from the group account = Sum of **all** points in the group account x 0.5

In other words, the income from the group account also depends on how many points in total were placed in the group account by all group members.

The income of the other two group members from the group account is calculated according to the same formula. In other words, all group members draw the same income from the group account.

If, for example, the points placed in the group account by all group members add up to 60 points, then each group member receives an income from the group account of 30 points (60 points x 0.5). If the points placed in the group account by all group members add up to 10 points, then each group member receives an income from the group account of 5 points (10 points x 0.5).

The difference between the private and the group account becomes clear if we see what happens with each individual point that you can place either in the private account or the group account.

- For each point you place in the **private account**, your income from the private account increases by 1 point.

- For each point you place in the **group account**, the sum of the points from the group account increases by 1 point. For each point that you place in the group account, you therefore receive an income of 0.5 points (1 point x 0.5). However, the income of the other two group members also increases by 0.5 points each. The total income of your group of three hence increases by 1.5 points. With every point you place in the group account, therefore, you not only earn 0.5 points, but the other two group members also earn 0.5 points each.
  In turn, you also profit from the points the two other group members place in the group account. For each point that another group member places in the group account, you earn 0.5 points (1 point x 0.5 = 0.5 points). This happens independently of whether you yourself have placed points in the group account or not.

Your total points income from your private account and the group account is hence calculated as follows:

	Points income from the private account
+	Points income from the group account
=	Total points income

It is important for you to understand how your income is calculated from the points distribution between private account and group account. We would therefore ask you please to answer a few control questions on the points distribution. You will receive further information on the procedure of this experiment as soon as all participants have correctly answered the questions.

Please follow the instructions on your screen now.

Information on the Exact Procedure of the Experiment – Continued

Before you make your decision on the points distribution between the private and the group account, it is determined whether your group of three is affected by the so-called **deduction rule**.

The deduction rule has the following effect: **Four points are subtracted from each group member who has placed less than 20 points in the group account.**

The deduction rule changes the calculation of the total points income as follows:

	Points income from the private account
+	Points income from the group account
-	4 points subtracted (if the deduction rule is in effect and the contribution to the group account was less than 20 points)
=	Total points income

Whether the subtraction rule is in effect in your group of three is determined as follows:

At the beginning of the experiment, it is randomly decided whether your group of three is an **A group** or a **B group**. **Each A group is randomly assigned a B group**. You find out in which group you are once the experiment is started on the computer.

A group:

The A group makes its decision on the points distribution between the private and the group account before the B group does.

However, before the points distribution is decided upon, a draw determines whether a vote on the **deduction rule** will take place in the A group.

If the vote takes place, then the members of the A group will decide whether or not the deduction rule will come into effect in their group. The deduction rule comes into effect if the majority of the members of the A group (i.e., 2 or 3 people) votes in favour. If a minority (nobody or 1 person) votes for the deduction rule, this rule does not come into effect.

If the vote does not take place, then a draw will determine whether the deduction rule will come into effect in the A group.

B group:

After the A group members have made their decision on the points distribution, the B group members also make their decision on the points distribution.

Whether or not the deduction rule comes into effect in the B group depends on whether or not it is in effect in the assigned A group. If the deduction rule is in effect in the corresponding A group, it is also in effect in the B group. In this case, the calculation of the points income changes as described above. If the deduction rule is not in effect in the corresponding A group, it is not in effect in the B group either.

B group members are informed whether the A group assigned to them voted on the deduction rule, or whether the rule was randomly introduced. You will then be told whether or not the deduction rule is in effect in the A group assigned to you, and hence in your group. Then, B group members decide on the points distribution between the private and the group account.

Summary of Experiment Procedure

1. A draw determines whether the members of the A group vote on the deduction rule. If there is no vote, a random draw decides whether the deduction rule comes into effect in the A group. If there is a vote, an A group majority decides on the deduction rule. If the rule comes into effect in the A group, then it will also be in effect in the corresponding B group.

2. Members of group A decide how to distribute the points endowment between the private and the group account.

3. Members of group B are told whether a vote has taken place in Group A and whether the deduction rule is in effect in their group or not.

4. Members of group B decide how to distribute their points endowment between the private and the group account.

5. All participants complete a brief questionnaire, which can also earn them money.

At the end of the experiment, you will receive all payoff-relevant information. Please stay in your booth until you are called.

Before you begin with the actual experiment, it is important for you to know how your income is calculated from the points distribution between the private and the group account, if the deduction rule is in effect. We would therefore ask you please to answer some additional control questions on the points distribution. As soon as all participants have correctly answered these questions, the experiment will begin.

Please follow the instructions on your screen now.

7.3 Questionnaire

1. Please indicate how many points you think **the other two members of your group** have contributed to the group account. In order to do this, please write down the total sum of the expected contributions of both other members of your group. Only full numbers between 0 and 40 are acceptable. If your figure corresponds to the actual sum of the contributions of both other members of your group, then you will receive 4 points in addition to your points income.

2. Please indicate how many points you think **the three members of the B group *(A group)* assigned to you** have contributed to the group account. In order to do this, please write down the total sum of the expected contributions of the three group members. Only full numbers between 0 and 60 are acceptable. If your figure corresponds to the actual sum of the contributions of both other members of your group, then you will receive 4 points in addition to your points income.

3. In your opinion, how many percent of all A groups in the experiment who decided on the subtraction rule have voted for the subtraction rule to come into force? (integer between 0 and 100).

4. *B players & A players Exo*: How important would it have been to you to be able to decide yourself on the deduction rule? (not at all important – very important)
A players in Endo: How important was it to you to be able to decide yourself on the deduction rule? (not at all important – very important)

5. How satisfied are you with the way in which it was determined for your own group whether or not the subtraction rule would be valid? (very unsatisfied – very satisfied)

6. How satisfied are you with the way in which it was determined for the B group *(A group)* assigned to your group whether or not the deduction rule would be valid? (very unsatisfied – very satisfied)

7. To what extent would you agree with the following statement: The deduction rule is a suitable instrument to guarantee that everyone will contribute something to the group account. (do not agree – agree completely)

8. Gender

9. Age

10. Course of study