Does Corruption Affect the Private Provision of Public Goods?

Tobias Cagala*, Ulrich Glogowsky**, Veronika Grimm*, Johannes Rincke*, Amanda Tuset Cueva*

July 4, 2017

Abstract

We present controlled experimental evidence on how corruption affects the private provision of public goods. Subjects in our experiment donate to non-profit associations. The associations provide local public goods that benefit all subjects. We compare average contributions between two conditions with the same efficiency: a corruption condition, where an administrator can expropriate part of contributions, and a control condition without corruption. Compared to the control condition, subjects matched to an expropriating administrator significantly reduce their contributions. Hence, contributors are less inclined to behave prosocially (i.e. are more likely to free-ride) if they are exposed to corruption. We demonstrate that this effect works through a specific channel: corruption breaks the otherwise positive link between baseline preferences for cooperation and private contributions to public goods.

JEL codes: D02; D03; H41
Keywords: Corruption; private provision of public goods; contribution behavior; cooperation preferences; prosocial behavior

*Department of Economics, University of Erlangen-Nuremberg. Cagala: tobias.cagala@fau.de; Grimm: veronika.grimm@fau.de; Rincke: johannes.rincke@fau.de; Tuset Cueva: amanda.tuset.cueva@fau.de. **Department of Economics, University of Munich. Glogowsky: ulrich.glogowsky@econ.lmu.de. Financial support by the Emerging Field Initiative of the University of Erlangen-Nuremberg and the Hans-Frisch-Stiftung are gratefully acknowledged.

1 Introduction

Economists tend to agree that corruption has severe negative consequences for society: it has been shown that corruption decreases private investment (Mauro, 1995; Campos *et al.*, 1999; Wei, 2000; Beekman *et al.*, 2014) and that the misuse of public funds for private gain deprives citizens of vital public services (Reinikka and Svensson, 2004, 2005; Olken, 2006, 2007). Beyond these well-known effects, a recent literature suggests that the presence of corrupt leaders adversely affects a much broader set of outcomes, including the type of behavior individuals show when interacting with their fellow citizens. For instance, research in psychology has demonstrated that group leaders' procedural fairness promotes cooperation among group members (De Cremer and Van Knippenberg, 2002). Similarly, recent experimental evidence from economics shows that free-riding behavior is diminished if elected authorities lead by example (Kelsey Jack and Recalde, 2015) and that framing past experiences in an ultimatum game as bribery erodes trust in others (Banerjee, 2016).[1]

In this paper, we test whether the exposure to a rent-extracting administrator affects the private provision of public goods.[2] The question how voluntary contributions to public goods respond to corruption is of vital importance. This is because public goods can be provided by the state, or through private contribution schemes. In the case of corruption, the provision of public goods by the state shrinks mechanically, as the misuse of public funds by state officials leaves citizens with fewer public goods in exchange for their tax money. Whether citizens are equipped with the socially desirable level of public goods thus depends on the response of private provision. If corruption leads to lower private contributions, it is likely that citizens will face a severe underprovision with respect to the overall level of public goods.

The effect of corruption on voluntary contributions could work through two dif-

[1] There is an older line of reasoning in political economy maintaining that autocratic power of executives and elite capture lead to low levels of interpersonal trust and civic participation, sometimes labeled as "social capital" (Putnam, 1993; Knack and Keefer, 1997). However, instead of identifying causal effects, this literature has mainly pointed to correlations in survey-based data.

[2] The focus on the consequences of corruption in the form of rent extraction differentiates our work from the existing experimental literature on corruption (e.g. Frank and Schulze, 2000; Abbink *et al.*, 2002; Barr and Serra, 2009; Cameron *et al.*, 2009; Abbink and Serra, 2012). These studies mainly focus on corruption in the form of bribery and investigate agents' motivation to engage in or punish corruption.

ferent channels. First, if corrupt officials are involved in transforming private contributions into public goods, rent extraction reduces the efficiency of public goods provision. We call this the efficiency effect.[3] More specifically, corruption decreases the marginal per capita return from contributing to the public good. Of course, this efficiency loss lowers the incentives for community members to contribute to private provision schemes. Second, corruption might erode individuals' contributions to the private provision of public goods through a motivational effect that goes beyond the efficiency effect. This effect might be explained by well-known concepts such as self-serving believes (corruption might strengthen the belief that the society lacks pro-social attitudes), reciprocity (individuals reduce contributions to decrease bureaucrats' rents from extraction), or betrayal aversion (individuals lower contributions to limit the potential to be betrayed).[4]

While the efficiency effect of corruption in the context of voluntary contribution mechanisms is important and interesting in its own right, it is also very similar in nature to the effect of the marginal per-capita return that has been extensively studied in the context of the public goods game (for an early survey, see Ledyard (1995)). In contrast, the pure motivational impact of corruption on private contributions, i.e. the effect remaining once we control for the efficiency effect, has rarely been studied empirically and is therefore not well understood.

As suggested by the previous literature, we expect the motivational effect of corruption on contribution behavior to be negative. Data from the World Values Survey (WVS) displayed in Figure 1 confirm this expectation. The figure plots the percentage of respondents who contribute to the private provision of public goods by volunteering for civic organizations. Among individuals who believe that corruption within their country's government is low, almost 38% identify themselves as contributors. In contrast, among individuals who perceive corruption to be high, the share of contributors

[3] Previous research on developing countries has indeed shown that corruption often takes the form of local chiefs expropriating (part of) households' contributions to communal public goods (Acemoglu *et al.*, 2014; Beekman *et al.*, 2014). Such contributions are often partly voluntary, which differentiates them conceptually from taxes used to finance public goods provided by the state.

[4] Di Tella and Pérez-Truglia (2015) introduce the concept of self-serving beliefs. Rabin (1993) and Dufwenberg and Kirchsteiger (2004) formalize the idea of reciprocity, and Fehr and Gächter (2000) and Falk (2007) show that individuals indeed behave reciprocal. Bohnet and Zeckhauser (2004), Bohnet *et al.* (2008) and Cubitt *et al.* (2015) discuss betrayal aversion in the context of investment decisions under risk.

is less than 27%.[5]

While the WVS evidence is interesting, it only shows a raw correlation. To identify the motivational effect of corruption on voluntary contributions, we therefore implement a controlled laboratory experiment. In the experiment, we observe subjects' one-shot contributions (out of a private endowment) to certain non-profit associations operating outside the laboratory. We identify the effect of corruption on voluntary contributions by comparing contributions in a corruption condition, where an administrator decides whether or not to expropriate a fixed share of contributions, to a control condition without active expropriation. As we want to study the pure motivational impact of corruption, we ensure that the transformation of contributions into public goods is equally efficient in both conditions. To that end, we adjust the efficiency in the control condition to match the efficiency in the corruption condition. This is achieved by means of a random draw that determines for each administrator in the control condition whether or not she receives the same fixed share of contributions as an expropriating administrator in the corruption condition.

Our main findings are as follows. First, we find that subjects matched to an expropriating administrator in the corruption condition contribute much less to public goods provision than subjects in the control condition. The effect is substantial: in our setting, being exposed to a corrupt administrator causes a 31% reduction in contributions. As our design shuts down the efficiency channel, the experiment identifies the pure motivational effect of corruption: contributors are less inclined to behave prosocially (and are more likely to free-ride) if they are exposed to corruption taking the form of an active expropriation decision by an administrator. Second, we use survey data elicited after the experiment to identify cooperative and non-cooperative contributor types. Importantly, the survey questions elicit baseline attitudes towards cooperation, independent from our experimental design. We study whether individuals' responses to corruption in the experiment differ between different types with

[5]It seems justified to assume that government corruption does not affect how much public goods voluntary organizations can provide from one hour of unpaid volunteer work. Hence, a direct efficiency effect of government corruption on the private provision of public goods is unlikely to drive the correlation in Figure 1. In other contexts, it is often difficult to differentiate between efficiency effects and pure motivational effects. See, for instance, OECD (2013), discussing a negative correlation between government corruption and subjective measures of tax compliance.

respect to baseline preferences for cooperation. We find that without corruption, non-cooperative types make lower contributions than cooperative types. However, whereas non-cooperative types do not react to corruption, cooperative types reduce their contribution to the level of non-cooperative types in the presence of expropriating administrators. This finding suggests that the overall effect of corruption on voluntary contributions works through a specific channel: the presence of corrupt administrators breaks the otherwise positive link between baseline preferences for cooperation and actual cooperative behavior.

The remainder of the paper is organized as follows. Section 2 presents our research design, Section 3 describes our main findings, and Section 4 concludes.

2 Experimental Design

Private Provision of Public Goods in the Experiment We investigate the effect of corruption on voluntary contributions to public goods in a laboratory experiment. In our experiment, we adapt a widely-used experimental design that studies contributions to a naturally occurring public good by eliciting choices in a modified dictator game (Eckel and Grossman, 1996; Benz and Meier, 2008; de Oliveira *et al.*, 2011; Voors *et al.*, 2012).[6] Specifically, subjects in the experiment make contributions to non-profit associations, which use the funds to provide real public goods to the population from which subjects are drawn. We achieve this as follows: we conduct the experiment with students enrolled at the department of economics and business administration at the University of Erlangen-Nuremberg. In the experiment, we provide subjects with an endowment which they can either keep for themselves or contribute to one of the various non-profit associations (mostly run by students) operating at the department. The associations offer a broad range of services, including placement into international exchange programs, students workshops, tutoring services, and counseling for students. The associations also participate in the organization of various social

[6]The main motivation for such an experimental design is to increase the motivation to contribute (i.e. individuals' altruism) by replacing the usual anonymous recipient with a reputable charity (Eckel and Grossman, 1996). This increases the variation in contributions and thus helps us to identify effects of corruption.

events at the department throughout the academic year.[7]

Treatment Conditions The experiment consists of a simple one-shot game. To identify the effect of corruption on contribution behavior, we implement two treatment conditions: a *corruption condition* and a *control condition*. In both conditions, we randomly determine subjects' player type, either contributor or administrator. In addition, we randomly allocate subjects to groups, each group comprising three contributors and one administrator. Both types of players receive a fixed endowment of 100 experimental currency units (ECU), which equals 10 Euro. Furthermore, both conditions consist of two stages. Figure 2 summarizes the timing of our experimental design.

In the first stage of the corruption condition, each contributor selects one out of five associations to which she can contribute an amount between 0 and 100 ECU in the second stage. The instructions list the associations by name and inform subjects about the associations' main activities. For instance, the international student association AIESEC is introduced as 'AIESEC: Placement for international exchanges and internships and corresponding counseling services; intercultural tutoring'. While contributors select an association, each administrator makes a binary choice of whether or not to expropriate a fixed share of 10% of the second-stage contributions in her group. Administrators who decide for expropriation know that this increases their payoff by 0 to 30 ECU, depending on the second-stage contributions. We do not inform administrators about which associations contributors in their group select. Hence, administrators cannot condition their expropriation decision on which associations benefit from contributions. In the second stage, contributors learn about their administrator's decision (expropriation of 10% of contributions, or no expropriation) before they decide how much to contribute to the previously chosen association. Note that the game does not involve any interaction between contributors.

The control condition differs from the corruption condition in that the first stage

[7]The list of associations includes the local branch of AIESEC, an international student organization, and two further local students' unions (activities: tutoring services, organization of social events at the department, and representation of students in various department committees). The remaining associations offer a broad range of services to students, including counseling services and workshops of various types. The associations are very active in advertising their services to the department community through announcements in courses, posters in the department building, and social media. The instructions in the appendix provide more detailed information on the different associations.

does not involve any active decision-making by administrators. Instead of deciding for or against expropriation, administrators in the control condition are informed about the outcome of a random draw that determines whether or not they receive 10% of the second-stage contributions in their group. In the experiment, we use the label 'additional compensation' for this part of administrators' payoff. We choose the probability for the random draw to be equal to the empirical propensity of administrators choosing expropriation in the corruption condition. Importantly, we neither communicate the exact probability nor mention that the probability depends on the behavior of administrators in another condition. The random draw in the control condition ensures that the efficiency of public goods provision, i.e. the amount received by associations per ECU contributed, is equal between conditions. In the second stage, contributors in the control condition learn about the outcome of the random draw for their administrator before they make their contribution decision.

Further Details of the Design Three further details of our experimental design are worth noting. First, grouping together three contributors with one administrator does not change the monetary incentive for making a contribution. We nevertheless assign individuals into groups of four players to ensure that, despite the moderate expropriation rate, our design implements substantial monetary incentives for administrators to opt for expropriation. Second, administrators and contributors make their decisions knowing that the experimenter doubles transfers to associations.[8] This ensures that contributions to the same associations would be less efficient in terms of public goods provision if contributors made them outside the laboratory. Third, administrators perform a simple administrative task after contributors make their contribution decisions. Specifically, administrators have to assign contributions to associations according to contributors' choices.[9] The only purpose of this element of the design is to ensure that the role administrators perform in the experiment is consistent with the function

[8] In groups where administrators benefit from contributions (either actively through expropriation or passively through the additional compensation), the doubling applies to contributions net of the 10% share accruing to administrators.

[9] The least popular association was selected by 9.4% of contributors while the most popular one was selected by 37.2%. The administrative task was implemented such that misallocations by administrators were ruled out. Contributors and administrators were informed about this.

implied by the 'administrator' label.

Identification of the Effect of Corruption Our design generates observations from groups where the administrator benefits from contributions (through the expropriation decision or the random draw), and from groups where this is not the case. We derive our results exclusively from studying contributors who interact with administrators who do benefit from contributions. Contributors from the remaining groups experience a situation where administrators do not interfere with public goods provision, and are thus of no particular use for our study. Hence, we identify the effect of corruption from comparing contributors who were matched to an expropriating administrator (corruption condition) to contributors who were matched to an administrator receiving the additional compensation (control condition).

Importantly, because the share of contributions accruing to administrators is equal in both conditions, this comparison involves contributors who face the same efficiency of public goods provision when deciding about their contribution. The only difference between both conditions is that administrators in the corruption condition make an active decision for expropriation, whereas administrators in the control condition benefit passively from contributions. Consequently, our design identifies the motivational effect of corruption on the private provision of public goods and separates this effect from the mere inefficiency effect associated with corruption.[10]

Technical Details We conducted the experiment in the Laboratory for Experimental Research Nuremberg (LERN). In total, 384 subjects participated in the experiment, 96 as administrators and 288 as contributors. The experiment took one hour, with an average payoff of 90.1 ECU. The average earnings, including the show-up fee of 4 Euro, were 13.01 Euro. We programmed the experiment with z-Tree (Fischbacher, 2007) and recruited subjects with ORSEE (Greiner, 2015). Subjects were recruited from the subject pool at LERN without imposing any restrictions. Subjects solved control questions before the experiment and answered survey questions on individual charac-

[10]This sets our work apart from field studies identifying donor aversion against charities' overhead cost (Gneezy *et al.*, 2014). Note also that, because administrators received a fixed compensation of the same size as a contributor's individual endowment, contributors could not reasonably interpret the expropriation of contributions as supportive to the fairness of the payoff allocation.

teristics and game-related issues after the experiment. We also informed subjects that we would send an e-mail that reports the total amounts transferred to the associations.

3 The Effect of Corruption on Voluntary Contributions

Out of the 48 administrators in the corruption condition, 38 decided for expropriation. This provides us with observations on 114 contributors from the corruption condition matched to an expropriating administrator. We implemented the same distribution in the control condition and thus obtained another 114 contributors from 38 groups with a passive administrator receiving the additional compensation. In our main analysis, we do not consider contributors from groups in which administrators did not benefit from contributions, but we briefly report the results for this subsample at the end of this section. The sample for our main analysis thus comprises 228 observations from contributors matched to an administrator who benefited from contributions, either actively through expropriation or passively through the additional compensation.[11]

Our main result is that corruption impairs the private provision of public goods. Figure 3 compares mean contributions between the corruption and the control conditions and shows a noticeable negative impact of corruption on contribution behavior. In the control condition, subjects contributed 16.9% of their endowment. In contrast, subjects contributed only 11.7% of their endowment in the corruption condition. This 30.9% reduction in mean contributions is statistically significant ($P = 0.039$, Mann-Whitney U test).[12]

Figure 3 identifies how administrators deciding in favor of expropriation affect voluntary contributions to public goods. Given that the marginal impact of contributions on public goods provision is identical between conditions, the effect of corruption captured by our design is a response to the fact that an administrator has made an active decision for expropriation. We conclude that even if we control for differences in efficiency, contributors who are exposed to corrupt administrators are less inclined to behave prosocially (and are thus more likely to free-ride) in terms of voluntary

[11] Figure A1 in the appendix summarizes our sample and shows the number of contributors conditional on administrators' decisions and the random draw.

[12] See Panel A in Table A1 in the appendix for descriptive statistics.

contributions to public goods.

Figure 3 also suggests that the negative correlation between perceived corruption and volunteering for civic organizations shown in Figure 1 is not just a spurious relationship. While we are well aware of the limits of laboratory work in terms of external validity, our results hint to a negative motivational response to corruption that could reflect itself in survey data like those from the WVS.

Figure 4 provides a more detailed perspective on our main finding. It displays histograms of contributions (bin size 10 ECU) and cumulative distribution functions of contributions for both conditions. Compared to the control condition, the figure reveals a higher likelihood of contributions up to 20% of endowments in the corruption condition. Contributions in the range between 40% and 70% of endowments are more likely in the control condition. Overall, we note that introducing corruption results in a substantial shift of probability mass towards lower contributions.

RESULT 1: *Controlling for differences in efficiency, voluntary contributions to public goods are significantly lower in the presence of expropriating administrators. Differences in average contributions are driven by a shift towards small and zero contributions in the presence of corruption.*

Having shown that corruption negatively affects voluntary contributions, we now turn to a more detailed analysis and ask if the overall effect of corruption on voluntary contributions identified in Figure 3 is driven by a specific contributor type in terms of the preference for prosocial behavior. Specifically, we study how the impact of corruption on voluntary contributions interacts with a measure of contributors' trust in others. In doing so, we follow Thöni *et al.* (2012) who show in a large experimentally-validated survey that survey measures of trust proxy for cooperation preferences (rather than for beliefs about others' cooperativeness).[13] Hence, comparing the responses to corruption between subjects with low vs. high levels of stated trust allows us to test whether the overall negative effect of corruption is driven by subjects with a weak or strong baseline preference for cooperation (or both). To study

[13] Thöni *et al.* (2012) run a public goods experiment in the laboratory and find that the response to the trust question is a strong predictor of how much subjects contribute given their beliefs about others' contributions, but that it does not predict how much subjects believe other people will contribute.

the interaction, we make use of subjects' responses to a survey question on generalized trust elicited after the experiment. Specifically, we asked subjects to respond to the statement 'Generally speaking, people can be trusted', with four response categories 'completely agree', 'agree', 'disagree', and 'completely disagree'.[14]

To study the interaction between corruption and preferences for cooperation, we split the sample of contributors into *cooperative types* and *non-cooperative types*. Specifically, we categorize subjects as 'cooperative types' if they choose one of the first two categories ('completely agree' or 'agree') in response to the trust question, and as 'non-cooperative types' if they choose one of the last two categories ('disagree' or 'completely disagree'). This classifies 130 subjects as cooperative, and 98 as non-cooperative. We then separately study how subjects with high and subjects with low preferences for cooperation respond to corruption. The subsample analysis assumes that survey responses to the trust question are unaffected by the treatment itself. Our data clearly support this assumption: the share of cooperative types in the control and the corruption condition is 59.7% and 54.4%, respectively. This difference in the share of cooperative types is not statistically significant ($P = 0.42$, Mann-Whitney U test).

Figure 5 demonstrates that differences in preferences for cooperation determine how subjects respond to corruption.[15] Three observations emerge. First, average contributions in the control condition are significantly higher for cooperative than for non-cooperative types ($P < 0.01$, Mann-Whitney U test). This finding mirrors the result reported by Thöni *et al.* (2012) and illustrates that a subject's response to the trust question indeed predicts voluntary contributions to public goods. Second, the left panel of Figure 5 shows a strong negative response to corruption among cooperative types: in the presence of expropriating administrators, subjects with a high baseline preference for cooperation reduce their contributions to the level of non-cooperative types. The difference between the average contribution of cooperative types in the control condition (20.8% of endowment) and the corruption condition (10.5%) is statistically significant ($P < 0.001$, Mann-Whitney U test). Third, the difference between

[14] Hence, our survey question is a simplified version of the one used by the WVS and discussed by Thöni *et al.* (2012) and others, which is 'Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?'.

[15] See Panel B in Table A1 in the appendix for descriptive statistics.

average contributions of non-cooperative types in the control condition (11.2% of endowment) and contributions of non-cooperative types in the corruption condition (13.1%) is not significant ($P = 0.32$, Mann-Whitney U test). This means that in our context, subjects with a low baseline preference for cooperation do not contribute at all to the overall negative response of contributions to corruption.

The pronounced heterogeneity in the treatment response uncovered in Figure 5 suggests that the overall effect of corruption on voluntary contributions to public goods works through a specific channel: while in a world without corruption a stronger individual preference for cooperation translates into higher contributions to public goods, this tendency is lost in populations facing corrupt administrators. Hence, because corruption breaks the positive link between preferences for cooperation and actual cooperative behavior among citizens, it can be understood as a form of anti-social behavior.[16]

RESULT 2: *The negative impact of corruption on voluntary contributions works through a specific channel: the presence of corrupt administrators breaks the positive link between preferences for cooperation among contributors and actual cooperative behavior.*

We performed a number of checks to test the robustness and internal validity of our results. For instance, estimating the treatment effect using a linear regression and controlling for individual characteristics leaves all our results unchanged (see Table A2 in the appendix for details). The estimates suggest that corruption reduces contributions by 29.2% relative to the average contribution in the control condition.[17] The effect is statistically significant and very close to the estimate of a 30.9% reduction based on a simple comparison of unconditional means. Table A2 also shows that our results are only marginally affected if we employ a Tobit specification, thereby accounting for the fact that contributions are censored at zero.

With 76 out of a total of 96 administrators benefiting from contributions, the sub-

[16]The finding of heterogeneous responses regarding stated trust in others differentiates our work from the literature on the determinants of social capital. This literature has often used measures of interpersonal trust as the outcome of interest, and has argued that trust itself is a representation of concepts like prosociality or social capital (Putnam, 1993; Knack and Keefer, 1997).

[17]See Table A2, column (1). The effect of corruption is −4.93. We compare this to the average baseline contribution of 16.9 in the control condition.

sample of contributors facing administrators who did *not* benefit from contributions amounts to only 30 contributors in each condition. Because our design aims at identifying the effects of expropriation and not on the effects of administrators forgoing options for rent extraction, we do not put much emphasis on the respective findings and only report these results for completeness. As documented in Table A3 in the appendix, contributors matched to non-expropriating administrators in the corruption condition contributed on average 16.9% of their endowment to the public good. In contrast, individuals matched to passive administrators who did not receive an additional compensation contributed 11.9% of their endowment. The difference in means is not statistically different from zero ($P = 0.193$, Mann-Whitney U test). Comparing mean contributions with and without the additional compensation scheme in the control condition, we find the difference to be not statistically different from zero ($P = 0.243$, Mann-Whitney U test). In the corruption condition, mean contributions differ significantly between exposure and no exposure to expropriation. As expected, contributions are higher if the administrator decided against expropriation ($P = 0.080$, Mann-Whitney U test).

4 Conclusion

This paper demonstrates that corruption reduces voluntary contributions to public goods. We design a simple one-shot contribution game that exposes subjects in a corruption condition to an expropriating administrator and compare contribution behavior to a control condition without corruption. Importantly, our design shuts down the efficiency effect resulting from administrators expropriating part of contributions, and hence identifies what we call the pure motivational effect of corruption on the private provision of public goods. The main result of our analysis is that corruption has severe negative consequences for voluntary contribution behavior: subjects matched to an expropriating administrator make much lower contributions compared to subjects in the control condition. We also show that this effect is entirely driven by subjects with a high baseline preference for cooperation. Absent corruption, this subgroup makes much higher contributions compared to subjects with a low preference for cooperating

with others. However, in the presence of corrupt administrators, a higher preference for cooperation does no longer trigger higher contributions. Our work thus identifies a specific channel through which bureaucratic corruption diminishes prosocial behavior of citizens.

Our findings have important implications for assessing the social costs of corruption and related forms of bad governance. Most importantly, the negative impact on voluntary contributions amplifies the scarcity of public services that results from the direct effect of the bureaucracy's misuse of public funds. Besley and Ghatak (2006) have recently argued that access to public goods is an essential determinant of quality of life, in particular in developing countries. Corruption might thus be considered even more detrimental to development if we account for its often neglected impact on the private provision of public goods.

We leave for future research the question how the legitimacy of administrators affects individuals' responses to corruption. Based on related research on sanctioning mechanisms (Baldassarri and Grossman, 2011), we conjecture that corruption by elected officials with a high legitimacy could have stronger effects on prosocial behavior than corruption by administrators or bureaucrats with relatively low legitimacy. It also seems worthwhile to investigate intercultural differences in how prosocial behavior responds to corruption, thereby linking the discussion to the literature on how groups manage to maintain cooperation in the presence of free-riding incentives (Henrich *et al.*, 2006; Herrmann *et al.*, 2008).

References

ABBINK, K., IRLENBUSCH, B. and RENNER, E. (2002). An experimental bribery game. *Journal of Law, Economics, and Organization*, **18** (2), 428–454.

— and SERRA, D. (2012). Anticorruption policies: Lessons from the lab. In D. Serra and L. Wantchekon (eds.), *New Advances in Experimental Research on Corruption*, *Research in Experimental Economics*, vol. 15, Emerald, Bingley, pp. 77–115.

ACEMOGLU, D., REED, T. and ROBINSON, J. A. (2014). Chiefs: Economic develop-

ment and elite control of civil society in Sierra Leone. *Journal of Political Economy*, **122** (2), 319–368.

BALDASSARRI, D. and GROSSMAN, G. (2011). Centralized sanctioning and legitimate authority promote cooperation in humans. *Proceedings of the National Academy of Sciences*, **108** (27), 11023–11027.

BANERJEE, R. (2016). Corruption, norm violation and decay in social capital. *Journal of Public Economics*, **137**, 14–27.

BARR, A. and SERRA, D. (2009). The effects of externalities and framing on bribery in a petty corruption experiment. *Experimental Economics*, **12** (4), 488–503.

BEEKMAN, G., BULTE, E. and NILLESEN, E. (2014). Corruption, investments and contributions to public goods: Experimental evidence from rural Liberia. *Journal of Public Economics*, **115**, 37–47.

BENZ, M. and MEIER, S. (2008). Do people behave in experiments as in the field? Evidence from donations. *Experimental Economics*, **11** (3), 268–281.

BESLEY, T. and GHATAK, M. (2006). Public goods and economic development. In A. Banerjee, R. Benabou and D. Mookherjee (eds.), *Understanding poverty*, Oxford: Oxford University Press, pp. 285–302.

BOHNET, I., GREIG, F., HERRMANN, B. and ZECKHAUSER, R. (2008). Betrayal aversion: Evidence from Brazil, China, Oman, Switzerland, Turkey, and the United States. *American Economic Review*, **98** (1), 294–310.

— and ZECKHAUSER, R. (2004). Trust, risk and betrayal. *Journal of Economic Behavior & Organization*, **55** (4), 467–484.

CAMERON, L., CHAUDHURI, A., ERKAL, N. and GANGADHARAN, L. (2009). Propensities to engage in and punish corrupt behavior: Experimental evidence from Australia, India, Indonesia and Singapore. *Journal of Public Economics*, **93** (7), 843–851.

CAMPOS, E., LIEN, D. and PRADHAN, S. (1999). The impact of corruption on investment: Predictability matters. *World Development*, **27**, 1059–1067.

CUBITT, R. P., GAECHTER, S. and QUERCIA, S. (2015). Conditional cooperation and betrayal aversion, CESifo Working Paper Series No. 5444.

DE CREMER, D. and VAN KNIPPENBERG, D. (2002). How do leaders promote cooperation? The effects of charisma and procedural fairness. *Journal of Applied Psychology*, **87**, 858–866.

DE OLIVEIRA, A. C., CROSON, R. T. and ECKEL, C. (2011). The giving type: Identifying donors. *Journal of Public Economics*, **95** (5-6), 428–435.

DI TELLA, R. and PÉREZ-TRUGLIA, R. (2015). Conveniently upset: Avoiding altruism by distorting beliefs about others. *American Economic Review*, **105** (11), 3416–3442.

DUFWENBERG, M. and KIRCHSTEIGER, G. (2004). A theory of sequential reciprocity. *Games and Economic Behavior*, **47** (2), 268–298.

ECKEL, C. C. and GROSSMAN, P. J. (1996). Altruism in Anonymous Dictator Games. *Games and Economic Behavior*, **16** (2), 181–191.

FALK, A. (2007). Gift exchange in the field. *Econometrica*, **75**, 1501–1511.

FEHR, E. and GÄCHTER, S. (2000). Fairness and retaliation: The economics of reciprocity. *Journal of Economic Perspectives*, **14**, 159–181.

FISCHBACHER, U. (2007). z-tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, **10** (2), 171–178.

FRANK, B. and SCHULZE, G. G. (2000). Does economics make citizens corrupt? *Journal of Economic Behavior & Organization*, **43** (1), 101–113.

GNEEZY, U., KEENAN, E. A. and GNEEZY, A. (2014). Avoiding overhead aversion in charity. *Science*, **346** (6209), 632–635.

GREINER, B. (2015). Subject pool recruitment procedures: Organizing experiments with ORSEE. *Journal of the Economic Science Association*, **1** (1), 114–125.

HENRICH, J., MCELREATH, R., BARR, A., ENSMINGER, J., BARRETT, C., BOLYANATZ, A., CARDENAS, J. C., GURVEN, M., GWAKO, E., HENRICH, N., LESOROGOL, C., MARLOWE,

F., TRACER, D. and ZIKER, J. (2006). Costly punishment across human societies. *Science*, **312** (5781), 1767–1770.

HERRMANN, B., THÖNI, C. and GÄCHTER, S. (2008). Antisocial punishment across societies. *Science*, **319** (5868), 1362–1367.

KELSEY JACK, B. and RECALDE, M. P. (2015). Leadership and the voluntary provision of public goods: Field evidence from Bolivia. *Journal of Public Economics*, **122**, 80–93.

KNACK, S. and KEEFER, P. (1997). Does social capital have an economic payoff? A cross-country investigation. *Quarterly Journal of Economics*, **112** (4), 1251–1288.

LEDYARD, J. (1995). Public goods: A survey of experimental research. In J. Kagel and A. Roth (eds.), *Handbook of experimental economics*, Princeton University Press, Princeton, pp. 111–194.

MAURO, P. (1995). Corruption and growth. *Quarterly Journal of Economics*, **110** (3), 681–712.

OECD (2013). *Tax and development: What drives tax morale?* Organization for Economic Cooperation and Development.

OLKEN, B. A. (2006). Corruption and the costs of redistribution: Micro evidence from Indonesia. *Journal of Public Economics*, **90** (4-5), 853–870.

— (2007). Monitoring corruption: Evidence from a field experiment in Indonesia. *Journal of Political Economy*, **115** (2), 200–249.

PUTNAM, R. D. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton: Princeton University Press.

RABIN, M. (1993). Incorporating fairness into game theory and economics. *American Economic Review*, **83** (5), 1281–1302.

REINIKKA, R. and SVENSSON, J. (2004). Local capture: Evidence from a central government transfer program in Uganda. *Quarterly Journal of Economics*, **119** (2), 679–705.

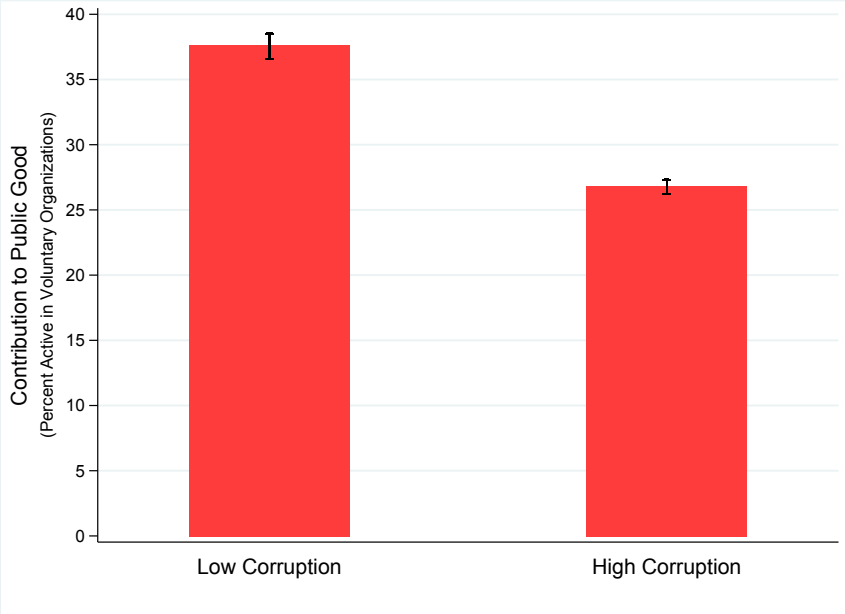
— and — (2005). Fighting corruption to improve schooling: Evidence from a newspaper campaign in Uganda. *Journal of the European Economic Association*, **3** (2-3), 259–267.

THÖNI, C., TYRAN, J. R. and WENGSTRÖM, E. (2012). Microfoundations of social capital. *Journal of Public Economics*, **96** (7-8), 635–643.

VOORS, M., TURLEY, T., KONTOLEON, A., BULTE, E. and LIST, J. A. (2012). Exploring whether behavior in context-free experiments is predictive of behavior in the field: Evidence from lab and field experiments in rural Sierra Leone. *Economics Letters*, **114** (3), 308–311.

WEI, S. (2000). Local corruption and global capital flows. *Brookings Papers on Economic Activity*, **2**, 303–354.

Figure 1: Corruption and Private Provision of Public Goods in the World Values Survey



Note: The figure shows the percent of respondents to the World Values Survey wave 6 (2010 - 2014) stating they are spending a strictly positive number of hours per month working in voluntary organizations, by perceived corruption among government officials. The left bar shows activity for voluntary organizations for respondents choosing an index value lower or equal to five (on a scale from one to ten) when assessing corruption within their country's government (low corruption). The right bar shows the respective figure for respondents choosing an index value larger or equal to six (high corruption). The difference in means between low and high corruption is significant at the 1% level ($P < 0.0001$, $n = 7716$, Mann-Whitney U test). Error bars show the mean ± the standard error of the mean. The set of countries were both survey questions were asked comprises Algeria, Bahrain, Iraq, Kuwait, Lebanon, Tunisia, and Yemen.

Figure 2: Experimental Design: Timing of the One-Shot Game

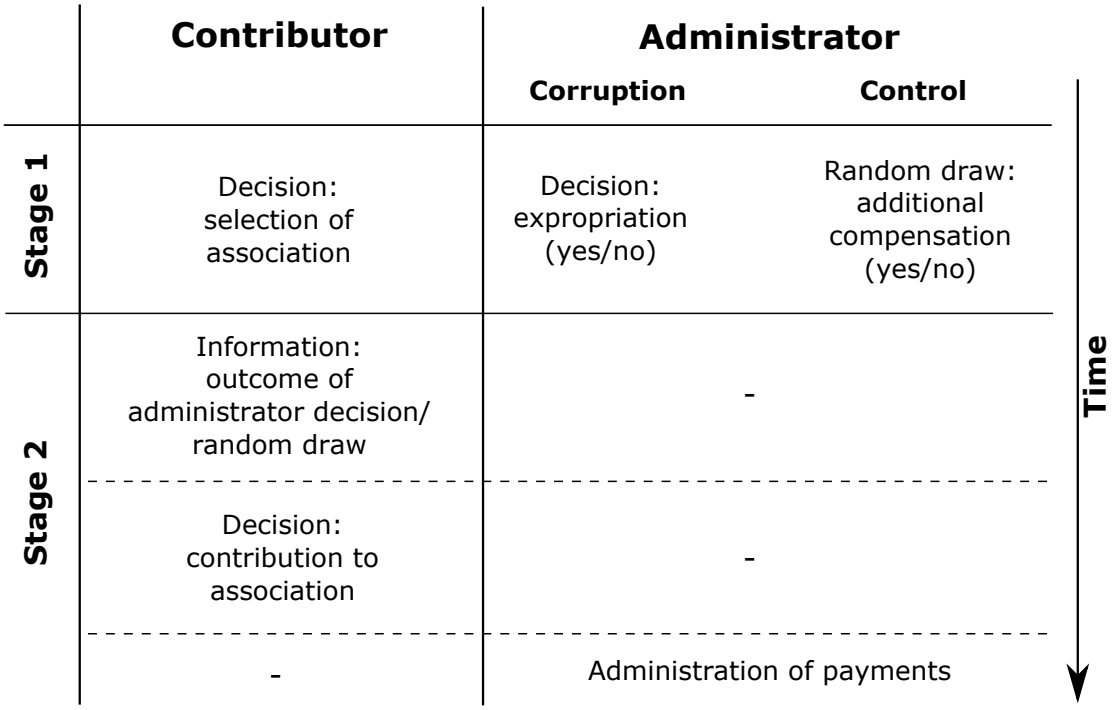
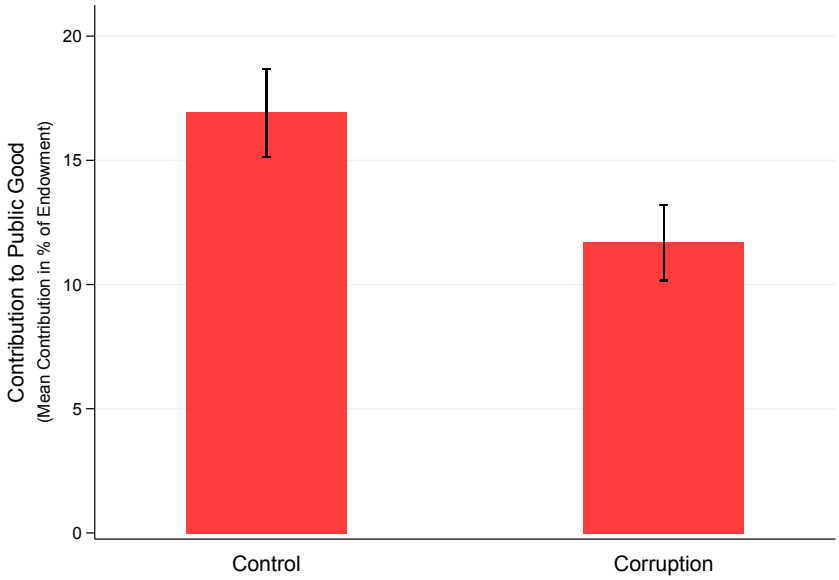
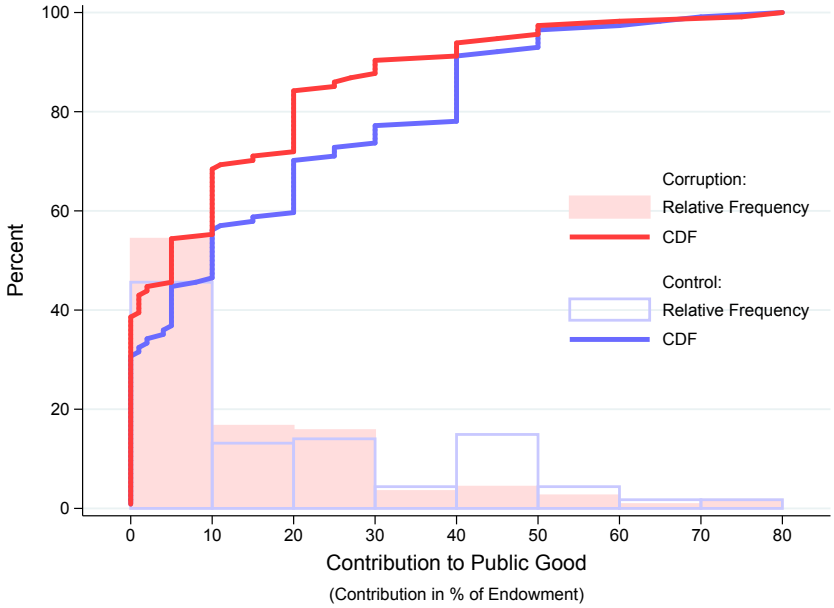


Figure 3: Corruption and Private Provision of Public Goods



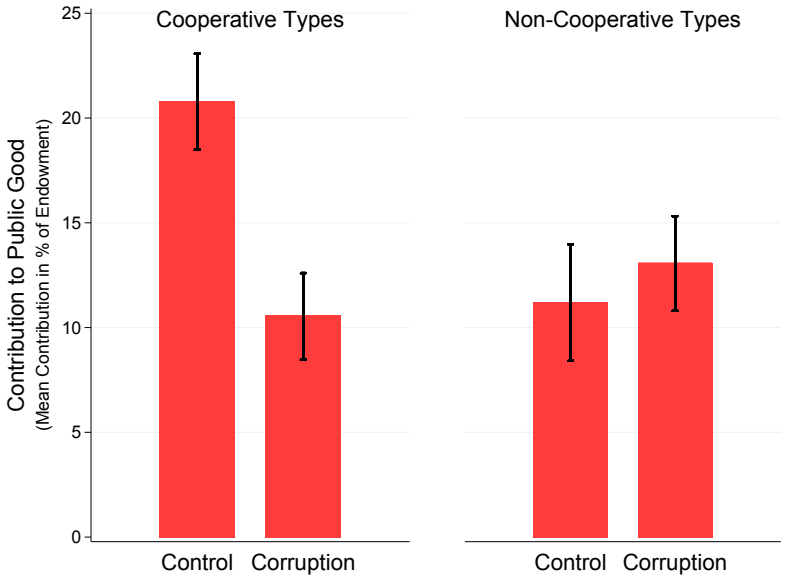
Note: The figure shows mean contributions in the corruption and the control condition. The difference in means between conditions is significant at the 5% level ($P = 0.039$, $n = 228$, Mann-Whitney U test). Error bars show the mean ± the standard error of the mean.

Figure 4: Histograms of Contributions and Corresponding CDFs



Note: The figure shows histograms of contributions and corresponding cumulative distribution functions (CDFs) of contributions for the corruption condition (red) and the control condition (blue). The bin size for the histograms is 10 ECU.

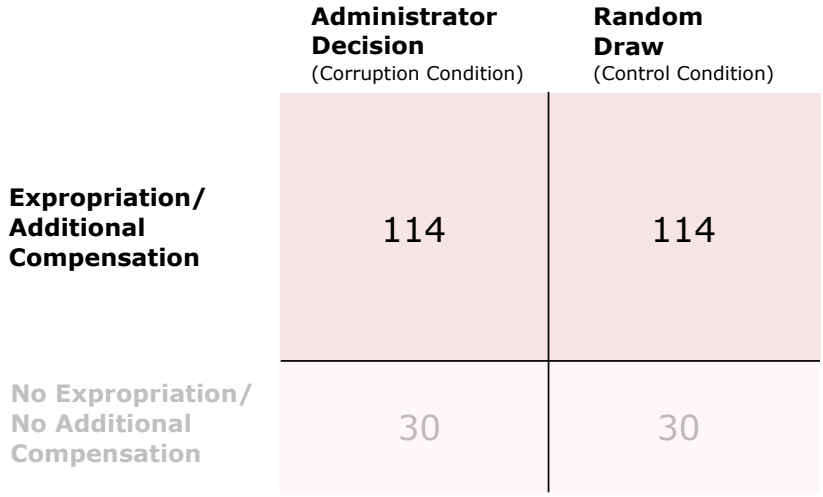
Figure 5: Heterogeneity of Treatment Effect by Preference for Cooperation



Note: The figure shows mean contributions in the corruption and the control condition for individuals with a high stated baseline level of interpersonal trust (left panel) and individuals with low stated baseline trust (right panel). Subjects are categorized as 'cooperative' if they choose 'agree' or 'completely agree' in response to the statement 'Generally speaking, people can be trusted', and categorized as 'non-cooperative' if they choose 'disagree' or 'completely disagree'. For non-cooperative types, the difference in means between conditions is insignificant ($P = 0.32$, $n = 98$, Mann-Whitney U test). For cooperative types, the difference in means between conditions is significant at the 1% level ($P = 0.0006$), $n = 130$, Mann-Whitney U test). Error bars show the mean ± the standard error of the mean.

Appendix (Not For Publication)

Figure A1: Number of Contributors Conditional on Administrator Decisions and the Random Draw



Note: The figure shows the number of contributors conditional on administrator decisions (corruption condition) and the random draw (control condition). We derive our main results from comparing the 114 contributors facing an administrator who decided in favor of expropriation with the 114 contributors in groups where the random draw assigned an additional compensation to the administrator. The symmetry in the distribution between conditions comes from the fact that we set the probability for administrators receiving the additional compensation in the control condition to be equal to the empirical propensity of administrators choosing expropriation in the corruption condition.

Table A1: Descriptive Statistics: Behavior of Contributors, Conditional on Expropriation / Additional Compensation for Administrators

Panel A: Contributions by Treatment Condition

	Control (Passive Administrator, Additional Compensation)	Corruption (Active Administrator, Expropriation)
Contributions in % of Endowment	16.9 (18.9)	11.7 (16.3)
Number of Observations	114	114

Panel B: Contributions by Treatment & Level of Baseline Trust

	Control		Corruption	
	Trusting Types	Non-Trusting Types	Trusting Types	Non-Trusting Types
Contributions in % of Endowment	20.8 (19.3)	11.2 (16.9)	10.5 (15.7)	13.1 (17.1)
Number of Observations	68	46	62	52

Note: The table shows mean contributions and standard deviations (in parentheses). The sample consists of all contributors who were matched to an administrator who benefited from contributions, either through active expropriation (corruption condition) or passively through the additional compensation (control condition). Panel A displays figures differentiated by condition. Panel B shows mean contributions by condition and baseline level of interpersonal trust. The trust measure comes from a survey conducted after the experiment. Subjects were asked to respond to the statement 'Generally speaking, people can be trusted', with response categories 'completely agree', 'agree', 'disagree', and 'completely disagree'. We categorize subjects as 'cooperative types' if they choose one of the first two categories, and as 'non-cooperative types' if they choose one of the last two categories.

Table A2: Treatment Effects on Contributors, Conditional on Expropriation / Additional Compensation for Administrators

	OLS	Tobit
	(1)	(2)
Effect of Corruption	−4.93**	−4.43**
	(2.30)	(2.15)
Log likelihood	-	-746.14
Number of Observations	228	
Average Contribution in Control Group	16.9	

Note: The sample consists of all contributors who were matched to an administrator who benefited from contributions, either through active expropriation (corruption condition) or passively through the additional compensation (control condition). Column (1) shows the effect of corruption using a simple OLS regression. As 34.6% of observations are left-censored at zero, Column (2) reports the corresponding effect from a Tobit regression (there is no right-censoring because no subject contributed the full endowment). The Tobit estimate shown in Column (2) is the average partial effect of changing from the neutral condition to the corruption condition. Standard errors (robust for OLS, Delta Method for Tobit) are reported in parentheses. Both regressions account for subjects' gender, field of study (economics vs. other), and a dummy for experience in laboratory experiments. All results are robust to including further controls like subjects' age and more disaggregated dummies for field of study. In the survey conducted after the experiment, one subject stated that she was confused and did not understand how contributions would translate into funds going to the associations. If we exclude this subject, results become somewhat stronger: the OLS estimate becomes −5.40**, the Tobit estimate is −4.78**.

Table A3: Descriptive Statistics: Behavior of Contributors, Conditional on No Expropriation / No Additional Compensation for Administrators

Contributions by Treatment Condition		
	Control (Passive Administrator, No Additional Compensation)	Corruption (Active Administrator, No Expropriation)
Contributions in % of Endowment	11.9 (17.3)	16.9 (21.4)
Number of Observations	30	30

Note: The sample consists of all contributors who were matched to an administrator who did not benefit from contributions, neither through active expropriation (corruption condition) nor passively through the additional compensation (control condition). The table shows mean contributions and standard deviations (in parentheses) by condition.

INSTRUCTIONS OF CORRUPTION AND CONTROL TREATMENTS
(Control treatment instructions replace highlighted text with grey text in brackets)

Welcome to the experiment, we are grateful for your participation. Please read the instructions carefully.

If you have any questions, please raise your hand. One of the experimenters will answer your questions. You are not allowed to communicate with other participants of the experiment. Please turn off your mobile phone. During the experiment it is not allowed to take notes.

This is an experiment on economic decision making. You can earn money with your participation. You will receive 4 Euro as a participation fee. During the experiment you can earn additional money. Your additional earnings depend on your behavior and the behavior of the other participants. During the experiment, money will be displayed in ECU (Experimental Currency Units) with an exchange rate of 1 Euro = 10 ECU. Your entire earnings will be paid to you in cash at the end of the second part of the experiment.

Participants will neither be informed about the identity of other participants, nor about others' role in the experiment or earnings. The data will be analyzed anonymously.

EXPERIMENT

ROLES

Every participant is assigned a role, either contributor or administrator. The roles are randomly assigned at the beginning of the experiment and do not change during the experiment. All participants are treated equally in role assignment. Every participant will be informed about her role at the beginning of the experiment.

GROUPS

All participants are randomly assigned into independent groups. Each group consists of three contributors and one administrator. Groups remain the same throughout the entire experiment.

PROCEDURE

The experiment consists of six steps. You decide only once, there are no repetitions.

Step	**Contributor**	**Administrator**
1)	Receipt of endowment	Receipt of fixed compensation
2)	Selection of an organization	Decision on expropriation of payments (Random selection of additional compensation)
3)	Information about the administrator's decision (additional compensation)	-
4)	Payment to organization	-
5)	-	Administration of payments
6)	Calculation of payoffs of all participants, organizations and payment	

STEP 1: RECEIPT OF ENDOWMENT / FIXED COMPENSATION

Contributors receive an endowment of 100 ECU.

The administrator receives a fixed compensation of 100 ECU for the administration of payments.

STEP 2: SELECTION OF AN ORGANIZATION

All contributors select one organization as recipient of a possible payment. Contributors of the same group can select different organizations. Payments during the experiment will be transferred to the selected organizations.

All organizations provide services for students of the University of Erlangen-Nuremberg. In the following, you find a list with a brief description of the organizations' activities.

Organizations	**Activities**
Fachschaftsinitiative (FSI)	Students' Union of the Department of Business and Economics Sciences, politics, events, parties, student counseling
Studentenvertretung (RCDS)	Students' Union of the Department of Business and Economics Sciences, politics, events, parties, student counseling
AIESEC	Placement for international exchanges and internships and corresponding counseling services, intercultural tutoring
START	Projects and events to encourage students interested in business creation, stipends, workshops
Studentenwerk	Cafeteria, residence, helpdesk for tuition and student loans, psychological and psychotherapeutic counseling, legal and social advice

STEP 2: DECISION ON EXPROPRIATION OF PAYMENTS (RANDOM SELECTION OF ADDITIONAL COMPENSATION)

The administrator decides actively on whether to expropriate 10% of the payments in addition to her fixed compensation or not (The compensation of the administrator includes a fixed component of 100 ECU and a variable component. She has no influence on the structure of her compensation. For the group, one of the following alternatives will be randomly selected with a certain probability):

Expropriation (Additional compensation): For the administration of payments, the administrator receives a fixed compensation of 100 ECU. The administrator decides actively to expropriate 10% of contributors' payments to the organizations in addition to her fixed compensation (and 10% of payments). Payments net of the subtracted 10% are doubled and transferred to the selected organizations. The organizations thus receive twice as much as the remaining payments.

No expropriation (No additional compensation): For the administration of payments, the administrator receives a fixed compensation of 100 ECU. The administrator decides actively not to expropriate 10% of contributors' payments to the organizations in addition to the fixed compensation. The entire payments are doubled and transferred to the selected organizations. The organizations thus receive twice as much as the payments.

STEP 3: INFORMATION ABOUT THE ADMINISTRATOR'S DECISION (ADDITIONAL COMPENSATION)

All contributors are informed about the decision of the administrator (whether the administrator receives an additional compensation or not).

STEP 4: PAYMENT TO ORGANIZATION

Out of her/his endowment, each contributor can pay an amount to the organization selected in step 2 (0 and 100 are also possible).

STEP 5: ADMINISTRATION OF PAYMENTS

The administrator assigns the payments made by contributors in her/his group to the selected organizations. A mechanism makes sure that when making the assignments, errors are precluded.

STEP 6: PAYOFF OF PARTICIPANTS AND ORGANIZATIONS

The payoffs of contributors, administrators and organizations are calculated as follows. For simplification, payments will be rounded to integer ECU amounts.

<table>
<tr><td colspan="2">CONTRIBUTOR</td></tr>
<tr><td colspan="2">Endowment
- Payment to organization
==========
Payoff</td></tr>
<tr><td colspan="2">ADMINISTRATOR</td></tr>
<tr><td>No expropriation (No additional compensation)
Fixed compensation
==========
Payoff</td><td>Expropriation (Additional compensation)
Fixed compensation
+ 10% of payments
==========
Payoff</td></tr>
<tr><td colspan="2">ORGANIZATION</td></tr>
<tr><td>No expropriation (No additional compensation)
2 * (sum of all payments to the organization)
==========
Payoff</td><td>Expropriation (Additional compensation)
2 * (sum of all payments to the organization)
- 10% of payments)
==========
Payoff</td></tr>
</table>

After the experiment, we will inform you about payments to the different organizations via e-mail. Please note that this may take some weeks.