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The Influence of Bribery and Relative Reciprocity on a Physician's Prescription Decision - An Experiment

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The Influence of Bribery and Relative Reciprocity on a Physician's Prescription Decision - An Experiment

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Abstract

Focusing on a physician's relationships to a briber and a patient, this experiment analyzes the influence of a bribe on a physician's treatment decision. We conduct a partner treatment, in which briber and physician play together for the whole experiment and a stranger treatment, where briber and physician are re-matched every period. With the help of the two treatments, we vary the relative reciprocity between the physician and the two other actors, briber and patient. Additionally we use a follow up questionnaire to measure the behavioral motivation of the participants. We find that reciprocity leads to bribery relationships: In the partner treatment physicians act corruptly more often. Just the variation of the relative reciprocity between the treatments shows differences in the behavior of the subjects. Differences in the participants' preferences deliver no explanation for their behavior in our experiment.

Keywords: Corruption, Reciprocity, Physician-Patient Relationship
JEL: I12, I18, D73

1. Introduction

Even though corruption in the health sector is forbidden by different legal regulations in the social, professional and penalty law in Germany (e.g. §128. SGB V and §499 StGB), it can be frequently observed that physicians accept financial or other rewards from pharmaceutical companies for prescribing a special pharmaceutical (Transparency International Deutschland e.V., 2008). In this experiment we analyze the influence of bribing on a physician's medical treatment choice. We focus on cases in which a pharmaceutical company bribes a physician. To vary the relationship between physician and briber, we conduct a stranger and a partner treatment: In the partner treatment, both participants play together for the whole experiment, in the stranger treatment all participants are re-matched in every period. Therewith we vary the strength of reciprocity and its influence on a physician's treatment decision. We use the trust game of Abbink et al. (2002) as a foundation for the design of our experiment. Additionally we use "The Preference Survey Module" from Falk et al. (2016) as a follow up questionnaire to measure the behavioral motivation of the participants.

Different studies from psychologists, economists, sociologists, ethnologists and anthropologists show that humans are not only motivated by their own benefit, but that they are also motivated by reciprocal concerns: humans consider the utility of other persons in their own behavior. Reciprocity shows up in the relationship between individuals and is the reaction of one individual to the action of another individual: "People like to help those who are helping them, and to hurt those who are hurting them" (Rabin, 1993). There are several studies analyzing reciprocal behavior of individuals with the help of experiments in different contexts, starting with Fehr et al. (1993). Most of the games are designed as trust games in which a first mover decides whether to transfer an amount of money to a second mover. The second mover can send back some money to favor the first mover. We also use a trust game with a partner and stranger treatment as the basis of our experiment.

Bolton and Ockenfels (2000) show that people are motivated by their own payoffs as well as the other participants payoffs. Equity, fairness and reciprocity influence a person's behavior. People build up reciprocal relationships between each other. In contrast, Fehr and Gächter (2000) found that also in interactions with complete strangers, people tend to return services or gifts. Even in one-shot games, subjects tend to reciprocate the behavior of the first mover (e.g. Berg et al. 1995; Dufwenberg and Gneezy 2000; Fahr and Irlenbusch 2000). However, as shown by Gächter and Falk (2002) in a repeated gift-exchange game, repeated interaction will increase reciprocity. One form of reciprocity is direct reciprocity, which often occurs in traditional markets: Traders base their decisions on their experiences with past transactions (Bolton et al., 2004). Additionally reciprocity can also have strategic elements (e.g. Bolton et al. 2013). People reciprocate because they want others to behave in a certain way or to build up beneficial reciprocal relationships. In the same way we conduct our partner treatment: both subjects play together for several rounds, can observe the past behavior of the other subject and can base their future decisions on their past experience.

As corruption normally appears secretly and hidden, experiments are a practical way to analyze corrupt behavior. Andvig (2005), Dušek et al. (2005) and Bobkova and Egbert (2013) review the first experiments on corruption. Most of the experimental investigations focus on the interaction between a business men and public officer. They use gift-exchange games (e.g. Abbink et al. 2002) or ultimatum games (e.g. Abbink and Hennig-Schmidt 2006). These experiments analyze different topics like the impact of negative externalities (e.g.Abbink et al. 2002, Abbink and Hennig-Schmidt 2006), wages (e.g. Azfar and Nelson 2007; Abbink 2004, Schulze and Frank 2003), gender (e.g. Frank and Schulze 2000, Frank et al. 2011) or culture (e.g.Barr and Serra 2010, Alatas et al. 2009).

To the best of our knowledge, the first interactive experiment on corruption was conducted by Abbink et al. (2002). They use a two-player sequential game in which a briber can transfer money to a public official. The official can accept or reject the bribe. With the help of three different treatments the influences of reciprocity, negative externalities and the risk of being caught are analyzed. They find that a corrupt relationship is based on reciprocity and trust. Adding negative externalities does not lead to a change in the participants' behavior, while including a probability of detection leads to less reciprocal cooperation. In another experiment Abbink (2004) used a stranger treatment to study the effect of staff rotation on corrupt behavior. In every round of the experiment firms and public-officials are re-matched randomly.

The subjects do not know the other subject they are playing with. The experiment shows that staff rotation, implemented with the help of the stranger treatment, has a significantly negative impact on the number of offered bribes and the number of fulfilled corrupt acts.

With the help of our experiment we want to analyze the influence of bribery and relative reciprocity on a physician's treatment decision. To vary the relative reciprocity between physician and briber as well as between physician and patient, we implement a partner and stranger treatment. We focus on the physicians bribe acceptance behavior and his prescriptions in both treatments. Thereby we shed light on the influence of a bribe on the physicians prescription and additionally on the influence of reciprocal concerns.

After explaining the experimental design in Section 2.1, we present our research hypotheses in Section 2.2 and the experimental procedure in Section 2.3. Next, Section 3 depicts the results and Section 4 concludes.

2. Experiment

2.1. Experimental Design

We designed an economic experiment to analyze the influence of reciprocity on a physician's treatment decision using the trust-game of Abbink et al. (2002) as a basis. With the help of two different treatments we vary the intensity of reciprocity between a physician and a briber. In contrast to Abbink et al. (2002) we decided to conduct a framed experiment to emphasize the special relationship between a physician and his patients. Therefore we use loaded instructions and avoid any corruption-related words like bribe or briber, instead the instructions use words like gift and pharmaceutical agent. (As we have a framed design, we will not consider any monetary equivalent to depict the moral costs). To avoid end game effects, the experiment ends randomly between round 10 and 15. We use a follow-up survey to measure the physician's behavioral motivations, especially the characteristics altruism and reciprocity.

The subjects are allocated randomly to the roles of either a physician or a pharmaceutical agent, acting as a briber.[1] There are no real patients in the lab. Rather, the monetary equivalent of the Patient's utility is donated to the medical charity organization "Doctors without Borders".

The experiment consists of two treatments: One treatment with a partner matching where Physician and Briber play together in all periods. In the other treatment we use a stranger matching, where in each period the Physician and Briber are matched to another player. The experimental structure is as follows: In a first step, Briber and Physician are matched respectively to the conducted treatment. Then each round in the experiment follows the same structure. First, the Briber decides about bribing the Physician. If he decides to bribe, the Physician can accept or reject the bribe. Next, the Physician decides to prescribe the patient-optimal or patient-non-optimal pharmaceutical. The medical treatment decision is independent from the acceptance of the bribe. Figure 1 shows the decision structure of our experiment.

If the Briber wants to bribe the Physician, he has to pay 5 ECU as a bribe. In case the Physician accepts the bribe, the amount is tripled, so that the Physician receives 15 ECU. The conversion factor reflects the difference in marginal utility, as the same amount of money means much less to the briber than to the physician. Note that accepting the bribe does not automatically lead to the prescription of the patient-non-optimal pharmaceutical. The Physician can accept the bribe and still prescribe the patient-optimal pharmaceutical. We framed the experiment in such a way that both pharmaceuticals are produced by the same pharmaceutical company, represented by the Briber. Pharmaceutical A is the patient-optimal pharmaceutical, while pharmaceutical B is the briber-optimal pharmaceutical. Pharmaceutical B leads to a higher payoff for the pharmaceutical agent, as it is a more profitable pharmaceutical. Pharmaceutical A is a very effective pharmaceutical with a short healing time, and leads to a higher payoff for the patient while it is less profitable for the pharmaceutical company. From now the *optimal prescription* is the patient-optimal prescription and the *non-optimal prescription* is the patient-non-optimal prescription.

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[1] From now on we refer to subjects in the role of the physician and subjects in the role of the pharmaceutical agent as Physician and Briber.
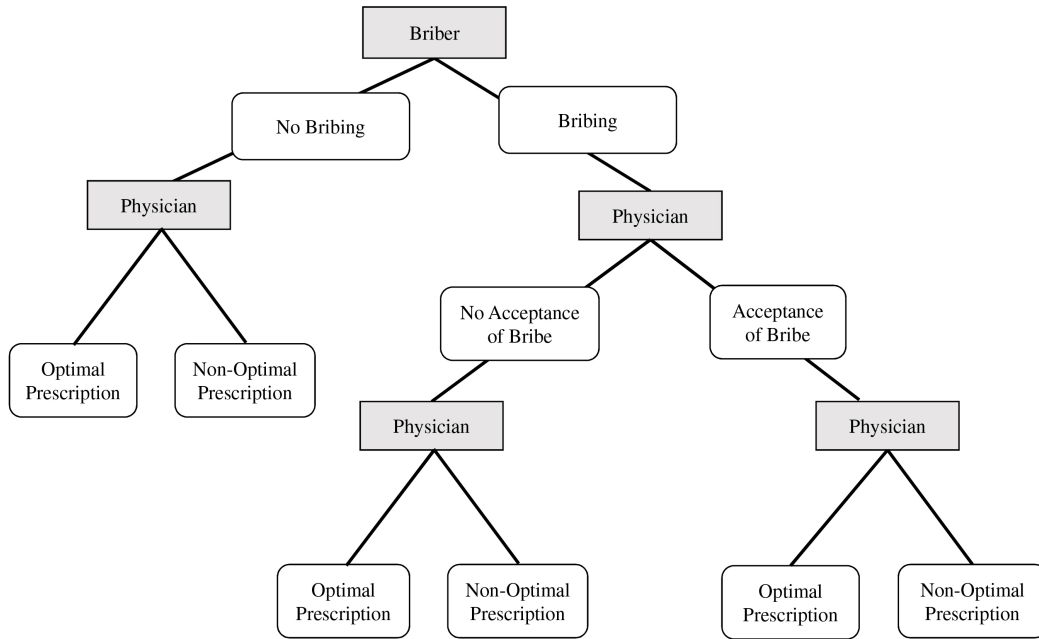
Figure 1: Structure of the Experiment

The Physician receives always the same payoff of 20 ECU independent from the prescribed pharmaceutical. By accepting a bribe he can get additional 15 ECU. He knows both pharmaceuticals, their payoffs for the Patient and for the Briber as well as his own payoff. Both, the Briber's and the Patient's payoff depend on the Physician's prescription decision. The Patient receives a payoff of 20 ECU if he is treated with the patient-optimal pharmaceutical and a payoff of 15 ECU if he is treated with the patient-non-optimal pharmaceutical. The Briber receives additional 15 ECU in all cases in which the physician prescribes the patient-non-optimal pharmaceutical. The difference in the payoffs between the two medical treatments is huge for the briber, but only small for the patient. In cases in which the Physician decides to prescribe the patient-non-optimal pharmaceutical, the Briber benefits a lot, while the Patient is harmed only a little. Nevertheless this act might induce some moral costs for the Physician.

Table 1 depicts the Physician's, Briber's and Patient's payoffs in each round. It distinguishes between the payoffs in the optimal and non-optimal prescription. Additionally the the influence of an accepted bribe on the individual's payoffs is presented.

Prescriptions	Non-optimal		Optimal	
Bribe accepted	yes	no	yes	no
Patient	15	15	20	20
Briber	32	37	17	22
Physician	35	20	35	20

Table 1: Individual Payoffs per Round in ECU

After the experiment we use parts of "The Preference Survey Module" from Falk et al. (2016). We focus on two questions for each of the characteristics altruism, positive and negative reciprocity. The preference

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survey is a symmetric module that measures behavioral preferences in a qualitative and quantitative way. For the qualitative measure, the subjects have to self-assess their character on an 11-point scale. For the quantitative measure the subjects play a hypothetical version of an incentivized choice experiment. The questions that we have used can be found in Appendix A.

2.2. Research Hypotheses

Our experiment is based on a trust game. Generally, in a trust game, a first mover can send money to a second mover, who can voluntarily return some money. In our case a pharmaceutical agent, acting as a Briber, can decide to send a bribe to a Physician. The Physician can accept this bribe and in the next step decide whether to return a favor by prescribing a patient-non-optimal pharmaceutical.

The literature on reciprocity shows that people reciprocate favors of other individuals. Even in interactions with complete strangers, reciprocal return services can be observed (Fehr and Gächter, 2000). That is why we expect that Physicians who accepted a bribe will reciprocate this favor by prescribing a patient-non-optimal pharmaceutical. These Physicians will more often prescribe a patient-non-optimal pharmaceutical than Physicians who rejected a bribe or did not receive any bribe offer.

Hypothesis 1.A. *Physicians prescribe the patient-non-optimal pharmaceutical significantly more often in cases in which they accepted an offered bribe than in cases in which no bribe was offered.*

Hypothesis 1.B. *Physicians prescribe the patient-non-optimal pharmaceutical significantly more often in cases in which they accepted an offered bribe than in cases in which they did not accept a bribe.*

In contrast we assume Physicians that rejected a bribe to prescribe the patient-optimal pharmaceutical. Physicians that reject a bribe might feel a strong obligation regarding the Patient. By taking the Patient's payoff into account they will not accept a bribe and will not prescribe a patient-non-optimal pharmaceutical.

Hypothesis 2. *Physicians that rejected a bribe, prescribe the patient-optimal pharmaceutical significantly more often than the patient-non-optimal pharmaceutical. This is independent of the treatment.*

In the partner treatment, Physician and Briber play together in every round of the experiment, so that a reciprocal relationship between Briber and Physician can develop. Both, Physician and Briber, have complete information about each others current payoff and past payoffs. The Briber can observe the Physician's behavior of the previous round. In cases in which the Physician values his relationship to the Briber higher than to the Patient, for example due to an offered bribe, he will decide to prescribe the patient-non-optimal pharmaceutical. Observing this behavior in previous rounds, the Briber will continue bribing the physician and the Physician will reciprocate the Briber's behavior by prescribing the patient-non-optimal pharmaceutical. This can be seen as a kind of strategic reciprocity. By reciprocating the Physician expects the Briber to send a bribe in the next round and so on. Thereby a bribery relationship based on reciprocity can be established.

In the stranger treatment, a stable reciprocal relationship cannot arise, because Briber and Physician will meet only ones and cannot observe their behavioral history. We expect that the Physician has no strategic incentive to reciprocate the Briber's bribe. Thus, the Physician might not prescribe the patient-non-optimal pharmaceutical. By assuming this behavior, the Briber will not bribe the Physician. However, there is evidence from anonymous one-shot experiments that subject cooperate even in one shot games (e.g. Berg et al. 1995; Dufwenberg and Gneezy 2000; Fahr and Irlenbusch 2000). Therefore it is possible that even in the stranger treatment successful corrupt acts can be observed.

Hypothesis 3.A. *There are significantly more successful corrupt acts in the partner treatment than in the stranger treatment.*

A successful corrupt act consists of the three steps bribing, accepting a bribe and prescribing a patient-non-optimal pharmaceutical. In the following hypotheses we look at all steps in detail. We assume that

in the stranger treatment less bribes are offered, because the Briber knows that he meets the Physician only ones and might not expect any reciprocation. The Physician will accept more bribes in the partner treatment as he has the chance to build up a reciprocal relationship. Thus, the Physician prescribes more patient-non-optimal pharmaceuticals due to reciprocation of the bribe and because he knows that he can expect future bribes.

Hypothesis 3.B. *Bribers offer significantly more bribes in the partner treatment than in the stranger treatment.*

Hypothesis 3.C. *Physicians accept significantly more bribes in the partner treatment than in the stranger treatment.*

Hypothesis 3.D. *Physicians prescribe the patient-non-optimal pharmaceutical significantly more often in the partner treatment than in the stranger treatment.*

We analyze the behavioral characteristics in our experiment with the help of "'The Preference Survey Module"' from Falk et al. (2016) with focus on altruism, positive and negative reciprocity. Therefore we set up additional hypotheses regarding the behavioral characteristics.

We assume that Physicians who have a strong altruistic motivation will act patient-oriented and take care of the patient's payoff. As the Patient is harmed by the prescription of the patient-non-optimal pharmaceutical, we expect altruistic Physicians to prescribe the patient-optimal pharmaceutical more often than the patient-non-optimal pharmaceutical. The Patient is not influenced by the acceptance of the Bribe. Therefore we presume that even altruistic Physicians will accept an offered bribe, but will then prescribe the patient-optimal pharmaceutical.

Hypothesis 4.A. *There is no significant difference in the amount of accepted bribes between Physicians with an above-average altruistic motivation and other Physicians.*

Hypothesis 4.B. *Altruistic Physician will prescribe significantly more patient-optimal pharmaceuticals than other Physicians.*

In both treatments, Bribers bribe the Physicians and the Physicians can return the favor by prescribing the patient-non-optimal pharmaceutical. We assume that Physicians that are reciprocally motivated in any direction will return the favor more often than Physicians that are not reciprocally motivated.

Hypothesis 5.A. *After accepting a bribe, there is a significant difference in the amount of patient-non-optimal prescriptions of Physicians with an above-average positive reciprocal motivation and other Physicians.*

Hypothesis 5.B. *After accepting a bribe, there is a significant difference in the amount of patient-non-optimal prescriptions of Physicians with an above-average negative reciprocal motivation and other Physicians.*

2.3. Experimental Procedure

The experiment was conducted in February 2017 in the Business and Economic Research Laboratory (BaER-Lab) at Paderborn University. The subjects were invited via Email with the Online Recruitment System ORSEE (Greiner, 2015) from a subject pool with around 2800 students from different faculties. Most of our subjects were cultural science and economic students. The experiment was computerized, using the software z-Tree (Zurich Toolbox for Readymade Economic Experiments) (Fischbacher, 2007).

Subjects were only allowed to take part in one session. The students were randomly assigned to the roles of the Briber or Physician. We started each session with a short introduction about the rules of the lab before handing out the written instructions. The instructions explain all decisions and the calculation of all payoffs in detail. In the instructions we informed the participants that their payoffs could be influenced by the decisions of their partner. They also knew that they are responsible for the Patient's payoff. The original instructions as well as translations of both instructions can be found in Appendix B. The students had ten minutes to read the instructions, after wards there was the possibility to ask questions. Next the

students had to answer four control questions to ensure their understanding of the instructions. Then the experiment started.

Since every computer screen presented only one decision at the same time, the participants made each decision separately. At the end of each round, the participants were informed about the decisions in this round, their own payoffs, their partner's payoffs as well as the donations to the charity . To secure a complete understanding, the calculation of the payoffs was described and explained in detail. After informing the participants about their payoffs, participants in the partner treatment were informed that they play together with the same partner in the next round. In the stranger treatment the participants got the information that they will be matched with a new partner who did not know their decisions and payoffs from the previous rounds.

The subjects played on average for 35 minutes and a whole session including introduction and payments lasted one hour. Overall 134 students took part in our experiment: 68 students in the partner treatment and 66 students in the stranger treatment. Directly after the experiment, two rounds were randomly drawn and the payoffs of these rounds were payed out. The subjects received their payments anonymously. The exchange rate was 0.25Euro per 1 ECU. Additionally every participant received a show-up fee of 2.50 Euros. The payoffs varied between 8.70 Euros and 15.90 Euros with an average payment of 11.48 Euros. In total 448.20 Euros were donated to the charity "'Doctors without Borders"'.

3. Results

3.1. Descriptive Statistics

The following table provides an overview about the descriptive statistics. It provides the subjects' characteristics gender and age per treatment and in total. Additionally it gives an overview about the average rounds that were played. Due to the different number of rounds and to avoid any end game effects, the following analysis focuses only on round 1 to 10. You can find data for all periods in Appendix C.

	Partner	Stranger	Total
Participants	68	66	134
Male	38.97%	37.53%	38.24%
Mean Age	23.87	24.21	24.04
Rounds	13.67	14.33	14

Table 2: Summary Statistics

Table 3 gives an overview about the Bribers' and Physicians' decisions in each treatment as well as in total. It shows the amount of offered bribes, the number of accepted bribes as well as the physicians' prescriptions.

		Partner	Stranger	Total
Bribing	Bribe offered	52.65%	35.45%	44.18%
	No Bribe offered	47.35%	64.55%	55.82%
Acceptance	Bribe accepted	87.71%	96.58%	91.22%
	Bribe not accepted	12.29%	3.42%	8.78%
Prescription (Total)	Optimal	53.82%	82.12%	67.76%
	Non-optimal	46.18%	17.88%	32.24%

Table 3: Overview of the Decisions

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	Prescriptions	Partner	Stranger	Total
No bribe offered	Optimal	86.34%	94.84%	91.18%
	Non -optimal	13.66%	5.16%	8.81%
Bribe rejected	Optimal	100%	100%	100%
	Non -optimal	0%	0%	0%
Bribe accepted	Optimal	14.01%	57.52%	32.22%
	Non -optimal	85.99%	42.48%	67.78%

Table 4: Overview of the Prescriptions

For the physicians' prescription decisions we provide the data for the cases in which no bribe was offered, a bribe was offered and rejected and a bribe was offered and accepted in Table 4.

Added up, in both treatments the Bribers decided 670 times about bribing a physician or not. They decided 296 times to bribe the Physician. The Physician accepted the bribe 270 times and rejected it only 26 times. In total all Physicians had to make 670 decision about the prescribed pharmaceutical. The patient-non-optimal pharmaceutical was prescribed 216 times. In nearly half of the cases, the Physician was bribed and the majority of Physicians accepted an offered bribe (see Table 3). In total the prescriptions differ between the partner and stranger treatment. We can see directly that Physicians that rejected a bribe will not prescribe a patient-non-optimal pharmaceutical (see Table 4).

	Partner	Stranger	Total Sample	Min	Max
Altruism1	7.76	8.18	7.97	0	10
Altruism2	151.69	118.64	135.41	0	1000
Positive Reciprocity1	15.54	16.5	16.01	0	80
Positive Reciprocity2	18.09	18.79	18.43	5	30
Negative Reciprocity1	5.49	5.14	5.31	0	10
Negative Reciprocity2	42.07	40.92	41.51	0	100

Table 5: Overview of the Behavioral Characteristics

After the experiment, the subjects filled out a questionnaire based on the preference survey from Falk et al. (2016) with focus on altruism and reciprocity to analyze their underlying behavioral motivations. The following Table 5 presents the mean-values, as well as the maximum and minimum values of the characteristics for each question and each treatment.

3.2. Results on Corruption

Now we analyze our data with respect to our previously presented hypotheses. We start with an analysis of the Physician's prescriptions. Thereby we focus on the influence of a bribe. The data is represented in Table 6.

	Optimal	Non-optimal	Total
Bribe not offered	341	33	374
Bribe rejected	26	0	26
Bribe accepted	87	183	270
Total	454	216	670

Table 6: The Physicians' Prescriptions

In cases in which no bribe was offered, only 8.82% of the Physicians decide to prescribe a patient-non-optimal pharmaceutical. In contrast, 67.78% of all Physicians who accepted a bribe, prescribe the patient-

non-optimal pharmaceutical. Physician's that reject a bribe, never prescribed the patient-non-optimal pharmaceutical. With the help of the χ^2-Test we can see, that Physicians prescribe the patient-non-optimal pharmaceutical significantly more often in cases in which they accepted a bribe than in cases in which no bribe was offered ($\chi^2 = 244.4860$, $p = 0.000$) or in cases in which they rejected the bribe ($\chi^2 = 46.1609$, $p = 0.000$). There is a significant difference in the prescription behavior in cases in which the Physician was successfully bribed. Therefore we cannot reject Hypotheses 1.A and 1.B.

Result 1. *Physicians that accepted a bribe, prescribe the patient-non-optimal pharmaceutical significantly more often than other Physicians.*

Table 6 shows that all Physicians who rejected a bribe, prescribed the patient-optimal pharmaceutical. Looking at the rejections in detail, Physicians rejected the bribe 22 times in the partner treatment and 4 times in the stranger treatment. In both treatments they never rejected the bribe and prescribed the patient-non-optimal treatment. A rejection of the bribe leads to a patient-optimal prescription.

Result 2. *Physicians that rejected a bribe, prescribe always the patient-optimal pharmaceutical.*

Now we shed light on the differences between the two treatments. We assume that the partner treatment increases the relationship and therefore the reciprocity between Physician and Briber. Therefore we expect more successful corrupt acts in the partner treatment in comparison to the stranger treatment in Hypothesis 3. A corrupt act is successful in all cases in which a bribe is offered and accepted and subsequently the patient-non-optimal pharmaceutical is prescribed. Concurrently we define all other outcomes as unsuccessful corrupt acts. The following Table 7 depicts the corrupt acts across treatments.

Corrupt Act	Partner	Stranger	Total
Unsuccessful	205	282	487
Successful	135	48	183
Total	340	330	670

Table 7: Successful Corrupt Acts

Looking at both treatments, the corrupt act is in 27.31% of all cases successful. In the partner treatment the corrupt act is successful in 39.71% of all cases, in the stranger treatment only in 14.55%. We find that there are significantly more successful corrupt acts in the partner treatment than in the stranger treatment ($\chi^2 = 53.3978$, $p = 0.000$).

Result 3.A. *There are significantly more successful corrupt acts in the partner treatment than in the stranger treatment.*

As a successful corrupt act contains three elements: Bribing, Accepting the Bribe and Prescribing the patient-non-optimal pharmaceutical, we shed separately light on every element of the corrupt act. First we look at the bribing and bribe accepting behavior in Table 8.

		Partner	Stranger	Total
Total	Bribe not offered	161	213	374
	Bribe offered	179	117	296
Bribe	not accepted	22	4	26
offered	accepted	157	113	270

Table 8: Number of offered and accepted Bribes

The Briber offers in the partner treatment in 52.65% of all cases a bribe. In the stranger treatment he only offers a bribe in 35.45% of the cases. The χ^2-Test shows a significant difference between the number of offered bribes in the partner and stranger treatment ($\chi^2 = 20.0717$, $p = 0.000$).

Result 3.B. *Bribers offer significantly more bribes in the partner treatment than in the stranger treatment.*

Now we look at the second element of a corrupt act: The acceptance of a bribe. Physicians accept an offered bribe in 87.71% of all cases in the partner treatment, and in 96.58% of all cases in the stranger treatment. The Fisher's exact test shows that this difference is significant ($p = 0.010$).

Result 3.C. *Physicians accept significantly more offered bribes in the stranger treatment than in the partner treatment.*

	Prescriptions	Partner	Stranger	Total
Total	Optimal	183	271	454
	Non-optimal	157	59	216
Bribe	Optimal	22	65	87
accepted	Non-optimal	135	48	183

Table 9: Optimal and Non-Optimal Prescriptions

After an accepted bribe, the last step for an successful corrupt act is the prescription of the patient-non-optimal pharmaceutical. Table 9 shows the total optimal and non-optimal prescriptions and the prescriptions in cases in which a bribe was accepted. In total, physicians prescribe the patient-non-optimal pharmaceutical in the partner treatment in 46.18% of the cases and in the stranger treatment in 17.88% of the cases. Independent of an accepted bribe, the number of patient-non-optimal prescriptions is significantly higher in the partner treatment compared to the stranger treatment ($\chi^2 = 61.3847$, $p = 0.000$). We focus on the prescriptions of Physicians who accepted an bribe: These Physicians prescribe the patient-non-optimal pharmaceutical in 85.99% of all cases in the partner treatment and only in half of the cases, in 42.48%, in the stranger treatment. The χ^2-Test shows a significant difference ($\chi^2 = 56.9557$, $p = 0.000$).

Result 3.D. *Physicians who accepted a bribe, prescribe the patient-non-optimal pharmaceutical significantly more often in the partner treatment than in the stranger treatment.*

3.3. Analysis of Underlying Behavioral Motivations

Now we start analyzing our data with regard to the subjects' underlying behavioral motivations. In a first step we had to specify an altruistic, positive and negative reciprocal physician. Therefore we calculated the mean values of each characteristic for each question from the Preference Survey Module of Falk et al. (2016) (see Table 5). In our experiment, a physician is altruistically motivated if he has an above average score in both of the questions regarding altruism. A physician is positive reciprocally motivated if he has an above average score in both questions regarding positive reciprocity and a physician is negative reciprocally motivated if he has an above average score in both questions regarding negative reciprocity. We use both measures, the qualitative and the quantitative, to consider the subjective self-assessment and the observed quantitative result. Table 10 gives an overview of the above average behavioral motivations of all participants.

Characteristic	Briber	Physician	Total
Altruism	17	22	39
Positive Reciprocity	17	14	31
Negative Reciprocity	20	19	39

Table 10: Above Average Behavioral Motivations

First we take a look at the behavioral characteristics of the 67 Bribers: 25.37% of the Bribers have an above average positive reciprocal motivation, 29.85% have an above average negative reciprocal motivation

and 25.37% have an above average altruistic motivation. From the 67 Physicians, 20.89% show an above average positive reciprocal motivation, 28.36% show an above average negative reciprocal motivation and 32.84% show an above average altruistic motivation. The χ^2-Test shows no significant difference in the distribution of the characteristics between the two roles Briber and Physician.

Table 11 shows that the 22 Physicians with an above-average altruistic motivation, receive 91 times (41.36%) a bribe offer. They accept the bribe in 90.11% of the cases. Physicians that do not have an above-average altruistic motivation accept it in 91.71% of the cases. Thus, we cannot find any significant difference in the acceptance behavior for altruistic physicians ($\chi^2 = 0.2007$, $p = 0.654$).

		below-average altruism	above-average altruism	Total
Total Bribe Acceptance	Bribe rejected	17	9	26
	Bribe accepted	188	82	270
Total Prescriptions	Optimal	303	151	454
	Non-optimal	147	69	216
Prescriptions if Bribe accepted	Optimal	58	29	87
	Non-optimal	130	53	183

Table 11: Behavior of Altruistic Physicians

Looking at the prescriptions of altruistic Physicians, we also do not find any significant difference between altruistic Physicians and other Physicians ($\chi^2 = 0.1148$, $p = 0.735$). 31.36% of the Physicians with an above-average altruistic motivations and 32.67% of the Physicians with an below-average altruistic motivation prescribe a patient-non-optimal pharmaceutical. After accepting a bribe, the altruistic Physicians prescribe the patient-non-optimal pharmaceutical in 64.63% of the cases and the non-altruistic Physicians in 69.15% of the cases. There is also no significant difference in the prescription behavior of these Physicians after accepting a bribe ($\chi^2 = 0.5329$, $p = 0.465$).

Result 4.A. *There is no significant difference in the amount of accepted bribes for Physicians with an above-average altruistic motivation and Physicians with an below-average altruistic motivation.*

Result 4.B. *There is no significant difference in the prescription behavior of Physicians with an above-average altruistic motivation and Physicians with an below-average altruistic motivation.*

Out of 67 Physicians, 14 Physicians show an above-average positive reciprocal motivation. They decide in total 140 times about the Patients' prescriptions and prescribe in 19.29% of the cases a patient-non-optimal pharmaceutical. We focus on the prescriptions in which a bribe was offered and accepted. Table 12 shows that these Physicians were bribed 49 times, accepted the bribe in 83.67% of the cases and rejected it in 16.33% of the cases. There is a significant difference in the bribe acceptance behavior between positive reciprocal Physicians and other Physicians ($\chi^2 = 4.1696$, $p = 0.041$).

		below-average positive reciprocity	above-average positive reciprocity	Total
Total Bribe Acceptance	Bribe rejected	18	8	26
	Bribe accepted	229	41	270
Total Prescriptions	Optimal	341	113	454
	Non-optimal	189	27	216
Prescriptions if Bribe accepted	Optimal	72	15	87
	Non-optimal	157	26	183

Table 12: Behavior of Positive Reciprocal Physicians

Next we look at the prescriptions of Physicians that accepted a bribe. Physicians with an above-average positive reciprocal motivation that accepted a bribe, prescribe in 63.41% of the cases the patient-non-optimal pharmaceutical. Physicians with a below-average positive reciprocal motivation prescribe the patient-non-optimal pharmaceutical in 68.56% of the cases. There is no significant difference in the prescription behavior of these Physicians ($\chi^2 = 0.4214$, $p = 0.516$).

Result 5.A. *Physicians with an above-average positive reciprocal motivation accept less bribes than Physicians with an below-average positive reciprocal motivation.*

Result 5.B. *There is no significant difference in the prescription behavior between Physicians who accepted a bribe and have an above-average positive reciprocal motivation or a below-average positive reciprocal motivation.*

Table 13 shows that the 19 Physicians who have an above-average negative reciprocal motivation were bribed 82 times and accepted the bribe in 89.02% of the cases. Physicians with an below-average negative reciprocal motivation accepted a bribe in 92.06% of the cases. There is no significant difference in the amount of accepted bribes between these Physicians ($\chi^2 = 0.6801$, $p = 0.410$).

		below-average negative reciprocity	above-average negative reciprocity	Total
Total Bribe Acceptance	Bribe rejected	17	9	26
	Bribe accepted	197	73	270
Total Prescriptions	Optimal	321	133	454
	Non-optimal	159	57	216
Prescriptions if Bribe accepted	Optimal	65	22	87
	Non-optimal	132	51	183

Table 13: Behavior of Negative Reciprocal Physicians

Now we shed light on the prescriptions of Physicians that accepted a bribe. Comparing the prescription behavior between Physicians with an above-average reciprocal motivation and Physicians with an below-average negative reciprocal motivation, we cannot find any significant difference. 67.01% of the physicians with an below-average negative reciprocal motivation and 69.86% of the physicians with an above-average negative reciprocal motivation prescribe a patient-non-optimal pharmaceutical ($\chi^2 = 0.1992$, $p = 0.655$).

Result 6.A. *There is no significant difference in the amount of accepted bribes for Physicians with an above-average negative reciprocal motivation and Physicians with an below-average negative reciprocal motivation.*

Result 6.B. *There is no significant difference in the prescription behavior of Physicians that accepted a bribe and have an above-average negative reciprocal motivation or a below-average negative reciprocal motivation.*

Against our assumption, we do not find any differences in the behavior of the subjects with regard to their behavioral preferences. Neither the bribe acceptance nor the prescription behavior is significantly different for subjects with an above or below-average altruistic or reciprocal motivation. But we do find differences between our treatments. A stronger reciprocity between Briber and Physician increases the number of successful corrupt acts. Bribery also influences the Physicians' prescriptions so that more patient-non-optimal pharmaceuticals are prescribed.

4. Conclusion

We conducted an experiment to analyze the influence of reciprocity on a Physician's medical treatment decision, using a partner and stranger design to vary the intensity of the relationships. Our results show that a change of the relative relationships between Physician and Briber has an influence on the physician's

prescription. In the partner treatment nearly all Physicians who accept a bribe prescribe the patient-non-optimal pharmaceutical. In contrast, in the stranger treatment less than half of the Physicians, that accept a bribe prescribe the patient-non-optimal pharmaceutical. Comparing both treatments, in the partner treatment, the corrupt act is more often successful than in the stranger treatment.

Analyzing the Physician's relative relationships (and therefore his relative reciprocity) towards the Briber, we can say that in the partner treatment his relative relationship to the Briber is stronger than in the stranger treatment. In the partner treatment, bribery relationship, based on reciprocity can establish. Our treatments show: A stronger relationship to the briber leads to more successful corrupt acts.

Across treatments, Physicians who accept a bribe are more likely to prescribe a patient-non-optimal pharmaceutical than Physicians to whom no bribe is offered. However, Physicians who reject an offered bribe will not prescribe a patient-non-optimal pharmaceutical.

Additionally we measured the behavioral characteristics of the participants. However, we find no significant differences in the participants behavior with regard to their behavioral preferences. In our experiment we can only find differences in the behavior of the subjects between the partner and stranger treatment. Nevertheless, it is not possible to identify a different behavior of subjects that have a general reciprocal motivation.

Our experiment shows that the reciprocal relationship between a physician and a pharmaceutical company will increase the probability for patient-non-optimal prescription. Therefore a starting point to reduce corrupt behavior in the health sector might be a regulation of the relationships between physicians and pharmaceutical companies. As the new law in Germany (§499 StGB) focuses not only on punishing physician, now also pharmaceutical companies can be punished for offering a bribe. Future research should analyze the influence of penalties on a physician's treatment decision.

Bibliography

Abbink, K. (2004). Staff rotation as an anti-corruption policy: an experimental study. *European Journal of Political Economy*, 20(4):887–906.

Abbink, K. and Hennig-Schmidt, H. (2006). Neutral versus loaded instructions in a bribery experiment. *Experimental Economics*, 9(2):103–121.

Abbink, K., Irlenbusch, B., and Renner, E. (2002). An experimental bribery game. *Journal of Law, Economics, and Organization*, 18(2):428–454.

Alatas, V., Cameron, L., Chaudhuri, A., Erkal, N., and Gangadharan, L. (2009). Gender, culture, and corruption: Insights from an experimental analysis. *Southern Economic Journal*, pages 663–680.

Andvig, J. C. (2005). Experimental research and corruption: A survey of budding research. In *Global Corruption Report*, pages 255–267. Transparency International.

Azfar, O. and Nelson, W. R. (2007). Transparency, wages, and the separation of powers: An experimental analysis of corruption. *Public Choice*, 130(3-4):471–493.

Barr, A. and Serra, D. (2010). Corruption and culture: An experimental analysis. *Journal of Public Economics*, 94(11-12):862–869.

Berg, J., Dickhaut, J., and McCabe, K. (1995). Trust, reciprocity, and social history. *Games and economic behavior*, 10(1):122–142.

Bobkova, N. and Egbert, H. (2013). Corruption investigated in the lab: a survey of the experimental literature. *International Journal of Latest Trends in Finance and Economic Sciences*, 2(4):337–349.

Bolton, G., Greiner, B., and Ockenfels, A. (2013). Engineering trust: reciprocity in the production of reputation information. *Management science*, 59(2):265–285.

Bolton, G. E., Katok, E., and Ockenfels, A. (2004). How effective are electronic reputation mechanisms? an experimental investigation. *Management science*, 50(11):1587–1602.

Bolton, G. E. and Ockenfels, A. (2000). Erc: A theory of equity, reciprocity, and competition. *American economic review*, 90(1):166–193.

Dufwenberg, M. and Gneezy, U. (2000). Measuring beliefs in an experimental lost wallet game. *Games and economic Behavior*, 30(2):163–182.

Dušek, L., Ortmann, A., and Lízal, L. (2005). Understanding corruption and corruptibility through experiments: A primer. *Prague economic papers*, (2).

Fahr, R. and Irlenbusch, B. (2000). Fairness as a constraint on trust in reciprocity: earned property rights in a reciprocal exchange experiment. *Economics Letters*, 66(3):275–282.

Falk, A., Becker, A., Dohmen, T. J., Huffman, D., and Sunde, U. (2016). The preference survey module: A validated instrument for measuring risk, time, and social preferences.

Fehr, E. and Gächter, S. (2000). Fairness and retaliation: The economics of reciprocity. *Journal of economic perspectives*, 14(3):159–181.

Fehr, E., Kirchsteiger, G., and Riedl, A. (1993). Does fairness prevent market clearing? an experimental investigation. *The quarterly journal of economics*, 108(2):437–459.

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

Frank, B., Lambsdorff, J. G., and Boehm, F. (2011). Gender and corruption: Lessons from laboratory corruption experiments. *The European Journal of Development Research*, 23(1):59–71.

Frank, B. and Schulze, G. G. (2000). Does economics make citizens corrupt? *Journal of economic behavior & organization*, 43(1):101–113.

Gächter, S. and Falk, A. (2002). Reputation and reciprocity: Consequences for the labour relation. *The Scandinavian Journal of Economics*, 104(1):1–26.

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

Rabin, M. (1993). Incorporating fairness into game theory and economics. *The American economic review*, pages 1281–1302.

Schulze, G. G. and Frank, B. (2003). Deterrence versus intrinsic motivation: Experimental evidence on the determinants of corruptibility. *Economics of governance*, 4(2):143–160.

Transparency International Deutschland e.V. (2008). *Transparenzmängel, Korruption und Betrug im deutschen Gesundheitswesen - Kontrolle und Prävention als gesellschaftliche Aufgabe*. Berlin.

Appendix

Appendix A. Questions from the Preference Survey Module

Appendix A.1. English Version

This is the English version of the questions of "The Preference Survey Module" from Falk et al. (2016) regarding the characteristics altruism, positive and negative reciprocity.

Altruism

1. Imagine the following situation:
   You won 1,000 Euro in a lottery. Considering your current situation, how much would you donate to charity?
   (Values between 0 and 1,00 are allowed)

2. How do you assess your willingness to share with others without expecting anything in return when it comes to charity? Please use a scale from 0 to 10, where 0 means you are "completely unwilling to share" and a 10 means you are "very willing to share". You can also use the values in between to indicate where you fall on the scale.

Positive Reciprocity

1. Please consider the following situation:
   You and another person, whom you do not know, both participate in a study where you can decide on how to assign a certain amount of money and thereby determine the outcome. The rules are as follows. Both participants get an account with 20 Euros. At the beginning, both participants thus own 20 Euros. The other person decides first. She can transfer money to your account. She can transfer any amount: 0, 1, 2 Euro, etc. up to 20 Euro. Each Euro that she transfers to you is tripled by the conductors of the study and booked to your account. After this first stage the other person therefore has 20 Euro minus the amount she transferred to you in her account. You have 20 Euro plus the tripled amount of the transfer of the other person on your account. Now you get to decide: you have the opportunity to transfer money back to the other person. You can transfer any amount up to 80 Euro, depending on how much you have in your account. This will be the end of the study and the account balances will be final. The other person has in her account 20 Euros minus the amount she transferred to you plus the amount you transferred back. You have 20 Euro plus the tripled amount of what the other person transferred to you minus the amount you transferred back to her. We would like to know how much you would choose to transfer back to the other person, for a given transfer of her to you. Suppose the other person transfers 5/10/15/20 Euro to your account. After the first stage you then own 20+3*5/10/15/20=35/50/65/80 Euro, the other person owns 20-5/10/15/20=15/10/5/0 Euro. What amount do you choose to transfer back?

2. Imagine the following situation:
   You are shopping in an unfamiliar city and realize you lost your way. You ask a stranger for directions. The stranger offers to take you with this car to your destination. The ride takes about 20 minutes and costs the stranger about 20 Euro in total. The stranger does not want money for it. You carry six bottles of wine with you. The cheapest bottle costs 5 Euro, the most expensive one 30 Euro. You decide to give one of the bottles to the stranger as a thank-you gift. Which bottle do you give? Respondents can choose from the following options: The bottle for (5, 10, 15, 20, 25, or 30 Euro).

Negative Reciprocity

1. How do you see yourself: Are you a person who is generally willing to punish unfair behavior even if this is costly? Please use a scale from 0 to 10, where 0 means you are "not willing at all to incur costs to punish unfair behavior" and a 10 means you are "very willing to incur costs to punish unfair behavior". You can also use the values in-between to indicate where you fall on the scale.

2. Imagine the following situation:
   Together with a person, whom you do not know, you won 100 Euro in a lottery. The rules stipulate the following: One of you has to make a proposal about how to divide the 100 Euro between you two. The other one gets to know the proposal and has to decide between two options. He or she can accept the proposal or reject it. If he or she accepts the proposal, the money is divided according to the proposal. If he or she rejects the proposal, both receive nothing. Suppose that the other person offered the following split: 50 Euro for you and 50 Euro for himself/herself. Do you accept this split? If you do, you will receive 50 Euro and the other person will receive 50 Euro. If you reject, both of you receive 0 Euro. Note that individuals answered a total of 5 questions that use the same wording but vary the amount that was offered by the other person. These amounts were 50, 40, 30, 20, and 10.

Appendix A.2. German Version

This is the German version of the questions of "The Preference Survey Module" from Falk et al. (2016) regarding the characteristics altruism, positive and negative reciprocity.

Altruismus

1. Wie schätzen Sie Ihre Bereitschaft mit anderen zu teilen, ohne dafür eine Gegenleistung zu erwarten, in Bezug auf den folgenden Bereich ein: wenn es um gemeinnützige Zwecke geht? Bitte klicken Sie ein Kästchen auf der Skala an, wobei der Wert 0 bedeutet "gar nicht bereit zu teilen ohne eine Gegenleistung zu erwarten" und der Wert 10 bedeutet "sehr bereit zu teilen ohne eine Gegenleistung zu erwarten". Mit den Werten dazwischen können Sie ihre Einschätzung abstufen.

2. Stellen Sie sich folgende Situation vor:
   Sie haben in einem Preisausschreiben 1.000 Euro gewonnen. Wie viel würden Sie in Ihrer momentanen Situation für einen gemeinnützigen Zweck spenden? (Werte zwischen 0 und 1000 Euro sind erlaubt)

Positive Reciprozität

1. Überlegen Sie bitte, was Sie in folgender Situation tun würden:
   Sie und eine andere Person, die Sie nicht persönlich kennen, treffen beide eine Entscheidung über die Verwendung von Geld und erzielen zusammen ein Ergebnis. Die Regeln gehen so: Jeder Teilnehmer erhält ein Konto mit 20 Euro. Am Anfang haben Sie und die andere Person also jeweils 20 Euro auf dem Konto. Zuerst entscheidet die andere Person. Sie kann Ihnen Geld auf Ihr Konto überweisen. Sie kann Ihnen einen beliebigen Eurobetrag überweisen, also 0 Euro, 1 Euro, 2 Euro usw. bis 20 Euro. Jeder Euro, den die andere Person an Sie überweist, wird von den Leitern der Studie verdreifacht und Ihrem Konto gutgeschrieben. Nach dem ersten Schritt sind also auf dem Konto der anderen Person 20 Euro minus der Überweisung an Sie. Auf Ihrem Konto sind 20 Euro plus dem Dreifachen der Überweisung an Sie. Jetzt entscheiden Sie: Sie haben die Möglichkeit, der anderen Person Geld zurück zu überweisen. Sie können jeden beliebigen Eurobetrag zurück überweisen, also 0, 1, 2, 3, usw. bis 80 Euro, je nachdem, wie viel Geld Sie insgesamt auf Ihrem Konto gutgeschrieben haben, nachdem Sie die Überweisung der anderen Person erhalten haben. Damit ist die Studie beendet. Die endgültigen Kontostände sind erreicht. Auf dem Konto der anderen Person sind jetzt 20 Euro minus der Überweisung an Sie plus Ihrer Rücküberweisung. Auf Ihrem Konto sind jetzt 20 Euro

plus das Dreifache der Überweisung an Sie minus Ihrer Rücküberweisung. Wir möchten nun von Ihnen wissen, welche Rücküberweisung Sie wählen würden, wenn die andere Person Ihnen einen bestimmten Betrag überweist. Angenommen, die andere Person überweist Ihnen 5(10/15/20) Euro. Sie haben dann nach dem ersten Schritt 20+3*5(10/15/20)=35(50/65/80) Euro, die andere Person hat 20-5(10/15/20)=15(10/5/0) Euro. Wie hoch ist Ihre Rücküberweisung?

2. Stellen Sie sich die folgende Situation vor:
   Sie sind in einer Ihnen fremden Stadt einkaufen und haben sich verlaufen. Sie fragen einen Fremden nach dem Weg, der Ihnen anbietet, Sie in seinem Auto zu Ihrem Zielort zu fahren. Dafür bräuchten Sie 20 Minuten Fahrzeit und es würde den Fremden 20 Euro kosten. Der Fremde möchte kein Geld dafür. Sie haben 6 Flaschen Wein bei sich. Die günstigste Flasche kostet 5 Euro, die teuerste 30 Euro. Sie beschließen, dem Fremden als "Danke-Schön" eine Flasche Wein zu geben.
   Welche Flasche schenken Sie ihm?
   Die Flasche für 5, 10, 15, 20, 25, oder 30 Euro?

Negative Reciprozität

1. Sind Sie jemand, der im Allgemeinen bereit ist, unfaires Verhalten zu bestrafen, auch wenn das für Sie mit Kosten verbunden ist? Bitte klicken Sie ein Kästchen auf der Skala an, wobei der Wert 0 bedeutet "gar nicht bereit Kosten auf sich zu nehmen um zu bestrafen", und der Wert 10 bedeutet "sehr bereit Kosten auf sich zu nehmen um zu bestrafen". Mit den Werten dazwischen können Sie ihre Einschätzung abstufen.

2. Stellen Sie sich folgende Situation vor:
   Zusammen mit einer anderen Person, die Sie nicht persönlich kennen, haben Sie 100 Euro bei einem Preisausschreiben gewonnen. Die Regeln besagen nun Folgendes. Einer von Ihnen soll einen Vorschlag darüber machen, wie die 100 Euro aufgeteilt werden. Der andere erfährt den Vorschlag, und hat dann zwei Möglichkeiten. Er kann die Aufteilung annehmen oder ablehnen. Wenn er den Vorschlag annimmt, wird das Geld so aufgeteilt, wie die andere Person es vorgeschlagen hat. Wird die Aufteilung abgelehnt, gehen beide leer aus. Angenommen, die andere Person macht einen Vorschlag über die Aufteilung. Sie wiederum sollen entscheiden, ob Sie den Vorschlag annehmen oder ablehnen. Welchen Betrag muss die andere Person Ihnen mindestens anbieten, damit Sie bereit sind, den Vorschlag über die Aufteilung anzunehmen?

Appendix B. Instructions

These are the original and translated instructions for the subjects that participated in our experiment. The instructions are different for the partner and stranger treatment as well as for the physician and pharmaceutical company. We marked it with (1) for partner treatment and (2) for the stranger treatment. All text without notation was the presented in both treatments. The first two parts "General information" and "Experimental Setup" are equal in both treatments and for both roles.

Appendix B.1. English Instructions

Welcome to the experiment!

General information

- During the experiment all amounts are indicated by the fictive currency "Taler".

- The payoff depends on both your own decisions and the decisions of the other players.

- During the experiment you generate payments for the charity organization *"Doctors Without Borders"*. These payments are donated once the session has ended. The donation receipt is accessible at the BaER-Lab homepage https://wiwi.uni-paderborn.de/forschung/ forschungszentren/baer-lab-business-and-economic-research-laboratory/ as from 08.02.2017. The total amount donated to the charity organization also depends on both your decisions and the decisions made by the other players throughout the experiment.

- Once the experiment has finished you are asked to fill in a questionnaire. You will receive a brief instruction beforehand. Your answers in the questionnaire do not impact the payoffs you generate during the experiment.

- The following instructions contain all necessary information for the implementation of the experiment. Please carefully read the instructions and raise your hand if there are any questions.

- Please be quiet, switch off your mobile phones, and do not talk to other participants throughout the course of the experiment.

- The currency Taler is exchanged at a rate of 10 Taler = 0.25 Euro. Your generated payoff and the show-up fee of 2.50 Euro is paid out to you in cash.

Experimental setup

- This experiment is about physicians' therapy decisions.

- Generally, there are three roles in this experiment: The role of the patient, the role of the pharmaceutical company representative and the role of the physician. Each participant is randomly assigned the role of the physician or company representative. The role of the patient will not be assigned during this laboratory based experiment. The patients' utility depends on the prescribed medication and is represented by the donation made to the charity organization *"Doctors Without Borders"*.

- During the experiment teams are randomly composed of one company representative and one physician each.

    - (1) Assigned teams play together over the entire session.
    - (2) Teams will be randomly recomposed after each round.

- The payoffs during the experiment are impacted by the decisions of the company representative and the physician.

- The experiment lasts at most 15 rounds of playing and is randomly terminated between rounds 10 and 15. The first 10 rounds will definitely be played. Afterwards, the experiment is terminated with a probability of 20% in each of the subsequent rounds.

- At the end of the experiment one participant is randomly selected to come forward and draw 2 numbers from a bag. These two numbers determine the periods that will be paid out at the end.

These are the instructions for the pharmaceutical agent.

Your role in the experiment

- You were randomly assigned the role of the **company representative** for the entire length of the experiment.

    – (1) Furthermore, you have been allocated to one physician with whom you will interact for the entire experiment.

    – (2) In every round of the experiment you will interact with another physician.

- The physicians' task is to prescribe medication to the patient. He/She can choose between medication A and medication B. Both medications are produced by your company.

- For the patient the different medications differ in the length of healing process required. Medication A promises a quicker recovery than medication B. Therefore, the patients' utility from receiving medication A is higher than that achieved through the prescription of medication B.

- For your company the medications differ in their production costs. Medication A is more cost-intensive than B. Hence, the utility achieved by your company is higher for the prescription of medication B when compared to medication A.

- You have a possibility to offer a present to the physician for the prescription of medication B **before** the physician has decided which medication to prescribe. If you offer a present, the physician may accept or reject it.

- The physicians' decision regarding which medication to prescribe is **independent** of the acceptance of the present.

Experimental procedure

1. Decision - Pharmaceutical company representative:

- You decide whether to offer a present to the physician or not.

    – Offer a present
    – Do not offer a present

2. Decision - Physician:

- If you have offered a present to the physician, then he/she can decide whether to accept or reject the present.

    – Acceptance of the present
    – Rejection of the present

- If you have not offered a present to the physician, he/she should directly proceed with the following decision:

3. Decision - Physician:

- **Independent** of the first decision the physician now decide which medication to prescribe to the patient.

    – Prescription of medication A
    – Prescription of medication B

- After each therapy decision (and hence after each round) the physician and you get informed regarding the decisions made by the other players. The physicians' payoff, your own payoff, and the patients' payoff for the respective round are also reported.

- (1) You interact with the same physician each round. He/She knows your decisions and your payoffs from the prior round.

- (2) Subsequently, you will be assigned to another physician. He/She does not know your decisions nor your payoffs from the prior round. In each round you will interact with a new physician.

Payoffs

Payoff for the patient:

- The patients' payoff is represented by a donation to *Doctors Without Borders* and depends on your decisions.

Summary patient:

- Prescription of medication A: Donation amount of 20 Taler

- Prescription of medication B: Donation amount of 15 Taler

Payoff for the physician:

- The physician receives a basic payment of 20 Taler for every patient he/she treats.

- Furthermore, you have the option to offer a present to the physician. If he/she accepts the present 15 Taler is credited to the physicians' account. The present has a cost of 5 Taler for your company.

Summary physician:

- No offer of a present or rejection of present offer: 20 Taler

- Offer of a present and acceptance of the present: 35 Taler

Payoff for the company representative:

- You always receive 15 Taler more when medication B is prescribed instead of medication A. You receive 22 Taler if medication A is prescribed and 37 Taler if medication B is prescribed.

- You have the possibility to offer a present to the physician to increase the inclination towards the prescription of medication B.

- The present has an additional cost of 5 Taler for your company. Following the acceptance of the present 15 Taler is credited to the physicians' account.

Summary company representative:

- No offer of a present or present offer and rejection by the physician:

  - Prescription of medication A: 22 Taler
  - Prescription of medication B: 37 Taler

- Offer of a present and acceptance by the physician:

  - Prescription of medication A: 17 Taler
  - Prescription of medication B: 32 Taler

Thank you for your participation!

Your role in the experiment

- You were randomly assigned the role of the **physician** for the entire length of the experiment.

    - (1) Furthermore, you have been allocated to one company representative with whom you will interact for the entire experiment.
    - (2) In every round of the experiment you will interact with another company representative.

- Your task is to prescribe medication to the patient. You can choose between medication A and medication B. Both medications are produced by the company.

- For the patient the different medications differ in the length of healing process required. Medication A promises a quicker recovery than medication B. Therefore, the patients' utility from receiving medication A is higher than that achieved through the prescription of medication B.

- For the company the medications differ in their production costs. Medication A is more cost-intensive than B. Hence, the utility achieved by the company is higher for the prescription of medication B when compared to medication A.

- There is a possibility that the company representative offers you a present for the prescription of medication B **before** you have decided which medication to prescribe. If you are offered a present by the company representative, you may accept or reject it.

- Your decision regarding which medication to prescribe is **independent** of the acceptance of the present.

Experimental procedure

1.Decision - Pharmaceutical company representative:

- The company representative decides whether to offer a present to the physician or not.

    - Offer a present
    - Do not offer a present

2. Decision - Physician:

- Possibly, you are offered a present by the company representative. Then, you can decide whether to accept or reject the present.

    - Acceptance of the present
    - Rejection of the present

- If you are not offered a present by the company representative, you should directly proceed to the following decision:

3.Decision - Physician:

- **Independent** of the first decision, you now decide which medication to prescribe to the patient:

    - Prescription of medication A
    - Prescription of medication B

- After each therapy decision (and hence after each round) you and the company representative get informed regarding the decisions made by the other players. The company representatives' payoff, your own payoff, and the patients' payoff for the respective round are also reported.

- (1) You interact with the same company representative each round. He/She knows your decisions and your payoffs from the prior round.

- (2) Subsequently, you will be assigned to another company representative. He/She does not know your decisions nor your payoffs from the prior round. In each round you will interact with a new company representative.

Payoffs

Payoff for the patient:

- The patients' payoff is represented by a donation to *Doctors Without Borders* and depends on your decisions.

Summary patient:

- Prescription of medication A: Donation amount of 20 Taler

- Prescription of medication B: Donation amount of 15 Taler

Your payoff:

- You receive a basic payment of 20 Taler for every patient you treat.

- Furthermore, the company representative may offer you a present. If you accept the present 15 Taler is credited to your account. The present has a cost of 5 Taler for the company representative.

Summary physician:

- No offer of a present or rejection of present offer: 20 Taler

- Offer of a present and acceptance of the present: 35 Taler

Payoff for the company representative:

- The company representative always receives 15 Taler more when medication B is prescribed instead of medication A. He/She receives 22 Taler if medication A is prescribed and 37 Taler if medication B is prescribed.

- The company representative has the possibility to offer you a present to increase your inclination towards the prescription of medication B.

- The present has an additional cost of 5 Taler for the company representative. Following the acceptance of the present 15 Taler is credited to your account.

Summary company representative:

- No offer of a present or present offer and rejection by the physician:

    - Prescription of medication A: 22 Taler
    - Prescription of medication B: 37 Taler

- Offer of a present and acceptance by the physician:

    - Prescription of medication A: 17 Taler
    - Prescription of medication B: 32 Taler

Thank you for your participation!

Herzlich Willkommen zum Experiment!

Allgemeine Informationen

- Während des Experiments werden alle Beträge in der fiktiven Währung "Taler" angegeben.

- Die Höhe der Auszahlungen ist abhängig von Ihren Entscheidungen und den Entscheidungen Ihrer Mitspieler.

- Außerdem generieren Sie Auszahlungen an die gemeinnützige Organisation *Ärzte ohne Grenzen*. Diese Auszahlungen werden nach Ende des Experiments direkt an *Ärzte ohne Grenzen* gespendet. Der Spendenbeleg ist auf der Homepage des BaER-Lab unter https://wiwi.uni-paderborn.de/forschung/ forschungszentren/baer-lab-business-and-economic-research-laboratory/ ab dem 08.02.2017 einzusehen. Der Betrag, der an *Ärzte ohne Grenzen* überwiesen wird, ist ebenfalls von Ihren Entscheidungen und den Entscheidungen der Mitspieler im Experiment abhängig.

- Nach Ende des Experiments bitten wir Sie noch einen Fragebogen auszufüllen. Sie erhalten hierzu eine kurze Anleitung, sobald das Experiment beendet ist. Ihre Antworten in diesem Fragebogen haben keinen Einfluss auf Ihre Auszahlung in diesem Experiment.

- Die vorliegenden Instruktionen beinhalten alle notwendigen Informationen für das Experiment. Bitte lesen Sie die Instruktionen aufmerksam und heben Sie bei Fragen die Hand.

- Bitte verhalten Sie sich während des Experiments ruhig, schalten Sie Ihr Handy aus und kommunizieren Sie nicht mit anderen Teilnehmern.

- Die Währung "Taler" wird zu einem Wechselkurs von 10 Talern = 0,25 Euro umgetauscht und zusammen mit der Show-Up Fee von 2,50 Euro bar an Sie ausgezahlt.

Aufbau des Experiments

- Dieses Experiment beschäftigt sich mit der ärztlichen Therapieentscheidung.

- Generell gibt es drei Rollen in diesem Experiment: Die Rolle des Patienten, die Rolle des Unternehmensvertreters und die des Arztes. Jeder Teilnehmer im Labor wird zufällig in die Rolle des Arztes oder des Unternehmensvertreters eingeteilt. Der Patient ist keine im Labor anwesende Person. Der Nutzen des Patienten ist vom verschriebenen Medikament abhängig und wird als Spende an die Hilfsorganisation *Ärzte ohne Grenzen* ausgezahlt.

- Im Experiment werden zufällig Teams aus je einem Unternehmensvertreter und einem Arzt gebildet. Diese Teams

  - (1) spielen für die **gesamte Dauer** des Experiments miteinander.
  - (2) wechseln **in jeder** Runde.

- Die Auszahlungen im Experiment werden von den Entscheidungen des Unternehmensvertreters und des Arztes beeinflusst.

- Das Experiment dauert maximal 15 Runden. Es wird zufällig zwischen Runde 10 und 15 beendet. Die ersten 10 Runden werden definitiv gespielt, danach wird das Experiment pro Runde mit einer Wahrscheinlichkeit von 20% beendet.

- Am Ende des Experiments wird zufällig ein Teilnehmer ausgewählt. Dieser kommt nach vorne und zieht blind aus einem Beutel zwei Zahlen. Die Zahlen bestimmen die beiden Perioden die am Ende ausgezahlt werden.

Dies sind die Instruktionen für den Unternehmensvertreter.

Ihre Rolle im Experiment

- Für das komplette Experiment wurde Ihnen zufällig die Rolle des **Unternehmensvertreters** zugewiesen. Sie treffen im **gesamten** Experiment

  – (1) immer auf **denselben** Arzt.

  – (2) **in jeder** Runde auf einen **neuen** Arzt.

- Die Aufgabe des Arztes ist dem Patienten ein Medikament zu verschreiben. Er hat die Wahl zwischen Medikament A oder Medikament B. Beide Medikamente werden von Ihrem Unternehmen produziert.

- Für den Patienten unterscheiden sich die Medikamente nur in ihrer Heilungsdauer. Medikament A hat eine kürzere Heilungsdauer als Medikament B. Deshalb ist für den Patienten der Mehrwert bei der Verschreibung von Medikament A höher als bei der Verschreibung von Medikament B.

- Für Ihr Unternehmen unterscheiden sich die Medikamente in den Herstellungskosten. Medikament A ist kostenintensiver als Medikament B in der Herstellung. Deshalb ist für Sie der Nutzen bei der Verschreibung von Medikament B höher als bei der Verschreibung von Medikament A.

- Sie können dem Arzt **vor** der Behandlung des Patienten ein Geschenk anbieten, damit er Medikament B verschreibt. Falls Sie dem Arzt ein Geschenk anbieten, kann dieser es annehmen oder ablehnen.

- Die Entscheidung des Arztes über das zu verschreibende Medikament ist **unabhängig** von der Annahme des Geschenks.

Ablauf des Experiments

1. Entscheidung - Unternehmensvertreter:

- Sie entscheiden, ob Sie dem Arzt ein Geschenk anbieten.

  – Geschenkangebot

  – Kein Geschenkangebot

2. Entscheidung - Arzt:

- Wenn Sie dem Arzt ein Geschenk anbieten, kann dieser entscheiden ob er es annimmt oder ablehnt.

  – Annahme des Geschenks

  – Ablehnung des Geschenks

- Sollten Sie dem Arzt kein Geschenk anbieten, so trifft er direkt die folgende Entscheidung:

3. Entscheidung - Arzt:

- **Unabhängig** von der ersten Entscheidung entscheidet der Arzt nun welches Medikament er dem Patienten verschreibt:

  - Verschreibung von Medikament A
  - Verschreibung von Medikament B

- Nach jeder Therapieentscheidung, also nach jeder Runde, erhalten Sie und der Arzt eine Information über die Entscheidungen des anderen Spielers. Ihre Auszahlung, die Auszahlung des Arztes und die Auszahlung an den Patienten für die jeweilige Runde werden ebenfalls angezeigt.

- Sie treffen **in jeder** Runde auf

  - (1) **denselben** Arzt. Dieser kennt Ihre Entscheidungen und Ihre Auszahlungen aus der Vorrunde.
  - (2) einen **neuen** Arzt. Dieser kennt Ihre Entscheidungen und Ihre Auszahlungen aus der Vorrunde **nicht**.

Auszahlungen

Auszahlungen für den Patienten:

- Die Auszahlungen des Patienten werden an *Ärzte ohne Grenzen* gespendet und sind abhängig von Ihren Entscheidungen.

Zusammenfasung Patient:

- Verschreibung von Medikament A: Spende in Höhe von 20 Talern

- Verschreibung von Medikament B: Spende in Höhe von 15 Talern

Auszahlung für den Arzt:

- Der Arzt erhält ein Grundgehalt in Höhe von 20 Talern für jeden Patienten, den er behandelt.

- Außerdem können Sie dem Arzt ein Geschenk anbieten. Nimmt der Arzt es an, erhält er 15 Taler gut geschrieben. Das Geschenk verursacht für Sie Kosten in Höhe von 5 Talern.

Zusammenfassung Arzt:

- Kein Geschenkangebot oder Ablehnung des Geschenkangebots: 20 Taler

- Geschenkangebot und Geschenkannahme: 35 Taler

Ihre Auszahlung:

- Sie erhalten immer 15 Taler mehr wenn Medikament B verschrieben wird anstatt Medikament A. Sie erhalten 22 Taler wenn Medikament A verschrieben wird und 37 Taler wenn Medikament B verschrieben wird.

- Sie haben die Möglichkeit dem Arzt ein Geschenk anzubieten, damit er geneigt ist Medikament B zu verschreiben.

- Das Geschenk selbst verursacht weitere Kosten in H"ohe von 5 Talern für den Unternehmensvertreter. Dem Arzt werden 15 Taler bei Geschenkannahme gut geschrieben.

Zusammenfassung Unternehmensvertreter:

- Kein Geschenkangebot **oder** Geschenkangebot und Ablehnung durch Arzt:
  - Verschreibung von Medikament A: 22 Taler
  - Verschreibung von Medikament B: 37 Taler
- Geschenkangebot und Annahme durch Arzt:
  - Verschreibung von Medikament A: 17 Taler
  - Verschreibung von Medikament B: 32 Taler

Vielen Dank für Ihre Teilnahme!

Ihre Rolle im Experiment

- Für das komplette Experiment wurde Ihnen zufällig die Rolle des **Arztes** zugewiesen. Sie treffen im **gesamten** Experiment

    – (1) immer auf **denselben** Unternehmensvertreter.

    – (2) **in jeder** Runde auf einen **neuen** Unternehmensvertreter.

- Ihre Aufgabe ist es, dem Patienten ein Medikament zu verschreiben. Sie haben die Wahl zwischen Medikament A oder Medikament B. Beide Medikamente werden vom zugewiesenen Unternehmen produziert.

- Für den Patienten unterscheiden sich die Medikamente nur in ihrer Heilungsdauer. Medikament A hat eine kürzere Heilungsdauer als Medikament B. Deshalb ist für den Patienten der Mehrwert bei der Verschreibung von Medikament A höher als bei der Verschreibung von Medikament B.

- Für das Unternehmen unterscheiden sich die Medikamente in den Herstellungskosten. Medikament A ist kostenintensiver als Medikament B in der Herstellung. Deshalb ist für das Unternehmen der Nutzen bei der Verschreibung von Medikament B höher als bei der Verschreibung von Medikament A.

- Es besteht die Möglichkeit, dass Ihnen der Unternehmensvertreter **vor** der Behandlung des Patienten ein Geschenk anbietet, damit Sie Medikament B verschreiben. Falls Ihnen der Unternehmensvertreter ein Geschenk anbietet, können Sie dieses annehmen oder ablehnen.

- Ihre Entscheidung über das zu verschreibende Medikament ist **unabhängig** von der Annahme des Geschenks.

Ablauf des Experiments

1. Entscheidung - Unternehmensvertreter:

- Der Unternehmensvertreter entscheidet, ob er Ihnen ein Geschenk anbietet. Er hat die Wahl zwischen:

    – Geschenkangebot

    – Kein Geschenkangebot

2. Entscheidung - Arzt:

- Möglicherweise bietet Ihnen der Unternehmensvertreter ein Geschenk an. Dann können Sie entscheiden, ob Sie dieses annehmen oder ablehnen.

    – Annahme des Geschenks

    – Ablehnung des Geschenks

- Sollte der Unternehmensvertreter Ihnen kein Geschenk anbieten, treffen Sie direkt die folgende Entscheidung:

3. Behandlungsentscheidung - Arzt:

- **Unabhängig** von der ersten Entscheidung entscheiden Sie nun welches Medikament Sie dem Patienten verschreiben.

    - Verschreibung von Medikament A
    - Verschreibung von Medikament B

- Nach jeder Therapieentscheidung, also nach jeder Runde, erhalten Sie und der Unternehmensvertreter eine Information über die Entscheidungen des anderen Spielers. Ihre Auszahlung, die Auszahlung des Unternehmensvertreters und die Auszahlung an den Patienten für die jeweilige Runde werden ebenfalls angezeigt.

- Sie treffen **in jeder** Runde auf

    - (1) **denselben** Unternehmensvertreter. Dieser kennt Ihre Entscheidungen und Ihre Auszahlungen aus der Vorrunde.
    - (2) einen **neuen** Unternehmensvertreter. Dieser kennt Ihre Entscheidungen und Ihre Auszahlungen aus der Vorrunde **nicht**.

Auszahlungen

Auszahlungen für den Patienten:

- Die Auszahlungen des Patienten werden an *Ärzte ohne Grenzen* gespendet und sind abhängig von Ihren Entscheidungen.

Zusammenfasung Patient:

- Verschreibung von Medikament A: Spende in Höhe von 20 Talern
- Verschreibung von Medikament B: Spende in Höhe von 15 Talern

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Ihre Auszahlungen:

- Sie erhalten ein Grundgehalt in Höhe von 20 Talern für jeden Patienten, den Sie behandeln.
- Außerdem kann Ihnen der Unternehmensvertreter ein Geschenk anbieten. Nehmen Sie dieses an, erhalten Sie zusätzlich 15 Taler gut geschrieben. Der Unternehmensvertreter hat Kosten für das Geschenk in Höhe von 5 Talern.

Zusammenfassung Arzt:

- Kein Geschenkangebot oder Ablehnung des Geschenkangebots: 20 Taler
- Geschenkangebot und Geschenkannahme: 35 Taler

Auszahlungen für den Unternehmensvertreter:

- Der Unternehmensvertreter erhält immer 15 Taler mehr, wenn Medikament B verschrieben wird anstatt Medikament A. Er erhält 22 Taler, wenn Medikament A verschrieben wird und 37 Taler, wenn Medikament B verschrieben wird.
- Der Unternehmensvertreter hat die Möglichkeit, Ihnen ein Geschenk anzubieten, damit Sie geneigt sind, Medikament B zu verschreiben.
- Das Geschenk selbst verursacht weitere Kosten in Höhe von 5 Talern für den Unternehmensvertreter. Ihnen werden 15 Taler bei Geschenkannahme gut geschrieben.

Zusammenfassung Unternehmensvertreter:

- Kein Geschenkangebot **oder** Geschenkangebot und Ablehnung durch Arzt:
  - Verschreibung von Medikament A: 22 Taler
  - Verschreibung von Medikament B: 37 Taler
- Geschenkangebot und Annahme durch Arzt:
  - Verschreibung von Medikament A: 17 Taler
  - Verschreibung von Medikament B: 32 Taler

Vielen Dank für Ihre Teilnahme!

Appendix C. Overview of all Decisions

In our analysis we consider only the decisions in periods 1-10. Here you can find an overview of all decisions in our experiments.

		Partner	Stranger	Total Sample
Bribing	No Bribe offered	51.39%	65.75%	58.62%
	Bribe offered	48.61%	34.25%	41.38%
Acceptance	Bribe accepted	88.11%	97.53%	92.03%
	Bribe not accepted	11.89%	2.47%	7.97%
Prescription	patient-optimal	58.67%	82.88%	70.85%
(Total)	patient - non -optimal	41.33%	17.12%	29.15%
Prescription	Optimal	88.33%	96.14%	92.74%
(no bribe offered)	Non -optimal	11.67%	3.86%	7.26%
Prescription	Optimal	100%	100%	100%
(bribe rejected)	Non -optimal	0%	0%	0%
Prescription	Optimal	17.50%	56.33%	34.64%
(bribe accepted)	Non -optimal	82.50%	43.67%	65.36%

Table C.14: Overview of the Decisions taken in all Periods

Recent discussion papers

2018-04	Vanessa Hilleringmann	The Influence of Bribery and Relative Reciprocity on a Physician's Prescription Decision – An Experiment
2018-03	Claus-Jochen Haake Cheng-Zhong Qin	On unification of solutions to the bargaining problem
2018-02	Simon Hoof	Feedback Pareto weights in cooperative NTU differential games
2018-01	Claus-Jochen Haake Nadja Stroh-Maraun	A Note on Manipulability in School Choice with Reciprocal Preferences
2017-12	Britta Hoyer Nadja Stroh-Maraun	Matching Strategies of Heterogeneous Agents under Incomplete Information in a University Clearinghouse
2017-11	Bernard Michael Gilroy Julia Günthner	The German Precariat and the Role of Fundamental Security - Is the Unconditional Basic Income a Possible Solution for the Growing Precarity in Germany?
2017-10	Achim Voß Mark Schopf	Lobbying over Exhaustible-Resource Extraction
2017-09	Walter Trockel Claus-Jochen Haake	Thoughts on Social Design
2017-08	Behnud Mir Djawadi René Fahr Claus-Jochen Haake Sonja Recker	Maintaining vs. Milking Good Reputation when Customer Feedback is Inaccurate
2017-07	Bernard M. Gilroy Nico Stöckmann	The varying relevance of impact factors in gravity models: An explanation of the delayed development towards global trade
2017-06	Xuehai Zhang Yuanhua Feng Christian Peitz	A general class of SemiGARCH models based on the Box-Cox transformation
2017-05	Juliane Proelss Denis Schweizer Volker Seiler	Do Announcements of WTO Dispute Resolution Cases Matter? Evidence from the Rare Earth Elements Market
2017-04	Yuanhua Feng Thomas Gries	Data-driven local polynomial for the trend and its derivatives in economic time series
2017-03	Sonja Brangewitz Behnud Mir Djawadi Angelika Endres Britta Hoyer	Network Formation and Disruption - An Experiment Are efficient networks too complex?
2017-02	Volker Seiler Evgenia Taach	Efectiveness of Official Development Assistance – Further Evidence from DAC Countries
2017-01	Nico Stöckmann	"The Impact of Refugees on Per Capita Income" A Gravity Model Approach
2016-06	Jochen Manegold	Stackelberg Competition among Intermediaries in a Differentiated Duopoly with Product Innovation
2016-05	Republished as CIE Working Paper 2017-05	
2016-04	Marlon Fritz Thomas Gries Yuanhua Feng	Growth Trends and Systematic Patterns of Booms and Busts – Testing 200 Years of Business Cycle Dynamics-