# Bribery and the Fair Salary Hypothesis in the Lab*

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**Abstract**

Previous studies have proposed a link between corruption and wages in the public sector. This paper investigates this link using a laboratory experiment. In the experiment, public officials have the opportunity to accept a bribe and can then decide between a neutral and a corrupt option. The corrupt option benefits the briber but poses a large negative externality on a charity.

I find that increasing the wage of public officials dramatically reduces their corruptibility. In particular, I find that experienced low wage public officials accept 91% of bribes on average, whereas high wage public officials accept 38%. Moreover, high wage public officials are less likely to choose the corrupt option. Comparing sessions with and without monitoring suggests that a non-zero level of monitoring may be necessary for the link between wages and corruption to occur.

Key Words: Bribery, Corruption, Experimental Economics, Laboratory Experiment

JEL Classification: D73, C91, K42

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# 1 Introduction

Corruption in its many forms is a significant problem in large parts of the developing world.[1] As a consequence, fighting corruption has at least ostensibly become a primary goal for many of the world's governments.[2] One possible policy instrument that has prompted considerable debate is the level of public official compensation. Theory (e.g. Becker and Stigler, 1974) suggests that increasing the wages of public officials should reduce their corruptibility. If this relationship -which I will refer to as the fair salary hypothesis- is true, it provides governments with a policy instrument that falls directly under its control and would therefore be relatively easy to implement.

However, empirical evidence in favor of the fair salary hypothesis has been hard to come by. Empirical studies have long been plagued by a lack of quality data, forcing studies to rely on indirect evidence. Additionally, cross-sectional studies tend to suffer from omitted variable bias and problems of reverse causality. Experimental economics provides a level of control that makes it possible to address these issues as well as obtain a more direct measure of corruption. This paper represents the results of a laboratory experiment in which participants in the role of public officials have the opportunity to accept a bribe and can then decide between a neutral and a corrupt option. The corrupt option benefits the briber but poses a large negative externality on a charity. Between treatments, I vary only public officials' wages. This provides a direct ceteris paribus measure of the impact of a change in wages on corruptibility. I find that increasing public officials' wages does indeed reduce their corruptibility. In particular, it makes experienced public officials 53 percentage points less likely to accept a bribe on average and reduces the number of corrupt choices by 27 percentage points.

The remainder of the paper is organized as follows. The next section provides a discussion of previous studies as well as possible mechanisms underlying the fair salary hypothesis. Section three then provides an overview of the bribery model that forms the basis of this experiment. Section four covers the design of the experiment and section five explains the experimental hypotheses. Section six presents the results of the experiment and in section seven I provide the results of a robustness check that shows that a nonzero level of monitoring may be necessary for the fair salary hypothesis to hold. Section eight concludes.

[1] See Svensson (2005) for an overview of several studies that find a detrimental effect of corruption on economic performance.

[2] As just one example, over the past year the Indian government has repeatedly emphasized the importance of fighting corruption, see for example http://www.nytimes.com/2011/02/17/world/asia/17india.html.

## 2 Background

Previous studies have suggested at least two reasons why increasing public officials' wages could reduce the level of corruption. Firstly, increasing public official salaries may increase the expected monetary costs of corruption. A wage increase will reduce the relative value of the wage a public official could expect to earn in the private sector. Under the right combination of monitoring and punishment, the expected loss from corruption for public officials will increase, inducing them to behave less corruptly (Becker and Stigler, 1974).[3]

Increasing public officials' wages may also increase the nonmonetary or 'moral' costs of corruption. There are at least three reasons why nonmonetary costs of corruption could be increasing in the wage of public officials. Firstly, public officials may perceive a high wage as more fair, making it more costly for them to go against the government's wishes by behaving corruptly; this idea is similar to the fair wage-effort hypothesis (Akerlof and Yellen, 1990, see also Van Rijckeghem and Weder, 2001). Secondly, there may be a social norm condoning side payments for low wage public officials but not for high wage public officials (Fisman and Miguel, 2007). Thirdly, inequality averse public officials may be more willing to increase their income through corruption if their wage is lower than the comparison wage (Fehr and Schmidt, 1999; Abbink, 2002).

However, field studies examining the link between corruption and public wages have produced little evidence in favor of the fair salary hypothesis. Svensson (2005) mentions four empirical studies addressing the fair salary hypothesis: Rauch and Evans (2000), Treisman (2000), Van Rijckeghem and Weder,(2001) and Di Tella and Schargrodsky (2003). Of these four, the first two find no robust evidence; the latter two find a positive association, although the estimated effect is rather small in both studies. Moreover, as Svensson argues, the the first three studies are based on cross-country data that make it hard to establish causality; moreover they use rankings rather than absolute levels to measure corruption. Di Tella and Schargrodsky (2003) make use of exogenous variation in the audit probability in the city of Buenos Aires, which increases the risks involved in corruption rather than directly affecting the relative wage of public officials.

In response to this apparent difficulty in acquiring high quality data, the last decade has seen a large increase in the number of laboratory experiments in the area of corruption. Lab experiments can be used as a substitute for

[3] An additional mechanism applies if public officials' utilities are a concave function of money. Having a large salary will then decrease their marginal utility of money, decreasing the attractiveness of accepting bribes.

field data when field data are not available or of low quality -as is often the case in the area of corruption. Even if good field data are available, lab experiments can serve a complementary role by presenting an environment with a level of control and noiselessness that field data tend to lack. Starting with Frank and Schulze (2000) and Abbink, Irlenbusch, and Renner (2002), corruption experiments have investigated issues ranging from the effect of staff rotation (Abbink, 2004) and intermediaries (Drugov, Hamman, and Serra, 2011) to the effect of different voting systems (Azfar and Nelson, 2007); see Abbink (2006) for an overview.

One possible reason why previous studies examining the fair salary hypothesis have yielded mixed findings is that they have paid only limited attention to the question of what constitutes an appropriate reference wage. Indeed, both monetary and nonmonetary considerations require a reference wage to determine what wage consistutes a 'high' wage and what wage should be regarded as a 'low' wage. Previous studies have tended to take aggregate level variables as reference wages, such as for example the average wage in the manufacturing sector (e.g. Van Rijckeghem and Weder, 2001). However, previous work in both psychology and economics suggests that people compare themselves to individuals who are similar to them, whom they often interact with and who are salient at the moment a comparison is made (see e.g. Festinger, 1954; Suls, Martin, and Wheeler, 2002; Buunk and Mussweiler, 2001; or Sweeney and McFarlin, 2004; or see Linde and Sonnemans, 2009 for a recent application in economics).

For income comparisons colleagues or other people encountered in work environments are the most likely reference points. A typical economist for example may compare herself to economists of a similar age, working in the same field and possibly at the same or similar level universities. For public officials on the verge of deciding whether or not to take a corrupt action, people in the work environment are either colleagues or people that require their service (i.e. potential bribers). At the time of a bribe, the focus on the potential briber is likely to be particularly strong since public officials in direct personal contact with bribers at the time a bribe takes place. Moreover, through bribing public officials and bribers can influence each others' incomes, making the income comparison between bribers and public officials especially salient. By contrast, aggregate variables such as the average wage in the private sector are abstract (and possibly unknown) and therefore not likely to be salient and the object of an income comparison. Thus, aggregate variables are not likely to play a large role in their thinking.

The lack of emphasis on implementing an appropriate reference wage may also explain why previous experimental studies have not provided consistent evidence in favor of the fair salary hypothesis. Abbink (2002) studied the fair salary hypothesis in the context of bribery by varying the wage of public officials with respect to the wage of a third party. However, the third party had no role in the experiment other than to absorb negative externalities.[4] Hence, the third party may not have been very salient to the public official at the time of the bribery decision and may thus not have served as a reference point.[5] This may explain why this study found no correlation between relative wages and bribery.

Armantier and Boly (2008) compare the results of a lab and a field experiment in which a candidate proposes a bribe to a grader in order to obtain a better grade. Unlike Abbink (2002), they are silent on what determines the appropriate reference wage. In line with the fair salary hypothesis, they find that increasing candidates' wages slightly decreases the rate at which they accept bribes in both the lab and the field. However, this effect is small and significant only in the lab using a binary response model with a large number of controls. Moreover, it is not immediately clear that the experiment reflects actual corrupt behavior, since neither accepting a bribe nor reporting an inflated grade had monetary consequences to anyone but the grader and the candidate in question.[6]

Thus, this paper contributes to the experimental literature in at least two ways. Firstly, it studies the relationship between the relative wage of public officials and their corruptibility whilst explicitly incorporating a more natural reference wage in the experiment. Secondly, it introduces a new way of implementing corruption in the lab by deducting money from a charity fund every time public officials make a corrupt decision; the latter point will be discussed in greater detail in the next section.

[4] The third party was performing a useful task, but not one that was related to the experimental situation the public official and the potential briber were partaking in.

[5] Additionally, since the third party consisted of laboratory subjects not contributing to the group income, some public officials may have felt that the third party deserved a punishment for not being productive.

[6] Barr, Lindelow, and Serneels (2009) and Jacquemet (2005) also document a link between public officials' wages and corruption in a laboratory experiment. However, in the former study, the monitoring rate is endogenously determined and increasing in the public official's wage; hence the link between wages and corruption could to a large extent be caused by the link between wages and monitoring. The latter study actually finds a positive correlation between public official wages and their corruptibility; the author conjectures that this is caused by the fact that being corrupt is costly in the experiment, so that high wage public officials can more easily afford to be corrupt.

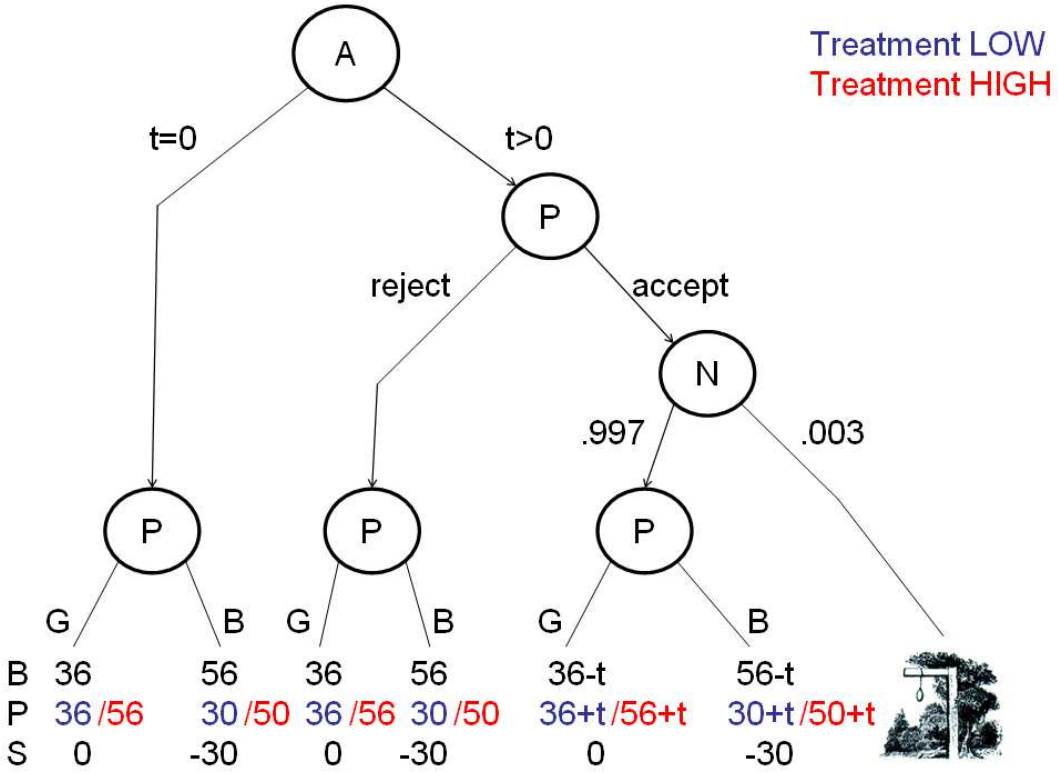


Figure 1: The Experimental Game Tree

## 3 The Bribery Model

To study bribery in an experimental context, I use an adapted version of the experimental bribery game (Abbink, Irlenbusch, and Renner, 2002). As a stylized model of a bribery situation, this model considers a public official who has to make a binary choice (e.g. accepting or rejecting a permit application). The public official's choice may depend on the actions of a potential briber, who has the option to transfer money to the official in the hope that the bribe will influence her decision. In this way the experimental model reflects a wide range of potential cases of (petty) corruption. The briber may for example be a small entrepreneur interested in obtaining an additional construction permit in a foresty area where no construction is allowed, or he may be a citizen seeking to move up the waiting list for an important surgical procedure.[7]

The experiment itself is a repeated game of 25 periods. The stage game

[7]It is important to note that in the experiment I avoided words like public official, briber or bribes. Instead, the experiment refers to the potential briber, the public official and a bribe as player 1, player 2 and a transfer respectively. Note, however, that Abbink and Hennig-Schmidt (2006) found no evidence of a framing effect on the results in a bribery experiment that also builds on Abbink, Irlenbusch, and Renner (2002).

(displayed in figure 1) consists of two stages. In the first stage, the briber (B) decides whether to offer a transfer (or bribe) of a nonnegative integer amount $t$ to the public official (P). If a positive transfer has been offered (i.e. if $t > 0$), the public official can decide to accept or reject the transfer. Following Abbink, Irlenbusch, and Renner (2002), if the public official decides to accept the offer, there is a small probability (.003) that both players are caught and disqualified from the experiment. To mimic the possibly large fines and job loss associated with getting caught in the corrupt act in practice, the punishment in the experiment is set to the largest feasible level. Players who are caught lose all their earnings in the current and preceding periods and are not allowed to participate in subsequent periods.[8]

Provided that players are not disqualified, the game then moves to the second stage. In this stage, the public official can choose between two alternatives G and B. Here G is a status quo option and B is a corrupt alternative. Perhaps more so than in previous experiments option B is a genuinely corrupt option, since choosing it will take money away from a good cause (a charity). At the same time, the potential briber strongly prefers option B to option G to represent the gains to corruption for the briber; it is also slightly less favorable to the public official, to represent the idea that the public official will need to exert some effort to justify her 'corrupt' choice to her superiors.

Allowing the cost of corruption to be imposed on a charity represents a new approach in the literature. Using a charity as the victim of corrupt behavior to a large degree reflects the way corruption imposes negative externalities on society in the field. In particular, the same way that corruption is almost universally regarded as a bad thing, not many people would condone taking money away from a charity. By contrast, previous experimental studies have largely imposed negative externalities on other subjects, which may not have such clear negative moral connotations. For example, if a participant expects other participant to be corrupt, he may actually feel that they deserve to have money taken away from them.

Returning to the game tree in figure 1, one can see that the only Nash equilibrium (for selfish preferences) of the stage game is for the public official to always choose option G and for no transfers to take place. As the last mover the selfish public official will always choose option G - the option that gives her the highest payoff. As a consequence, the briber knows that he should not

[8] In the experiment, the disqualified participants still received a show-up fee of 7 euros. With the probability of punishment set to .003, even pairs with transfers in every period would only face a probability of of $1 - .997^{25} = .072$ of being disqualified.

offer a transfer, since offering a transfer can only lower his payoff.[9] Moreover, Abbink, Irlenbusch, and Renner (2002) use a mathematical induction argument to show that the stage game result holds for all rounds.

The experiment uses two treatments varying with respect to the wage of the public official. Figure 1 gives the pay-offs associated with both treatments. The public official's wage is either equal to the income of the briber (treatment LOW) or higher (treatment HIGH).

## 4 Experimental Design

The experiment was conducted with 76 participants over four sessions in either June 2010 or June 2011 at the CREED laboratory of the University of Amsterdam. Participants were recruited using an on line recruitment procedure. The vast majority were students, with the largest fraction (52%) from the economics department.

The experiment itself was computerized using PHP/MySQL. Upon entering the laboratory, subjects were randomly assigned to a computer terminal. They then received a set of instructions which was identical for bribers and public officials. As part of the instructions, participants went through a set of questions to test their level of understanding. The instructions and questions are reproduced in appendix A.

After finishing the check-up questions participants were asked to choose a charity for the current session. At the beginning of every session, I reserved a substantial sum of money (5000 points or 50 Euros) for a single charity. Every time any public official then chose option B (the corrupt option), this reduced the remaining charity fund by 30 points. In the experiment, participants were asked to pick one charity from a list of five charities that are well-known in the Netherlands.[10] These were UNICEF, the Dutch Red Cross, the World Wildlife Foundation, Cliniclowns and the Prins Bernhard Cultuurfonds.[11] They could

[9] Technically this holds only if the briber expects the public official to accept the transfer with positive probability, otherwise the briber will be indifferent between proposing and not proposing a transfer.

[10] Relative to a fixed charity, allowing participants to select from multiple charities made it possible for them to select a charity that fit better with their personal taste. For a fixed charity, there is a large chance that at least some participants do not care about the chosen charity. Allowing participants to pick their own charity decreases this chance. Since choosing a certain charity directly increased the chance that this charity would be picked, each participant also had the incentive to pick his or her preferred charity.

[11] Cliniclowns are an organization of Dutch clown doctors, who seek to help alleviate some of the stress in seriously ill, hospitalized young children. The Prins Bernhard Cultuurfonds sponsors a wide range of cultural activities in the Netherlands, such as theater, art and the conservation of architectural monuments.

also specify another charity of their choosing, although they were told that including a controversial charity could lead to the payment being awarded to another charity instead. At the end of the session, the charity choice of one randomly determined participant was implemented.[12]

After every participant had finished the instructions and check-up questions and chosen a charity, participants started the experiment. Every session consisted of 25 periods. Before the first period, every participant was told their role (briber or public official). Their role remained fixed over the whole experiment and public officials were matched to the same briber for all 25 periods.[13]

Every period in the experiment consisted of five stages (see figure 1). In the first stage, bribers decided whether or not to offer a bribe. Conditional on offering a bribe, they could specify the size of the bribe in stage 2. In stage 3, public officials decided whether or not to accept a bribe. Conditional on accepting the bribe, stage 4 consisted of a random draw that determined disqualification; disqualified subjects were immediately notified and asked to fill out an unrelated questionnaire for the remainder of the experiment. Finally, in stage 5 public officials could choose between options G and B. Note that for many pairs some stages were skipped in several periods. In particular, bribers who did not offer a bribe would send the period from stage 1 straight to stage 5. The decision screen displayed all possible moves by both players and indicated at what stage the period had arrived.[14]

Every period ended after all pairs had finished the period. After 25 periods, one subject was randomly picked to roll a die to determine the winning charity. Participants then received an overview of their earnings and were asked to fill out a questionnaire. The questionnaire contained background questions, motivational questions and a psychological questionnaire related to corruption taken from Rabl and Kühlmann (2008). Upon finishing the questionnaire, participants were paid their earnings (including a show-up fee of 7 euros) and asked to leave the laboratory.

Participants earnings ranged from 14.14 to 23.70 euros with an average of 17.63 euros. Charities earned between 20.60 and 41.90 euros, with an average of 31.40 euros. In total every session lasted approximately 75 minutes (15 minutes for the instructions, 30 minutes for the decision problem and 30 minutes for the

[12]The number of participants that chose UNICEF, the Red Cross, the WWF, the Cliniclowns, the Prins Bernhard Cultuurfonds and another charity was equal to 34, 15, 14, 6, 1 and 6 respectively. The winning charities were the Red Cross (once) and the WWF (three times).

[13]In other words the experiment used a partners design. See Abbink (2004) for an experimental analysis of the effect of using partners or strangers design in a bribery experiment.

[14]The decision screen is reproduced in appendix B.

questionnaire plus payment). Since no feedback from other pairs was given to participants, the number of independent observations is equal to 38.

## 5 Hypotheses

This study examines the relationship between an increase in the relative wage of public officials and their corruptibility.[15] There are at least two reasons for the public official to be more reluctant to accept a bribe. Firstly, they may face higher non-monetary costs of corruption. Inequality averse (Fehr and Schmidt, 1999) public officials will for example note that accepting a bribe in treatment LOW may decrease disadvantageous inequality (a good thing), whereas accepting a bribe in treatment HIGH will increase (advantageous) inequality (a bad thing). Public officials who care about status can guarantee themselves a higher income level than the briber without accepting a bribe in treatment HIGH, in treatment LOW a large bribe is necessary to guarantee a higher income level than the briber. Secondly, public officials in treatment HIGH have more to lose from accepting a bribe (i.e. a higher monetary cost). Both monetary and non-monetary mechanisms lead to the following hypothesis.[16]

> Fair Salary Hypothesis 1: Public officials are less likely to accept a bribe in treatment HIGH than in treatment LOW.

If the monetary and nonmonetary costs of corruption are increasing in the public official's relative wage, then the frequency of corrupt (B) choices should decrease as well. To see this, note that a bribery relationship is a reciprocal relationship between a briber and a public official. Public officials who want to continue a bribery relationship should pick option B after accepting a bribe to reciprocate the briber. If hypothesis 1 holds, public officials in treatment HIGH will be less likely to accept bribes. Thus, there will be less reason for them to maintain the bribery relationship, which means they should be less likely to pick option B. This leads us to the next hypothesis.

[15] In the remainder of the paper I will focus mostly on the behavior of public officials. The reasons for deemphasizing bribers are that briber behavior (a) is not directly relevant to the fair salary hypothesis, (b) is less interesting in scope (only a transfer offer) and (c) crucially depends on how bribers expect public officials to behave (in contrast to public officials, who already know the behavior of the briber by the time they have to make their decisions).

[16] A possible third mechanism could be that public officials' utility functions are concave in money. However, this mechanism is unlikely to have a large bite in the experiment since for small amounts it is reasonable to assume that utility functions are approximately linear.


Figure 2: Incidence of Transfers and B Choices

*Note.* The left figure plots the distribution of the fraction of rounds a positive bribe was offered for each pair. The right figure plots the fraction of rounds a B choice was made, again for each pair.

Fair Salary Hypothesis 2: Public officials are less likely to choose the corrupt action B in treatment HIGH than in treatment LOW.

## 6 Results

In this section I present the results of the experiment. Before moving on to hypotheses 1 and 2, it is important to recall that the equilibrium of the model with selfish preferences predicts no bribery will take place. However, figure 2 shows that in almost all (34/38) pairs transfer proposals occurred at least once. Moreover, for many pairs transfer proposals were present in a substantial number of rounds; the median number of rounds a bribe was offered is equal to 9 (out of 25). Though somewhat less frequent, B choices also occurred in a large majority of pairs (28/38); the median number of rounds a B decision was made is equal to 3.

In the remainder of this section I report the results of both the whole sample and of only periods 11 to 25; I include the latter to minimize the noise generated by participants who are still trying to learn the game. Note also that investigating a public officials corruptibility is only possible for public officials that have been offered at least one bribe. In four pairs (three in treatment LOW, one in treatment HIGH) no bribe was ever offered and these pairs can

Table 1: Motivations for Transfer Acceptance

| | LOW | HIGH | Difference | p-value |
|---|---|---|---|---|
| Own payoff | 4.30 | 3.89 | -.41 | .562 |
| Charity payoff | 3.15 | 4.95 | 1.80 | .004*** |
| Player 1's payoff | 3.95 | 3.95 | .00 | .952 |
| Observations | 20 | 18 | | |

* significant at 10%; ** significant at 5%; *** significant at 1%

*Notes.* This table gives the average response to three questions in the post-experimental questionnaire. These questions were "In deciding to accept player 1's transfer offer the charity's/my own/player 1's pay-off was an important factor." Answers were reported on a Likert Scale ranging from 1 to 7. The reported statistics are Mann-Whitney tests.

thus not be incorporated into the analysis.[17]

### 6.1 Bribery Acceptance

Hypothesis 1 suggests that public officials in treatment HIGH should be less likely to accept bribes. Figure 3 shows that this is indeed the case. Public officials in treatment LOW accept on average 80% of proposed bribes (91% for periods 11-25), whereas public officials in treatment HIGH accept 44% of bribes (38% in periods 11-25). This difference is statistically significant for the whole sample (Mann-Whitney; $N_{LOW} = 17$, $N_{HIGH} = 17$, z=3.109, p=.002) and for periods 11 to 25 (Mann-Whitney; $N_{LOW} = 12$, $N_{HIGH} = 15$, z=3.653, p=.000).[18] Thus, the evidence is in line with hypothesis 1: increasing public officials wages indeed reduces the acceptance rate of bribe offers.[19]

This result by itself does not tell us why public officials chose to accept fewer bribes in treatment HIGH. One possible reason that public officials accepted fewer transfers is that the transfers offered in treatment HIGH were lower than in treatment LOW. This would require that proposed transfer size differed

[17]Because of random assignment, attrition of public officials is random for the whole sample and therefore not a problem for any statistics that apply to all periods. For periods 11-25, however, one may worry that attrition may be non-random since bribers may be induced to stop bribing by their matched public official's behavior in the preceding periods. In particular, it may be that the results reported in this section are upward biased if bribe rejecting public officials are more likely to drop out in treatment LOW and/or bribe accepting officials are more likely to drop out in treatment HIGH. However, neither scenario seems particularly plausible intuitively and neither is supported by the data. For example, since rejected bribes are costless there is no reason for bribers to stop bribing if bribes are rejected and there is no evidence that bribers who stopped bribing actually faced public officials who were less likely to accept bribes.

[18]Probit regressions with clustered standard errors by pair yield similar results; z=-3.28, p=.001 for all periods and z=-3.89, p=.000 for periods 11-25).

[19]In total, 120 bribes were accepted over all treatments; no pair was actually disqualified in the experiment. The probability of no disqualifications with 120 bribes is equal to $(1 - .003)^{120} = .697$.

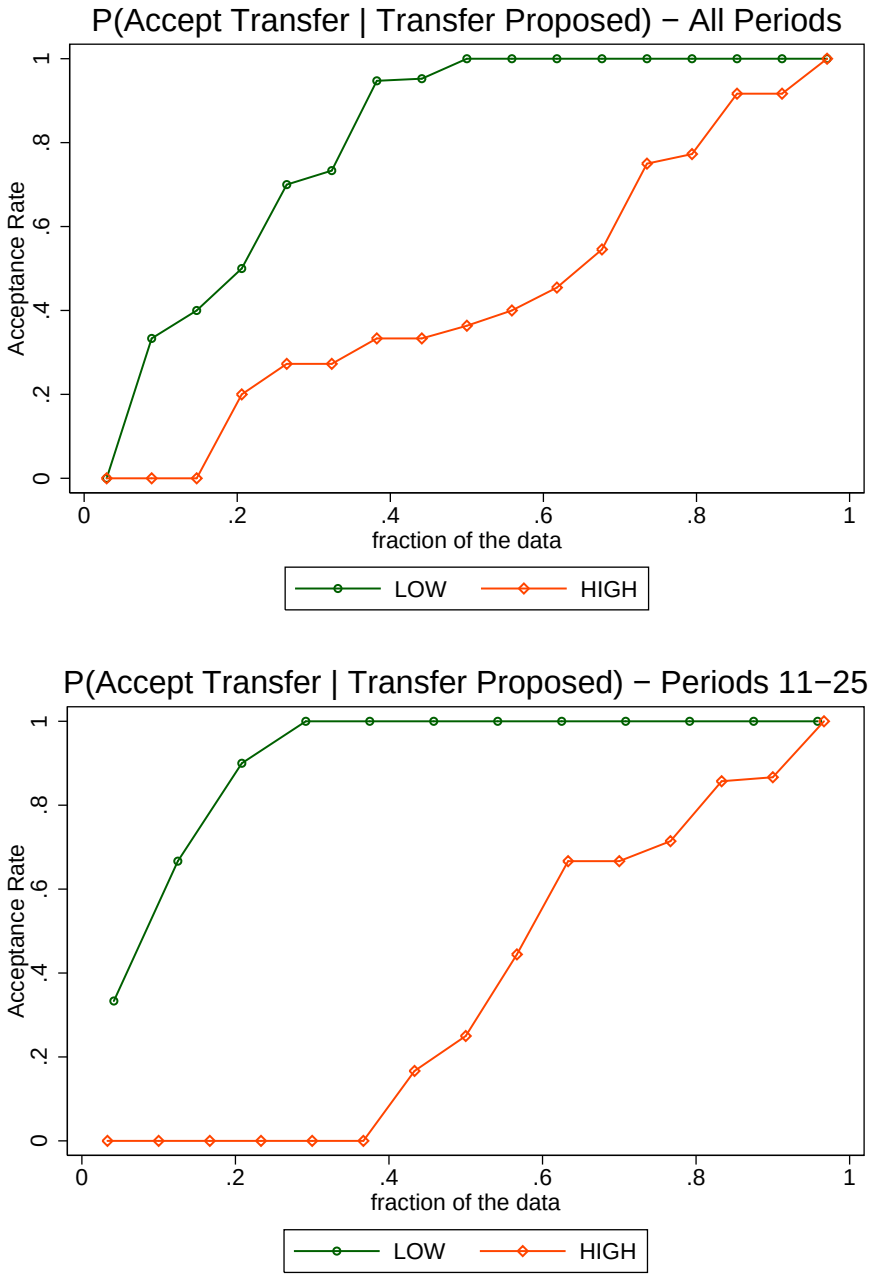


Figure 3: Transfer Acceptance Probabilities

*Note.* The figure plots the cumulative distribution of transfer acceptance rates by pair for both treatments. The upper panel reports the results for all periods, the lower panel reports the results for periods 11-25.

between treatments and that the proposed transfer size had a positive influence on bribe acceptance. However, the data provide little evidence for either claim. Indeed, although proposed transfer size is slightly lower in treatment HIGH (9.57) than in treatment LOW (11.39), the difference between treatments is significant at the 10% level only for the whole sample (Mann-Whitney; $N_{LOW} = 17$, $N_{HIGH} = 17$, z=1.671, p=.095) and not significant for periods 11 to 25 (Mann-Whitney; $N_{LOW} = 12$, $N_{HIGH} = 15$, z=1.199, p=.230). Importantly, the transfer acceptance rate also does not depend on the proposed transfer size over both treatments.[20] These two findings combined strongly suggest that the difference in acceptance rates between treatments cannot be explained by differences in transfer amounts.

Some evidence for the motivations of public officials comes from the post-experimental questionnaire. In the questionnaire, public officials answered the following questions: "In deciding to accept player 1's transfer offer the charity's/my own/player 1's pay-off was an important factor." Table 1 reports the results of the three questions by treatment. Strikingly, for public officials in treatment HIGH, avoiding damage to the charity was named as the most important factor in deciding (not) to accept bribes, whereas for public officials in treatment LOW, the charity was the least important factor. This finding is not consistent with a monetary cost explanation, since for a monetary cost explanation the payoff of the charity is irrelevant. It does however fit well with the idea that nonmonetary costs are increasing in public officials' wages, since high wage public officials care relatively less about their own payoff and the payoff of the briber.

### 6.2 G and B Choices

Thus we have seen that public officials are less likely to accept transfers in treatment HIGH and that this difference is not driven by differences in proposed transfer size but may be driven by differences in non-monetary costs of corruption. This difference in transfer acceptance rates is also reflected by the percentage of B choices in each treatment. Figure 4 gives an overview of the percentage of B choices conditional on a transfer having been proposed. For the whole experiment, the percentage of B choices is 15 percentage points lower in treatment HIGH; this difference is not significant (Mann-Whitney; $N_{LOW} = 17$, $N_{HIGH} = 17$, z=.975, p=.330; Probit p=.166). For periods 11 to 25 the difference becomes larger (27 percentage points) and significant at the 10% level

[20] In a probit regression of the transfer acceptance decision on transfer amount and a constant, the p-value for transfer amount equals .268 for the whole sample and .464 for periods 11-25.

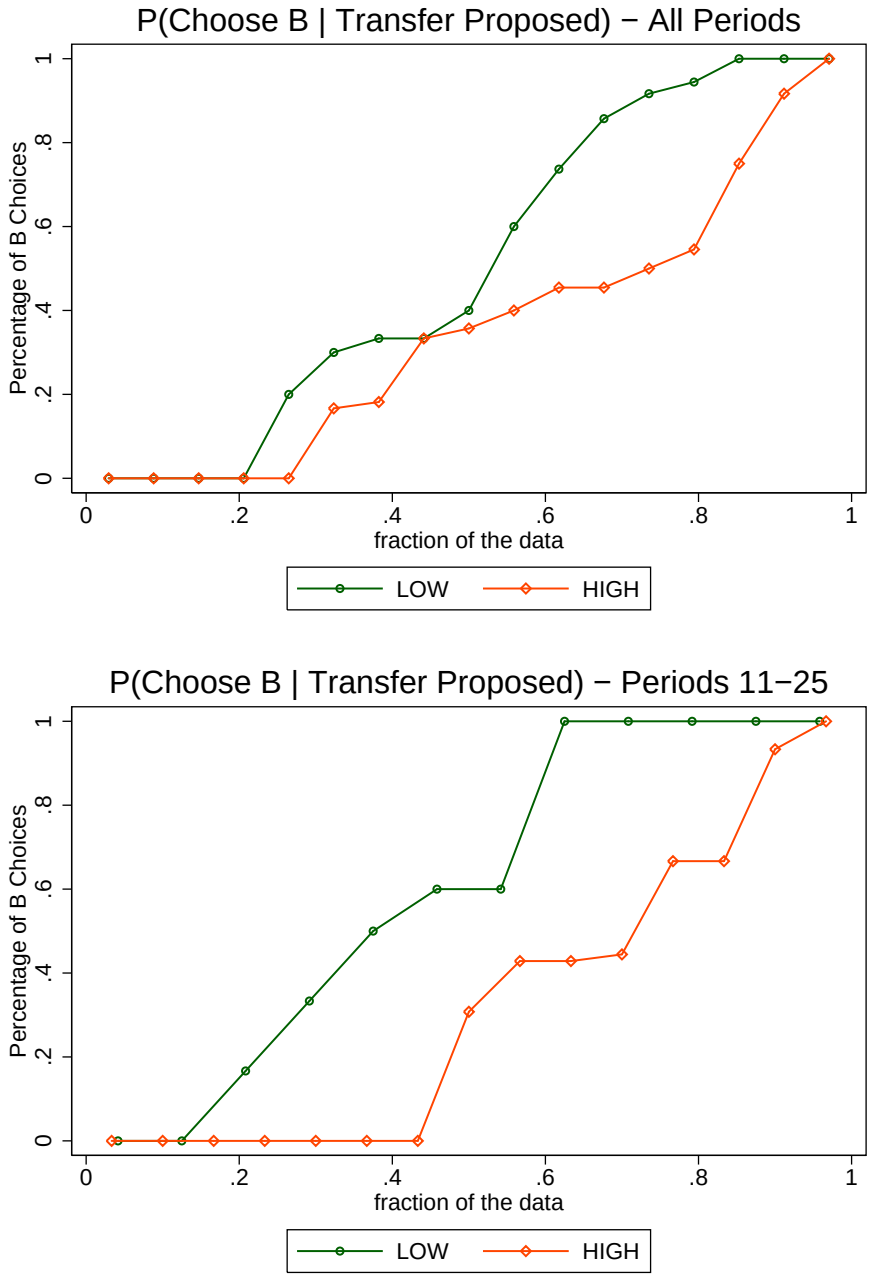


Figure 4: Fraction of B Choices

*Note.* The figure plots the cumulative distribution of the percentage of B choices by pair for both treatments. The upper panel reports the results for all periods, the lower panel reports the results for periods 11-25.

Table 2: Importance of Charity in Transfer Acceptance

| | LOW | HIGH | Difference | p-value |
|---|---|---|---|---|
| Monitoring | 3.15 | 4.95 | 1.80 | .004*** |
| No Monitoring | 3.78 | 3.48 | -.30 | .565 |
| Difference | .63 | -1.47 | | |
| p-value | .236 | .035** | | |

* significant at 10%; ** significant at 5%; *** significant at 1%

*Notes.* This table gives the average response to the question "In deciding to accept player 1's transfer offer the charity's pay-off was an important factor" in the post-experimental questionnaire. Answers were reported on a Likert Scale ranging from 1 to 7. The reported statistics are Mann-Whitney tests.

(Mann-Whitney; $N_{LOW} = 12$, $N_{HIGH} = 15$, z=1.876, p=.061; Probit p=.056). Thus, the difference seems to become more pronounced in later periods; indeed if for instance periods 16-25 are taken instead of periods 11-25 the difference is significant at the 1% level. To a large extent, the number of B choices seems reflect the difference in bribe acceptance rates described above; indeed the correlation between bribe acceptance and B choices is equal to .4470 for treatment LOW and .6529 for treatment HIGH.[21]

## 7 Robustness: Bribery without Monitoring

Thus far we have seen that increasing public officials' wages greatly decreases the percentage of transfers they accept and slightly decreases the number of corrupt (B) choices they make. This tells us that within the current experimental setting (positive monitoring rate, large penalty to the charity), increasing public officials' wages reduces their corruptibility. This section describes the results of additional sessions that explore the robustness of these findings to setting the monitoring rate to zero. A zero monitoring rate is also of practical interest, since monitoring activities in practice are costly and often subject to corruption themselves; they should as such only be maintained if necessary to reduce corruption levels.

Setting the monitoring rate to zero removes monetary costs considerations from public officials. Thus, to the extent that monetary costs were relevant with a monitoring rate of .003, we should expect a smaller treatment effect with a monitoring rate of zero. However, monetary costs were already quite small in

[21] The reason the difference between B choices is smaller than the difference between transfer rates is due to two factors. For one, not all accepted transfers lead to B choices; the number of accepted transfers leading to G choices is equal to 32.4% for treatment LOW and 26.3% for treatment HIGH. For another, the fraction of B choices taken after rejected transfers is not equal to zero (it is equal to 6.7% and 13.3% for treatments LOW and HIGH respectively).

Table 3: Overview of Transfer Acceptance Rates

| | LOW | HIGH | Difference | p-value |
|---|---|---|---|---|
| Monitoring | .91 | .38 | -.53 | .000*** |
| No Monitoring | .97 | .79 | -.18 | .016** |
| Difference | .06 | .41 | | |
| p-value | .368 | .002*** | | |

* significant at 10%; ** significant at 5%; *** significant at 1%

*Notes.* This table gives the mean transfer acceptance rates conditional on a transfer being offered. That is, first I computed the average acceptance probability for every pair and then averaged these probabilities over all pair for every treatment. The reported statistics are Mann-Whitney tests; only periods 11 to 25 are used.

both treatments. Indeed, the only predicted treatment difference for selfish risk neutral public officials is that they accept bribes of 3 or 4 in treatment LOW but not in treatment HIGH.[22] In the experiment, however, only 5% of proposed bribes were equal to 3 or 4. Thus with risk neutrality monetary costs can only explain a small fraction of the total difference between treatments; hence the rest of the treatment difference should come from nonmonetary cost considerations.[23]

Setting the monitoring rate to zero may also affect the nonmonetary costs of corruption. In particular, a positive monitoring rate may be a signal to public officials that accepting a transfer is not a moral or normative thing to do. Without monitoring this signal disappears, which could induce public officials to be more corrupt.

To investigate the influence of setting the monitoring rate to zero I ran an additional four sessions in June 2011. These sessions were identical to the sessions described in the previous sections, except that the monitoring rate was equal to zero instead of .003. In total, 84 subjects took part in these sessions, earning between 13.42 and 21.88 euros. Charities earned between 11.00 and 34.10 euros, with an average of 25.50 euros.

To analyze the influence of monitoring on the fair salary hypothesis I compare the results of these sessions with the results of the previous section. Figure

[22] In the experiment, average earnings over all periods for public officials in treatment LOW and HIGH were 943 and 1420 points respectively, leading to an expected per period loss from disqualification equal to $.003 * 943 = 2.83$ and $.003 * 1420 = 4.26$ for treatments LOW and HIGH respectively. For risk neutral public officials, the bribe needs to be higher than the expected per period loss; thus the predicted minimum accepted bribes are equal to 3 and 5 in treatments LOW and HIGH respectively.

[23] Introducing risk aversion would predict stronger differences, although with small probabilities risk seeking is more commonly observed than risk aversion. See e.g. Tversky and Kahneman, 1992 and Abbink, Irlenbusch, and Renner, 2002 for evidence that subjects underestimate disqualification probabilities in a bribery game.

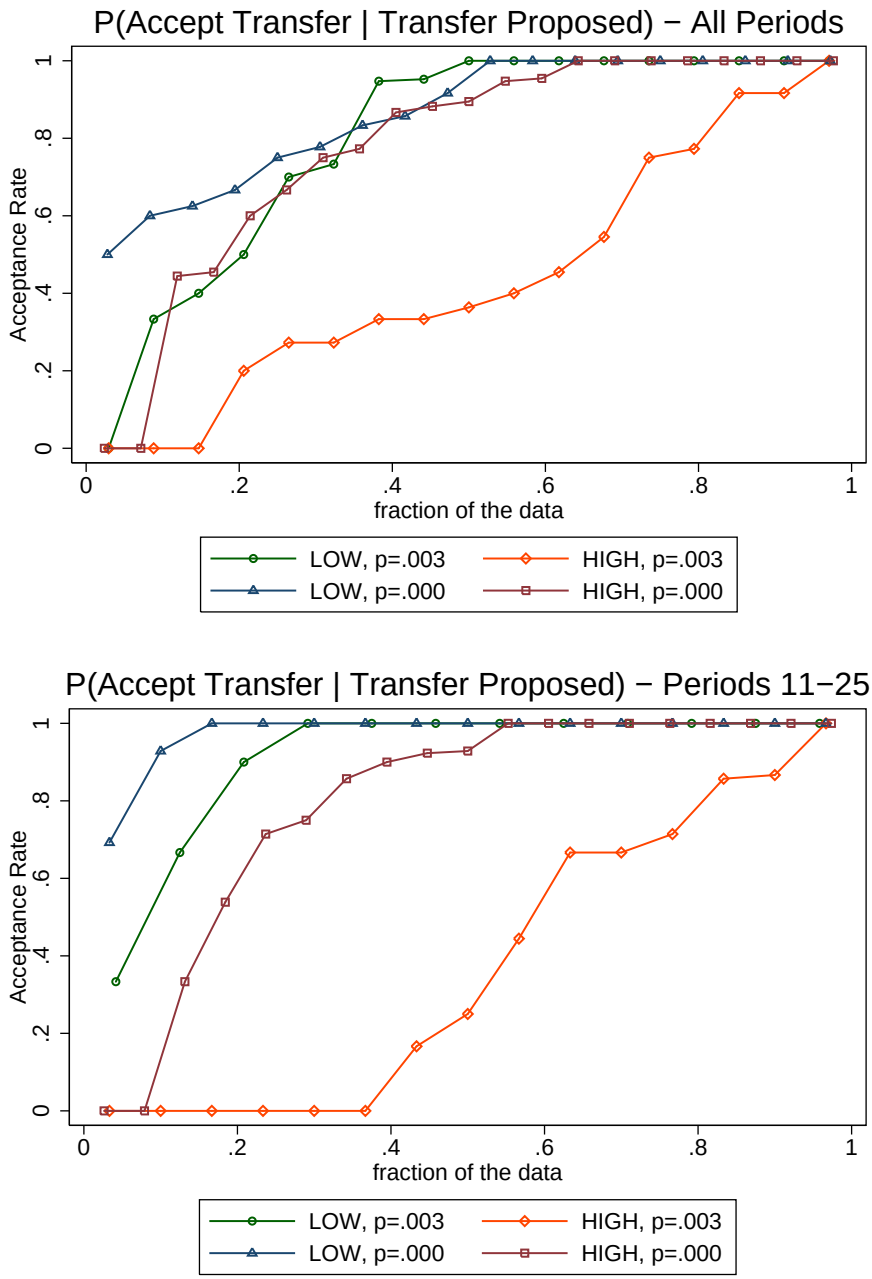


Figure 5: Transfer Acceptance Rate with and without Monitoring

*Note.* The figure plots the cumulative distribution of transfer acceptance rates by pair for both sessions with monitoring (p=.003) and sessions without monitoring (p=.000). The top panel displays the results for all periods and the lower panel displays the results for periods 11-25.

5 and table 3 give the transfer acceptance rates for both treatment HIGH and treatment LOW for sessions with monitoring and sessions without monitoring. In terms of the effect of monitoring, two things stand out. Firstly, monitoring hardly seems to have any impact on behavior in treatment LOW. Secondly, removing monitoring from treatment HIGH leads to a substantial change in behavior; in sessions without monitoring public officials are far more likely to accept positive transfer offers. However, table 3 also shows that in periods 11 to 25 public officials in treatment HIGH are still less likely to accept transfers than officials in treatment LOW. However, over the whole sample this difference is no longer significant.

Removing monitoring also strongly lowers the importance public officials attach to the charity in the questionnaire. Table 2 shows that self-reported care for the charity in treatment HIGH drops to the level of treatment LOW in riskless sessions, whereas it was substantially higher in sessions with monitoring. Moreover, the fraction of B choices no longer differs between treatments either.

All in all this suggests that the evidence presented in the previous section is only partially robust to the removal of monitoring. In fact, it suggests that both monitoring and a high wage are necessary to lower corruption levels. However, these findings may also be due to a ceiling effect in the transfer acceptance rates in treatment LOW. Even with monitoring public officials accepted 91% of proposed transfers on average, meaning there was hardly any scope for the transfer acceptance rate to increase further without monitoring. On the other hand, for treatment HIGH the average acceptance rate (38%) still left a lot of room for the acceptance rate to increase.

## 8 Discussion

This study has investigated the link between public officials' wages and their corruptibility. I find that increasing the wage of public officials dramatically reduces their corruptibility. In particular, I find that experienced low wage public officials accept 91% of bribes, whereas experienced high wage public officials accept only 38%. Moreover, high wage public officials are 27 percentage points less likely to choose the corrupt option. A robustness check suggests that a positive monitoring rate may be a necessary condition for fair salaries to affect the corruptibility of public officials.

All in all, these results stand in contrast with Abbink (2002), who finds no link between wages and corruptibility in the lab. The contrast with this study is particularly illuminating since its experiment is based on the same bribery

model and also has positive levels of monitoring. The difference in findings suggests that the reference wage is important; if a third party is used as a reference wage as in Abbink (2002), the relative wage of the public official does not seem to matter, whereas if the briber is used as the reference wage as in this study, there is a strong effect. This suggests that in empirical studies selecting an appropriate reference wage may be important; changing the relative wage of the public official will only have an effect on his corruptibility if he actually uses the chosen reference wage in income comparisons.

As the robustness check showed, a positive monitoring rate seems to be a necessary condition for the fair wage effect to appear. At the same time, even the positive monitoring rate in the experiment was very small. This suggests that the positive monitoring rate served as a signal to public officials that accepting bribes was not a moral thing to do. Even if nonmonetary costs are important, a small but positive level of monitoring may thus be necessary to reduce corruption.

For future work, several extensions are possible. It may for example be interesting to vary the wage of public officials within the same session. To the extent that the wages of colleagues can also serve as reference wages, it may be expected that public officials with wages that are higher than both colleagues and bribers will be even less likely to accept bribes. It is also possible to allow public officials to solicit bribes rather than have them wait for bribers to offer one. These extensions may help provide additional insights on the conditions that need to be met for the fair salary hypothesis to hold.

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# A Instructions

Welcome to the CREED laboratory. Please read the following instructions carefully.[24]

In today's experiment, there are two types of participants: Player 1 and Player 2. Your type will be randomly drawn after everyone has finished the instructions. You will then also be randomly matched to a player of the other type. **Both your type and the player you are matched with will remain unchanged throughout the experiment.**

All in all the experiment consists of 25 periods. The payment you receive at the end of the experiment depends on the decisions you make. Moreover, you will be able to earn money for a charity. The currency of the experiment is the experimental franc. At the end of the experiment, all francs you earned will be converted into euros at a rate of 100 francs per euro, such that 1000 francs are worth 10 euros. You will also receive a show-up fee of 7 euros.

## Decision Situation

Every period in this experiment consists of 5 stages, which will always take place in the following order:

### Stage 1: Transfer or no Transfer

Player one decides whether or not he wants to transfer an amount to player two. If he does, then the period is continued with stage 2. If player one decides not to transfer an amount, then the period continues with stage five.

[24] These instructions are the instructions for the LOW wage treatment with monitoring. In sessions without monitoring, stage IV is omitted and stage V is called stage IV instead.

**Stage 2: The Amount to Be Transferred**

Player one decides on the amount to be transferred to player two. The transferred amount can be any whole number greater than zero. The period then continues with stage 3.

**Stage 3: Acceptance or Rejection of the Transfer**

Player two then decides whether he accepts or rejects the proposed transfer. If player two decides to accept the transfer, the proposed amount is removed from player 1's credit and added to player 2's credit. The period then continues with stage 4. If player two rejects the transfer, then the credits remain unchanged. The period is then continued with stage four.

**Stage 4: Possibility of Getting Disqualified**

If player 2 decided to accept the transfer in stage 3, a number out of the range from 0 to 999 is randomly drawn. If the number is 0, 1 or 2, then both player 1 and player 2 are disqualified. That means that the experiment ends for these two players and all their previous earnings are canceled. (At the end of the experiment, both players receive only their show-up fee.) The two disqualified participants fill in a questionnaire until the experiment has ended. For the other participants, the experiment continues normally. If the randomly drawn number is 3, 4, ..., 998, or 999, the period is continued with stage 5 (see next page).

**Stage 5: Player 2 Chooses Between X and Y**

| | X | Y |
|---|---|---|
| Player 1 | 36 | 56 |
| Player 2 | 36 | 30 |
| Charity | 0 | -30 |

Player 2 chooses one of the alternatives X or Y. If player 2 selects alternative X, then his credit is increased by 36 and the credit of player 1 is increased by 36 (as in the table above). The credit of the charity remains unchanged. If player 2 selects alternative Y, then his credit is increased by 30 and the credit of player 1 is increased by 56. The credits of the charity are decreased by 30 francs.

There will be only one charity for this experiment. The charity starts off with a total of 5000 francs, which is equal to 50 euros. The final donation depends on the decisions made by the participants in the experiment. The donation will be strictly anonymous; no mention will be made of either the UvA, CREED or any participant of this experiment.

After stage 5, the period has ended. Overall pay-offs are the sum of all changes of credits during the 5 stages of the period.

**The Pay-Offs**

The decision situation will be repeated for 25 periods. You receive your earnings at the end of the experiment, where the exchange rate is 1 euro for 100 francs. In addition you will receive a show-up fee of 7 euros.

**Question 1**

Suppose you are player 2 and player 1 has proposed a transfer of 8. If you accept, what will be your (player 2's) pay-off if you choose option X? What will be player 1's pay-off in this case? What will be the pay-offs for option Y? TIP: look up the values for X and Y on one of the previous pages or on the printout of the instructions.

**Question 2**

In this experiment, there are a total of 20 participants, such that there are 10 pairs. Suppose that in a certain period there are 5 pairs in which player 2 chooses option Y. How many francs will the charity lose in this period?

**Charities**

For this experiment, we have selected a total of five charities. At the end of the experiment, we will pick the charity selected by one randomly determined person. Thus, the likelihood that a charity is picked is proportional to the number of people that picked this charity. For example, a charity chosen by six people will be three times more likely to be picked than a charity chosen by two people. If you would like to support another charity, you can select option 'F: Other Charity' and type the name of the charity in the text box. We must emphasize that a self-chosen charity will only be paid out if it passes a 'fit-and-proper-charity' test. For example, organizations like AlQaeda or your best friend's holiday fund will be considered invalid charities. If an invalid option is drawn, we will redraw until a valid charity has been selected.

**A. UNICEF:** Created by the United Nations General Assembly on December 11, 1946, to provide emergency food and healthcare to children in countries that had been devastated by World War II. Presently, its activities include promoting childrens rights, and securing worldwide visibility for children threatened by poverty, disasters, armed conflict, abuse and exploitation. UNICEF was awarded the Nobel Peace Prize in 1965.

**B. WWF/WNF:** Founded on September 11, 1961, its official mission is "to halt the destruction of our environment". Currently, the WWF focuses on restoring populations of 36 species (including elephants and tunas) as well as conserving 25 globally important ecoregions (including the Amazon Forest).

**C. Red Cross:** Founded on February 9, 1863, its official mission is "to stand for the protection of the life and dignity of victims of international and internal armed conflicts." Amongst its activities, it attempts to organize nursing and care for those who are wounded on the battlefield; it also supervises the treatment of prisoners of war.

**D. Cliniclowns:** Founded in 1992, its goal is to cheer up severely sick or handicapped children to help them recuperate from their ailments. Its most important activity is to send clowns to visit children's wards to cheer up the children, but it has also started a theatre tour for children with multiple disabilities.

**E. Prins Bernhard Cultuurfonds:** Founded in 1940 by Prince Bernhard of the Netherlands, its goal is to support projects that work to preserve Dutch cultural and natural heritage. Its activities include awarding prices and scholarships to talented musicians, poets and other artists. On average, it supports 4000 projects per year.

# B Decision Screen