



# Discussion Paper

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Centre for Decision Research and Experimental Economics

Discussion Paper Series

ISSN 1749-3293

***CeDEx Discussion Paper No. 2007–11***

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November 2007

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# The limits of self-governance when cooperators get punished: Experimental evidence from urban and rural Russia<sup>+</sup>

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16 November 2007

## Abstract

We report evidence from public goods experiments with and without punishment which we conducted in Russia with 566 urban and rural participants of young and mature age cohorts. Russia is interesting for studying voluntary cooperation because of its long history of collectivism, and a huge urban-rural gap. In contrast to previous experiments we find no cooperation-enhancing effect of punishment. An important reason is that there is substantial punishment of high contributors in all four subject pools. Thus, punishment can also undermine the scope for self-governance in the sense of high levels of voluntary cooperation that are sustained by sanctioning free riders only.

JEL: H41; C91; D23; C72

Keywords: social norms, free riding, misdirected punishment, experiments.

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<sup>+</sup> Revised version of CeDEx Discussion paper 2006-13. This paper is part of the MacArthur Foundation Network on Economic Environments and the Evolution of Individual Preferences and Social Norms. Support from the EU-TMR Research Network ENDEAR (FMRX-CT98-0238) is gratefully acknowledged. We are also very grateful for the invaluable research assistance provided by Valerie Kovalenko, Sergiy Zorya, and Lena Gerasimenko. We also would like to thank the University of Agricultural Sciences, Samara (Ust-Kinel), the Kursk Academy of Agricultural Sciences, in particular Prof. Dr. Mucha and Prof. Dr. Schulga for supporting us with necessary infrastructures and for helping us organizing the experiments, the Kursk State University for the possibility to use their classrooms and Hans Kolb-Wellpappe Ltd., Memmingen, for the donation of cardboards used in the experiments. We are grateful for comments from Iris Bohnet, Sam Bowles, Steve Burks, Jeffrey Carpenter, Armin Falk, Urs Fischbacher, Ernst Fehr, Fiona Greig, Glenn Harrison, Karla Hoff, Charles Noussair, Arno Riedl, Martin Sefton, Tomomi Tanaka, Stephan von Cramon-Taubadel, and Richard Zeckhauser, as well as seminar, workshop and conference participants in Berlin, Erfurt, Harvard, London, Middlebury, Sapporo, Sheffield, Siena, Trento and Utrecht. Benedikt Herrmann is grateful for the support by the Department of Agricultural Economics at the University of Göttingen and for the hospitality of the Kennedy School of Government at Harvard University.

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## 1. Introduction

Since the seminal papers by Yamagishi (1986) and Ostrom, et al. (1992) there is substantial experimental evidence that many people are willing to punish free riders at own costs. Punishment can mitigate the free rider problem and induce high cooperation levels.<sup>1</sup> Thus, a conclusion from these experiments is that pro-social motivations coupled with costly informal sanctions of free riders make “self-governance” in the sense of high levels of voluntary cooperation possible (Ostrom, et al. (1992); Ostrom (2000)).

In this paper we report evidence that informal punishment can have detrimental consequences that severely limit successful self-governance. We derive this conclusion from public goods experiments with and without punishment that we conducted using four different subject pools in Russia. The participants were 566 urban and rural residents from all walks of life and two distinct age cohorts – young people with an average age of 20, and mature people aged 30 to 76, with an average age of 44. We observed substantial punishment not only of free riders, but also of people who contributed the same or more than the punishing subject.

The presence of punishment influenced voluntary contributions. Among the urban mature participants cooperation in the presence of a punishment option was even lower than in its absence. In the other three subject pools contributions were the same in the presence as in the absence of punishment. In experiments where participants played a public goods game with punishment after playing one without punishment, we observed that contributions decayed in all four subject pools – despite the presence of a punishment option.

We conclude from these results that punishment is not necessarily beneficial for cooperation but can also limit successful self-governance. Punishment of cooperators has been largely neglected in previous research on social preferences because it was negligible compared to the punishment of free riders.<sup>2</sup> Our results show that this neglect is not warranted because punishment of cooperators can be very significant in some subject pools. Moreover, our finding also has theoretical relevance, since in some widely applied social preference models preferences that would give rise to the punishment of cooperators are excluded by assumption (see, e.g., Fehr and Schmidt (1999) and the discussion of this fact in Falk, et al. (2005)).<sup>3</sup>

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<sup>1</sup> By now a host of publications analyze under what conditions punishment can increase and stabilize cooperation. See for instance Fehr and Gächter (2000), Fehr and Gächter (2002); Masclet, et al. (2003); Egas and Riedl (2006); Noussair and Tucker (2005); Page, et al. (2005); Bochet, et al. (2006); Bowles, et al. (2006); Gürerk, et al. (2006); Sutter, et al. (2006); Botelho, et al. (2007); Carpenter (2007); Kroll, et al. (2007); Ones and Putterman (2007); Sefton, et al. (forthcoming); Nikiforakis and Normann (forthcoming).

<sup>2</sup> The studies by Falk, et al. (2005) and Cinyabuguma, et al. (2006) are exceptions. The latter authors refer to the punishment of cooperators as “perverse punishment”.

<sup>3</sup> Fehr and Schmidt (1999) assume that people dislike advantageous inequality (i.e.,  $\beta \geq 0$ ). However, given the parameters in our experiments, our observation that many people punish the cooperators implies that they *increase* rather than decrease the payoff differential. Such behavior is ruled out by assuming  $\beta \geq 0$ .

Our results on the importance of punishment of cooperators emerged from a research endeavor that investigates the extent to which societal background shapes pro-social behavior and its enforcement via altruistic punishment. This endeavor was inspired by theoretical arguments that social preferences are endogenous to the societal environment (Bowles (1998)) and can be studied by laboratory experiments (Camerer and Fehr (2004)). We conducted our experiments in urban and rural Russia and among young and old age cohorts because these subject pools differ starkly from one another on many sociological and economic dimensions. In particular, our 2×2 factorial subject pool design allows us to study systematically two social background characteristics that might be relevant with respect to norms of cooperation and punishment. The two factors we are interested in are age and whether one is living in an anonymous urban or a close-knit rural area.

Age is interesting as there is growing evidence that pro-social behavior is linked to age (e.g., List (2004); Holm and Nystedt (2005); Bellemare and Kröger (2007); Sutter (2007); Sutter and Kocher (2007)). Moreover, our two age cohorts also differ in the extent to which they experienced collectivism. Our mature participants were for a large part of their life exposed to a collectivist ideology and economy.<sup>4</sup> The experience of young urban and rural participants has been shaped less by communist ideology and more by the rocky transition to a market economy and the accompanying sociological changes. Among the changes are widespread perceptions of ubiquitous unfairness in the economic process and a lack of trust in the rule of law.<sup>5</sup>

The second dimension of our investigation is whether norms of cooperation are different between urban and rural people. There are two reasons why this might be so. First, due to several developmental lags inherited from the past the gap between urban and rural areas is huge in Russia (Fitzpatrick (1994); Spulber (2003)), and is particularly pronounced in the region of Kursk, where we conducted our experiments. In contrast, the urban-rural gap has largely vanished in western countries (e.g., Hofferth and Iceland (1998)). The rural areas were particularly strongly shaped by collectivism, because economic and social life was dominated by monopolist collective farms. Second, at a theoretical level, differences between groups can emerge easily due to an evolved psychology of “conformist transmission” (e.g., Henrich and Boyd (1998)). Moreover, norm enforcement is easier in close-knit parochial communities than in anonymous large groups with limited monitoring possibilities (see, e.g., Bowles and Gintis (2002) for theoretical arguments and Carpenter (2007) for experimental evidence).

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<sup>4</sup> In addition to being a collectivist economy (e.g., Spulber (2003); Gregory and Harrison (2005)), Russia was the longest-lived attempt to create a collectivist society where the individual, from the earliest childhood on, was supposed to pursue the interests of the group and to abandon the pursuit of self-interest (e.g., Clawson (1973)).

<sup>5</sup> See Shleifer and Treisman (2005) for a recent account on Russia’s development, Brainerd (1998) on the rise of inequality, Fedotkin (2003) and Kluegel and Mason (2004) on fairness perceptions, and Hoff and Stiglitz (2004) on the rule of law.

Rural residents might be used to different levels of social control and may therefore have internalized different norms of cooperation to those of their urban counterparts.

A further aspect of our four subject pools is that they share the same language, political system and the broader Russian background in general. Our factorial subject pool design allows us therefore to address the extent of differences between social groups that exist *within* a society – in our case between ‘young’ and ‘mature’ age cohorts and between urban and rural subject pools. While there are several studies by now that compare students and non-students or look at behavior of villagers (e.g., Barr (2001)), there is, to our knowledge, no study that investigates differences in social preferences between young and mature cohorts and urban and rural residents in a factorial design.<sup>6</sup>

Our most important results – in addition to the surprisingly high rate of punishment of cooperators and its detrimental effect on cooperation – are as follows. We find that rural residents and mature participants are more cooperative than urban residents and young people, respectively. While overall punishment behavior is not affected by socio-demographic variables, we find that highly educated people and people who are a member of at least one voluntary civic organization are more likely to punish cooperators.

## **2. Experimental design and procedures**

### *2.1. Subject pools and locations of experiments*

We devised a 2×2 factorial subject pool design, where we vary whether a subject is (i) at least 30 years, or younger than 30 years and (ii) a rural or an urban resident. We document all details about our four subject pools in Appendix A. Here we summarize the most important facts about our subject pools and the locations of our experiments.

We conducted our experiments with the urban participants in the city of Kursk and the neighboring city of Zheleznogorsk. Kursk has roughly 430’000 inhabitants and is located in the heartland of the former Soviet Union, the so-called ‘Central Black Earth Zone’ 400 miles south of Moscow. The 185 urban ‘mature’ participants (56 percent females) were between 30 and 68 years old, the average was 44.6 years and 25 percent were older than 50 years. Most of the urban mature participants had spent most of their lives in larger cities (see Appendix A for details). Sixty percent held white-collar jobs and 40 percent were blue-collar workers. Fifty percent held a university degree. The urban mature participants were strangers to one another. A participant only knew 3.4 percent of the other participants on average.

We conducted the experiments with the rural residents in small villages in the area of

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<sup>6</sup> See, for instance, Fehr and List (2004); Carpenter, et al. (2005); Carpenter and Seki (2005); Egas and Riedl (2006) and Bellemare and Kröger (2007) for recent studies that compared students to non-students within a given society. List (2004) studies age effects in voluntary contributions. Sutter and Kocher (2007) observe trust and trustworthiness across six different age cohorts.

Kursk. Although the city of Kursk is only 40 to 50 miles away rural life in these villages is very insular for a lack of good roads, cars, and modern communication technologies. The 92 rural mature participants (50 percent females) were between 30 and 70 years old; the average age was 43.1 years and 17 percent were older than 50 years. Thus, the urban and rural mature participants were similar with respect to age and gender composition. Fifty-eight percent were blue-collar workers and 42 percent had a white-collar job. Slightly less than a third of the rural mature participants had a university degree. While the urban participants were strangers to one another, the rural participants knew each other well. The average participant knew 43 percent of the other participants. The differences in the number of people’s acquaintances in the different subject pools fits well with the dense personal networks in rural areas and the anonymity of urban living conditions. Most of the rural residents had actually spent most of their lives in the countryside.

The 140 urban young participants were mostly undergraduates from various universities and polytechnic institutes in the city of Kursk; twelve percent were non-students who mostly held blue-collar jobs. We recruited the majority of the 149 rural young participants in Ust-Kinel because we could only find 42 young rural volunteers in the area of Kursk.<sup>7</sup> In both young subject pools the average age was roughly 20 years; 95 percent were younger than 22 years. Among the urban (rural) young participants 21 (34) percent were females. On average, an urban (rural) young participant knew 9 (25) percent of the other participants.

## 2.2. *The decision situations*

In all subject pools the decision situation was a one-shot public good experiment with and without punishment opportunities. Participants were divided into groups of  $n = 3$  participants and endowed with 20 tokens. Participants decided simultaneously how many of these tokens to contribute to a public good, called “project”. All participants received a marginal per capita return of 0.5 from any contribution to the public good, which was just the sum of all individual contributions  $c_i$  to the project. We chose a marginal per capita return of 0.5 to make the calculations for the participants easy. The monetary payoff  $\pi_i^1$  in the one-stage public goods game without punishment for each subject  $i$  in the group was therefore given by

$$\pi_i^1 = 20 - c_i + 0.5 \sum_{j=1}^3 c_j .$$

This payoff function is widely used in public goods experiments. It offers the participants a monetary incentive to free ride completely (i.e., to choose  $c_i = 0$ ), since the

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<sup>7</sup> Ust-Kinel is a small village with roughly 5000 inhabitants, 700 miles east of Moscow. The participants all come from similar rural areas and share a similar socioeconomic background as our rural young participants of the Kursk region.

marginal per capita return of a contribution to the public good is less than 1. The social marginal return is 1.5, which implies that the social payoff is maximized if everyone contributes his or her whole endowment to the public good.

A second decision stage was added under punishment conditions. Participants were informed about the contribution of the other two members of their group after the simultaneous investment decision of the first stage. Participants then had the possibility to simultaneously punish their group members by assigning so-called “deduction points”. The allocation of a deduction point  $p_{ij}$  by player  $i$  to player  $j$  reduced the first-stage payoff of player  $i$  by one token and that of player  $j$  by 3 tokens. If player  $i$  received  $p_{ji}$  deduction points from the other group members and assigned  $p_{ij}$  deduction points to member  $j$ , the final pecuniary payoff of subject  $i$ ,  $\pi_i$ , was

$$\pi_i = \pi_i^1 - (3 \sum_{j=1}^3 p_{ji} + \sum_{j=1}^3 p_{ij})$$

(see also Fehr and Gächter (2002), who used exactly the same punishment function).<sup>8</sup> All participants played two one-shot games: one game without punishment (called N-experiment) and another game with the punishment option (called P-experiment). Participants interacted with the same group members in both games. We ran two sequences. In the N-P sequence participants first played the N-experiment and then the P-experiment. In the P-N sequence the order of experiments was reversed to control for sequence effects. Participants learned about the second experiment only after they had finished the first experiment to avoid anticipation effects. Group composition stayed the same and participants were aware of this.

### 2.3. Discussion of the design

Our design has three main purposes. First, we want to measure the participants’ initial cooperative attitudes in a situation that is not confounded with strategic considerations coming from repeated play. Therefore, we deliberately had the participants play each treatment only once. Take the N-experiment of the N-P sequence. Since the game is one-shot, each player has a dominant strategy to free ride if he or she only cares about own payoff. Thus, under conditions of anonymity, this game measures the *extent of initial non-strategic cooperativeness* that is present among our subject pools. In the P-experiment of the P-N sequence we measure two things, (i) the participants’ degree of cooperation in the presence of a punishment option and (ii) the participants’ punishment behavior. A selfish and rational subject will not punish, since punishment is costly and the game is one-shot. Yet, we know

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<sup>8</sup> The choice of punishment function is important for the impact on cooperation one can expect. The existing evidence (from sequences of one-shot games) shows that for our chosen parameters contributions increase significantly relative to a no-punishment benchmark (see e.g., Fehr and Gächter (2002) and in particular Egas and Riedl (2006) and Nikiforakis and Normann (forthcoming) who provide comparative-static evidence of the impact of punishment effectiveness on cooperation).

from numerous experiments that many people are prepared to punish free riding (see footnote 1). Almost all previous experiments involved repeated play, however. Our one-shot experiment is therefore a particularly demanding environment for observing cooperation and punishment.<sup>9</sup>

Second, our design also allows measuring the effect of changed incentives. In the N-P sequence, for instance, we can measure how participants change their contribution from the observed level in the N-experiment, if we add the punishment option. In the P-N sequence we measure the effect of taking away the punishment option.

#### *2.4. Procedures*

We recruited the urban residents and villagers through announcements in factories, public places and in addition by approaching people on the streets and in public transport. Word-of-mouth also played a significant role and worked very well, in the sense that people from all walks of life participated in the experiments, in particular in Kursk. We recruited most of the young participants by announcements in universities. In the city of Kursk we conducted the experiments in lecture halls of the Academy of Agricultural Sciences. In Zheleznogorsk and the rural areas we ran the experiments in lecture halls of local schools. On average 33.5 people participated in a session.

Moving beyond university student subject pools creates some challenges for the experimenter (see also Henrich, et al. (2004); Ortmann (2005)). The experimenter demand effect is an important issue which we tried to minimize by several measures. First, we conducted all experiments according to a detailed script that contained (i) the exact rules how to conduct the experiment and (ii) a summary of the rules, payoffs, and procedures which we read to the participants. Second, the team of assistants who helped conducting the experiments was always the same in all experiments. They were all locals. We trained them well before the experiment. Third, one person, a Russian native and academic teacher at a university in Kursk, conducted all experiments to minimize the experimenter demand effect that may come from the German nationality of the principal investigator, Benedikt Herrmann. Fourth, all assistants and the lead experimenter received extensive training about the experimental procedures, and were supervised during the experiment by Benedikt Herrmann who speaks Russian fluently.

A further important challenge of any one-shot experiment is that participants understand the game. We took several steps to ensure this. First, we wrote the instructions in German and

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<sup>9</sup> In the Fehr and Gächter (2000) and Fehr and Gächter (2002) experiments participants played the games with and without punishment repeatedly either with random matching or stable groups in each period (in Fehr and Gächter (2000)) or with a ‘perfect stranger’ matching (in Fehr and Gächter (2002)) that ensured that the same group members only interacted once. See also the one-shot experiments without punishment of List (2004) and the one-shot experiments with and without punishment of Walker and Halloran (2004).

then had them translated into Russian and back into German (by another translator) to control for language-induced differences in meaning. Second, we used a neutral framing to control for possible framing effects that might also be different between our urban and rural subject pools. The instructions were very detailed and explained the calculation of rules and payoffs step by step. We also added several completed numerical examples to show how payoffs are calculated. Third, participants could read the instructions at their own pace. Participants could also ask questions at any time (in private). Fourth, participants had to answer a set of control questions that tested their understanding of payoff calculations. The huge majority of participants had no difficulty at all in understanding the rules of the experiment.<sup>10</sup> Fifth, the lead experimenter summarized the rules of the game and the payoff calculation (by reading a prepared script). Sixth, before the experiment actually started, there was a further possibility to ask questions. We document a sample copy of the instructions in Appendix B.

The experiments were hand-run. Cardboard partitions separated the participants to maximize the between-subject anonymity of decisions. We also took several steps to maximize subject-experimenter anonymity (see Hoffman, et al. (1996); Bohnet and Frey (1999)). First, given the country's past, we never asked for the names of our participants and made clear throughout that the sole purpose of this experiment is scientific. Second, participants had to submit their decision sheets in closed envelopes and received the results of the contribution decisions of their group in closed envelopes. Thus, the experimenter could not observe an individual's decision. Moreover, all the calculation of results and the preparation of information sheets were done in a separate room, by assistants other than those who collected the decision sheets. Finally, the participants received their payoffs anonymously and in sealed envelopes. The participants were fully aware of all these 'almost double-blind' procedures.

We administered an anonymous questionnaire at the end of the experiments. We asked for (i) socio-demographic information (described in Appendix A) and (ii) trust attitudes which we discuss in a separate paper (Gächter, et al. (2004)).

We aimed at paying participants on average roughly the equivalent of two days income, net of show-up fees. Since an experiment lasted on average two hours, the hourly wage was rather high and our participants were fairly excited about the level of stakes. On average our participants (who were paid in Rubles) earned the equivalent of \$8.3 including a show-up fee of \$3.

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<sup>10</sup> Our research assistants helped those who had problems, according to strictly determined rules how to answer questions. Some participants were nevertheless unable to answer all questions correctly. For the data analysis we discard all observations from these participants. In total, we had to discard the data from 40 participants. This leaves us with data from 566 participants (185 urban mature; 92 rural mature; 140 urban young; 149 rural young).

### 3. Cooperation and punishment

#### 3.1. Cooperation in the presence and absence of punishment opportunities

**Result 1:** *Urban young participants were the least cooperative group. The presence of a punishment opportunity did not enhance cooperation. Among urban mature participants, cooperation in the P-experiment was even weakly significantly lower than in the N-experiment.*

Figure 1 contains the main support for Result 1. It depicts, separately for the subject pools, the histograms of contributions in the N- and P-experiments, respectively, when these experiments were played as first experiments (i.e., we look at contributions in the N-experiments of the N-P sequence and the P-experiments of the P-N sequence).

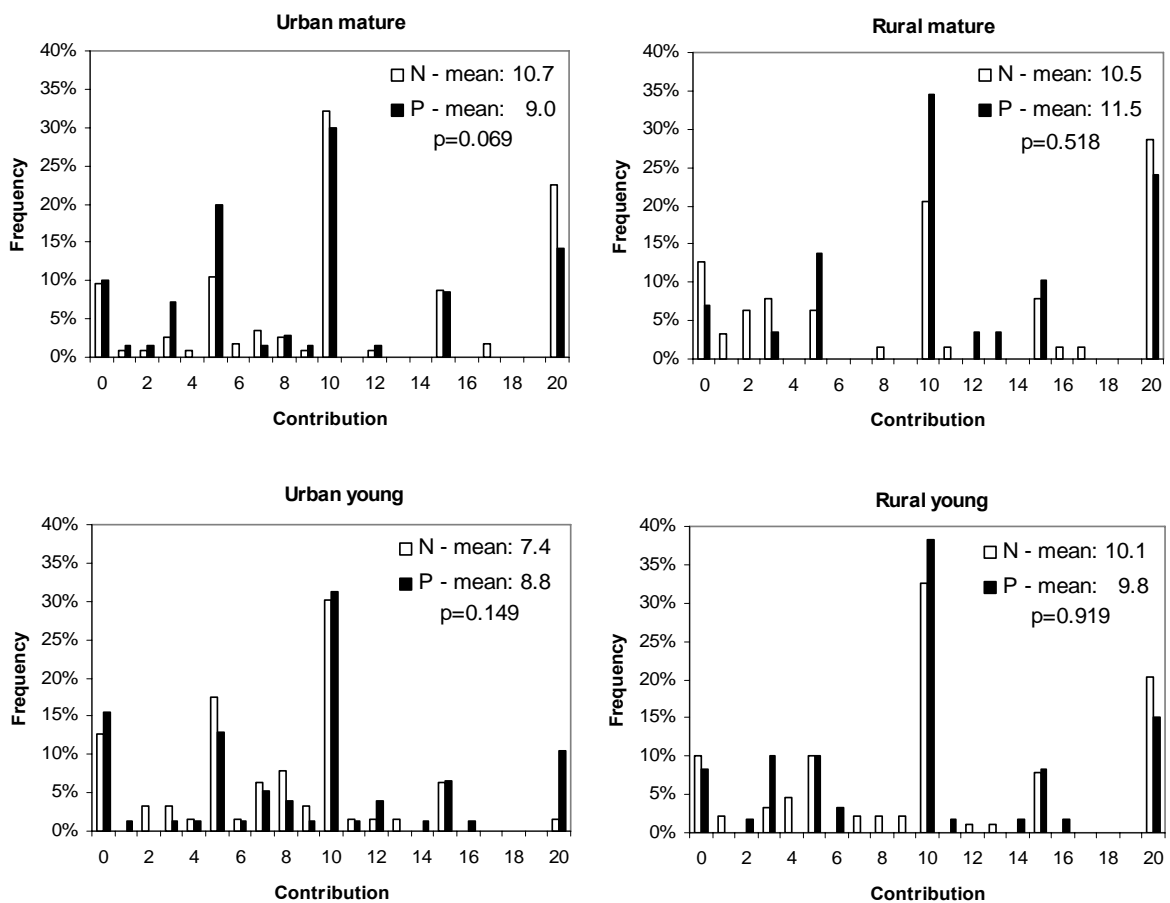


FIGURE 1: CONTRIBUTIONS IN THE FIRST EXPERIMENT IN THE NO-PUNISHMENT (N) AND THE PUNISHMENT EXPERIMENT (P)

Figure 1 conveys three observations. First, contributions differed between subject pools. The urban and rural mature participants contributed on average 10.7 and 10.5 tokens (i.e.,

53.7 and 52.5 percent, respectively, of their endowment). The rural young participants contributed 50.6 percent and the urban young participants contributed 37.1 percent of their endowment. A non-parametric Kruskal-Wallis test reveals that these differences are significant between subject pools ( $p=0.010$ ). The significant differences are due to the urban young participants. Thus, the cooperation rate by the urban young participants provides a lower bound for the cooperativeness in our subject pools. The contribution rates of the other subject pools are not significantly different from one another ( $p=0.806$ , Kruskal-Wallis test).

Second, we find no significant differences in cooperation rates between subject pools in the presence of a punishment option ( $p=0.171$ , Kruskal-Wallis test). The third finding is that in all subject pools the presence of a punishment option in the P-experiment did not shift contribution rates to a statistically significantly higher level than in the N-experiment. Among the urban mature and the rural young participants contribution rates were on average even *lower* in the presence than in the absence of a sanctioning mechanism; this effect is weakly significant for the urban mature participants.

Figure 1 reveals some interesting similarities and differences between subject pools. In the N-experiments the fraction of zero contributions was remarkably similar across subject pools. The most frequent contribution was 10 tokens, except for the rural mature participants where the modal contribution was 20 tokens. By contrast, among the urban young participants virtually nobody contributed 20 tokens. In the P-experiments the modal contribution was 10 tokens in all subject pools. The frequency of full contributions was lower in all subject pools in the P-experiment than in the N-experiments; with the exception of urban young participants. A particularly noteworthy observation is that among urban mature participants the frequency of low contributions was *higher* and the frequency of high contribution was *lower* in the presence of a punishment option than in its absence.

### 3.2. Reactions to changed incentives

Our design allows us investigating how a change in incentives influenced cooperation. We added punishment in the second experiment in the N-P sequence and we removed the punishment opportunity in the second experiment in the P-N sequence. From previous experiments (e.g., Fehr and Gächter (2002)) we predict that contributions in the N-P sequence increase in the P-experiment relative to the N-experiment and fall in the P-N sequence. Result 2 records the evidence.

**Result 2:** *In the N-P sequence contributions decayed significantly in the second experiment despite the presence of a punishment option. This result, which holds in all subject pools except in the rural mature subject pool, is in contrast to existing evidence. The*

reason for the decay was that in all subject pools the high contributors in the N-experiment reduced their contributions substantially whereas the low contributors in the N-experiment did not increase their contributions in the P-experiment.

Figures 2 and 3 provide support for Result 2. We start with Figure 2. The presence of a punishment opportunity is symbolized with a black diamond and the absence with a white circle. We also show the 95-percent confidence intervals of the mean contributions.

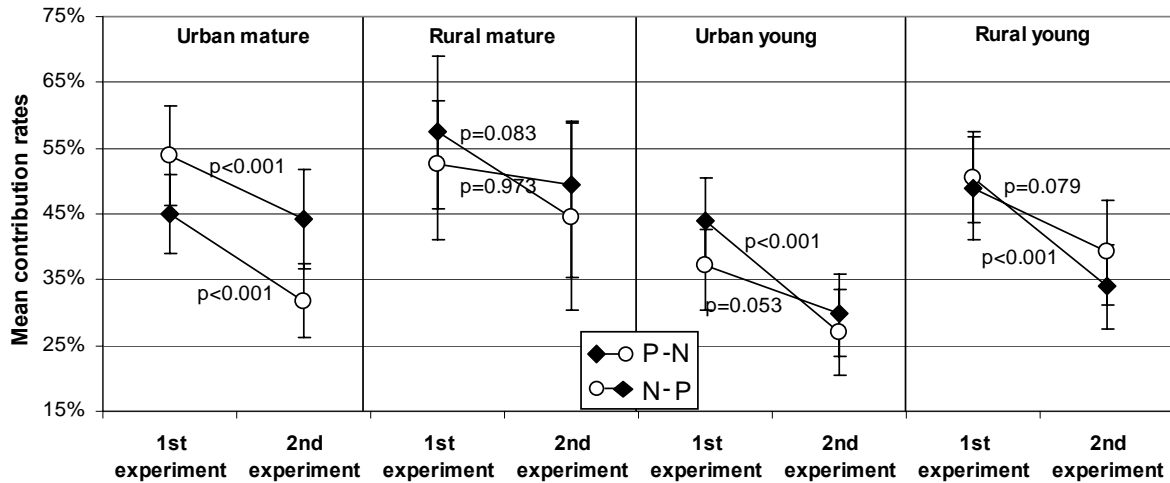


FIGURE 2: THE EFFECT OF CHANGING INCENTIVES IN THE N-P AND THE P-N EXPERIMENTS

Look at the P-N sequence first, where we took the punishment opportunity away in the second experiment. Contribution rates declined in the P-N sequence in line with our prediction and the literature. Among the urban participants this decline is significant at the 0.1-percent level (two-sided Wilcoxon signed-ranks tests), whereas among the rural participants the decline is only weakly significant.

Contribution rates did not increase when punishment was added (i.e., in the N-P-sequence), which is contrary to our prediction and reported evidence.<sup>11</sup> Contribution rates even decayed on average. The decay is highly significant in the urban mature and the rural young pools; weakly significant among the urban young participants and insignificant among the rural mature participants (two-sided Wilcoxon signed ranks tests with group averages as independent observations).

We look at individual contribution rates and how they changed from the N- to the P-experiment in the N-P sequence to understand this unexpected result. Specifically, we take the N-experiments as the benchmark and define a contribution rate in the N-experiment as

<sup>11</sup> See the references in footnote 1. Cooperation is higher in the presence than the absence of punishment in all these experiments.

‘below (above) median’ if it is less (at least) the median contribution in a given subject pool (the median contribution rate is 50 percent in all subject pools, except urban young, where it is 40 percent).

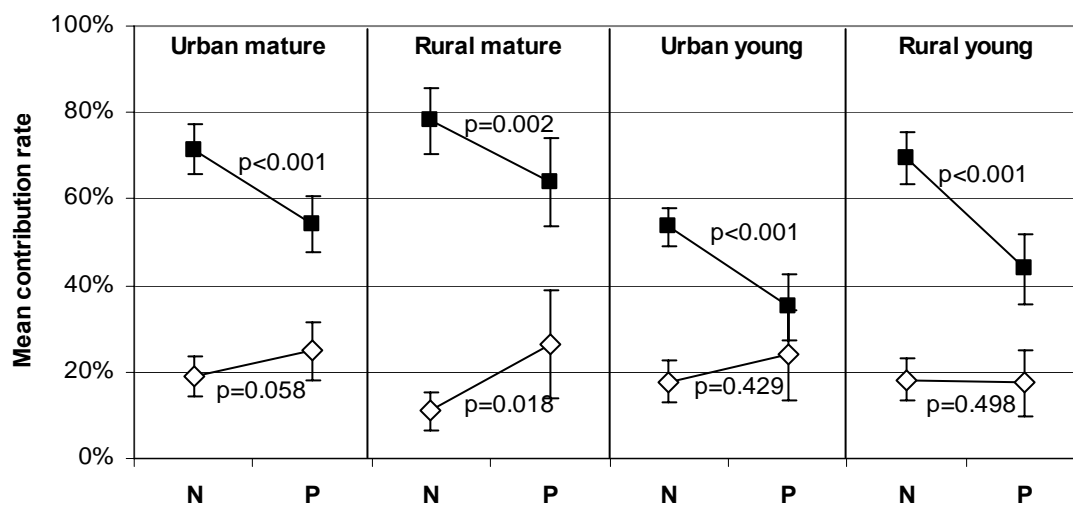


FIGURE 3: WITHIN-SUBJECT CHANGE IN CONTRIBUTION RATES FROM THE N- TO THE P-EXPERIMENT FOR “BELOW-MEDIAN” CONTRIBUTORS IN THE N-EXPERIMENT (WHITE DIAMONDS) AND “AT LEAST MEDIAN” CONTRIBUTORS IN THE N-EXPERIMENT (BLACK RECTANGLES).

Figure 3 depicts how contribution rates for these two subgroups changed from the N- to the P-experiment. We find that the drop in contribution rates that we observe in all four subject pools in the N-P sequence was predominantly due to the ‘at least median’ contributors. They lowered their contribution rates in the P-experiment on average by 19.3 percent relative to the N-experiment. This change in behavior was remarkably similar in all subject pools. The ‘below median’ contributors in the N-experiment only changed their contributions from the N- to the P-experiment (weakly) significantly in the mature subject pools. Apparently, the ‘below median’ contributors in the young subject pools were not impressed very much by the addition of a punishment opportunity.

### 3.3. Punishment behavior

We pool the data from the N-P and the P-N sequences since punishment patterns are very similar. We record the following result.

**Result 3:** *We find in all subject pools substantial punishment of free riders but also of cooperators. The expenditures on punishment of cooperators across subject pools ranged from 35 to 78 percent of the expenditures on punishment of free riders.*

Figure 4 and Table 2 provide the support for this result. Figure 4 shows the data from the perspective of a punishing subject. Figure 4 depicts for each subject pool the average punishment expenditures of a punishing subject as a function of the punished subject's deviation from the punisher's contribution at the first stage of the P-experiment. A punished subject's contribution in the first stage of the P-experiment can deviate from the punisher's contribution by  $-20$  to  $+20$  tokens. For expositional ease we divide this range into five intervals. For instance, if the difference is  $-15$ , this means that the punished subject contributed 15 tokens less than the punishing subject and we categorize the corresponding punishment act into the deviation interval  $[-20,-11]$ . If the difference is positive, the punished subject contributed more than the punisher. If the difference is zero, the punisher and the punished subject contributed exactly the same amount to the public good at the first stage. The figure also shows the 95-percent confidence bounds. We also indicate the degree of 'misdirected punishment'  $\mu$ .  $\mu$  denotes the ratio of mean expenditures on the punishment of non-negative deviations to the mean expenditures on punishment of negative deviations.

Figure 4 reveals a pattern of punishment that is quite different to that observed elsewhere, with the exception of the urban young participants. For instance, the mean pattern of punishment of urban mature participants is u-shaped. Strikingly, the urban mature participants also punished those who contributed the *same* (zero deviation) with more than one punishment point. Even more surprising is the observation that the urban mature participants also punished those who contributed *more* than they did. For instance, on average punishers expended almost two money units to punish those who contributed between 11 and 20 tokens more to the public good than they did. The urban mature participants also punished negative deviations, which is in line with the existing evidence. The more the punished subject's contribution fell *below* the punisher's contribution, the more strongly the deviator got punished. For rural mature participants the pattern was similar, although less pronounced.

We find that among the young participants the rural ones punished across the board. The punishment of urban young participants (which consists mostly of students) came closest to the punishment observed in western student subject pools (see the references in footnote 1). Yet, we find substantial punishment of contributors who contributed more than the punishing subject even among the urban young participants. For instance, the lowest average punishment of high contributors was 0.59 punishment points among the Kursk young participants whereas it was only 0.34 points among the Zurich students who participated in the one-shot experiments of Fehr and Gächter (2002)). Across subject pools the ratio of misdirected punishment,  $\mu$ , varied between 35 percent among urban young participants and

78 percent among urban mature participants.<sup>12</sup> In other words, although less important than punishment of free riders, misdirected punishment was very substantial in our subject pools.

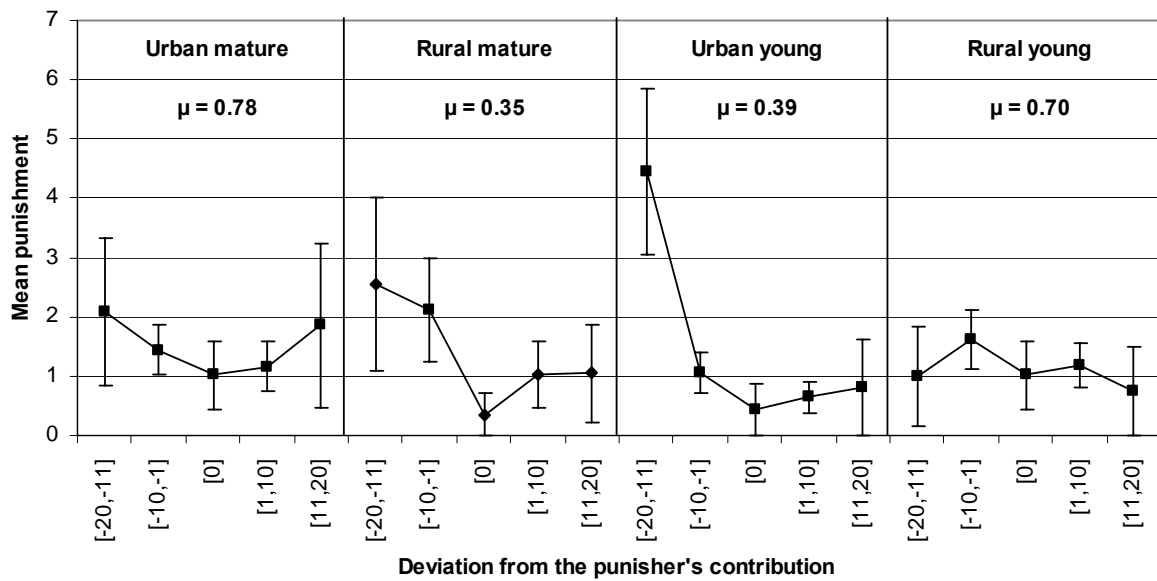


FIGURE 4: PUNISHMENT OF GROUP MEMBERS AS A FUNCTION OF THEIR DEVIATION FROM THE PUNISHER'S CONTRIBUTION.  $\mu$  DENOTES THE RATIO OF MISDIRECTED PUNISHMENT.

An econometric analysis of punishment behavior corroborates the findings of Figure 4. We take a separate look at the four subject pools. Since punishment for negative and positive deviations is different we introduce the interaction variables 'Absolute negative deviation' and 'Positive deviation'. The variable 'Absolute negative deviation' is the absolute value of the actual deviation of the punished subject's contribution from the contribution of the punishing subject in case the punished subject contributed strictly less than the punishing subject, and zero otherwise. We define the variable 'Positive deviation' analogously. We also include the total group contribution (split up in own contribution and the sum of the other group members' contribution) to account for a possible impact of the absolute cooperation level on punishment. The variable 'Second experiment' is a dummy for the P-experiment of the N-P sequence. The estimation method is Tobit, since punishment is censored between 0 and 10 (ordered Probit estimations yield the same qualitative results). We calculate robust standard errors and cluster on the independent groups. Table 1 records the results.

Punishment was significantly correlated to free riding in all subject pools; the rural young participants were the exception. The more a subject's contribution deviated from the

<sup>12</sup> Recall that  $\mu = (\text{mean punishment of negative deviations})/(\text{mean punishment of non-negative deviations})$ . Then the detailed results are as follows:  $\mu_{\text{Urban mature}} = 1.192/1.537 = 0.78$ ;  $\mu_{\text{Rural mature}} = 0.787/2.263 = 0.35$ ;  $\mu_{\text{Urban young}} = 0.592/1.514 = 0.39$ ;  $\mu_{\text{Rural young}} = 1.079/1.533 = 0.70$ . See Section 4 for a discussion and some results from a comparable one-shot experiment conducted in Zurich which underscores that the observed  $\mu$ 's are exceptionally high.

contribution of the punishing subject, the more this subject got punished. The coefficient of ‘Absolute negative deviation’ is similar for urban and rural mature participants ( $\chi^2(1) = 0.19$ ,  $p=0.660$ ). The rural young participants punished free riders less harshly than all other subject pools ( $p<0.063$ , pair-wise  $\chi^2(1)$ -tests). The young urban participants punished free riders significantly more harshly than the young rural participants ( $\chi^2(1) = 15.50$ ;  $p=0.0001$ ); they also punished more harshly than the mature urban participants ( $\chi^2(1) = 4.69$ ;  $p=0.030$ ) and exhibited no significantly different punishment behavior of free riders than the rural mature participants ( $\chi^2(1) = 2.45$ ;  $p=0.118$ ). Punishment was not significantly related to positive deviations, again with the exception of rural young participants.

TABLE 1: AN ECONOMETRIC ANALYSIS OF PUNISHMENT BEHAVIOR

	Urban mature	Rural mature	Urban young	Rural young
Absolute negative deviation	0.360 (0.111)***	0.440 (0.182)**	0.648 (0.133)***	0.124 (0.127)
Positive deviation	-0.073 (0.116)	-0.091 (0.112)	-0.069 (0.071)	-0.264 (0.085)***
Own contribution	-0.211 (0.119)*	-0.158 (0.139)	-0.235 (0.116)**	-0.267 (0.098)***
Sum of contribution of other group members	0.120 (0.063)*	0.015 (0.106)	0.159 (0.062)***	0.021 (0.060)
Second experiment	-0.517 (1.259)	3.742 (1.828)**	0.118 (0.861)	-0.003 (0.992)
Constant	-4.095 (1.356)***	-6.504 (2.835)**	-3.987 (1.372)***	0.560 (1.556)
Observations	370	184	280	298
Wald chi(5)	19.48***	23.51***	19.90***	16.63***

Robust standard errors in parentheses \* significant at 5%; \*\* significant at 1%  
Note: Tobit estimates.

The presence of a punishment option in the P-experiments led to substantial losses in earnings relative to the earnings in the N-experiments. This holds true in all subject pools. For instance, the average earning of an urban mature participant in the N-experiment was 24.7 money units. In the P-experiment the earnings dropped to 13.7 money units, which implies a relative loss in earnings of 44.5 percent. The average relative loss in earnings of a rural mature participant was 44.6 percent; urban young participants lost 29.2 percent and for the rural young participants the relative loss amounted to 39.7 percent.

### 3.4. The impact of socio-demographic differences on cooperation and punishment

Our final step is to look at the relevance of the socio-economic variables for cooperation and punishment. We pool the data of all four subject pools and of all N- and P-experiments,

respectively, and set up a Tobit regression model that explains the contribution rates to the public good as a function of important socio-economic variables (for details see Appendix A). We include gender; a dummy for mature participants ('mature', which equals 1 if age  $\geq$  30; 0 otherwise); a dummy whether one is a rural or an urban resident ('rural'); dummies for our non-students, who were either blue collar or white collar workers; two dummies for the highest education achieved ('secondary school' and 'university degree'); a dummy whether one is a 'member in any organization'; a dummy whether one is 'religiously active' or not; the 'number of known other participants' as a proxy for social proximity of participants; a dummy 'city size > 2'000 inhabitants', which is 1 if the subject has spent most of his or her life in a city with more than 2'000 inhabitants, irrespective of a person's current situation as an urban or rural resident<sup>13</sup>; and finally a dummy ('second experiment') if the experiment was second in sequence. We have chosen these variables because their relevance has been suggested by previous literature<sup>14</sup> and/or because they follow directly from our research questions, like whether there is – ceteris paribus – a difference between urban and rural residents, or young and mature age cohorts. Result 4 collects our findings.

**Result 4.** *In both the N- and the P-experiment we find that – ceteris paribus – rural residents and mature participants contributed more to the public good than urban and young participants. Punishment is largely unrelated to socio-demographic factors.*

We document the support for this result in Tables 2 and 3. Our strategy is to estimate first a model where the two main explanatory variables relate to the variables which are our main interest – whether a subject is at least 30 years old (dummy variable 'mature') and whether a subject is a rural or an urban resident (dummy variable 'rural'). In a second step we control for other potentially important covariates. We document the estimation results on cooperation in the N- and P-experiments in Table 2. Table 3 will present the results on punishment.

We find in the *N-experiments* that both mature participants and rural participants contribute significantly more than their younger and urban counterparts, respectively.<sup>15</sup> When we control for covariates we find that none of the covariates is significant at conventional levels. The variable 'mature' is no longer significant, while 'rural' remains significant. We find it particularly noteworthy that the education variables are insignificant. This suggests that contributions are not due to confusion if we assume that better educated people are less easily

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<sup>13</sup> This variable is a proxy for the dominant experience of the social background of one's life (see Appendix A).

<sup>14</sup> Many studies have found gender effects in social preferences (see Croson and Gneezy (2004) for a survey). List (2004), Sutter (2007) and Sutter and Kocher (2007) find a relationship between age and social preferences. Putnam (2000) and Glaeser, et al. (2002) argue for the relevance of memberships in civic organizations. Sosis and Ruffle (2003) have evidence for the relevance of religious activity for cooperation.

<sup>15</sup> List (2004) also found a positive effect of age on contributions.

confused. We conclude that the observation that rural participants contribute significantly more than urban residents is a robust finding, whereas the age effect seems to be fragile.

TABLE 2: THE IMPACT OF SOCIO-DEMOGRAPHIC FACTORS ON COOPERATION

	Dependent variable			
	Cooperation rate in N		Cooperation rate in P	
	(1)	(2)	(1)	(2)
Mature (age $\geq 30$ )	0.083 (0.033)**	0.050 -0.054	0.122 (0.031)***	0.134 (0.052)**
Rural resident	0.099 (0.034)***	0.094 (0.043)**	0.064 (0.032)**	0.074 (0.043)*
Female		0.014 (0.036)		-0.020 (0.033)
White-collar worker		0.063 (0.077)		-0.024 (0.080)
Blue-collar worker		-0.018 (0.066)		-0.141 (0.069)**
Secondary school		0.045 (0.057)		0.100 (0.054)*
University degree		0.036 (0.058)		0.081 (0.052)
Member in any organization (dummy)		-0.015 (0.036)		-0.048 (0.033)
Religiously active		0.036 (0.040)		-0.017 (0.035)
Share of known other participants		-0.053 (0.080)		-0.048 (0.077)
City size > 2'000 inhabitants		-0.021 (0.017)		-0.011 (0.017)
Second experiment	-0.179 (0.034)***	-0.171 (0.035)***		-0.117 (0.031)***
Constant	0.385 (0.030)***	0.405 (0.074)***	0.379 (0.031)***	0.458 (0.068)***
Observations	566	521	566	521
Wald $\chi^2$	42.6***	57.0***	30.5***	53.3***

Tobit regressions with robust standard errors. Robust standard errors in parentheses;  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

We get slightly different results with respect to contribution rates in the *P-experiment*. First, we find again that mature participants and rural participants contributed significantly more than young and urban participants. Both effects remain (weakly) significant when we control for covariates. Among the covariates we find that blue-collar workers contributed significantly less than students (the benchmark) and people whose highest degree is from a secondary school contributed significantly more than students. All other variables are insignificant at conventional levels.

We turn next to punishment behavior and record the estimation results in Table 3. In our first models we do not distinguish whether the punished subject had deviated positively or

negatively from the punisher's contribution. We also control for the same variables as in Table 1.

TABLE 3: THE IMPACT OF SOCIO-DEMOGRAPHIC FACTORS ON PUNISHMENT

	Dependent variable					
	All punishment		Punishment of negative deviations		Punishment of non-negative deviations	
	(1)	(2)	(3)	(4)	(5)	(6)
Mature (age $\geq$ 30)	0.087 (0.581)	0.306 (0.975)	0.214 (0.761)	2.279 (1.420)	-0.089 (0.777)	-0.587 (1.265)
Rural resident	0.243 (0.592)	0.772 (0.789)	0.262 (0.792)	0.787 (1.024)	0.280 (0.744)	1.053 (0.994)
Absolute negative deviation	-0.418 (0.067)***	-0.410 (0.067)***	-0.494 (0.113)***	-0.455 (0.108)***		
Non-negative deviation	-0.134 (0.050)***	-0.139 (0.052)***			-0.009 (0.062)	-0.023 (0.063)
Own contribution	-0.254 (0.059)***	-0.257 (0.060)***	-0.443 (0.109)***	-0.436 (0.108)***	-0.102 (0.086)	-0.106 (0.088)
Sum of others' contribution	0.089 (0.034)***	0.084 (0.033)**	0.142 (0.058)**	0.115 (0.056)**	0.039 (0.050)	0.048 (0.049)
Second experiment	0.400 (0.613)	0.330 (0.619)	-0.295 (0.758)	-0.254 (0.722)	1.063 (0.798)	0.864 (0.827)
Female		-0.446 (0.592)		-0.320 (0.707)		-0.725 (0.871)
White-collar worker		-1.576 (1.422)		-2.509 (1.950)		-1.362 (2.044)
Blue-collar worker		0.285 (1.055)		-2.065 (1.694)		1.564 (1.383)
Secondary school		0.681 (0.981)		-0.444 (1.186)		1.294 (1.459)
University degree		1.506 (1.086)		0.155 (1.237)		2.535 (1.506)*
Member in any organization (dummy)		0.776 (0.587)		0.301 (0.735)		1.469 (0.823)*
Religiously active		0.243 (0.626)		-0.354 (0.928)		0.878 (0.795)
Share of known other participants		-0.556 (1.289)		-0.057 (1.943)		-1.278 (1.614)
City size > 2'000 inhabitants		0.303 (0.263)		0.328 (0.336)		0.230 (0.387)
Constant	-3.164 (0.891)***	-4.188 (1.432)***	-1.505 (1.106)	-1.195 (1.770)	-4.321 (1.143)***	6.551 (2.002)***
Observations	1132	1042	469	433	663	609
Wald $\chi^2$	66.9***	70.7***	22.1***	27.5**	4.9	22.5*

Tobit regressions with robust standard errors. Robust standard errors in parentheses;  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

We find that no socio-demographic variable, including the two variables of main interest, are significantly related to punishment. In models (3) and (4) we only look at punishment of negative deviations, i.e., situations where the punished subject had contributed *less* than the punishing subject. Again we detect no influence of socio-demographic variables on punishment of free riders. Finally, when we confine our attention to punishment of non-negative deviations (models (5) and (6)), there is no difference between mature and young participants, and urban and rural participants. This also holds if we control for covariates. Here we get three noteworthy results. People who were a member in any voluntary organization punished non-negative deviations from their own contribution weakly significantly more than people with no memberships. People with a university degree punished weakly significantly more than students and white-collar workers weakly significantly less than students. Thus, higher degrees of education did not lower misdirected punishment, which suggests that punishment of non-negative deviations was not due to confusion.

#### **4. Discussion – putting the results into perspective**

The results surprised as a lot. The first surprise is that in all subject pools punishment was almost completely ineffective in raising contributions. The second surprise is that there was a lot of punishment across the board. Based on evidence from previous experiments on punishment we expected some punishment in case of free riding but we did not anticipate such a high degree of punishment of people who contributed *the same or more* than the punishing subject. For instance, in the Fehr and Gächter (2002) experiments misdirected punishment amounted to  $\mu = 0.23$ , which is substantially lower than the  $\mu$ 's we observe in our Russian subject pools.

A plausible response to our findings is that they are maybe an artifact of one-shot games. For instance, since all previous experiments were played repeatedly (see footnote 1), it might be that the drop in cooperation we see is due to the one-shot nature of our game. However, we do not believe that this is the case. Two sets of results, one from one-shot games and one from repeated games, support our belief.

First, Gächter and Herrmann (in preparation) conducted three-player one-shot experiments (no repetitions) with the same parameters like the ones used in this paper in an undergraduate subject pool in Zurich, Switzerland. Like in this paper, subjects ( $n=141$ ) played either the N-P sequence or the P-N sequence. Thus, the experiments are directly comparable. Figure 5 reports the results.

Panel A shows that in the first experiment contributions are significantly higher in the P-experiment, compared to the N-experiment (Mann-Whitney test, individual contributions as

independent observations,  $p=0.0035$ ). In other words, the Zurich subjects increased their contributions in the P-experiment, relative to the N-experiment without any experience of punishment. Apparently they anticipated punishment and reacted accordingly. By contrast, the Russian subjects were rather unimpressed by the presence of a punishment option, as the contributions in the P-experiment were not significantly higher than in the N-experiment (see Figure 1). Russian subjects were similarly unimpressed by adding a punishment option in the N-P sequence, as contributions dropped in all subject pools (Figure 2). By contrast, in the N-P sequence contributions in the Zurich subject pool *increased* significantly ( $p=0.0478$ , Mann-Whitney test, independent group averages as observations).

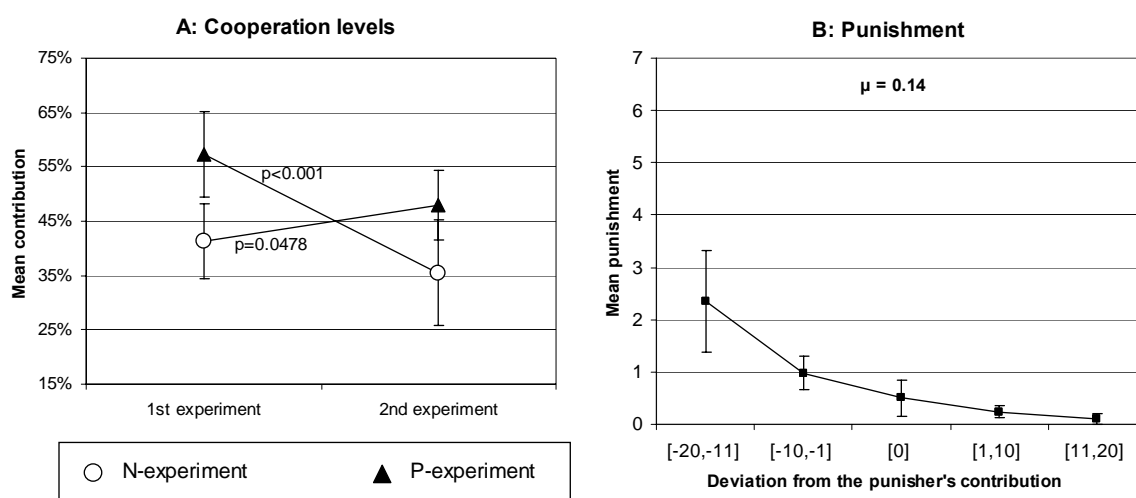


FIGURE 5: COOPERATION AND PUNISHMENT IN ONE-SHOT GAMES IN ZURICH (Data source: Gächter and Herrmann (in preparation), own calculations)

Panel B depicts the punishment pattern in the Zurich subject pool. Misdirected punishment is substantially smaller than in all subject pools reported in this paper. Even if one believes that some punishment in a one-shot game is due to errors, Figure 5B suggests that the extent of (misdirected) punishment which we observe in our Russian subject pools cannot be solely erroneous, as the extent of misdirected punishment is small in our Zurich subject pool.

Second, Herrmann, et al. (in preparation) report evidence from finitely repeated public goods games. Self-governance might be much easier in repeated games, which also provide an intrinsic incentive to limit misdirected punishment. Figure 6 shows data on cooperation (panel A) and punishment (panel B) of experiments in which the same group members ('partners') interacted for ten periods and were aware of it. Specifically, groups first played ten periods with no punishment and were then informed that they would play another ten

periods with punishment. Hermann et al. conducted these experiments with 80 undergraduates in Samara, a large Russian city.

Figure 6 shows the main results from these experiments. In the absence of punishment (periods 1-10) average contributions follow the usual declining pattern. When punishment is added (periods 11-20), the declining trend is stopped. Yet, on average, contributions only increase moderately (from an average of 10.6 to 12 tokens). The increase is statistically insignificant (two-sided Wilcoxon signed-ranks test,  $p=0.218$ ; group averages over all periods as independent observations).<sup>16</sup> Thus, our observation from the one-shot games that punishment does not have a cooperation-enhancing effect also holds for the repeated games. This finding stands in very stark contrast to Fehr and Gächter (2000). They report that in their comparable sequence contributions in the finitely repeated public good game with punishment reached almost the maximum contribution level. The increase from the N-experiment to the P-experiment was significant at any conventional level.

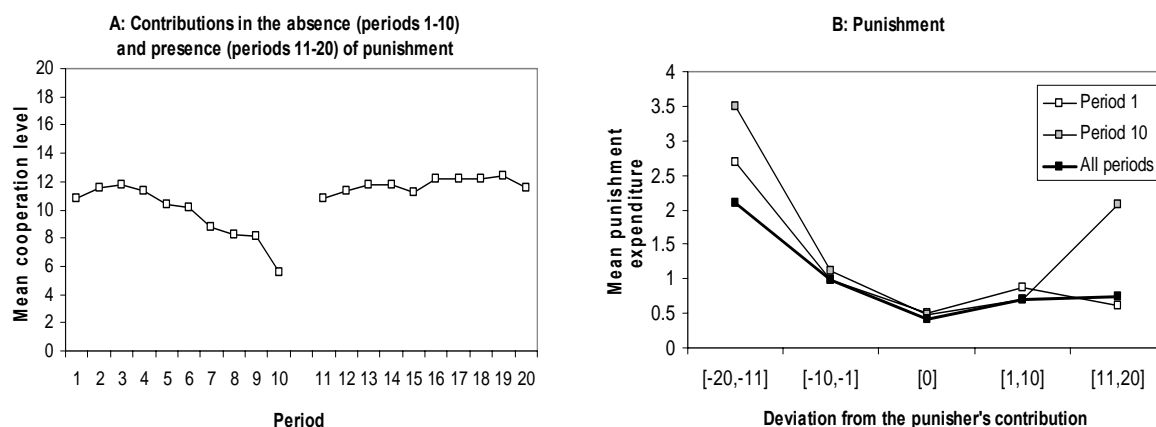


FIGURE 6: COOPERATION AND PUNISHMENT IN REPEATED GAMES  
(Data source: Herrmann, et al. (in preparation), own calculations).

Figure 6B looks at punishment as a function of the punished subject's deviation from the punisher's contribution. We distinguish between period 1 and period 10, to check for temporal stability. We also include the average punishment over all periods. We find that punishment is very similar at the beginning and at the end of the experiment. This holds in particular in the range of deviations from -10 to +10, which comprises 88 percent of all observations. Experience with the game does not diminish punishment. To the contrary punishment of large deviations – both negative and positive – is harshest in the final period. As a comparison with Figure 4 reveals, the punishment patterns in the repeated game are also remarkably similar to the pattern exhibited by the young Kursk subjects, who are most

<sup>16</sup> These conclusions also hold if we only compare periods 1 and 11. Subjects contributed 10.8 tokens in period 1 and 11.0 tokens in period 11 ( $p=0.8227$ ).

comparable to the Samara students with respect to their socio-demographic background. Even quantitatively results are very similar, in particular for positive deviations and deviations between [-10,-1].

In summary, based on these results from both one-shot and repeated games, we believe that our observations from one-shot games are a robust phenomenon and not an artifact of a lack of repetition. Thus, our conclusion that misdirected punishment might limit successful self-governance is supported. Future research should address the sources of such detrimental punishment.

## 5. Summary and concluding remarks

We conducted experiments with 566 adult participants in urban and rural Russia. We employed a 2×2-factorial subject pool design to investigate potential differences in cooperation and punishment behavior between (i) ‘mature’ and ‘young’ participants and between (ii) residents of urban and rural areas, which still differ sharply with respect to living conditions. Our mature participants were socialized during communism, whereas the young participants spent their adolescent years in the turbulent transition period after the breakdown of the Soviet Union. Thus, these subject pools differ starkly from the western undergraduate subject pools used in most experiments on voluntary cooperation. Our experiments therefore provide (i) a ‘robustness check’ of previous findings in sociologically different subject pools, and (ii) allow us to uncover the potential impact of socio-demographic factors on cooperation and punishment.

We observe in all subject pools substantial levels of voluntary cooperation and punishment of free riders. This finding supports previous conclusions about the importance of altruistic cooperation and punishment, and reciprocity in general (e.g., Fehr and Fischbacher (2003), Falk, et al. (2006)). We have the following main new results:

1. *The sociological background matters for voluntary cooperation. In particular, we found higher levels of voluntary cooperation among rural residents than among urban residents; the student–non-student distinction does not matter in our data.* This result highlights that probably the student–non-student distinction is less important than previously suggested (e.g., Carpenter, et al. (2005)) if we take the broader sociological environment, like the urban-rural distinction, into perspective.
2. *We found in all subject pools very high levels of punishment of people who contributed the same or even more than the punishing subject.* Although misdirected punishment has been observed in previous experiments on cooperation and

punishment, it was substantially lower than in the present experiment. This explains why hitherto misdirected punishment has been rather neglected.

3. *In no subject pool did punishment lead to a significant increase in cooperation. Instead, the presence of a punishment option resulted in substantial payoff losses.* Thus, misdirected punishment can undermine the positive impact of punishment for cooperation and thereby limit the success of ‘self-governance’. Our results show that it does not take ‘counter-punishment’ (i.e., multiple rounds of retaliatory punishment for having got punished) to limit successful self-governance (Cinyabuguma, et al. (2006); Denant-Boemont, et al. (2007); Nikiforakis (forthcoming)).

The main contribution of this paper is to demonstrate that punishment might not only be used to discipline free riders as previous evidence might have suggested. Future research should address the question how prevalent misdirected punishment is across different cultures, why people punish cooperators, and how this can be explained by theories of social preferences.

## Appendix A: Socio-economic background of our subject pools

In total, 606 people divided into 202 independent groups participated in our study. The experiments took place in the city of Kursk; in the neighboring city of Zheleznogorsk, in eight different villages of the Kursk region (Ivanovka, Kazanka, Kosorzha, Nizhniy Daymon, Sedmikhovka, Nikolaevka, and Matveevka, all around 40 miles north of Kursk), and in Ust-Kinel, 400 miles east of Moscow. Forty participants were not able to solve the control questions of the experiment, so we cannot be sure whether they understood the decision situation properly. We drop them from the data set, which leaves us with valid data from 566 urban and rural participants.

An anonymous post-experimental questionnaire provides us with the socio-demographic details of our subject pools. In addition to obvious socio-demographic variables (age, gender, education and profession), we asked them about the size of the city where they had spent most of their lives, to get a proxy for the formative background of our participants. This variable contains four categories: (1) city size is up to 2'000 inhabitants; (2) between 2'000-10'000 inhabitants; (3) between 10'000-100'000 inhabitants and (4) more than 100'000 inhabitants. This city size variable gives us some information about the background of the participants that is not captured by the place where we ran the experiments. Put differently, this variable gives us some validation for our assumption that the classification of participants as urban or rural is substantially correct. A further proxy for a rural vs. urban background is the actually observed social distance between our participants. To get information on this, we asked them, at the end of the experiment, how many other participants (out of roughly 30 in each session) they knew.

A further piece of background information relates to the social activities of our participants. We have two indicators. One measure is whether a subject is religiously active or not (*Religious activity*, a dummy variable). The second indicator of social activity, the *Membership* variable (a dummy variable), records whether the subject is a member of any civic voluntary associations (political, interest groups, sports, culture, nonprofits, others).

### A. Mature urban and rural participants (age $\geq 30$ )

Table A1 contains the results for the urban and rural mature participants. Urban and rural mature participants were about equally old (44.6 and 43.0 years, respectively). The share of females between the pools was very balanced and with 55.0 and 53.3 percent the same in both pools. There are no statistically significant differences between urban and rural subject pools with respect to age and gender composition.

The rural mature participants had indeed spent most of their lives in small places: The mean city size category for them is 1.46. By contrast, the urban mature participants reported an average city size category of 3.4, which means that most of them had spent most of their lives in a rather large city. A  $\chi^2$ -test confirms that our city size variable is significantly differently distributed between the two subject pools. Thus, our categorization of subject pools as urban and rural has substantive content. The urban mature participants knew on average only 3.4 percent of the other participants. By contrast, the villagers knew each other well. On average one participant knew 43.1 percent of the other participants. This difference, which is significant at any conventional level, reflects the different levels of social distance in the urban and rural areas, respectively.

The rural mature participants were significantly less religiously active than the urban mature participants. Both subject pools revealed similarly low levels of societal engagement. This low rate of membership is consistent with observations from other studies that Russians generally have a very low engagement in any civic voluntary association (e.g., Rose (2000)). For instance, based on interviews conducted in 1998, Rose (2000), reports that 80 to 90 percent of the Russians do not belong to any voluntary association. In our subject pools this was true for 71 percent.

Table A1 also contains information about the jobs our participants held. The urban and rural subject pools differed significantly with respect to professional composition. We distinguish between white-collar and blue-collar workers. Our definition of white-collars comprises all jobs that consist of non-manual work (civil servants, clerks, executives, entrepreneurs); blue-collar workers do manual work (workers, farmers, homemakers). Roughly 63 of the urban mature participants were white-collar workers; in the rural areas their fraction was 46 percent. A fair number of our participants were blue-collar workers. Workers from the villages were predominantly engaged in agricultural production (for example as tractor drivers). In the cities 43.5 percent of the participants were clerks, while in the villages we only had 27.1 percent clerks. In the rural context these participants were mainly teachers at the local schools or local hospital employees. Farmers occurred only among the villagers and accounted for 2.2 percent of the participants. 5.4 percent of the urban and 0 percent of the rural participants considered themselves as entrepreneurs. The share of executives and civil servants was low in both pools.

Finally, we turn to the educational background of our participants, which is also significantly different between subject pools. The urban participants were more highly educated on average than the rural participants.

Fewer urban than rural mature participants had only compulsory education. Among the urban mature participants almost half of our participants had a completed university degree. Among the rural mature participants this was true for a third of our participants.

TABLE A1: KEY FIGURES ABOUT THE MATURE SUBJECT POOLS (AGE  $\geq$  30)

	Urban mature (n=185)	Rural mature (n=92)	Statistical comparisons (p-value; test)
General background data			
<i>Mean age in years</i>	44.6 (8.6)	43.0 (9.7)	0.164 (t-test)
<i>Percent Female</i>	55.0	53.3	0.337 ( $\chi^2$ -test)
<i>Mean of city size category</i>	3.5 (0.8)	1.5 (0.8)	0.000 ( $\chi^2$ -test)
<i>Share of known participants (in percent)</i>	3.5 (6.4)	43.1 (37.8)	0.000 (t-test)
Indicators of social activity			
<i>Religiously active (in percent)</i>	83.2 (37.4)	56.5 (49.8)	0.000 ( $\chi^2$ -test)
<i>At least one membership (in percent)</i>	30.3 (46.1)	26.1 (44.2)	0.406 ( $\chi^2$ -test)
Professions of participants (in percent)			0.001 ( $\chi^2$ -test)
White collar	62.7	45.7	
<i>Clerks</i>	43.5	27.1	
<i>Executives</i>	9.8	9.8	
<i>Entrepreneurs</i>	5.4	0.0	
<i>Civil servants</i>	4.3	8.7	
Blue collar	37.3	58.1	
<i>Workers</i>	26.1	33.7	
<i>Farmers</i>	0.0	2.2	
<i>Homemakers</i>	10.9	18.5	
Education (highest level attained, in percent)			0.001 ( $\chi^2$ -test)
<i>Compulsory education</i>	22.3	27.2	
<i>Secondary school degree</i>	19.0	39.1	
<i>University degree</i>	50.0	32.6	
<i>No data</i>	8.7	1.1	

Note: Numbers in parentheses are standard deviations.

### B. Young urban and rural subject pools

The 289 young participants were on average 20 years old; the rural young participants were slightly older than their urban counterparts. Between 21 and 32 percent were females. The urban students mostly came from medium-sized and big cities, whereas the rural students were mostly from small and medium-sized cities. This difference is highly significant. The rural students had a significantly higher rate of acquaintance with other participants than the urban students (9.9 percent vs. 24.9 percent). Urban and rural students are about equally religiously active. Yet, when it comes to memberships in civic voluntary organizations, we find a strong difference between subject pools. Among the urban participants, 63 percent reported a membership in at least one civic voluntary organization, whereas only 46 percent the rural participants were members in any civic organization. The majority of our young participants were students, but significantly fewer among the rural participants. A2 we summarize key background figures of our young subject pools.

TABLE A2: KEY FIGURES ABOUT THE YOUNG SUBJECT POOLS (AGE &lt; 30)

	Urban young (n=140)	Rural young (n=149)	Statistical comparisons (p-value; test)
General background data			
<i>Mean age in years</i>	20.5 (2.2)	21.0 (2.5)	0.053 (t-test)
<i>Percent Female</i>	21.4	32.4	0.016 ( $\chi^2$ -test)
<i>Mean of city size category</i>	2.8 (1.1)	1.9 (1.0)	0.000 ( $\chi^2$ -test)
<i>Share of known participants (in percent)</i>	9.9 (9.8)	24.9 (24.2)	0.000 (t-test)
Indicators of social activity			
<i>Religiously active (in percent)</i>	84.3 (36.5)	81.9 (38.6)	0.517 ( $\chi^2$ -test)
<i>At least one membership (in percent)</i>	62.9 (48.5)	45.6 (50.0)	0.001 ( $\chi^2$ -test)
Professions of participants (in percent)			
<i>Students (in percent of participants)</i>	89.3 (31.0)	74.5 (43.7)	0.001 ( $\chi^2$ -test)
<i>White collar (in percent of participants)</i>	3.6 (18.6)	6.0 (23.9)	0.334 ( $\chi^2$ -test)
<i>Blue collar (in percent of participants)</i>	7.1 (25.8)	19.5 (39.7)	0.003 ( $\chi^2$ -test)

Note: Numbers in parentheses are standard deviations.

## Appendix B: Instructions

*The following instructions were originally written in Russian. We document the translated instructions from the N-P sequence.*

### General Explanations for Participants

You are now taking part in an economics experiment, financed by several research foundations. If you read the following instructions carefully, then you will – depending on your decisions – earn a considerable amount of money. It is therefore very important that you read these instructions carefully.

The instructions are solely for your private information. During **the experiment it is strictly prohibited to communicate with other participants in any way**. If you have any questions, **please ask us**. A violation of this rule will lead to the exclusion from the experiment and the cancellation of all payments.

During the experiment we will not speak of Rubles but of Guilders. So your whole earnings will be calculated in Guilders first. At the end of the experiment, the total amount of Guilders you have earned will be converted to Rubles at the following rate:

**1 Guilder = 2.5 Ruble.**

**At the end of experiment you will receive the total sum of Guilders you earned plus 100 Rubles in cash as a show-up fee.**

At the beginning of the experiment all participants will be divided into groups of three members. Apart from you, your group will have two further members. **Only the experimenter knows the composition of groups. Neither before, nor after the experiment, will you learn who was in your group.**

There is only one task in this experiment. You will have to decide **whether to contribute Guilders to a group project, or whether you keep the Guilders for yourself**. On the following pages we will describe the sequence of events in the experiment in detail. At the end of this introduction you will find exercises that should be helpful to familiarise with the decision situation.

### **The Decision:**

At the beginning of the first stage, every participant receives an “endowment” of **20 Guilders**. You will have to decide how many of these 20 Guilders you contribute to the **project**, and how many you keep for yourself. The two other participants will have to make the same decision. They can as well contribute Guilders to the project or keep them for themselves. Thus, you and the other participants can choose any amount between 0 and 20 Guilders. Every Guilder you do not contribute to the project, will be yours automatically and will be paid to you at the end of experiment at the rate indicated above.

The following will happen with Guilders you contributed to the project: the experimenter will top up the sum of contributed Guilders by 50% and this sum will be **divided equally among the three group members**.

For example, if you contribute one Guilder to the project, the experimenter will add half a Guilder. The sum, namely 1.5 Guilders, will be distributed among all three group members of the group in equal parts, so each group member receives 0.5 Guilders. Therefore, for every Guilder you put into the project you will earn 0.5 Guilder from the project. At the same time the earnings of each other group member will increase by 0.5 Guilders as well, since they receive the same income from the project as you do. Thus, with your contribution of one Guilder to the project, the income of the group rises by 1.5 Guilders. In turn it holds that a contribution of one Guilder to the project by another group member will raise your earnings by 0.5 Guilders.

After all three group members have decided on their contributions to the project, the earnings of every participant are determined.

### **How are your earnings from your decision calculated?**

The earnings of each group member will be calculated in the same way. The earnings consist of two parts:

- (1) Guilders one keeps for oneself (“**Income from Guilders retained**”)
- (2) “**Earnings from the Project**”.

The earnings from the project amount to

$$0.5 \times (\text{total sum of contributions to project})$$

Your total earnings will therefore be calculated according to the following formula:

$$\begin{aligned} \text{Your total earnings} = \\ \text{Earnings from Guilders retained} + \text{Earnings from the project} = \\ (20 - \text{Your contribution to the project}) + 0.5 \times (\text{Sum of all contributions to the project}). \end{aligned}$$

If you contribute nothing to the project, your “earnings from Guilders retained” is 20. If you contribute 10 Guilders to the project, for instance, your “earnings from Guilders retained” is 10. The total amount of contributions to the project increases and therefore your “earnings from the project” increase as well.

### **To illustrate the calculation of earnings we list some examples here:**

- If all three group members **contribute 0** Guilders to the project, all three will receive “earnings from Guilders retained” of 20. Nobody receives therefore anything from the project, since nobody contributed to the project. The total earnings of each group member are therefore 20 Guilders.

$$\text{Calculation of total earnings for each group member: } (20 - 0) + 0.5 \times (0) = 20$$

- If all three group members contribute 20 Guilders to the project, a total amount of 60 Guilders will be contributed towards the project. The “earnings from Guilders retained” are zero for everyone; but each member receives earnings from the project of  $0.5 \times 60 = 30$  Guilders.

$$\text{Calculation of total earnings for each group member: } (20 - 20) + 0.5 \times (60) = 30$$

If you contribute 20 Guilders to the project, the second member contributes 10 Guilders, and the third member contributes 0 Guilders, the earnings will be as follows: As you and the second group member have invested in total 30 Guilders, you both will receive an income from the project of 15 Guilders. As you have invested all your 20 Guilders into the project, you earn in total 15 Guilders at the end of the experiment. The second group member also receives 15 Guilders from the project. As he has invested 10 Guilders into the project, 10 Guilders remained at his disposal. Thus in total he receives  $10 + 15 = 25$  Guilders. The third group member who has contributed nothing, also receives 15 Guilders from the project and additionally the 20 Guilders of the “Earning from Guilders retained”, therefore in total  $20 + 0.5 \times (30) = 35$  Guilders.

*Calculation of your total earnings:  $(20 - 20) + 0.5 \times (30) = 15$*

*Calculation of second group member’s earnings:  $(20 - 10) + 0.5 \times (30) = 25$*

*Calculation of third group member’s earnings:  $(20 - 0) + 0.5 \times (30) = 35$*

- Suppose the other two members contribute 20 Guilders to the project, you contribute nothing. In this case the earnings are calculated as follows:

*Calculation of total earnings for the 2nd and 3rd member (contribution of 20):*

$$(20 - 20) + 0.5 \times (40) = 20.$$

*Calculation of total earnings for you (contribution 0):*

$$(20 - 0) + 0.5 \times (40) = 40$$

For your decision, you will receive the following decision sheet (**shown here only as an example**):

**Decision sheet:**

**Please fill in the box the amount of Guilders you contribute to the project:**

**(Maximum 20 Guilders)**

On a decision sheet like the one above, you will fill into the box how many Guilders you would like to contribute to the project.

After you have made your decision, please put your decision sheet in the provided envelope, seal the envelope and hand it over to a research assistant. Your decision will only be seen by the leader of the experiment. He will then calculate your earnings. You will then get an information sheet, in a sealed envelope, which will tell you how much the other participants in your group invested into the project and what your earnings and those of the other group members are.

**Control questions:**

**Please answer all the questions and write down your calculation. The questions that ask for earnings refer to the amount of Guilders, not the earnings in Rubles. The examples are hypothetical and serve to help you understanding the payoff calculations.**

1. Suppose each group member has 20 Guilders at his or her disposal. Nobody (including you) contributes anything to the project.

What are your total earnings from the experiment? .....

What are the others’ total earnings from the experiment? .....

2. Suppose each member has 20 Guilders. You contribute 20 Guilders to the project. The two other group members contribute 20 Guilders to the project as well.

What are your total earnings from the experiment? .....

What are the others' total earnings from the experiment? .....

3. Each member is endowed with 20 Guilders. Suppose you contribute 3 Guilders. The second member contributes 10 Guilders and the third member contributes 17 Guilders.

Your total earnings from the experiment? .....

The total earnings of the second member? .....

The total earnings of the third member? .....

4. Each member is endowed with 20 Guilders. Suppose you and the second member contribute 20 Guilders to the project; the third member contributes 0 Guilders.

Your total earnings from the experiment? .....

The total earnings of the second member? .....

The total earnings of the third member? .....

**Do you have any questions?**

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<b>General Explanations for the Participants</b>
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We will now repeat the experiment with some changes. As in the previous experiment, you are endowed with 20 Guilders. However, this time you must make **two** decisions. The **first decision** is identical to the decision you made in the experiment we have just conducted. In the first decision you must again make a decision about how many of the 20 Guilders from your endowment you want to contribute to a project (and therefore also how many you will keep for yourself). The earnings at the first stage will be calculated in the same way as they were calculated in the previous experiment. For each Guilder you choose to keep, you will earn one Guilder. For each Guilder you contribute to the project you, and all other group members, will earn 0.5 Guilders. Each Guilder another group member contributes to the project raises your earnings by 0.5 Guilders.

**The group composition is the same as in the first experiment. You will not find out who is in your group. This experiment will also be conducted only *once*.**

**What is different in the new experiment?**

New is a **second stage**, which takes place immediately after you have received the information sheet about the contribution and the income of the other participants.

**The 2<sup>nd</sup> stage:**

At the second stage you will learn how much the other group members have contributed to the project. At this stage, through assigning **deduction points**, you can **reduce** the earnings of **each** of the other group members. You can also **leave** the earnings of the other group members **unchanged**. The other group members can also reduce **your** earnings if they so wish. The exact procedure will be described below in greater detail. We will first describe the income consequences that will follow from the assignment of deduction points.

**How are your earnings at the second stage calculated?**

If you assign deduction points to another group member **the earnings of this group member will be reduced by three times the amount of assigned deduction points**. This means **that if you assign one deduction point to another group member, the leader of the experiment will reduce his earnings by 3 Guilders**.

If you assign 2 deduction points to a group member, his income will be reduced by 6 Guilders. If you assign 9 deduction points his income will be reduced by 27 Guilders, etc.. If you decide to assign 0 deduction points to a particular group member his earnings will not be changed.

**You can assign a maximum amount of 10 deduction points to each other member.**

If you **assign deduction points, you will also have costs. For each assigned deduction point, you will have costs of one Guilder.** For example, if you assign 5 deduction points, you will have costs of 5 Guilders, if you assign 10 deduction points, you will have costs of 10 Guilders, etc.

If you assign no deduction points, you will, of course, have no costs from assigning deduction points.

Your total earnings from both stages will be calculated according to the following formula:

**Total earnings from the 2<sup>nd</sup> stage =**

**= (earnings from the 1<sup>st</sup> stage)**

**minus 3 x (the amount of deduction points received from other group members)**

**minus (the amount of deduction points you assigned to other group members)**

**In case the reduction in earnings resulting from the received deduction points exceeds the earnings from the 1<sup>st</sup> stage, the earnings after the 2<sup>nd</sup> stage will be zero minus the costs of the deduction points you assigned to other group members.**

Your total earnings at the end of the second stage have thus three components: (1) your earnings from the first stage. (2) The tripled amount of deduction points received from other participants. (3) The costs that you have incurred through assigning deduction points.

**Please notice the following special case:** If the tripled amount of deduction points received exceeds the income from the first stage, the deduction points of the affected member will be only be deducted by the amount of the earnings from the first stage. This means that the earnings minus the tripled amount of deduction points from the other members will be set to zero. Independent of this, one has to bear the full costs of deduction points one assigns to other members. Please note that you *always* can exclude losses *with certainty* through your own decisions.

#### **How do you make your decisions at the 2<sup>nd</sup> stage?**

As in the first experiment, all participants will first determine their contributions to the project. These decision sheets will be collected. Next, you will receive the decision sheet for the 2<sup>nd</sup> stage. On the decision sheet for the 2<sup>nd</sup> stage you will be informed about how many Guilders the other participants have contributed to the project and what your earnings and those of the other group members in Guilders are. Now, in an additional row, you must decide, whether and if so, how many deduction points you will assign to the other members of your group.

Below you will see an example of the decision sheet, which you will receive with the relevant information for the second decision.

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#### **Decision sheet for the second stage:**

	<b>You</b>	<b>Second Member</b>	<b>Third Member</b>
<b>Contributions to the project</b>	Your contribution	Contribution of the second group member	Contribution of the third group member
<b>Earnings from the first stage</b>	Your earnings	Earnings of the second group member	Earnings of the third group member
	<b>Your deduction points:</b>		

Please decide whether, and if so, how many deduction points you would like to assign to the others. If you would not like to assign any deduction points, please enter a zero. You can assign a maximum of 10 deduction points to each group member. You must, in any case, make a decision and fill in the boxes.

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The second decision sheet is designed in the following way:

- In the **first row** you will see the “Contribution to the project” that the three group members made at the first stage. Your contribution at the first stage is listed in the first column.
- In the **second row** (“Earnings from the first stage”) you will see, which earnings each group member received from their decision in the first stage. Under the heading “You”, you will see *your* earnings, in the second and third columns you will see the earnings of the other group members.
- In the **third row** (“Your deduction points”) you have to make your decisions for the second stage: You now have to decide how many deduction points you would like to assign to **each of the other** group members. Enter in the respective box a number between 0 and 10. You have to make an entry into each box. If you would not like to change the income of a certain group member, enter a 0. **You can assign a maximum of 10 deduction points to each of the other group members.**

After you have entered your decisions on the decision sheet regarding the assigning of deduction points at the second stage, put your decision sheet in the envelope and hand it over to an assistant. The leader of the experiment will calculate your earnings and the earnings of the other group members. At the end of the experiment, the assistants will hand out your payoff in an envelope. Only the leader of the experiment will know your decisions.

The experiment will be finished after you have made your decisions about assigning deduction points and the experimenter has collected the envelopes. There will be no further experiment. You have then to answer some questions and then you will receive your payment.

Do you have any questions?

#### Control questions

***All questions must be answered. Please show all your calculations. If you have questions, please ask the experimenters! The examples are hypothetical and serve only to help your understand the payoff calculations.***

**1.** You want to assign 6 deduction points to the first member and 8 deduction points to the second group member.

Which costs will you incur? .....

By how much will the earnings of the first group member be reduced? .....

By how much will the earnings of the second group member be reduced? .....

**2.** You want to assign 10 deduction points to the first group member. You want assign no deduction points to the second group member.

Which costs will you incur? .....

By how much will the earnings of the first group member be reduced? .....

By how much will the earnings of the second group member be reduced? .....

**3.** You do not assign any deduction points.

Which costs will you incur? .....

By how much will the earnings of the first group member be reduced? .....

By how much will the earnings of the second group member be reduced? .....

**4.** Suppose the second member of the group earned 10 Guilders in the 1<sup>st</sup> stage. From you he receives 5 deduction points; and from the third member he receives 6 deduction points.

By how much will the earnings of the second group member be reduced? .....

## References

- Barr, A., 2001. Social dilemmas and shame-based sanctions: experimental results from rural Zimbabwe. The Centre for the Study of African Economies Working Paper Series. Working Paper 149
- Bellemare, C., Kröger, S., 2007. On representative social capital. *European Economic Review* 51, 183-202.
- Bochet, O., Page, T., Putterman, L., 2006. Communication and punishment in voluntary contribution experiments. *Journal of Economic Behavior & Organization* 60, 11-26.
- Bohnet, I., Frey, B. S., 1999. Social distance and other-regarding behavior in dictator games: Comment. *American Economic Review* 89, 335-339.
- Botelho, A., Harrison, G. W., Costa Pinto, L. M., Rutström, E. E., 2007. Social Norms and Social Choice. mimeo, University of Minho and University of Central Florida.
- Bowles, S., 1998. Endogenous preferences: The cultural consequences of markets and other economic institutions. *Journal of Economic Literature* 36, 75-111.
- Bowles, S., Carpenter, J. P., Gintis, H., 2006. Mutual Monitoring in Teams: Theory and Experimental Evidence on the Importance of Reciprocity. IZA Discussion Paper Series 2106.
- Bowles, S., Gintis, H., 2002. Social Capital and Community Governance. *The Economic Journal* 112, 419-436.
- Brainerd, E., 1998. Winners and Losers in Russia's Economic Transition *American Economic Review* 88, 1094-1116.
- Camerer, C. F., Fehr, E., 2004. Measuring Social Norms Using Experimental Games: A Guide for Social Scientists. In Henrich, J., et al., (Eds.), *Foundations of Human Sociality: Experimental and Ethnographic Evidence from 15 Small-scale Societies*. Oxford University Press, New York, pp. 55-95.
- Carpenter, J. P., 2007. Punishing free-riders: how group size affects mutual monitoring and the provision of public goods. *Games and Economic Behavior* 60, 31-51.
- Carpenter, J. P., Burks, S., Verhoogen, E., 2005. Comparing Students to Workers: The Effect of Stakes, Social Framing, and Demographics on Bargaining Outcomes. In Carpenter, J. P., et al., (Eds.), *Field Experiments in Economics*. Research in Experimental Economics. Elsevier JAI, Amsterdam.
- Carpenter, J. P., Seki, E., 2005. Do Social Preferences Increase Productivity? Field Experimental Evidence from Fishermen in Toyama Bay. IZA Discussion Paper No. 1697.
- Cinyabuguma, M., Page, T., Putterman, L., 2006. Can second-order punishment deter perverse punishment? *Experimental Economics* 9, 265-279.
- Clawson, R. W., 1973. Political Socialization of Children in the USSR. *Political Science Quarterly* 88, 684-712.
- Crosen, R., Gneezy, U., 2004. Gender Differences in Preferences. Mimeo, Chicago Business School and Wharton Business School.
- Denant-Boemont, L., Masclet, D., Noussair, C., 2007. Punishment, Counterpunishment and Sanction Enforcement in a Social Dilemma Experiment. *Economic Theory* 33, 145-167.
- Egas, M., Riedl, A., 2006. The Economics of Altruistic Punishment and the Maintenance of Cooperation. mimeo, University of Maastricht.
- Falk, A., Dohmen, T., Huffman, D., Sunde, U., 2006. Homo Reciprocans: Survey Evidence on Prevalence, Behavior and Success. IZA Discussion Paper Series 2205.

- Falk, A., Fehr, E., Fischbacher, U., 2005. Driving forces behind informal sanctions. *Econometrica* 73, 2017-2030.
- Fedotkin, I., 2003. Confiscate and Divide. Expectations of the people have not changed in the last 86 years. *Vedomosti #3 - JRL* 7255.
- Fehr, E., Fischbacher, U., 2003. The nature of human altruism. *Nature* 425, 785-791.
- Fehr, E., Gächter, S., 2000. Cooperation and punishment in public goods experiments. *American Economic Review* 90, 980-994.
- Fehr, E., Gächter, S., 2002. Altruistic punishment in humans. *Nature* 415, 137-140.
- Fehr, E., List, J. A., 2004. The hidden costs of incentives – trust and trustworthiness among CEOs. *Journal of the European Economic Association* 2, 743-727.
- Fehr, E., Schmidt, K. M., 1999. A Theory of Fairness, Competition, and Cooperation. *Quarterly Journal of Economics* 114 3, 817-868.
- Fitzpatrick, S., 1994. *Stalin's Peasants: Resistance and Survival in the Russian Village after Collectivization*. Oxford University Press, New York.
- Gächter, S., Herrmann, B., in preparation. Cultural influences on human altruism. mimeo University of Nottingham.
- Gächter, S., Herrmann, B., Thöni, C., 2004. Trust, voluntary cooperation, and socio-economic background: survey and experimental evidence. *Journal of Economic Behavior & Organization* 55, 505-531.
- Glaeser, E. L., Laibson, D., Sacerdote, B., 2002. An economic approach to social capital. *Economic Journal* 112, F437-F458.
- Gregory, P., Harrison, M., 2005. Allocation under Dictatorship: Research in Stalin's Archives. *Journal of Economic Literature* 43, 721-761.
- Gürerk, Ö., Irlenbusch, B., Rockenbach, B., 2006. The Competitive Advantage of Sanctioning Institutions. *Science* 312, 108-111.
- Henrich, J., Boyd, R., 1998. The Evolution of Conformist Transmission and the Emergence of Between-Group Differences. *Evolution and Human Behavior* 19, 215-241.
- Henrich, J., Boyd, R., Bowles, S., Camerer, C. F., Fehr, E., Gintis, H., 2004. *Foundations of Human Sociality. Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies*. Oxford University Press, Oxford.
- Herrmann, B., Thöni, C., Gächter, S., in preparation. Cross-cultural differences in norm enforcement.
- Hoff, K., Stiglitz, J. E., 2004. After the big bang? Obstacles to the emergence of the rule of law in post-communist societies. *American Economic Review* 94, 753-763.
- Hofferth, S. L., Iceland, J., 1998. Social Capital in Rural and Urban Communities. *Rural Sociology* 63, 574-598.
- Hoffman, E., McCabe, K., Smith, V. L., 1996. Social Distance and Other-Regarding Behavior in Dictator Games. *American Economic Review* 86, 653-660.
- Holm, H. J., Nystedt, P., 2005. Intra-generational trust—a semi-experimental study of trust among different generations. *Journal of Economic Behavior & Organization* 58, 403-419.
- Kluegel, J. R., Mason, D. S., 2004. Fairness matters: Social justice and political legitimacy in post-communist Europe. *Europe-Asia Studies* 56, 813-834.
- Kroll, S., Cherry, T. L., Shogren, J. F., 2007. Voting, Punishment, and Public Goods. *Economic Inquiry* 45, 557-570.
- List, J. A., 2004. Young, selfish and male: Field evidence of social preferences. *Economic Journal* 114, 121-149.

- Masclot, D., Noussair, C., Tucker, S., Villeval, M.-C., 2003. Monetary and nonmonetary punishment in the voluntary contributions mechanism. *American Economic Review* 93, 366-380.
- Nikiforakis, N., forthcoming. Punishment and Counter-Punishment in Public Good Games: Can We Really Govern Ourselves? *Journal of Public Economics*.
- Nikiforakis, N., Normann, H., forthcoming. A Comparative Statics Analysis of Punishment in Public Goods Experiments. *Experimental Economics*.
- Noussair, C., Tucker, S., 2005. Combining monetary and social sanctions to promote cooperation. *Economic Inquiry* 43, 649-660.
- Ones, U., Putterman, L., 2007. The ecology of collective action: A public goods and sanctions experiment with controlled group formation. *Journal of Economic Behavior & Organization* 62, 495-521.
- Ortmann, A., 2005. Field Experiments in Economics: Some Methodological Caveats. In Carpenter, J. P., et al., (Eds.), *Field Experiments in Economics*. Elsevier JAI, Amsterdam, pp. 51-70.
- Ostrom, E., 2000. Collective action and the evolution of social norms. *Journal of Economic Perspectives* 14, 137-158.
- Ostrom, E., Walker, J. M., Gardner, R., 1992. Covenants with and without a Sword - Self-Governance Is Possible. *American Political Science Review* 86, 404-417.
- Page, T., Putterman, L., Unel, B., 2005. Voluntary Association in Public Goods Experiments: Reciprocity, Mimicry, and Efficiency. *Economic Journal* 115, 1032-1052.
- Putnam, R., 2000. *Bowling Alone. The Collapse and Revival of American Community*. Simon & Schuster, New York.
- Rose, R., 2000. Getting things done in an antimodern society: social capital networks in Russia. In Dasgupta, P., Serageldin, I., (Eds.), *Social capital. A multifaceted perspective*. The World Bank, Washington, D.C.
- Sefton, M., Shupp, R., Walker, J. M., forthcoming. The Effect of Rewards and Sanctions in Provision of Public Goods. *Economic Inquiry*.
- Shleifer, A., Treisman, D., 2005. A Normal Country: Russia After Communism. *Journal of Economic Perspectives* 19, 151-174.
- Sosis, R., Ruffle, B. J., 2003. Religious Ritual and Cooperation: Testing for a Relationship on Israeli Religious and Secular Kibbutzim. *Current Anthropology* 44, 713-722.
- Spulber, N., 2003. *Russia's Economic Transitions. From Late Tsarism to the New Millennium*. Cambridge University Press, Cambridge
- Sutter, M., 2007. Outcomes versus intentions: On the nature of fair behavior and its development with age. *Journal of Economic Psychology* 28, 69-78.
- Sutter, M., Haigner, S., Kocher, M., 2006. Choosing the stick or the carrot? Endogenous institutional choice in social dilemma situations. *CEPR Discussion Papers* 5497.
- Sutter, M., Kocher, M., 2007. Trust and trustworthiness across different age groups. *Games and Economic Behavior* 59, 364-382.
- Walker, J. M., Halloran, M. A., 2004. Rewards and sanctions and the provision of public goods in one-shot settings. *Experimental Economics* 7, 235-247.
- Yamagishi, T., 1986. The Provision of a Sanctioning System as a Public Good. *Journal of Personality and Social Psychology* 51, 110-116.