Markussen, Thomas; Putterman, Louis; Tyran, Jean-Robert

Working Paper

Self-Organization for collective action: An experimental study of voting on formal, informal, and no sanction regimes

Working Paper, No. 2011-4

Provided in Cooperation with:
Department of Economics, Brown University

Suggested Citation: Markussen, Thomas; Putterman, Louis; Tyran, Jean-Robert (2011) : Self-Organization for collective action: An experimental study of voting on formal, informal, and no sanction regimes, Working Paper, No. 2011-4, Brown University, Department of Economics, Providence, RI

This Version is available at:
https://hdl.handle.net/10419/62605

Appendix to Markussen, Putterman and Tyran, 2011

Self-Organization for Collective Action: An Experimental Study

of Voting on Formal, Informal, and No Sanction Regimes

<u>Experimental instructions</u>

Instructions for DC treatment. Instructions for other treatments are available upon request to the authors.

Welcome

You are now taking part in an economic experiment. Depending on your decisions and the decisions of other participants, you will be able to earn money. How you can earn money is described in these instructions. Please read them carefully. You will have to answer control questions, to check that you understand the instructions. You can only continue the experiment when you have answered these questions correctly.

During the experiment you are not allowed to communicate with other participants. If you have a question, raise your hand. One of us will come to answer your question. Sometimes you may have to wait a short while before the experiment continues. Please be patient.

During the experiment your earnings will be calculated in points. Points will be converted to Danish kroner at the following rate:

5 points = 1 DKK

At the end of the experiment your total earnings will be paid out to you in cash.

The experiment has seven phases (that means, seven sets of 4 periods, in total, 28 periods). The following instructions explain the details of phase 1. The details of the subsequent phases will be explained later.

Instructions for Phase 1

In the experiment, all participants are randomly divided into **groups of 5**. This means that you are in a group with four other participants. **You will be part of the same group throughout the entire experiment**. Nobody knows which other participants are in their group, and nobody will be informed who was in which group after the experiment.

Phase 1 is divided into 4 periods. In each period, each group member, yourself included, will be given an **endowment of 20 points**. In each period you will have to make one decision.

Your decision

You and the four others in your group simultaneously decide how to use the endowment. There are two possibilities:

1. **You can allocate points to a group account.**
2. **You can allocate points to a private account.**

You will be asked to indicate the number of points you want to allocate to the group account. Only integers between 0 and 20 are allowed for this purpose. The remaining points will automatically be allocated to your private account. Your earnings depend on the total number of points in the group account, and the number of points in your private account.

How to calculate your earnings

Your earnings from your private account are equal to the number of points you allocate to it. That is, **for each point you allocate to your private account you get 1 point as earnings**. For example, your earnings from the private account equal 3 points if you allocate 3 points to it. The points you allocate to your private account do not affect the earnings of the others in your group.

Your earnings from the group account equal the **sum** of points allocated to the group account by all 5 group members multiplied by 0.4. **For each point you allocate to the group account you and all others in your group each get 0.4 points as earnings**. For example, if the sum of points in the group account is 30, then your earnings from the group account and the earnings of each of the others in your group from the group account are equal to 12 points.

Your earnings can be calculated with the following formula:

20 – (points you allocated to the group account) + 0.4 * (sum of points allocated by all group members to the group account)

Note that you get 1 point as earnings for each point you allocate to your private account. If you instead allocate 1 extra point to the group account, your earnings from the group account increase by 0.4 * 1 = 0.4 points and your earnings from your private account decrease by 1 point. However, by allocating 1 extra point to the group account, the earnings of the other 4 group members also increase by 0.4 points. Therefore, the total group earnings increase by 0.4 * 5 = 2 points. Note that you also obtain earnings from points allocated to the group account by others. You obtain 0.4 * 1 = 0.4 points for each point allocated to the group account by another member.

Example

Suppose you allocate 10 points to the group account, the second and third members of your group each allocate 20 points to the group account, and the remaining two individuals allocate 0 points each. In this case, the sum of points in the group account is 10 + 20 + 20 + 0 + 0 = 50 points. Each group member gets earnings of 0.4 * 50 = 20 points from the group account.

Your total earnings are: 20 – 10 + (0.4 * 50) = 10 + 20 = 30 points.

The second and third members' earnings are: 20 – 20 + (0.4 * 50) = 0 + 20 = 20 points.

The fourth and fifth members' earnings are: 20 – 0 + (0.4 * 50) = 20 + 20 = 40 points.

Do you have any questions? (Please raise your hand.)

Instructions for Phase 2 to 7

Please read these instructions carefully. Again, you will have to answer control questions to check that you understand the instructions.

The next six phases are like the previous one in that you continue to interact with the same four individuals and in each period you make a decision about allocating 20 points to either a private account or a group account. The earnings consequences of your decisions are also as before.

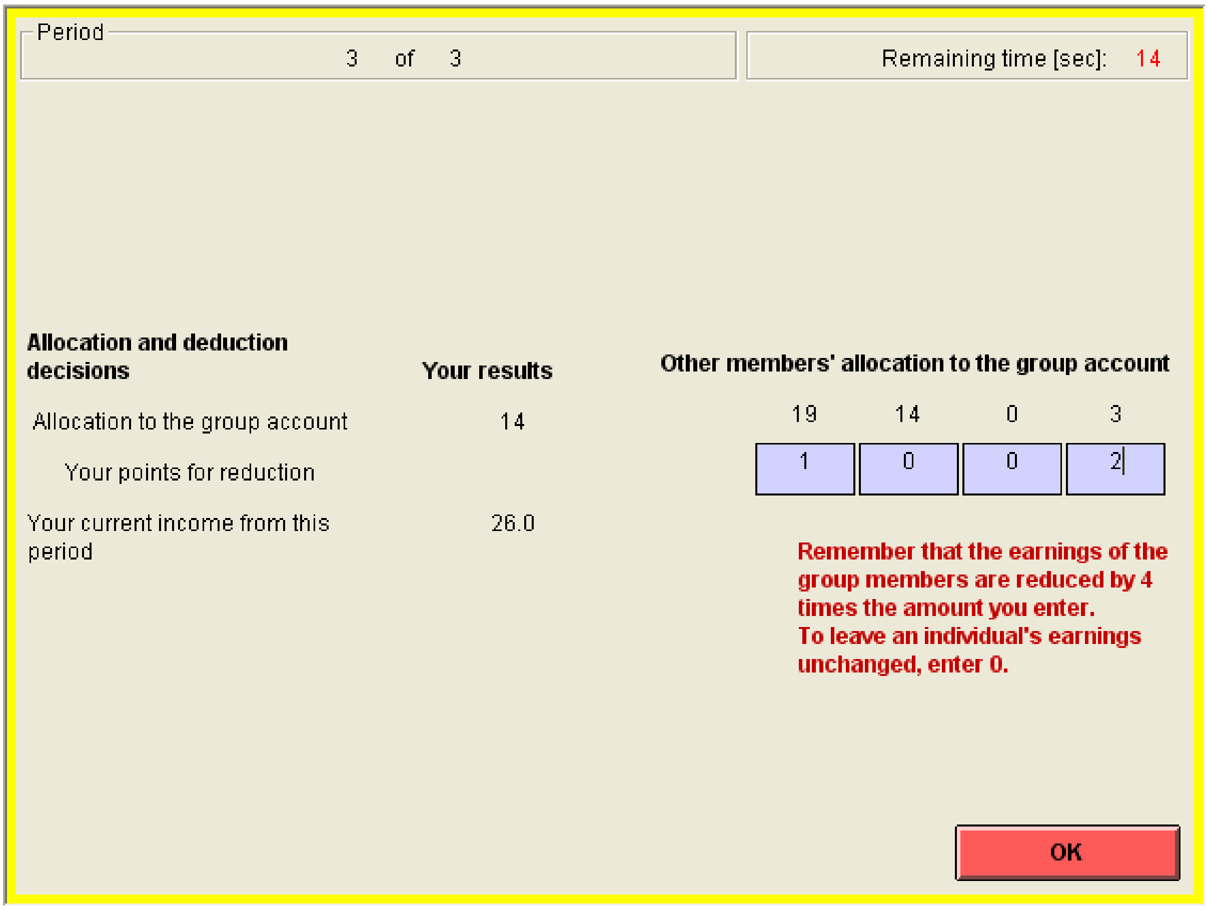
However, there will now be **three** different **rule sets**, two of them new to these phases, which affect your earnings in different ways. In each phase, your group will use **one** of these rule sets.

Now, we describe the three rule sets.

RULE SET 1 (*no point reductions*): In rule set 1, earnings are determined in exactly the same way as in Phase 1 of the experiment.

RULE SET 2 (*individual point reductions*): In rule set 2, there are two stages in each period. In the first stage, you make your allocation decision and learn the decisions of the other group members along with your earnings. In the second stage, you have an opportunity to reduce the earnings of others in your group at a cost to you. Here is how it works.

After the first stage of each period, you will be shown the amount allocated to the group account by each of the others in your group, **in a random order**, and in a box below that information you will be asked to enter a number of points (if any) that you wish to use to reduce the earnings of the individual who made that allocation decision (see below). Each point you allocate to reducing another's earnings **reduces your own earnings by 1 point** and **reduces that individual's earnings by 4 points**. Your own earnings can be reduced in the same way by the decisions of others in your group. You are free to leave any or all others' earnings unchanged by entering 0s in the relevant boxes.



Note: Numbers shown are for illustration only.

Earnings in each period are calculated as follows:

20 – (points you allocate to group account) + 0.4*(sum of points allocated by all in group to group account) – (points you use to reduce others' earnings) – 4*(sum of reduction points directed at you by others in your group),

For example, suppose that you use 0 points to reduce the earnings of the first and second group members whose allocations appear on the screen, you use 1 point to reduce the earnings of the third, and you use 2 points to reduce the earnings of the fourth. Suppose further that these individuals use 0, 1, 0 and 3 points to reduce your earnings. Then the third and fourth individuals' earnings for the period will be reduced by 4 and by 8 points, respectively, in addition to any reductions due to the decisions of others. Your own earnings for the period will be reduced by 3 points = your cost of imposing reductions on others, plus (1x4)+(3x4)=16 points = the reductions imposed on your earnings by others. At the end of the reduction stage, you will learn that your earnings were reduced by others by a total of 16 points, but you will not be told which individuals reduced your earnings or by how much any given individual reduced your earnings. Others will also not know who in particular reduced their earnings by how much.

The earnings reduction process is subject to two limits. First, you cannot assign more than 10 reduction points to any one individual in your group. Second, the total effective reduction of your earnings due to others' decisions in a given period cannot be greater than your total earnings from the allocation stage of that period. For example, if your earnings after the allocation stage are 26 points and if others use a total of 7 points to reduce your earnings, you will lose only 26 points, not 7x4 = 28. However, the points that you spend to reduce the earnings of others are always costly to you, even if that brings your earnings for a period to less than zero. To continue with the example in which you earn 26 points before reductions and you lose 26 points due to the (28 points worth of) reductions others impose on you: if in the same period you have chosen to spend 3 points on reducing others' earnings, your total earnings for the period are – 3. Points lost in some periods are deducted from your accumulated earnings of other periods.

Remember that if no reductions are imposed (the reduction boxes are filled in with 0's), earnings after the reduction stage are the same as those before it.

RULE SET 3 (*automatic point reductions*): In rule set 3, each individual pays a fixed fee of **two** points in each period. The fee is deducted from your earnings **at the end of the period**. In addition, each individual pays a fine equal to **80 percent** of the amount of points allocated to the **private account.**

Earnings in each period are calculated as follows:

20 – (points you allocate to group account) + 0.4*(sum of points allocated by all in group to group account) – 0.8*(points you allocate to private account) – 2

For example, suppose you allocate **10 points** to the group account, the second and third members of your group each allocate 20 points to the group account, and the remaining two individuals allocate 0 points each. In this case, the sum of points in the group account is 10 + 20 + 20 + 0 + 0 = 50 points. Each group member gets earnings of 0.4 * 50 = 20 points from the group account.

Your total earnings are: 20 – 10 + (0.4 * 50) – (0.8*10) – 2 = 10 + 20 – 8 – 2 = 20 points.

The second and third members' earnings are: 20 – 20 + (0.4 * 50) – (0.8*0) – 2 = 0 + 20 – 0 – 2 = 18 points.

The fourth and fifth members' earnings are: 20 – 0 + (0.4 * 50) – (0.8*20) – 2 = 20 + 20 – 16 – 2 = 22 points.

Notice that for each point you put in your private account, you gain 0.2 points (that is, you gain 1 point as income and lose 0.8 points in fines); and for each point you put in the group account, you gain 0.4 points.

This table presents an overview of the three rule sets:

RULE SET 1 *(no point reductions)*	RULE SET 2 *(individual point reductions)*	RULE SET 3 *(automatic point reductions)*
Same as in Phase 1	Each group member can reduce other group members' earnings after seeing the allocations of each individual to the group account. It costs 1 point to reduce the earnings of another group member by 4 points	There is a fixed cost of 2 points in each period, deducted from your earnings at the end of the period. Each individual pays a fine equal to 80 percent of the amount of points he or she allocated to the private account.

At the beginning of each phase, your group will **choose between two of these rule sets**, by **voting**. Each individual votes for the rule set that he or she prefers and the rule set receiving the highest number of votes in your group is implemented in the next four periods. At the beginning of the next phase, your group will again choose between two different rule sets, by means of voting.

Do you have any questions? (Please raise your hand.)

Tables

Table A1 Voting outcomes (percent)

		Group level					
		Phase					
Share of groups using:	*Treatment*	2	3	4	5	6	7
No Sanctions	DC	78.6	28.6	-	50.0	14.3	-
	DE	75.0	83.3	-	50.0	66.7	-
	NC	85.7	42.9	-	35.7	57.1	-
	NE	75.0	91.7	-	33.3	83.3	-
Informal Sanctions	DC	21.4	-	42.9	50.0	-	42.9
	DE	25.0	-	83.3	50.0	-	66.7
	NC	14.3	-	64.3	64.3	-	71.4
	NE	25.0	-	100.0	66.7	-	100.0
Formal Sanctions	DC	-	71.4	57.1	-	85.7	57.1
	DE	-	16.7	16.7	-	33.3	33.3
	NC	-	57.1	35.7	-	42.9	28.6
	NE	-	8.3	0.0	-	16.7	0.0

		Individual level					
		Phase					
Share of subjects voting for:	*Treatment*	2	3	4	5	6	7
No Sanctions	DC	65.7	37.1	-	40.0	24.3	-
	DE	65.0	66.7	-	53.3	61.7	-
	NC	68.6	40.0	-	45.7	55.7	-
	NE	70.0	65.0	-	40.0	60.0	-
Informal Sanctions	DC	34.3	-	42.9	60.0	-	51.4
	DE	35.0	-	73.3	46.7	-	68.3
	NC	31.4	-	64.3	54.3	-	64.3
	NE	30.0	-	71.7	60.0	-	81.7
Formal Sanctions	DC	-	62.9	57.1	-	75.7	48.6
	DE	-	33.3	26.7	-	38.3	31.7
	NC	-	60.0	35.7	-	44.3	35.7
	NE	-	35.0	28.3	-	40.0	18.3

Table A2 Punishment under informal sanctions

	Treatment				
	DC	DE	NC	NE	All
Share of punishment options used	0.08	0.12	0.14	0.19	0.14
Share of individuals who punished at least once	0.84	0.71	0.83	0.95	0.83
Reduction points sent per person per period, mean:					
All	0.58	0.91	1.13	1.25	1.01
Punishers only	2.80	3.70	3.24	2.84	3.10
Share of individuals who received punishment at least once	0.70	0.96	0.79	0.93	0.85
Punishment points received per person per period, mean:					
All	0.58	0.91	1.13	1.25	1.01
Punished individuals only	3.31	2.81	3.37	2.79	3.00
Share of punishment directed at above-median contributors ("perverse punishment")	0.00	0.14	0.14	0.12	0.13

Note: The first line is based on the 9,120 punishment options opportunities. Lines 2 and 5 are based on the 235 participants who used informal sanctions in at least one phase. Lines 3 and 6 are based on the 2,280 subject-by-period observations under informal sanctions. Line 4 is based in the 741 subject-by-period observations where punishment points were *sent.* Line 7 is bases in the 766 subject-by-period observations where punishment points were *received.* The last line is based on the 1,255 punishment opportunities where punishment was actually used. (Note that lines 3 and 6 are by necessity identical.)

We report in the paper that ”the lion’s share of punishment was relatively efficiently targeted, so that subjects tended to earn more by contributing more.” Our evidence is as follows. We estimated GLS regressions for all IS-condition observations at individual level, with earnings as dependent and contribution to group account as independent variable, controls for group average contribution and period, and standard errors clustered by group. There is one regression for each of four phases (2, 4, 5, 7) and for each treatment. The estimated coefficients on amount contributed are positive in 13 of 16 regressions, with none of the 3 negative coefficients being significant but with 8 of the 13 positive coefficients being statistically significant, half of these at the 1% level. Efficient targeting of punishment is also seen from the fact that individuals contributing above their group median received only 13% of all punishment given.

Table A.3 Contributions per person per period by treatment, condition and phase

Treatment	*Condition*	*Phase* 1	2	3	4	5	6	7
DC	NS	*11.5*	*8.7*	6.6		6.7	13.4	
	IS		16.9		19.0	19.6		*19.7*
	FS			18.6	18.9		18.9	19.0
	*MW-test, p-value**		*0.02*	*0.00*	*1.00*	*0.00*	*0.04*	*0.53*
DE	NS	*12.6*	*11.6*	12.1		10.7	12.0	
	IS		14.3		16.6	18.9		*19.0*
	FS			17.0	18.4		19.5	18.6
	MW-test, p-value		*0.41*	*0.13*	*0.67*	*0.03*	*0.04*	*0.86*
NC	NS	*11.9*	*9.3*	9.9		9.1	8.4	
	IS		18.9		16.9	17.9		*19.1*
	FS			14.1	11.9		14.0	14.4
	MW-test, p-value		*0.03*	*0.04*	*0.01*	*0*	*0.01*	*0.01*
NE	NS	*9.1*	*6.3*	4.7		3.8	4.2	
	IS		11.8		12.7	16.2		*13.8*
	FS			17.8	-		10.8	
	MW-test, p-value		*0.02*	*0.11*	-	*0.01*	*0.03*	-
All	NS	*11.3*	*9.0*	8.4		7.8	8.3	
	IS		15.2		15.8	18.0		*17.4*
	FS			16.7	16.5		17.1	17.7
	MW-test, p-value		*0.00*	*0.00*	*0.52*	*0.00*	*0.00*	*0.93*

*Mann-Whitney tests of the hypothesis that contributions under the two conditions are equal.

Tests are conducted at the *group* level, for phase averages. All Mann-Whitney tests reported in the paper and appendix are two-tailed.

Table A.4 Determinants of voting

	Dependent variable:								
	Voted for *informal* sanctions (against no sanctions) in **Phase 5 (Vote 4)**			Voted for *formal* sanctions (against no sanctions) in **Phase 6 (Vote 5)**			Voted for *formal* sanctions (against informal) in **Phase 7 (Vote 6)**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Earn_is/earn_ns	0.738***	0.766***	0.771***						
	(0.147)	(0.161)	(0.176)						
Earn_fs/earn_ns				0.563***	0.579***	0.525**			
				(0.206)	(0.220)	(0.219)			
Earn_fs/earn_is							0.788***	0.825***	0.746***
							(0.261)	(0.230)	(0.255)
Contribution in period 1	0.008	0.007	0.008	-0.004	-0.006	-0.005	-0.016*	-0.018**	-0.016*
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.008)	(0.008)	(0.008)
Gave perverse punishment	-0.295***	-0.231*	-0.233**	-0.287*	-0.174	-0.174	-0.069	-0.036	-0.079
	(0.102)	(0.118)	(0.117)	(0.154)	(0.181)	(0.154)	(0.216)	(0.238)	(0.223)
Received perverse punishment	-0.046	-0.025	-0.021	0.049	0.009	-0.036	0.484***	0.454***	0.364***
	(0.103)	(0.101)	(0.100)	(0.104)	(0.122)	(0.135)	(0.062)	(0.066)	(0.105)
Female		-0.101	-0.085		-0.043	-0.051		0.099	0.117
		(0.087)	(0.088)		(0.126)	(0.121)		(0.150)	(0.149)
CRT score		0.097**	0.094**		0.066	0.064		0.05	0.057
		(0.039)	(0.039)		(0.042)	(0.039)		(0.053)	(0.052)
General political pref.		0.029	0.028		0.011	0.01		-0.022	-0.018
		(0.018)	(0.019)		(0.021)	(0.021)		(0.026)	(0.026)
Number of phases with FS			0.145			-0.044			-0.023
			(0.090)			(0.134)			(0.091)
Number of phases with IS			0.013			-0.087			-0.118
			(0.099)			(0.075)			(0.113)
Treatment:									
DC	-0.064	-0.09	-0.228*	0.14	0.173	0.167	0.022	-0.005	-0.034
	(0.124)	(0.128)	(0.132)	(0.120)	(0.117)	(0.128)	(0.184)	(0.158)	(0.144)
DE	-0.137	-0.151	-0.165*	0.152	0.166	0.155	-0.351***	-0.352***	-0.302**
	(0.105)	(0.102)	(0.098)	(0.188)	(0.202)	(0.183)	(0.118)	(0.100)	(0.119)
NC	-0.185*	-0.184	-0.234**				-0.196	-0.204*	-0.223
	(0.108)	(0.113)	(0.102)				(0.154)	(0.124)	(0.137)
Pseudo-Rsq	0.26	0.28	0.29	0.16	0.16	0.17	0.46	0.48	0.48
Observations	200	200	200	125	125	125	125	125	125

Note: Probit regressions, marginal effects reported. Standard errors in parentheses. Standard errors adjusted for within-group clustering. In the regression for Phase 6, the outcome does not vary within treatment 4 (all five individuals with the relevant experience voted for formal sanctions) and the observations in this treatment can therefore not be included. The earnings variables are always based on experience from *the most recent phase* where the subject experienced the institution in question. For example, "earn_fs/earn_is" is mean earnings in the most recent phase with formal sanctions, divided by mean earnings in the most recent phase with informal sanctions. On the "General political pref." variable, a higher value signifies a more right-leaning attitude. * significant at 10%; ** significant at 5%; *** significant at 1%

Table A.5 Determinants of contributions, NS and non-deterrent FS

	Dependent variable: Contribution to public good								
Sanction type and treatment	NS (all treatments)			FS (**NC**)			FS (**NE**)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Contribution in previous period	0.399***		0.350***	0.386***		0.320***	0.148		0.156
	(0.035)		(0.032)	(0.097)		(0.096)	(0.158)		(0.179)
Others' mean contribution in previous period	0.407***		0.405***	0.166		0.210*	-0.582		-0.637
	(0.054)		(0.050)	(0.149)		(0.126)	(0.388)		(0.417)
CRT score		0.405	-0.014		0.819***	-0.030		0.806	1.981
		(0.305)	(0.154)		(0.307)	(0.290)		(3.186)	(2.113)
Female		0.044	-0.102		-0.993	0.416		-0.341	-3.232
		(0.531)	(0.356)		(1.548)	(0.836)		(6.124)	(3.923)
General political pref.		-0.144	-0.130**		-0.206	-0.083		-0.358	-0.309
		(0.109)	(0.063)		(0.247)	(0.149)		(0.812)	(0.531)
Contribution in period 1			0.129***			0.253***			0.014
			(0.026)			(0.051)			(0.191)
Phase:									
Phase 2		-2.361***							
		(0.384)							
Phase 3	0.004	-3.175***	-0.077						
	(0.221)	(0.465)	(0.237)						
Phase 4				-1.541*	-2.855***	-1.984***			
				(0.829)	(1.009)	(0.725)			
Phase 5	0.121	-3.300***	0.116						
	(0.360)	(0.527)	(0.371)						
Phase 6	-0.472*	-3.591***	-0.524*	0.399	0.14	0.484	-10.306***	-6.366***	-10.247***
	(0.245)	(0.585)	(0.271)	(1.106)	(1.057)	(1.081)	(3.735)	(2.213)	(3.923)
Phase 7				0.318	0.203	-0.123			
				(1.336)	(1.339)	(1.297)			
Period:									
Period 2		-0.775***			-0.783			1.000	
		(0.187)			(0.798)			(2.614)	
Period 3	-0.178	-1.797***	-0.251	-0.490	-1.704***	-0.508	-1.500	-0.933	-1.452
	(0.324)	(0.273)	(0.312)	(1.036)	(0.627)	(1.036)	(2.713)	(2.614)	(2.849)
Period 4	-1.387***	-4.137***	-1.528***	-2.137	-3.861***	-2.176*	-2.338	-0.933	-2.383
	(0.457)	(0.403)	(0.437)	(1.312)	(0.871)	(1.308)	(2.708)	(2.614)	(2.844)
Treatment:									
DC	0.200	2.611**	-0.016						
	(0.411)	(1.133)	(0.457)						
DE	1.357***	5.219***	1.228**						
	(0.516)	(1.346)	(0.577)						
NC	0.194	3.353***	0.254						
	(0.500)	(1.059)	(0.539)						
Constant	0.278	10.337***	0.209	6.220***	15.923***	4.448*	26.975***	18.301***	26.854***
	(0.582)	(1.292)	(0.806)	(2.373)	(1.600)	(2.303)	(8.391)	(5.931)	(9.775)
R-sq. (overall)	0.16	0.36	0.41	0.07	0.21	0.22	0.18	0.27	0.31
Observations	3,480	1,830	1,830	460	345	345	60	45	45
Number of individuals	260	255	255	70	70	70	10	10	10

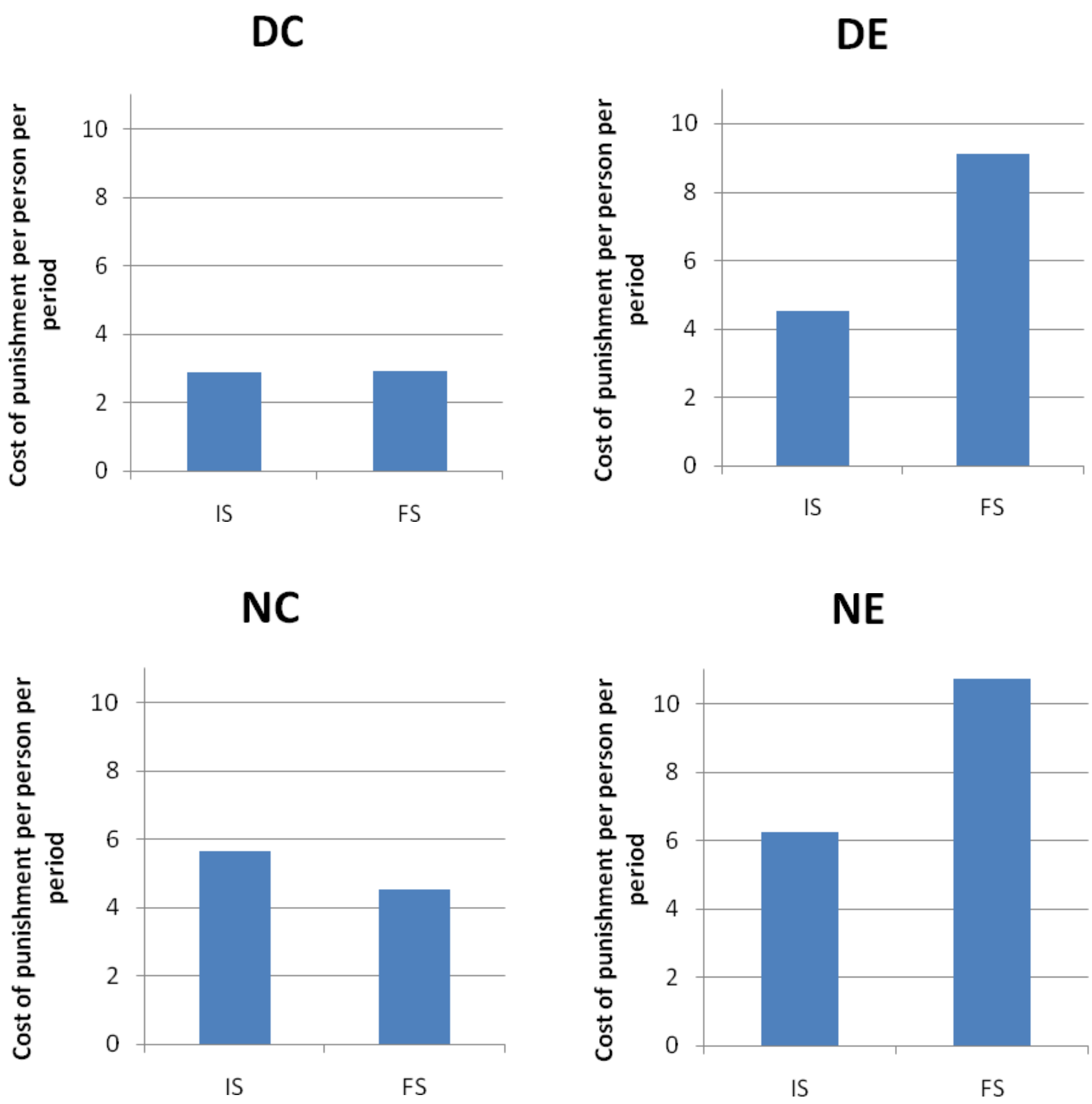
Note: Random effects GLS regressions. Standard errors in parentheses. Standard errors corrected for within-group clustering, except in regressions 5 and 6 where only two different groups are included. Observations from phase 1 are excluded in regressions 2 and 3. * significant at 10%; ** significant at 5%; *** significant at 1%

Table A.6 Determinants of contributions, informal sanctions

	Dependent variable: Contribution to public good						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Contribution in previous period	0.478***			0.596***	0.435***	0.630***	0.462***
	(0.041)			(0.043)	(0.047)	(0.043)	(0.042)
Others' mean contribution in previous period	0.416***				0.441***		0.415***
	(0.049)				(0.046)		(0.047)
Non-perversely punished in previous period	0.384**					0.830***	0.379*
	(0.185)					(0.300)	(0.195)
Perversely punished in previous period	-0.338					-2.627***	-0.430
	(0.727)					(0.730)	(0.722)
CRT score		0.926***	0.746***	0.136	0.185*	0.183	0.199*
		(0.251)	(0.262)	(0.117)	(0.112)	(0.120)	(0.113)
Female		-0.807	-0.629	-0.181	-0.124	-0.093	-0.089
		(0.553)	(0.515)	(0.265)	(0.203)	(0.252)	(0.206)
General political pref.		0.044	0.065	-0.026	-0.029	-0.024	-0.026
		(0.100)	(0.105)	(0.044)	(0.036)	(0.044)	(0.038)
Contribution in period 1			0.162***	0.031**	0.032**	0.036**	0.031**
			(0.042)	(0.014)	(0.015)	(0.015)	(0.015)
Phase:							
Phase 4	0.285	0.444	0.448	0.519	0.276	0.664	0.351
	(0.400)	(0.578)	(0.573)	(0.488)	(0.389)	(0.456)	(0.390)
Phase 5	0.232	1.152*	1.157*	0.927*	0.202	0.965**	0.290
	(0.373)	(0.656)	(0.653)	(0.494)	(0.367)	(0.457)	(0.369)
Phase 7	0.189	1.529**	1.543**	0.874*	0.160	0.923**	0.262
	(0.348)	(0.757)	(0.753)	(0.483)	(0.347)	(0.433)	(0.343)
Period:							
Period 2		0.751***	0.751***				
		(0.127)	(0.127)				
Period 3	-0.413**	1.005***	1.005***	-0.193	-0.403**	-0.243	-0.402**
	(0.178)	(0.181)	(0.182)	(0.157)	(0.177)	(0.161)	(0.177)
Period 4	-0.782***	0.858***	0.858***	-0.492***	-0.773***	-0.552***	-0.767***
	(0.194)	(0.236)	(0.236)	(0.180)	(0.191)	(0.181)	(0.191)
Treatment:							
DC	0.582*	5.277***	5.023***	2.068***	0.555	1.810***	0.576
	(0.329)	(1.469)	(1.344)	(0.575)	(0.371)	(0.522)	(0.361)
DE	0.460*	3.098*	2.718*	1.453**	0.395	1.337**	0.421
	(0.267)	(1.715)	(1.614)	(0.609)	(0.285)	(0.526)	(0.278)
NC	0.552**	4.246***	4.070***	1.702***	0.551*	1.572***	0.563*
	(0.272)	(1.489)	(1.368)	(0.600)	(0.303)	(0.520)	(0.296)
Constant	1.775***	10.621***	9.058***	5.042***	1.801***	4.243***	1.534**
	(0.680)	(1.562)	(1.492)	(0.981)	(0.641)	(0.993)	(0.723)
R-sq (overall)	0.21	0.25	0.55	0.61	0.57	0.61	0.61
Observations	2,280	2,280	1,710	1,710	1,710	1,710	1,710
Number of subjects	235	235	235	235	235	235	235

Note: Random effects GLS regressions. Standard errors in parentheses. Standard errors corrected for within-group clustering. * significant at 10%; ** significant at 5%; *** significant at 1%

Figure A.1. Absolute cost of sanctioning, by sanction scheme and treatment



The figure shows the total cost of sanctioning per person per period. Under IS, the cost of sanctioning includes costs to givers and receivers of punishment. Under FS, both the fixed cost of sanctions (2 or 8 points) and the point reductions received by free riders (sanction rate*points in private account).