Supplementary Information for TRANSPARENCY REDUCES BRIBERY BY SHAPING BELIEFS IN A PUBLIC GOODS EXPERIMENT WITH CORRUPTION OPPORTUNITIES

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Appendix A to E

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Appendix A. Theoretical model

In this setting, the outcome of contribution and bribing behavior, in terms of material gains, depends not only on the individual's decision-making process and intrinsic propensities but also on exogenous as well as strategic factors. More specifically, the payoff of our experimental participants depends on their choices, the (exogenously determined) bribe acceptance, and others' contributions. Therefore, every subject i belonging to group g has, in every round of play, a payoff function of the form:

$$\pi_{i,g} = \delta_{i,g}[e_{i,g} - (p \cdot b + (1-p)(b + \underline{c}_{i,g})) + \alpha\Sigma_{j=1}^{N} c_{j,g}] \tag{1}$$

$$+(1-\delta_{i,g})(e_{i,g} - c_{i,g} + \alpha\Sigma_{j=1}^{N} c_{j,g})$$

where:

$\delta_{i,g}$ is subject's decision to corrupt;

$e_{i,g}$, $c_{i,g}$ and $\underline{c}_{i,g}$ are, respectively, her endowment, contribution choice and minimal mandatory contribution;

p is the acceptance decision of the (computerized) bureaucrat associated to group g;

b is the bribe offered, which in the experiment is set to 2 tokens;

α is the Marginal Per Capital Return (MPCR hereafter) of the public good, which is set to 0.4.

From a payoff-maximization perspective, contributing minimally remains the optimal choice as in standard linear public good games. The value of the bribe is set to 2 tokens so as to be lower to the lowest minimal contribution, i.e., the one associated with the lowest endowment value (12 tokens).

Similarly to Barr and Serra (2009), one's bribing attempt, if successful, has an impact on the material payoff of all group members, as the whole community usually bears the negative effects of corruption in the real world. In our model, this is reflected in others' lower contributions: if individual j successfully bribes the bureaucrat, then $c_{j,g} = 0$ in all other group members' payoff functions.

Furthermore, we hypothesize that the decision-making process accounts for non-monetary benefits and costs not captured by the mere material payoff. Social preferences might affect the decision to bribe in several ways. Bribing comes with a non-monetary cost, $\mu\delta_{i,g}$, associated with the immorality of the action *per se* and to the reduction in others' payoffs caused

by the possibility to free-ride; the parameter μ, with $\mu \geq 0$, captures the extent to which an individual perceives the act as immoral. When wrongdoings can be publicly known, μ also captures the psychological cost associated with the stigma, which is again related to one's morality concerns.

In addition to moral costs, individuals' decision-making can be subject to the pressure originating from the adherence to a social norm. We model this aspect as a quadratic loss function of the form $\sigma(\delta_{i,g} - \delta_{-i,g})^2$, where the parameter σ, with $\sigma \geq 0$, identifies the weight an individual assigns to deviating from the social norm and $\delta_{-i,g}$ is the peers' corruption behavior. The latter is clearly unobservable, given the simultaneity in our game; however, it can be approximated by individual i's belief regarding others' behavior, i.e., $\delta^e_{-i,g}$.

Similarly, contribution choices can be affected not only by individual intrinsic preferences, as in the case of free riders or unconditional cooperators, but also by the observation of others' choices, as in the case of conditional cooperators.* We, therefore, model utility also as a function of the distance between own and others' contributions, i.e., $\gamma(c_{i,g} - c_{-i,g})^2$ where a strictly positive γ is associate to preferences for conditional cooperation whereas we can assume $\gamma = 0$ in the case of free riders and unconditional cooperators.

The utility function associated with our minimal-contribution public good game with corruption is, therefore

$$U_{i,g} = \pi_{i,g} - \mu\delta_{i,g} - \sigma(\delta_{i,g} - \delta^e_{-i,g})^2 - \gamma(c_{i,g} - c_{-i,g})^2 \tag{2}$$

where $\pi_{i,g}$ is the material payoff given by equation 1.

Therefore, the choice to bribe can be affected not only by considerations pertaining to the material payoff but also by a combination of non-monetary costs. In a situation with no or very low (expected) corruption, an agent with both moral ($\mu > 0$) and social norm (σ) concerns has a very low incentive to bribe. However, in a corrupt environment, the solution is less straightforward, as adherence to the social norm can offset moral costs. Our experiment offers some insights into this specific aspect.

*For a discussion and review of the behavioral types in linear public good games, i.e., conditional and unconditional cooperators and free riders, see Töni and Volk (2018).

Appendix B. Questionnaire

Q1. Gender

Q2. Age

Q3. Faculty

Q4. Geographic area (Possible answers: Italian regions or abroad)

Q5. How often, in a regular week, do you happen to read a newspaper?

- Everyday
- More than once a week but not every day
- Once a week
- Less often
- Never

Q6. How often, in a regular week, do you happen to read news on the internet?

- Everyday
- More than once a week but not every day
- Once a week
- Less often
- Never

Q7. How often, in a regular week, do you happen to watch the news on TV?

- Everyday
- More than once a week but not every day
- Once a week
- Less often
- Never

[Unincentivized trust game, not used in the data analysis]

For the following questions, please refer to your area of origin. Please indicate how much the following statements are suitable to describe your city (where 0 means *The statement does not fit at all* and 10 means *The statement fits perfectly*)

Q8. In my area, corruption in the public schooling system is very strong.

Q9. In my area, corruption in the public health system is very strong.

Q10. In my area, corruption in the police is very strong.

Q11. In my area, corruption in public offices is very strong.

Q12. In my area, corruption in the judiciary system is very strong.

Q13. In my area, elections are clean and there is NO corruption.

Q14. It has never happened to you or other members of your family that a person, who plays a role in a public or private body (e.g., a doctor, a teacher, a judge), has asked or made it clear that (s)he wanted money or other compensations in exchange for a favor (e.g., speed up a practice, a recommendation, remove a fine)?

- Medical and health care: yes/no
- School or university: yes/no
- Police: yes/no
- Other public offices: yes/no

Q15. In the last 12 months, has it ever happened to you or other members of your family to consent to these requests and to pay in cash or via other types of compensation?

- Medical and health care: yes/no
- School or university: yes/no
- Police: yes/no
- Other public offices: yes/no

Appendix C. Experimental Instructions

[Not part of original instructions: translation from Italian, instructions for PRI treatment.]

Welcome! Please read the following instructions carefully. All the participants are reading these same instructions and are participating to this experiment for the first time.

During this experiment, you will be asked to make some decisions. Your decisions, along with those of the other participants, will determine your earnings for the experiment, which will be calculated as explained later. The final gain for the experiment will be paid individually and privately by the experimenters at the end of the experiment.

All sums used in the experiment are expressed in tokens. All the tokens that you have earned will be converted into Euros at an exchange rate of:

$$2.5 \text{ tokens} = 1 €$$

This experiment is completely computerized. From this moment on, the use of mobile phones is prohibited as well as any interaction between participants. Those who violate these rules will be excluded from the experiment without receiving any payment. If you have any doubt about the experiment, raise your hand and one of the experimenters will immediately answer your question privately.

The experiment ends with a questionnaire; the information is confidential and will be considered anonymously and only for research purposes.

The experiment consists of 2 phases. The choices you will make during the two phases and the relative payments are completely independent. The profit for the experiment will be equal to the participation fee of 4 euros plus the sum of the payments for the first and second phases.

PHASE 1. Phase 1 of the experiment consists of 24 rounds. In this phase, you will be part of a group of 4 participants, including yourself. These groups will be randomly formed by the computer before the first round and will remain constant throughout the duration of the experiment. Each group is associated with a computerized bureaucrat, who has a certain probability of accepting to be corrupted. Such probability will be randomly determined by the computer and can be any number between 0 and 100% in intervals of 5% (i.e. it can be equal to 0, 5, 10, 15 ..., 95, 100, where all values are equally likely). The role of the bureaucrat will be explained later.

In each round, you and all members of the group will receive an endowment, which is always the same in all the rounds for each individual, but can vary from one group member to another. In particular, the endowment may be 12, 15, 18, 21 or 24 tokens; the value is chosen randomly by the computer for each participant and all values are equally likely. At

the beginning of each round you will always be assigned the same amount of tokens; it will not be possible to know which endowment value has been assigned to the other members of your group.

In each round, you will be asked to make two choices; all group members will take the same two choices simultaneously.

Choice 1. At the beginning of each round, you will have to decide how many tokens from your endowment do you want to keep for yourself and how many tokens you want to put in a mutual fund, whose earnings are equally redistributed to all group members? The minimum contribution is equal to 1/3 of the initial endowment and the maximal contribution is equal to the budget.

The total profit in each round is equal to: initial endowment - your contribution + 0.4 *(sum of group members' contributions)

In each round one of the group members, randomly selected by the computer, has the possibility to bribe the computerized bureaucrat, offering him 2 tokens to have the possibility of not contributing at all in the common fund. The bureaucrat has a probability p to accept or reject this bribe offer.

Choice 2. In each round, you will have to choose whether you want to bribe the bureaucrat or not, in case you will be the selected group member. You will be asked to make this choice before knowing if you have been selected or not.

If you will be selected by the computer:

- If you decide to try to bribe the bureaucrat and your offer is accepted, your contribution to the mutual fund will be 0 and you will only have to pay 2 tokens to the bureaucrat; your earnings for this round would be: endowment - 2 + 0.4 *(sum of the contributions of the 3 group members)

- If the bureaucrat does NOT accept the offer, you will have to pat both the bureaucrat (2 tokens) and the minimum contribution equal to a 1/3 of your endowment; your earnings for this round would be: endowment - 1/3 d - 2 + 0.4 *(sum of the contributions of the 4 members of the group)

- If you decide not to bribe the bureaucrat, your contribution (and consequently your earnings) will be equal to the amount selected in Choice 1.

If you will not be selected by the computer, your Choice 1 will be implemented automatically.

NOTE: every 8 rounds the bureaucrat will change. This means that after rounds 8 and 16, the computer will select a new probability of acceptance of the bribe proposal.

At the end of each round, before knowing how much you have earned, you will be asked to make two hypotheses:

a) What do you think is the probability that the bureaucrat agrees to be corrupted (the values you can choose are those possible for p, i.e. 0, 5, 10, 15 ..., 95, 100 percent).

b) How many of the other 3 members of the group, in your opinion, have chosen to bribe the bureaucrat (their Choice 2).

NOTE: at the end of the experiment the computer will generate a lottery in which you will have the chance to win alternatively 2.5 tokens or 10 tokens. Your chance to win 10 tokens increases (by 2%) every time your hypotheses a or b are correct. In total, in the 24 rounds, you will have to state 48 hypotheses (24 of type a and 24 of type a); so your chance to win 10 tokens can be at most 96%.

Before the next round begins, the computer will communicate to you if you have been selected to offer a bribe to the bureaucrat (and, in case you have chosen to bribe him, whether your offer has been accepted) and your earnings for the round.

Effective earnings for phase 1

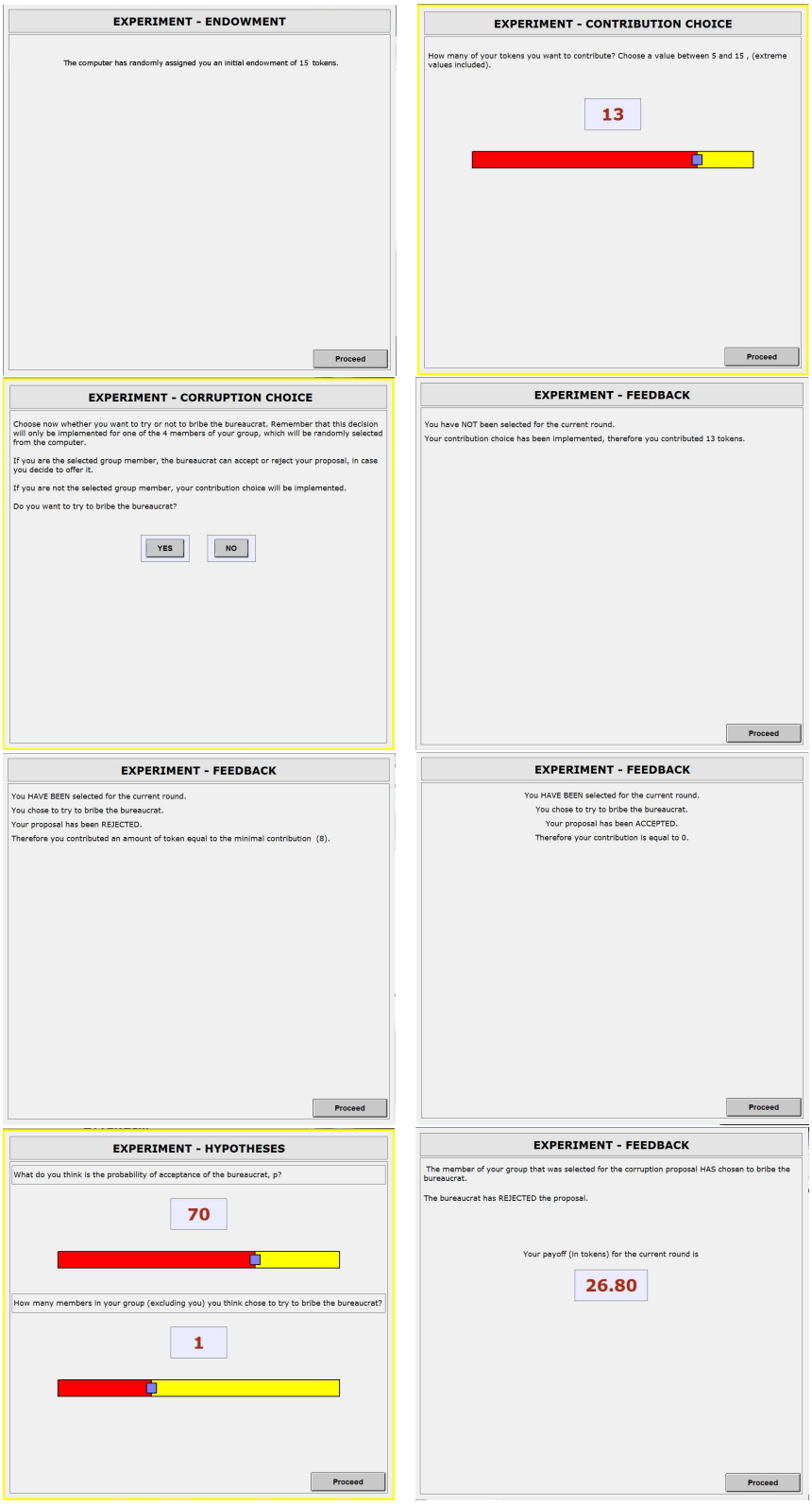
At the end of the experiment, the computer will randomly select one of the 24 rounds. Your actual income for Phase 1 will be equal to: earnings realized in the selected round + earnings realized in the lottery on the hypotheses.

PHASE 2. Phase 2 of the experiment will consist of a short series of individual choices. The instructions will be displayed on the screen as soon as Phase 1 is completed.

Final Earnings for the experiment

Your final earnings for the experiment will be given by the sum of the participation fee (equal to 4 €) plus the sum earned in Phases 1 and 2.

Appendix D. Translated screenshots



Appendix E. Additional tables and robustness tests

Table A.1: Results from random-effect regressions with corruption choice and share of contributed endowment as dependent variable and with gap covariates at round t

	Individual choices at round t			
	Corrupt		Contribute	
	Feedback	*Decision*	*Feedback*	*Decision*
Belief-actual n (t)	0.048***	0.051***	0.000	0.000
	(0.007)	(0.007)	(0.002)	(0.002)
Belief-actual p (t)	0.057**	0.048*	0.005	0.003
	(0.024)	(0.026)	(0.008)	(0.008)
Private information $(t-1)$. Reference category: not selected/did not bribe				
Bribe rejected	−0.088***		−0.005	−0.002
	(0.026)		(0.010)	(0.010)
Bribe accepted	−0.019		0.008	0.008
	(0.027)		(0.010)	(0.009)
Corrupt_{t-1}		0.194***		
		(0.019)		
Corrupt_1		0.232***		
		(0.037)		
Contribute_{t-1}	−0.076	−0.045		0.178***
	(0.051)	(0.055)		(0.020)
Contribute_1				0.403***
				(0.044)
Treatment = PUB	−0.148***	−0.086**	−0.021	−0.022**
	(0.055)	(0.041)	(0.017)	(0.011)
Endowment	0.009	0.003	−0.004**	−0.003**
	(0.006)	(0.005)	(0.002)	(0.001)
Ambiguity aversion	0.008	0.009	0.012**	0.005
	(0.018)	(0.013)	(0.006)	(0.004)
Experienced corr.	0.048	0.071	0.036	0.007
	(0.107)	(0.078)	(0.033)	(0.021)
Perceived corr.	0.017	0.006	0.001	−0.000
	(0.015)	(0.011)	(0.005)	(0.003)
Individual Characteristics	✓	✓	✓	✓
Period dummies	✓	✓	✓	✓
Observations	3,128	3,128	3,128	3,128
Number of ID	136	136	136	136

Dependent variables are choice to corrupt (first two columns of results, reporting marginal effects from random-effect probit) and contributed a share of endowment (last two columns, reporting coefficients from random-effect tobit). Additional covariates are defined in Table 2 in the main text. Both dynamic specifications (*Decision* columns) include, together with the lagged choice, also the initial condition. All regressions include period dummies.

Standard errors in parentheses: ***p<0.01, **p<0.05, *p<0.1

Table A.2: Balance table of participants' characteristics with two-sample t tests on mean differences

Variable	PRI Mean/(SE)	PUB Mean/(SE)	PRI - PUB t test
Female	0.412	0.397	0.863
	(0.060)	(0.060)	
Age	22.441	22.838	0.322
	(0.290)	(0.275)	
News exposure	2.534	2.652	0.335
	(0.093)	(0.079)	
Experienced corr.	0.221	0.173	0.306
	(0.035)	(0.031)	
Perceived corr.	4.765	5.032	0.468
	(0.246)	(0.272)	
Ambiguity aversion	7.426	7.574	0.601
	(0.202)	(0.195)	
South	0.500	0.588	-0.088
	(0.061)	(0.060)	
N	68	68	

The values displayed for t-tests are the p-values of a two-independent sample t test run on the between-treatment differences in means. The unit of observation is the experimental participant. PRI indicates Private Information treatment, and PUB indicates Public Information treatment; for both, we have 68 participants. Significance: ***=.01, **=.05, *=.1.

Table A.3: Between-treatment differences and t test of choices and beliefs for round 1

Variable	PRI Mean/(SE)	PUB Mean/(SE)	PRI - PUB t test
	Beliefs		
Others (n)	1.897	1.809	0.088
	(0.111)	(0.105)	
Belief - actual n	1.044	1.265	-0.221
	(0.150)	(0.143)	
Bureaucrat (p)	0.451	0.406	0.045
	(0.026)	(0.020)	
Belief - actual p	-0.085	-0.071	-0.014
	(0.044)	(0.038)	
	Choices		
Corrupt	0.515	0.368	0.147*
	(0.061)	(0.059)	
Contribute	0.399	0.407	-0.009
	(0.014)	(0.018)	
N	68	68	

The values displayed for t-tests are the p-values of a two-independent sample t test run on the between-treatment differences in means. The sample is limited to round 1 only. The unit of observation is the experimental participants, as beliefs and choices are elicited before feedback is released. PRI indicates Private Information treatment, and PUB indicates Public Information treatment; for both we have 68 independent observations. Significance: ***=.01, **=.05, *=.1.

Table A.4: Average group contributions (in share of endowment) in PUB treatment by public information type and overall

Public info $(t-1)$	Mean contribution (t)	N
Did not bribe	0.404	211
Bribe rejected	0.401	88
Bribe accepted	0.407	92
Total	0.404	391

Average share of endowment contributed to the public good at the group level in the PUB treatment. The *public info* variable indicates the outcome of the bribing attempt at round $t-1$, which is publicly shared before round t starts.

Table A.5: Results from random-effect tobit regression with Mundlak correction, with beliefs on the bureaucrat and other group members' level of corruption as dependent variables

Beliefs on corruption acceptance and attempts at round t				
	Bureaucrat (p)		Others (n)	
	feedback	*decision*	*feedback*	*decision*
Private information ($t-1$). Reference category: not selected/did not bribe				
Bribe rejected	-0.031^{*}		-0.115	
	(0.018)		(0.080)	
Bribe accepted	0.071^{***}		0.189^{**}	
	(0.018)		(0.079)	
Corrupt_{t-1}		0.043^{***}		0.222^{***}
		(0.011)		(0.049)
Contribute_{t-1}	0.026	0.030	0.131	0.157
	(0.035)	(0.035)	(0.154)	(0.154)
Treatment = PUB	-0.033^{*}	-0.034	-0.383^{**}	-0.270^{*}
	(0.019)	(0.021)	(0.154)	(0.144)
Endowment	-0.003	-0.003	-0.017	-0.024
	(0.002)	(0.002)	(0.018)	(0.017)
Ambiguity aversion	0.013^{**}	0.012^{*}	-0.030	-0.038
	(0.006)	(0.007)	(0.051)	(0.047)
Experienced corr.	-0.048	-0.049	-0.019	-0.052
	(0.037)	(0.039)	(0.294)	(0.273)
Perceived corr.	-0.016^{**}	-0.012^{**}	-0.013	0.004
	(0.005)	(0.005)	(0.042)	(0.038)
Individual Characteristics	✓	✓	✓	✓
Period dummies	✓	✓	✓	✓
Mundlak correction	✓	✓	✓	✓
Observations	3,128	3,128	3,128	3,128
Number of ID	136	136	136	136

Dependent variables are beliefs about the probability of bribe acceptance (first two columns of results) and of other group members (last two columns). Specifications include either the information privately received (*feedback* columns, with ref. ctg = not selected/did not bribe) or the corruption choice, both of the previous round. Columns 1 and 3 refer to end-of-period feedback that the subject receives in response to her bribing offer. Columns 2 and 4 decision to corrupt in the previous round, independently from its outcome and whether the subject is then actually selected for offering a bribe. Additional covariates are defined in Table 2 in the main text. All specifications are estimated via random-effect tobit regression and include period dummies and individual means of time-varying covariates.

Standard errors in parentheses: $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$

Table A.6: Results from random-effect regressions with Mundlak correction, with corruption choice and share of contributed endowment as dependent variables

	Individual choices at round t			
	Corrupt		Contribute	
	Feedback	*Decision*	*Feedback*	*Decision*
Belief-actual n $(t-1)$	0.030^{***}	0.016^{**}	-0.000	-0.000
	(0.006)	(0.006)	(0.002)	(0.002)
Belief-actual p $(t-1)$	0.042^{*}	0.026	-0.000	-0.001
	(0.025)	(0.025)	(0.008)	(0.008)
Private information $(t-1)$. Reference category: not selected/did not bribe				
Bribe rejected	-0.098^{***}		-0.005	-0.003
	(0.025)		(0.010)	(0.010)
Bribe accepted	-0.042		0.007	0.007
	(0.027)		(0.010)	(0.010)
Corrupt_{t-1}		0.180^{***}		
		(0.017)		
Corrupt_{1}		0.111^{***}		
		(0.028)		
Contribute_{t-1}	-0.076	-0.055		0.178^{***}
	(0.052)	(0.053)		(0.020)
Contribute_{1}				0.404^{***}
				(0.043)
Treatment = PUB	-0.074^{**}	-0.045	-0.021	-0.020^{*}
	(0.037)	(0.028)	(0.017)	(0.011)
Endowment	0.003	0.001	-0.005^{**}	-0.003^{**}
	(0.004)	(0.003)	(0.002)	(0.001)
Ambiguity aversion	0.007	0.006	0.013^{**}	0.005
	(0.012)	(0.009)	(0.006)	(0.004)
Experienced corr.	0.012	0.024	0.033	0.005
	(0.070)	(0.052)	(0.032)	(0.021)
Perceived corr.	-0.007	-0.008	-0.001	-0.001
	(0.010)	(0.007)	(0.005)	(0.003)
Individual Characteristics	✓	✓	✓	✓
Period dummies	✓	✓	✓	✓
Mundlak correction	✓	✓	✓	✓
Observations	3,128	3,128	3,128	3,128
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Dependent variables are choice to corrupt (first two columns of results, reporting marginal effects from random-effect probit) and contributed share of endowment (last two columns, reporting coefficients from random-effect tobit). Additional covariates are defined in Table 2 in the main text. Both dynamic specifications (*Decision* columns) include, together with the lagged choice, also the initial condition. All regressions include individual means of time-varying covariates and period dummies.

Standard errors in parentheses: ***p<0.01, **p<0.05, *p<0.1