

Measuring image concern

Emeric Henry ^{*} Jan Sonntag [†]

November 1, 2015

Abstract

It is now well documented that individuals, on average, change their behavior when their actions are observed by others. Yet, there is no systematic way of measuring this dimension of preferences at the individual level. In this paper, we propose a novel experimental game to measure the individual sensitivity to image concerns. We show that few socio-economic characteristics can explain the level of image concern. One exception is that members of ethnic minorities seem to be more imaged concerned, in particular when observed by a member of other groups. Men (resp. women) are more image concerned when observed by women (resp. men). Finally, we show that more image concerned individuals tend to be more selfish and find evidence consistent with the fact that they try to avoid situations where their actions risk being visible.

JEL Classification: D03, D64

Keywords: image concern, experimental measurement, repeated prisoner's dilemma

1 Introduction

Individuals behave differently when their choices and actions can be observed by others. This dimension of preferences, called image concern, is now well documented empirically (Ariely et al. 2009, Andreoni and Petrie 2004, Bursztyn and Jensen 2015) and some important theoretical implications have been drawn (see for instance Benabou and Tirole 2006, 2011). Yet, nothing is known about the heterogeneity in the population of the sensitivity to image concerns. Moreover, neither the drivers of image concern, nor the consequences

^{*}Sciences Po, Department of Economics and CEPR

[†]Sciences Po

are comprehensively documented. One of the main reasons for this gap in the literature is that there is currently no systematic way of measuring individual sensitivity to the perception by others.

The first goal of this paper is to propose an experimental game designed to measure image concern at the individual level. This game is constructed to be portable so that it can be tested in a variety of settings, in the spirit of other games aimed at measuring social preferences, such as the trust game, the dictator or the public goods game. It should be easily implemented even remotely, in other words should not involve interactions repeated over a longer period of time, and should be easy to include at the start of a lab or field experiment. The second goal of the paper is to study the socioeconomic determinants of sensitivity to image concern, to examine whether the identity of the observer matters and to examine whether image concern is linked to other social preferences. We show that members of ethnic minorities seem to be more image concerned, in particular when observed by a member of other groups. Men (resp. women) are more image concerned when observed by women (resp. men). Finally, we show that more image concerned individuals tend to be more selfish and find evidence consistent with the fact that they try to avoid situations where their actions risk being visible.

The *image concern game* we propose involves three players: a dictator (he), a recipient and an observer (she). The dictator determines how much money to transfer to a lottery with two possible outcomes: success, in which case the recipient receives a given amount of money, or failure, in which case the recipient receives nothing. The more money the dictator transfers, the higher the chances of success. Before the lottery is actually run, the dictator has to reveal (in an incentive compatible way) his willingness to pay μ to remain anonymous, i.e. for his picture not to be revealed to the observer, in case the lottery is a failure. The observer *sees only the outcome of the lottery, not the amount the dictator actually transferred*. The recipient never sees any pictures.

There are two main aspects that drive the structure of this game. First, image concern is easily measured by the willingness to pay μ to remain anonymous. Second, and most importantly, this measurement is independent of other social preferences including altruism. Indeed, what is revealed to the observer in case the dictator does not remain anonymous, is not the actual amount transferred, but the fact that the lottery was a failure. Thus, the inference the observer makes when she sees the picture is an updated belief on the preferences and characteristics of the dictator conditional on the fact that the lottery was a failure, and this belief cannot be conditioned on the actual amount transferred.

The fact that the measurement is not confounded by altruism becomes clear when considering two dictators with the same image concern but a different level of generosity.

In our setting, the two dictators will give different amounts in the lottery but will bid the same way for anonymity. We could have chosen a setting where dictator and recipient play a classical dictator game and the dictator first has to bid for anonymity given that the amount transferred will be revealed to the observer. In such a case, the more generous dictator would still transfer more than the other in the lottery, but would then bid less for anonymity since he would have less to be ashamed of. We would thus mistakenly conclude that the first dictator was less image concerned. Our game, at a slight cost of complexity, is designed to overcome this potential issue.

Running this game in the lab, we find a large amount of heterogeneity: about one third of the participants chooses not to pay anything, while one third gives a large amount to remain anonymous. We show the validity of our measure in a number of ways. The first approach we use is to build a different game to measure image concern and to show that the distribution of image concern in the population appears broadly similar.¹ The second is to validate the measure with survey data. There is unfortunately no well established question aimed at measuring image concern, contrary to the case of trust where one question is used very systematically.² We thus constructed ourselves one main question "It is important for me not to be perceived as selfish". We show that the answers are indeed correlated with our image concern measure. The third validation is to use the data we generate in a second phase of the experiment and compare behavior in an infinitely repeated prisoner's dilemma run in certain treatments with observers and in others without. We find that image concerned individuals do modify much more their behavior than others when playing in presence of observers.

Turning to drivers and correlates of image concern, we find that few socioeconomic variables have explanatory power except nationality.³ *Non-French citizens appear to be more image concerned than those reporting to be of French nationality.*⁴ We also find that more image concerned individuals report having fewer friends. Overall this suggest that socioeconomic characteristics cannot explain variations in this dimension of preferences, but that this component could be a key factor influencing social interactions.

The dictators in our study can view the picture of the observer before making their decision and play four rounds of the image concern game with different recipients and

¹We however find this game less appropriate since it suffers from the issue mentioned above that it cannot separate the measurement of generosity and the measurement of image concern.

²The "Interpersonal Trust" question, is usually asked in the following terms: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?"

³We ask a survey question about nationality and not race, since questions on race are not allowed in France.

⁴Mostly nationals of former French colonies in North Africa. Questions on race cannot be asked directly.

observers. We can therefore determine whether the characteristics of observers influence the amount transferred. Few characteristic of the observer significantly impact the willingness to pay to remain anonymous. This is encouraging evidence of the portability of the setup.⁵ Interestingly, two dimensions clearly stand out. First, *men bid more for anonymity when observed by women and women bid more when observed by men*, this second effect being stronger. Second, *non French individuals pay much more for anonymity when facing French observers*, a fact linking nicely to the literature on discrimination. One possible interpretation is that they fear that due to prejudice, a failed outcome of the lottery will be more adversely interpreted than if he was French.

Our experiments involve two phases: in the first phase, we run our measurement game and in the second we run an infinitely repeated prisoner's dilemma, in some treatments with observers, in others without. To the best of our knowledge, this is the first time repeated prisoner's dilemma are played in the presence of observers, a side contribution of our paper. The purpose of this second phase is twofold. First to determine whether image concerned individuals behave differently than others when not observed. Second, provide further validation of our game by documenting how more image concerned individuals react to the fact of being observed.

The first result we find is that more image concerned individuals, when not observed, tend to cooperate less in the infinitely repeated prisoner's dilemma. This could be due either to the level of altruism, or to beliefs about the likelihood that the partner that cooperates. Based on the fact that the result is even stronger for the late games, where beliefs will have started converging, we argue that this is more evidence in favor of the fact that *more imaged concerned individuals are more selfish*.

We then examine how image concerns affect the reaction to being observed. Note that it is not straightforward to know what actions are judged favorably by the community since they involve strategic considerations. An additional contribution of our paper is to document this social norm. We do that by asking observers to rate the behavior of those they observe after each round. On top of socioeconomic factors (such as age and nationality) and appearance on the photo (such as the fact of smiling), we find that two main factors drive favorable ratings by observers. First, cooperating increases rating. Second, this high rating for cooperation depends on what the player did the round before. Cooperation is significantly better rated when it follows cooperation by the same player in the previous round. Observers seem to value consistency in cooperation.⁶

⁵Indeed if the experiment is run in different settings, different observers will be used. This evidence suggests that the measurements are not sensitive to this fact.

⁶Surprisingly, the rating does not depend on the actions of the partner in the previous round. In particular a deviation following cooperation by the partner in the previous round does not receive a worse rating

Comparing treatments run with observers to those without, we can show that more image concerned individuals correct more than others their behavior in the direction of the social norm, when observed. This turns out to be also true for the second, and more subtle aspect of the social norm related to consistency of cooperation. This result provides strong further validation of our experimental game.

The final result we obtain is that there is a significant positive correlation in Phase 1 (where we run our image concern game), between the amount given in the lottery and the bid for anonymity. We show in a small model that this is not incoherent with the finding that more image concerned individuals tend to be more selfish. Indeed these individuals in phase 1 realize that a failed outcome of a lottery will be more costly for them since they will choose to pay more for anonymity. This will encourage them, for a given level of generosity, to bid more for anonymity to avoid the bad outcome. This suggests that image concerned individuals avoid situations where they risk being exposed.⁷

Our paper is closely connected to the empirical literature on the influence of being observed, involving both field and lab experiments. We differ in both our goal and approach. The goal of most of these papers is to document the average influence of being observed and the methodology they use is to compare average differences between treatments. We, on the other hand, are interested in individual measurements and individual consequences. Ariely et al. (2009) for instance compares effort levels in treatments that varied in three dimensions: subjects were either observed or unobserved, received monetary incentives or not and contributed either to a “good cause” (Red Cross) or a “bad one” (NRA). They find that being observed increased effort levels only when subjects did not receive monetary incentives and only when they volunteered for a good cause.

There is also a literature documenting what can be seen as consequences of being image concerned. Mellstrom and Johannesson (2008) show that offering small monetary rewards significantly decreases blood donations and that offering the possibility to donate the reward to a charity immediately restores blood donation rates. This suggest that image concern can be an important driver of unselfish actions (see also Lacetara and Macis 2010). Della Vigna et al. (2012) show that notifying residents in advance of the exact time of solicitation in a door to door fundraiser significantly decreases the share of households opening doors, one possible interpretation being that image concerned individuals attempt to avoid the pressure. Bursztyn and Jensen (2015) show that image concerns can

than if it follows deviation by the partner.

⁷This is coherent with the results of Della Vigna et. al. 2012 who show that when the date of a door to door fundraising visit is announced, people try to avoid being present. Our individual measurement of image concerns allows us to show direct evidence of such mechanism whereby image concerned people avoid situations where their image is at risk.

also affect educational choices and show the key importance of who the observers actually are.

There is also extensive evidence on this topic using laboratory experiments. Andreoni and Petrie (2004) find that contributions in a public goods game increased when the players were not anonymous. Dana et al. (2006) offer participants a costly option to opt out of a dictator game and show that giving in the dictator game is in part motivated by participants not wanting to appear selfish. In the same spirit, other contributions (Rege and Telle 2004, Sanek and Sheremeta 2013), find that providing options for the participants to overcome their moral dilemmas significantly lowers transfers.

We point out one branch of the literature that tries to find individual proxies for image concern. Carpenter and Myers (2010) use data on the purchase by firefighters of vanity plates that make them identifiable at all times. They show that this proxy can predict higher responses to emergency calls but has no effect on less visible activities such as training. Algan et al. (2013) in a study of Wikipedia, used the size of the contributors page and the extent to which they choose to display awards as a proxy for image concern.⁸ We share the goal of these papers to find individual proxies for image concern but try to determine a less context specific measure exploitable in a wide variety of settings.

Our approach is similar to some extent to the approach in the literature on trust. Analogously to Glaeser et al. (2000), Fehr et al. (2003) and Sapienza et al. (2007) we compare measurements of preferences obtained by survey questions to those resulting from laboratory experiments. Our results also link us to the literature on racial discrimination and brings a new twist. We find that non French are particularly image concerned when facing French individuals. There is a growing literature studying experimentally issues of discrimination and prejudice. Here what seems to play a role is the fear of prejudiced reactions.

Finally the second phase of our experiments links us to the literature on infinitely repeated games in the lab (Dal Bo and Frechette 2011 among others). To the best of our knowledge, it is the first time a repeated prisoner's dilemma is played with observers. On top of our analysis on image concern, our study also allows for a better understanding of the social norms governing those games, using the ratings by observers of the behavior of participants.

The paper is organized as follows. In section 2 we introduce our main experimental game. In section 3 we present the experimental setup. In sections 4 and 5 we describe both correlates of image concern in terms of socio economic characteristics as well as

⁸Algan et al. 2014 in an analysis of open source software programmers use the answer to a survey question to identify image concern.

behavior in other games. Finally in section 6 we discuss possible limitations of our game and further research directions.

2 Measuring image concern: the procedure

2.1 The image concern game

The **image concern game** we propose is played between three players: the dictator (he), the recipient and the observer (she). The game is played as follows:

1. The dictator sees the photo of the observer but the observer does not see any pictures yet. The recipient never sees the picture of the observer throughout the game.
2. The dictator receives an amount of 100 tokens. He decides how much to allocate to a lottery. The lottery has two possible outcomes: success, in which case the recipient receives 50 tokens or failure, in which case the recipient receives nothing. For each token paid by the dictator, the chances of success increase by one percent, i.e if the dictator gave an amount $X \in (0, 100)$, the probability that the lottery is a success is $0.01 X$.
3. Before the lottery is actually run, the dictator chooses the maximum amount μ he is willing to pay to remain anonymous in case the lottery results in a failure.
4. The lottery is carried out:
 - (a) If it is a success, the recipient receives 50 tokens and the picture of the dictator appears on the screen of the observer.
 - (b) If it is a failure, the recipient receives nothing and the willingness to pay μ chosen in step 3 is used. To guarantee truthful revelation of the willingness to pay in step 3, the following mechanism is implemented: a random number $b \sim U(0, 100)$ is drawn. If $b \leq \mu$, the dictator pays b and remains anonymous (the observer does not see the dictator's picture). If $b > \mu$, the dictator pays nothing and the observer sees the picture of the dictator. In both cases, the observer learns that the lottery outcome was a failure.

No matter the result of the lottery, neither the observer nor the recipient ever learns the amount actually transferred in either step. They only learn the outcome of the lottery.

As suggested in the introduction, there are several key ideas that underly the setup of this game. First, the individual image concern can be measured by the maximum willingness to pay μ to remain anonymous, chosen in step 3. Second, we chose to have three players, rather than just a dictator and a recipient, in order to separate image concerns from fear of retaliation. Indeed if the picture was shown in the case of loss of anonymity, not to the observer, but directly to the recipient, it would not be possible to separate these two motives. Third, the decision to pay for anonymity is separated from the amount actually transferred in the lottery by the dictator. Indeed, regardless of how much the dictator gave in step 1, the inference that an observer makes about the dictator's generosity when she sees a failure is the same since she does not observe the actual amount transferred.

This last point is clarified in a small model presented in appendix A2. We show that the optimal choice of μ , the bid for anonymity, is independent of the amount X put in the lottery, provided the cost function is separable in the two expenditures. The idea is that the bid matters only in the case the lottery is a failure, and conditional on a failure, the amount X actually invested no longer plays a role. The model however suggests that image concerns might affect the initial choice of X , a point we return to in section 5.2.

2.2 The random observation game

We also propose a second game, **the random observation game**, that will be used to corroborate some of the results obtained using **the image concern game**. We nevertheless believe it is less well suited to measuring image concern for reasons outlined in section 2.3.3.

The game is played in four rounds. Before the first round, each player is randomly assigned one of three roles: dictator, recipient or observer. In each round, each dictator is matched with a recipient and an observer. At the end of rounds, players are rematched with others. Each round is played as follows:

1. The dictator and the observers see each other's pictures on their screens. The recipient does not see any picture, nor do the others see a picture of the recipient.
2. The dictator receives an endowment of 100 tokens.
3. A random draw determines if the round will be *deterministic* or *probabilistic*
 - If the round is *deterministic*, the dictator chooses how much to transfer to the recipient and the observer sees both the picture of the dictator and the amount he transferred

- If the round is *probabilistic*, the dictator chooses an amount to transfer to the recipient and pays this amount. However his decision is implemented only with probability $1/3$. With probability $2/3$ the recipient receives a random amount drawn from a uniform distribution over $[0, 100]$. The observer sees both the picture of the dictator and the amount received by the recipient, but does not observe the actual amount paid by the dictator.

The key idea behind this game is that image concern can be measured by the difference in amounts transferred by the dictator between probabilistic and deterministic rounds. A simpler setup can of course come to mind where we would just switch on and off the presence of observers across rounds. We could then compare the behavior in rounds with observers to rounds without. However, this setup would suffer from a strong experimenter demand effect, since this would clearly push the participants to give more when observed. Our setup mitigates this concern.

Note however that this game, as most alternative setups except for our image concern game, suffers from the problem highlighted in the introduction, that the individual level of generosity will interact with the measure of image concern. A more generous individual might change less his behavior between deterministic and probabilistic rounds since he has less to be ashamed of.

2.3 Experimental setup

2.3.1 Organization of the sessions

The experiment was entirely computer-based and there was no communication between subjects. All participants were seated in the same room, separated by screens, and briefed together. Before the experiment started, a picture was taken of each participant and fed into the experimental software, so that subject anonymity could be removed in a controlled manner. The participants were told that the photo would be destroyed immediately after the end of the session. Each participant had a minimum guaranteed amount of 4 euros.

Each session was then organized in 2 phases:⁹

Phase 1: participants play the game measuring image concern, either the *image concern game* (most sessions) or the *random observation game*.

⁹At the end of these two phases, the same survey was administered in all sessions

For sessions where the *image concern game* was run, four successive rounds were played. Subjects were randomly assigned to be either a dictator, a recipient or an observer and informed of their assignment. They kept this role for the four rounds. At the beginning of each round, a photo of the observer was shown to the dictator (in the right panel of his screen as shown in Figure 7). At the end of each round each dictator was rematched with a different observer and recipient. In each round an observer was assigned two dictators. No dictator encountered the same observer or recipient twice.

The players were informed that they would play four rounds of a game of which one would be selected at random to determine their payoffs. Nevertheless, at the end of each round, they observed the outcome. The payoff of the dictator and the recipient depended on the dictator's choice and the outcome of the lotteries, as described in section 2.1. The observers on the other hand received a fixed payment of 40 tokens per round, independent of other players' actions.

In the *random observation game*, the observer and the dictator saw each other's computer name and photo on their screens throughout the round, whereas the recipient did not know with whom he had been matched. A random draw at the start of each round determined whether the round would be deterministic or probabilistic, and the result of the draw was announced to all players. The payoff of the dictator and the recipient depended on the dictator's choice and random outcomes for probabilistic rounds, as described in section 2.2. The observers on the other hand received a fixed payment of 40 tokens per round, independent of other players' actions

Phase 2 : we then ran an infinitely repeated prisoner's dilemma game described below.¹⁰ In half the sessions, the prisoner's dilemma games were run with observers, in the others without.

Finally, at the end of the experiment, a survey was conducted collecting socioeconomic information as well as questions related to image concerns, such as the main question we use as validation for our image concern game.

Infinitely repeated prisoner's dilemma. Players were organized in pairs and played the following prisoner's dilemma with payoffs presented in Table 1. In addition in some treatment an observer was added, as described below.

¹⁰The instructions for phase 2 were read at the end of phase 1.

TABLE 1: PAYOFFS OF PRISONER’S DILEMMA

	C	D
C	8,8	0,10
D	10,0	4,4

The infinitely repeated game was implemented as a random continuation rule game where at the end of each round there was a probability $7/8$ that another round was played in the game.¹¹ After each game, the participants were rematched so that no group of subjects encountered each other more than once.¹² In practice, as in Peysakhovich and Rand (2013) or Fudenberg et al. (2012), we didn’t randomize the number of rounds *during* the session but *before* since we wanted to compare behavior across treatments and thus wanted games of identical length. We chose to follow the randomization chosen by Peysakhovich and Rand (2013), who also used a continuation probability of $7/8$, and we chose exactly the same length as in the first three games described in their paper: given this approach, each participant played three games, the first with 12 rounds, the second with 1 round and the third with 3 rounds. The participants were told they would play a maximum of three games, but it was not made clear whether the randomization at the end of each round was done on the spot or had been done before (as was in fact the case). They only knew that at the end of each round, there was 7 chances out of 8 to have another round in the game.

In some sessions, the actions of both players in the prisoner’s dilemma were shown to an observer. Each observer was assigned to two pairs of players. The observers saw the players’ photos and computer names, as well as the decisions they made in the game. A picture of the observer and his or her computer name was visible on the players’ screens while they took their decisions so that they knew by whom they were observed. Observers had to indicate whether they had met the other participants before and were asked in each round, after having observed the choice of the players, how they rated the behavior of the participants in the game.

The payoff in this phase of the two players playing the prisoner’s dilemma was the sum of payoffs in all rounds. It of course depended on their own choice and the choice of the other player. On the contrary, the observers received a flat payment per round of 5 tokens that was independent of the players’ actions.

¹¹With that continuation probability, cooperation is both a subgame perfect and risk dominant action.

¹²Within a repeated game the same group would of course play all the rounds.

2.3.2 The sample

TABLE 2: SUMMARY STATISTICS

Variable	Mean	Min	Max
Female	.58	0	1
Student	.62	0	1
Economist	.29	0	1
Married	.57	0	1
Age	29.5	18	71
French	.84	0	1

The experiment was run in May and September 2014 at the Laboratoire d'Economie Experimentale de Paris (LEEP). The lab has access to a diverse subject pool that comprises individuals not affiliated to any university as well as students and staff. Table 2 provides descriptive statistics for the sample of participants who played the image concern game in phase 1 since this is the main focus of the analysis. The sample is fairly balanced in terms of sex and marital status and is not exclusively composed of students. Note that we promised the participants to destroy the photos at the end of the experiment. In the survey, we ask them their nationality and code the variable French if they report being French. Most of those who report not being French are nationals from North African countries.

TABLE 3: SESSIONS

Phase 1	Phase 2	N. sessions	N.participants	Average gain
Image concern game	PD (observed)	5	100	17.22
Image concern game	PD (unobserved)	5	100	16.18
Random observation game	PD (observed)	4	80	18.78

Each treatment involved exactly 20 participants. In phase 1, eight of those participants were assigned the role of dictator, eight the role of recipient and four the role of observer (observers were in charge of two dictators in each round). The number of sessions and participants are detailed in table 3. In most sessions (10 out of 14), the first phase was our image concern game. In the second phase, a prisoner's dilemma was played, with observers in half the treatments and without for another half.

2.3.3 Constructing measures of image concern

The image concern game

The image concern game is designed to measure image concern in a straightforward way using the willingness to pay for anonymity. However we ran the game four times for each individual, using different observers and recipients. We thus have four individual measures that we could potentially combine in different ways. For instance we could have in mind three main measures:

1. *First mu*: the willingness to pay the first time the game is played
2. *Average mu*: the average value of the willingness to pay over the four periods
3. *Positive mu*: an indicator variable taking the value 1 if the first value of mu is positive

In practice, for reasons outlined below, we will in most of the paper use the willingness to pay for anonymity in the first round (first mu).

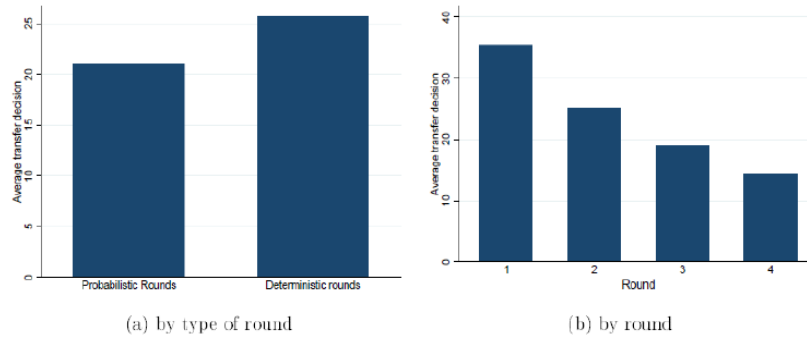
The random observation game

In the random observation game, which we use only for some validation of our base game, the image concern is naturally measured by the difference in amounts transferred by the dictator between probabilistic and deterministic rounds. As shown in panel a) of figure 1, we see that there is on average a difference between contributions in the two types of rounds. As expected, transfers are higher in deterministic rounds, i.e rounds for which the dictator is sure that his choice will be observed. This average effect is coherent with the literature (Ariely et. al. 2009, Andreoni and Petrie 2004 and others).

However, when testing experimentally this game in the laboratory, a further issue emerged: as visible in panel b) of Figure 1, the average donation decreased round to round even though it was clearly specified that only one round would be chosen at random to determine the payoffs.¹³ Thus the measurement of μ proposed above turns out to be dependent on the order in which these games were played. Thus, throughout this paper, whenever the random observation game is discussed, we use a different measure of image concern that we call the robust mu: the average difference between rounds at switching points, where switching points are periods where a probabilistic round follows a deterministic round or vice versa.

¹³This interesting feature does not seem to appear in the literature although Engel (2010) notes in his meta-study of dictator game experiments that repeating the game decreases transfers. A possible explanation could be that subjects who are generous in the beginning become satiated with feeling generous over the course of the game and thus decrease their transfers.

FIGURE 1: AVERAGE TRANSFER DECISIONS IN THE RANDOM OBSERVATION GAME



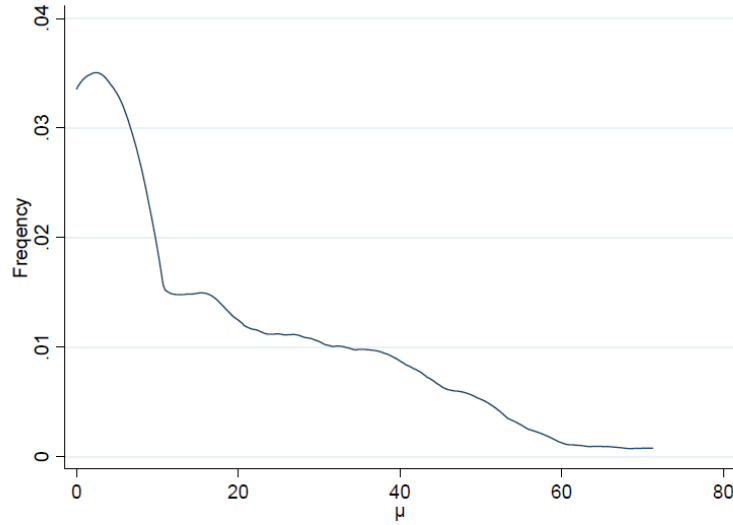
3 Measuring image concern: the results

3.1 Heterogeneity in image concern

The results of the experiment reveal a significant heterogeneity in the sensitivity to image concern. The distribution of μ chosen in the first round (variable firstmu) is given in Figure 2 (shape is very similar for the average value of μ). 41 percent of the sample is completely insensitive, i.e. does not pay to stay anonymous. On the contrary, more than 25 percent seem quite sensitive and give more than 20. Since this is the first study to measure individual sensitivity to image concern using an experimental game, it is difficult to compare the distribution to existing results. As a reference point, Carpenter and Myers (2010) find that 23 percent of firefighters in their sample purchase a vanity plate for their car, what the authors interpret as being imaged concerned.

We find a similar distribution and a similar proportion of non-concerned individuals when using the results of the random observation game, with the robust μ measure (see Figure 8 in the appendix). The proportion of completely insensitive individual is slightly higher (47 percent of the sample), but we nevertheless also find a high degree of heterogeneity.

FIGURE 2: DISTRIBUTION OF IMAGE CONCERN



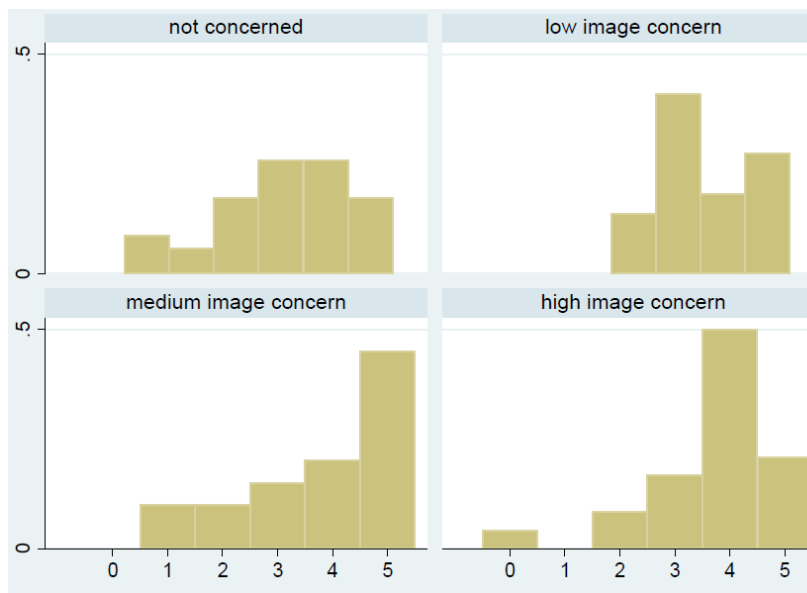
For most of the paper we exclude 3 outliers who bid more than 90 for anonymity whereas the highest bid among the rest of the population is 75. The results are robust to the inclusion of these individuals. This leaves us with 101 individuals for whom we have a measure of image concern.

3.2 Validation of the game

One key question immediately arises: are we indeed measuring image concern? As explained earlier, there is not, as in the case of trust, a widely accepted survey question convincingly capturing the degree of image concern. We therefore constructed a question that appeared to reasonably measure this construct: "It is important for me not to be perceived as selfish" on a 0-5 Likert scale. We show in Figure 3 the distribution of answers to this question by level of image concern. The distribution tends to shift to the right for higher levels of image concern, suggesting that indeed our measure captures the sensitivity to the perception by others. As robustness we show in the appendix the distribution distinguishing only two categories, image concerned versus not (Figure 9), and find a similar shift.

In table 4 we present the results of an ordered logit using as explanatory variables

FIGURE 3: DISTRIBUTION OF ANSWER TO QUESTION "IT IS IMPORTANT FOR ME NOT TO BE PERCEIVED AS SELFISH" (SCALE 0-5) BY IMAGE CONCERN LEVEL



alternatively the first mu, the average mu or the positive mu variable.¹⁴ All of them are positively associated with higher answers to the question, but the effect of the first mu is most significant. It is important to note that it is the only variable that can explain variations in the answer to that question. In particular, none of our socio economic variables turns out to significantly impact the answers. We find similar results in table 5 where we use as dependent variable whether the individual answered 4 or 5 to that question (on a 0-5 Likert scale).

The consistency between the results using both games and the association with the natural question in our questionnaire offers a strong initial validation of our measure of image concern. We offer further validation in section 5 when we compare sessions where the repeated game was played with observers to those where it wasn't. We show that more image concerned individuals, as measured by our game, react more to the fact of being observed and in particular are more likely to choose the action judged positively by observers.

¹⁴There is one observation per dictator. We excluded outliers who bid more than 90 for anonymity

3.3 What measure of image concern should we use?

As explained in section 2.3.3, we ran four rounds of the image concern game, leaving us with different possible choices for the image concern measure. The first observation is that the average value of μ does not vary much across rounds, except for the last round where it is lower.¹⁵ The average bid for anonymity in the first round is 14.4, while overall it is 13.9.

However, we find that the bidding behavior in later rounds is affected by the outcome of the previous rounds. In particular, as shown in table 6 the fact of having lost the lottery and having been visible in the previous round leads to significantly lower bids in the current round. This fact could have multiple explanations. One could simply be due to the disappointment of having lost the lottery for anonymity, i.e become visible despite having paid.

Regardless of the explanation for this effect, the observed sensitivity to the individual histories lead us to *use mostly the bid for anonymity in the very first round as our indicator of sensitivity to image concern*. Note also that this is in coherence with the results above since this variable *firstmu* is significantly correlated with the answers to the image concern question.

4 Drivers and consequences of image concerns

The first goal of this paper is to propose a game to measure individual sensitivity to image concerns, and to validate the measure we obtain, as was presented in the previous sections. The second goal, the object of this section, is to explore what socioeconomic characteristics are correlated with image concern and start examining whether more image concerned individuals behave differently than others.

4.1 Drivers of image concern

In table 7, we present the main socioeconomic characteristics that drive image concern. In columns (1) we consider the full sample, in column (2) we restrict the sample to those having bid a positive amount for anonymity, while in columns (3), we use as explanatory variable the indicator variable of whether μ is positive (positive mu variable). The main result is that very few socioeconomic characteristics can explain the sensitivity to image concern. The only fact that seems to emerge is that non French citizens are slightly more

¹⁵this difference between the last round and the previous one is not significant when introducing a number of controls.

image concerned. In particular they are more likely to bid something for anonymity. The special sensitivity of non French is consistent with the idea that these populations may face discrimination and stereotypes. Sex, age, level of study or profession appear to play no role.¹⁶

At the end of the study, a relatively detailed survey was conducted that allow us to determine among other things, other dimensions of behavior. We find that the more image concerned individuals report having significantly fewer friends and are less involved in political parties, as reported in table 8.¹⁷ Although the sample size warrants prudence, what seems to emerge is that the sensitivity to image concern cannot be explained by socioeconomic characteristics, but has close connections with behavioral patterns, such as the formation of friendships.

4.2 Does the observer matter?

We now examine whether the characteristics of the observer have an impact on the amount paid to preserve anonymity. Table 9 presents the results. The results in column (1) show that sex, age or nationality of the observer has no influence on average. The fact that the observer smiles has a slight positive impact that tends not to be significant. Interestingly, the fact that the observer knows the dictator has no effect.¹⁸

Columns (2) and (3) introduce interaction terms to understand the role of observers in more detail. Two main results emerge. First, *males give more when they are observed by a female and female give more when observed by males*, and the second effect is significant. Second, *dictators give significantly more when they are non-French and observed by a French*.¹⁹ This could be driven by the experience of discriminating behavior. In fact there are two plausible explanations. The first is that non French are just intrinsically more sensitive to the perception French people might have of them. The second is that they expect the French to be prejudiced against them and thus interpret a bad outcome more negatively, pushing the non French to initially give more. Note that this prejudice if it was indeed present, would not be justified, since the non French give more in the lottery, even though

¹⁶We do not report all coefficients here, but all controls are included

¹⁷Other dimensions such as being involved in non profit or the amount of donations made seems unrelated to image concern.

¹⁸Note that there is no clear expectation to be had on the direction of this effect. We might suppose image concern should be higher for individuals the dictator knows since he might be brought to interact with them outside the lab. At the same time, the individuals he knows might have already formed an opinion and infer less based on the outcome of the experiment.

¹⁹As a reminder, we use the variable coding nationality as French or not, as a proxy for the race of individuals, that we cannot ask directly. Most of the non French are nationals of North African countries.

the difference is not significant.²⁰ We insist on the fact that these interactions terms are significant even though none of the socioeconomic variables have explanatory power.

5 Do image concerned individuals behave differently?

We now turn to the analysis of the behavior of participants in phase 2 where they played the prisoner's dilemma. To the best of our knowledge, this is the first time infinitely repeated prisoner's dilemma are played with observers. We will exploit both the differences across sessions (sessions with and without observers), as well as individual heterogeneity in image concern within sessions.

The purpose of this analysis is threefold. First, to determine whether image concerned individuals behave differently than others, for instance in terms of cooperation rates. This first part will focus on treatments where the prisoner's dilemma was played without observers. Second, we examine whether image concerned individuals react more than others to the fact of being observed. This will provide further validation of our measure of image concern. Finally, the results will also inform us on the norm of behavior that prevails for the prisoner's dilemma.

5.1 Cooperation rates of image concerned individuals

We first exploit the variation within sessions of the image concern parameter to determine whether more image concerned individuals behave differently than others, in particular in terms of cooperation rates. The first thing we show is that, in environments where they are not observed, more image concerned individuals are more likely to defect.

In table 10 we report the results of a probit regression of the cooperation variable explained by socioeconomic characteristics and by the image concern parameter, *restricting attention to treatments where the prisoner's dilemma was played without observers*. Regardless of whether we focus on all rounds (column (1)), only the first round of each game (column (2)) or exclusively on the last game (column (3)), we find that the more image concerned individuals cooperate significantly less. This is particularly striking since no socioeconomic characteristic has explanatory power.

Cooperation rates in infinitely repeated games can reflect both an intrinsic level of altruism, but also beliefs held about how likely others are to cooperate. We favor the interpretation based on altruism since the result seems even stronger when we restrict the sample to the last game (column (3)) where beliefs should be less heterogenous since

²⁰Non-French: 0.22, French: 0.17, $t=1.571$

learning will already have occurred during earlier games. This suggest an initial picture where image concerned individuals appear less altruistic: they are more concerned with themselves and the impression they give to others – a result that should be explored in later work.

5.2 Avoiding situations with risk of exposure

We showed in the previous section that image concerned individuals were naturally less inclined to cooperate in the repeated prisoner’s dilemma, what we interpreted as being less altruistic. When we turn to the link between image concern and the amount transferred in the lottery in the first phase, results reported in table 17, we find on the contrary that more image concerned individuals transfer higher amounts to the lottery.

The small model presented in appendix A2 can reconcile these two facts. We show that, for the same level of altruism, more image concerned individuals will bid more at the lottery stage as they know that a failed outcome will be more costly for them as they will have to pay more for anonymity. It is therefore possible that this effect might overcome the fact that, to start with, more image concerned individuals are less generous.

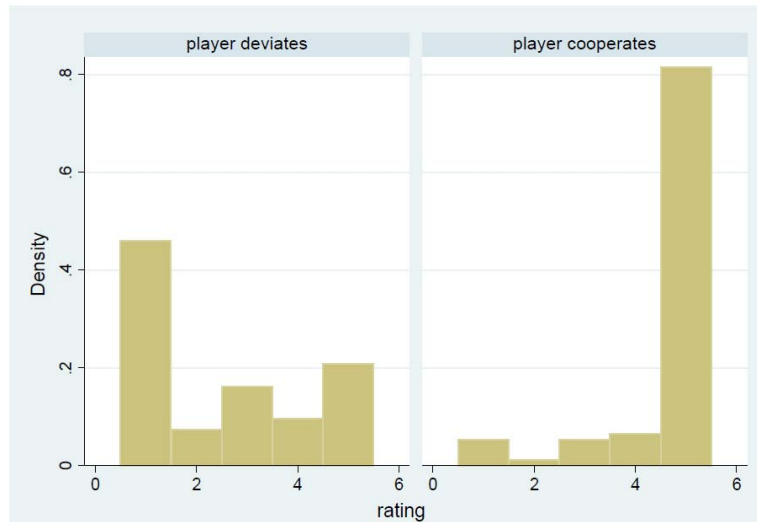
This evidence is therefore consistent with the idea that image concerned individuals might try to avoid situations where they risk being exposed and would thus pay a higher cost from being shown in a bad light. This is consistent with the interpretation given in Della Vigna et al. (2012) who show that notifying residents in advance of the exact time of solicitation in a door to door fundraiser significantly decreases the share of households opening doors, one possible interpretation being that image concerned individuals attempt to avoid the pressure. Our individual level measure of image concern allows us to show even more precise evidence of such a mechanism.

5.3 The social norm

We now turn to the impact of being observed in the prisoner’s dilemma. The first thing to determine is what actions in the prisoner’s dilemma are considered appropriate by the community, i.e what is the social norm. This first step is essential to interpret the effect of image concern. We can address this interesting and novel question by studying observer’s ratings of player’s actions. The first thing that unambiguously appears in Figure 4 is that the action of cooperating is highly rated by the observers.

However, the perception of observers is also based on a more subtle reaction to the history of play. We can use the fact that the observers were asked to give a rating following each round after observing the actions of both players. In Figure 5, we examine the rating

FIGURE 4: RATING OF BEHAVIOR BY OBSERVER (SCALE 1-5)



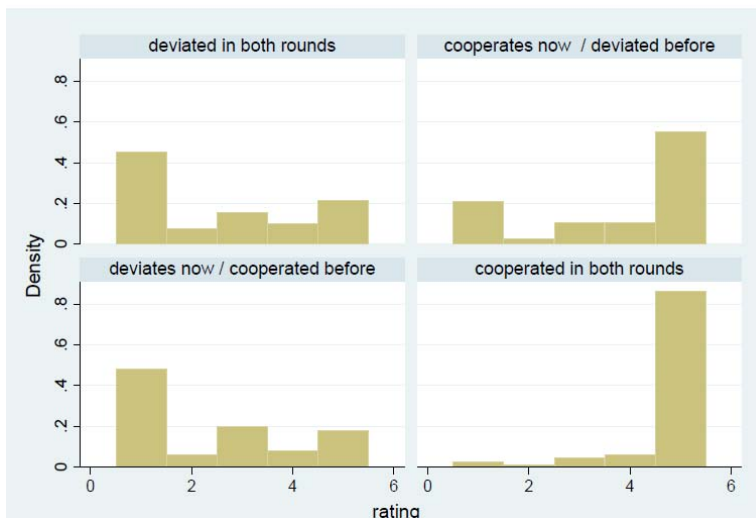
of the current behavior conditional on the action of the player in the previous period. We still see that cooperation is better rated than deviation, but we also see that this reaction is particularly strong when the player also cooperated in the previous round. The observers rate very highly consistency in cooperation. One interpretation could be that they value unconditional cooperators, who consistently avoid deviating.

It would be natural to think that ratings would also depend on what the other player did in the past. We show in the appendix Figure 10 how rating of current actions depend on past actions of the partner. The most striking fact is that there is no extra negative rating coming from a deviation that follows cooperation by the partner, i.e there does not seem to be a judgment on betrayal of the partner.

The regression analysis (tables 11 and 12) confirms these findings. We first note that a certain number of facts not linked to behavior affect the ratings. Students, younger people and those who smile on the picture are better rated than others. One interesting fact, linking back to the issue of perception of discrimination, is that French observers tend to give a significantly higher rating to non-French. A natural interpretation is that they fear being perceived as prejudiced.

In terms of observed behavior, we find that indeed, cooperation in a round significantly increases the rating. This is true in an ordered logit (table 11) as well as in a probit regression where the dependent variable is an indicator variable of whether the maximal

FIGURE 5: RATING OF BEHAVIOR BY OBSERVER DEPENDING ON PAST CHOICES



rating was given (table 12). The second main finding is the confirmation of the result visible in Figure 5: the fact that cooperation follows cooperation in the previous round has an extra positive effect on ratings (column (3)); stability is valued. On the other hand, there is no significant dependency of the rating on the action of the partner in the previous round (column (2)). This social norm will be used in the next sections to determine how image concerned individuals react to the fact of being observed.

5.4 The average impact of being observed

We now examine whether on average, the fact of being observed, affects how likely individuals are to follow the social norm. We thus adopt the approach used in most of the literature and compare the average behavior in treatments with observers to those without. To the best of our knowledge, this is the first paper to examine the behavior in the prisoner’s dilemma game with third-party observers.²¹

On average across all rounds, in treatment without observers, the average cooperation rate is 0.3 while it is 0.53 with observers. The difference is significant (t-test $t = 8.82$). Be-

²¹Previous papers have focused mainly on punishment by third-parties for norm enforcement, rather than observation alone (see for instance Fehr and Fischbacher (2004)). In our setup observers have no possibility to punish players. Sutter et al. (2009) use a much weaker form of observation, where observers only know about decisions and payoffs but do not see players’ pictures or anything that could identify them.

ing observed pushes players to cooperate more, i.e to follow more the social norm. This is coherent with the literature that compares behavior in public good games when observed (Andreoni and Petrie 2014) and other experimental games played with observers.

We now turn to the second dimension that appears to influence ratings, the consistency in behavior. When we restrict to rounds where in the previous round, the player cooperated, then in the current round the rate of cooperation is 0.66 without observers and 0.77 with observers, and the difference is significant ($t = 3.43$). When on the contrary we focus on the case where the player deviated in the previous round, the rate of cooperation falls to 0.11 with observers and 0.15 without observers, a difference no longer significantly different from 0 ($t = 1.65$). This confirms that, when observed, more image concerned individuals are more likely to follow even more subtle norms.

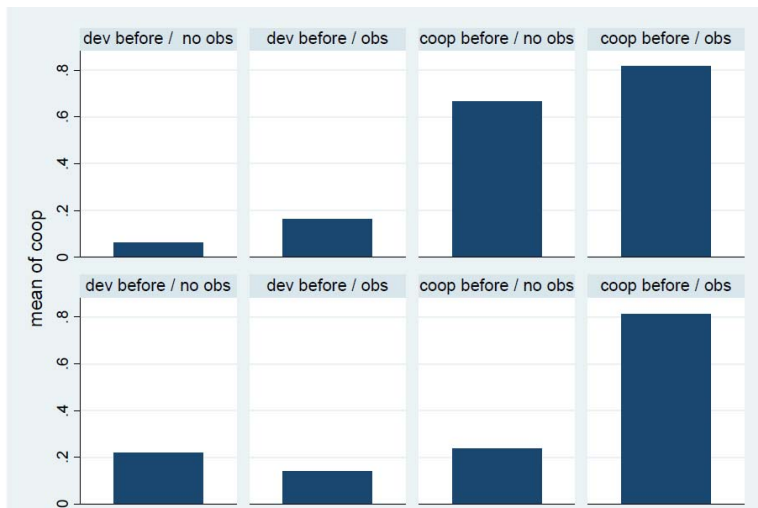
5.5 Further validation of our measure

Our measure of image concern is further validated by the fact that more image concerned individuals become more prone to behave according to the social norm and cooperate when observed. As reported in table 13 for the whole sample and 14 for the sample restricted to the last repeated game, image concerned participants react more than others to the fact of being observed. We see in columns (3) of both tables that the interaction term between image concern and being observed is positive and significant in Table 14 (i.e for the last repeated game).

Similarly, image concerned individuals also react stronger to the social norm of consistency in cooperation, which was highly rated by observers. This can be seen graphically in figure 6, where the first line are for individuals who are not very image concerned (average μ below 20) and the second line is for those that are very concerned (average μ above 20): For individuals who cooperated in the previous round, the effect on cooperation of being observed is much stronger when the individual is image concerned than when not.

These graphical results are confirmed in tables 15 (for all rounds) and 16 (restricting attention to the last game). In column (1) we restrict the sample to non-observed sessions and we see that more image concerned individuals tend to cooperate less after a round where they cooperated than the less image concerned (this was also visible in Figure 6). However we see in column (2) that for observed sessions, this effect disappears. Image concerned individuals seem to take into account the fact that this lack of consistency in cooperation is badly perceived by observers. This is confirmed in column (3) where the interaction term between the level of image concern, cooperation in previous round and

FIGURE 6: COOPERATION RATES DEPENDING ON PAST BEHAVIOR AND PRESENCE OF OBSERVERS. FIRST ROW, LOW IMAGE CONCERN (AVERAGE MU BELOW 20) SECOND ROW, HIGH IMAGE CONCERN (AVERAGE MU ABOVE 20)



the fact of being observed is positive and significant. These results are even stronger when we restrict to the last game (table 16) and is also present if we just compare the image concerned and the non imaged concerned individuals.

6 Discussion

We have presented in this paper a novel experimental game to measure image concern, validated the measure and presented initial facts about image concerned individuals. To conclude this paper we discuss some of the possible issues that might be raised about this game.

Experimenter as observer

It can be feared that the dictator has the feeling of being observed, not only by the observer in the game, but also by the experimenter. If the dictator believes that the experimenter can see how much he pays to be anonymous and if he thinks the observer will adversely view payments for anonymity, it could imply that the image concerned individuals could be less inclined to give than if the experimenter was not present.

We took several precautions to limit this potential problem. First, we clearly told the participants that they would remain anonymous from the point of view of the experimenter: they were told that the photos would be deleted at the end of the session, and that we would of course preserve the anonymity when we conduct the analysis. Furthermore, while the picture of the observer was always visible on the screen of the dictators, the experimenter was not visible during the experiment.

We point out that if in spite of these precautions, subjects were still unconsciously influenced by the experimenter effect, this would have little impact on the results presented here. Indeed, it would only decrease the variance in the answers but not change the ranking of individuals in terms of μ .²² The fact that we find a high degree of heterogeneity in the population, suggests that even if this effect was present, it would not be large.

The nature of observers

We set out with the goal of proposing a game that would be portable, as defined in the introduction, and could be used for instance for comparison across geographical areas. Of course, if this game was run on a large scale, the same observers would not be systematically used. A comforting feature of our analysis is that we find that the characteristics of the observers have no impact on the bid for anonymity up to one exception. We find the interesting result that non-French bid more when observed by French. This fact, that needs to be more broadly confirmed, may suggest that ideally observers should not be chosen among the ethnic majority in the country where the analysis is run.

In conclusion, this paper proposes an experimental procedure to measure individual sensitivity to image concerns, validates the measure and starts exploring determinants and consequences of this underexplored dimension of preferences. It opens the way for extensive future research on the topic.

²²Unless of course there are two dimensions of image concern that can both vary across the population: being concerned about the perception by the experimenter of the level of generosity and being concerned about the perception of the experimenter about trying to hide your true type.

7 Appendix A1

TABLE 4: CORRELATIONS BETWEEN IMAGE CONCERN MEASURE AND ANSWER TO QUESTION

	(1)	(2)	(3)
	not selfish	not selfish	not selfish
first bid for anonymity	0.02 ^b (0.01)		
positive mu		0.64 (0.40)	
average mu			0.02 ^c (0.01)
risk aversion	0.01 (0.12)	0.01 (0.13)	0.01 (0.12)
economist	-0.93 ^c (0.50)	-0.81 ^c (0.47)	-0.96 ^c (0.52)
age	0.01 (0.02)	0.02 (0.02)	0.01 (0.02)
married	-0.36 (0.41)	-0.21 (0.39)	-0.31 (0.40)
french	-0.80 (0.55)	-0.73 (0.52)	-0.78 (0.55)
Observations	101	101	101
Pseudo R ²	0.047	0.041	0.044

Standard errors in parentheses

^c p<0.1, ^b p<0.05, ^a p<0.01

NOTES. This table reports the estimations of an ordered logit regression of the answers to the question "It is important for me not to be perceived as selfish" (0-5 Likert scale) on image concern measures and socio-economic characteristics. The sample contains all individuals who played as dictators in the image concern game, excluding 3 outliers

TABLE 5: EXPLAINING SENSITIVITY TO SELFISHNESS

	(1) answer 4+	(2) answer 4+	(3) answer 4+
first bid for anonymity	0.02 ^b (0.01)		
positive mu		0.36 (0.30)	
average mu			0.02 ^b (0.01)
risk aversion	-0.01 (0.06)	-0.01 (0.06)	0.00 (0.06)
economist	-0.16 (0.33)	-0.09 (0.32)	-0.18 (0.33)
age	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
married	-0.15 (0.27)	-0.07 (0.26)	-0.11 (0.27)
french	-0.48 (0.36)	-0.43 (0.36)	-0.45 (0.36)
Observations	101	101	101
Pseudo R^2	0.071	0.049	0.072

Standard errors in parentheses

^c p<0.1, ^b p<0.05, ^a p<0.01

NOTES. This table reports the estimations of an probit regression of the indicator variable taking the value 1 if the participant answered 4-5 to the question "It is important for me not to be perceived as selfish" (0-5 Likert scale) on image concern and socio-economic characteristics. The sample contains all individuals who played as dictators in the image concern game, excluding 3 outliers.

TABLE 6: EXPLAINING ROUND TO ROUND VARIATIONS IN BIDS FOR ANONYMITY

	(1)	(2)
	bid for anonymity	bid for anonymity
first bid for anonymity	0.60 ^a (0.07)	0.53 ^a (0.07)
age	0.21 ^b (0.10)	0.21 ^b (0.09)
married	-1.61 (2.29)	-1.94 (2.20)
french	-2.44 (3.37)	-2.26 (3.06)
lost lottery, was visible		-7.40 ^a (2.81)
lost lottery, stayed anonymous		-1.49 (3.78)
Observations	303	303
R ²	0.417	0.438

Standard errors in parentheses

^c p<0.1, ^b p<0.05, ^a p<0.01

NOTES. This table reports the estimations of a regression of the bidding strategy in rounds 2 to 4 explained by the bid in the first round, and the realizations of the different lotteries in the previous round (in column 2). The standard errors are clustered at the individual level.

TABLE 7: EXPLAINING IMAGE CONCERN

	(1)	(2)	(3)
	first mu	first mu	positive mu
female	0.06 (4.26)	-5.31 (6.27)	0.40 (0.28)
age	0.28 (0.24)	0.18 (0.27)	0.01 (0.01)
student	-7.71 (6.26)	-7.94 (7.68)	-0.61 (0.41)
family status	0.01 (3.63)	-2.92 (4.86)	0.18 (0.23)
french	-4.04 (5.74)	-3.79 (6.32)	-0.73 ^c (0.39)
Observations	101	63	101
R^2	0.118	0.108	
Pseudo R^2			0.121

Standard errors in parentheses

^c $p < 0.1$, ^b $p < 0.05$, ^a $p < 0.01$

NOTES. Columns (1) presents the regression of variable first mu on socio economic characteristics for the full sample. Column (2) restricts the sample to individuals who bid a positive amount. Column (3) is a probit regression of the indicator variable taking value 1 if the individual bid a positive amount for anonymity.

TABLE 8: EXPLAINING OTHER BEHAVIORS

	(1)	(2)
	nb friends	party member
first bid for anonymity	-0.04 ^a (0.02)	-0.02 ^b (0.01)
female	-1.58 ^b (0.73)	-0.57 (0.41)
age	0.01 (0.03)	0.01 (0.02)
student	0.44 (0.92)	-0.19 (0.52)
married	-0.18 (0.74)	0.07 (0.37)
french	1.62 ^c (0.88)	
Observations	101	85
R^2	0.135	
Pseudo R^2		0.117

Standard errors in parentheses

^c $p < 0.1$, ^b $p < 0.05$, ^a $p < 0.01$

NOTES. Column (1) presents the estimations of a regression of the variable measuring the self-reported number of friends. Column (2) presents the estimation of a probit regression of an indicator variable taking the value 1 if the participant is a party member.

TABLE 9: ROLE OF OBSERVERS

	(1)	(2)	(3)
	bid for anonymity	bid for anonymity	bid for anonymity
know observer	-1.05 (3.26)	-0.38 (3.21)	-0.30 (3.24)
observer smiles	2.61 (6.17)	2.65 (6.41)	2.26 (6.38)
observer female	-0.85 (1.79)		-0.79 (1.82)
observer french	0.46 (2.54)	0.47 (2.52)	
female w. obs female		2.58 (2.97)	
female w. obs male		5.71 ^c (3.33)	
male w. obs female		2.63 (2.66)	
risk aversion		0.01 (0.55)	0.09 (0.56)
french w. obs french			5.28 (4.49)
french w. obs non-french			6.86 (4.81)
non-french w. obs french			10.67 ^b (4.86)
Observations	404	404	404
R^2	0.182	0.180	0.181

Standard errors in parentheses

^c p<0.1, ^b p<0.05, ^a p<0.01

NOTES. Columns (1), (2) and (3) present the regression of variable first mu on characteristics of the observer for the full sample. All regressions include period fixed effects. Standard errors are clustered at the participant level.

TABLE 10: COOPERATION IN TREATMENTS WITHOUT OBSERVERS

	(1)	(2)	(3)
	cooperate	cooperate	cooperate
first mu	-0.02 ^c (0.01)	-0.03 ^b (0.01)	-0.03 ^b (0.01)
female	-0.14 (0.30)	-0.29 (0.35)	-0.71 ^c (0.38)
Age	0.01 (0.02)	-0.01 (0.02)	-0.02 (0.02)
student	-0.15 (0.54)	-0.45 (0.56)	-0.33 (0.64)
french	-0.80 (0.49)	-0.51 (0.54)	-0.49 (0.42)
player smiles	-0.33 (0.44)	-0.01 (0.50)	-0.35 (0.44)
Constant	0.47 (0.91)	1.31 (1.02)	1.47 (1.23)
Observations	640	120	120
Pseudo R^2	0.055	0.093	0.156

Standard errors in parentheses

^c $p < 0.1$, ^b $p < 0.05$, ^a $p < 0.01$

NOTES. This table reports the estimations of a probit regression of the indicator variable taking the value 1 if the player cooperated, restricting the sample to treatments with no observers. Column (1) includes all rounds of the prisoner's dilemma game. Column (2) restricts to the first round of each game. Column (3) restricts the sample to the third game. Standard errors are clustered at the participant level.

TABLE 11: OBSERVER RATINGS

	(1)	(2)	(3)
	rating	rating	rating
cooperate	2.94 ^a (0.50)	2.47 ^a (0.65)	1.78 ^a (0.68)
observer french / player non french	1.40 ^c (0.84)	1.28 ^c (0.78)	1.40 ^c (0.77)
observer french	-0.74 (0.83)	-0.75 (0.75)	-0.78 (0.79)
student	1.21 ^c (0.64)	1.24 ^c (0.64)	1.22 ^b (0.62)
player smiles	2.37 ^a (0.90)	2.16 ^b (0.89)	2.00 ^b (0.87)
know each other	-2.16 ^a (0.70)	-2.13 ^a (0.70)	-2.16 ^a (0.67)
french	1.11 (0.78)	1.06 (0.72)	1.19 ^c (0.72)
deviate after partner coop		0.29 (0.40)	
cooperate after partner coop		0.75 (0.65)	
deviate after player coop			-0.15 (0.33)
cooperate after player coop			1.60 ^b (0.71)
Observations	520	520	520
Pseudo R ²	0.242	0.246	0.253

Standard errors in parentheses

^c p<0.1, ^b p<0.05, ^a p<0.01

NOTES. This table reports the estimations of a regression of the ratings given by the observer on the player's characteristics and behaviors. Standard errors are clustered at the participant/observer level.

TABLE 12: OBSERVER RATINGS

	(1) top rating	(2) top rating	(3) top rating
cooperate	1.63 ^a (0.25)	1.32 ^a (0.34)	1.08 ^a (0.36)
observer french / player non french	4.95 ^a (0.93)	5.01 .	4.92 .
observer french	0.71 (0.62)	0.56 (0.64)	0.72 (0.60)
student	0.70 ^b (0.34)	0.73 ^b (0.35)	0.69 ^b (0.35)
player smiles	0.81 (0.57)	0.68 (0.57)	0.64 (0.55)
know each other	-0.51 (0.38)	-0.50 (0.37)	-0.50 (0.36)
french	4.82 ^a (0.89)	4.93 ^a (0.28)	4.83 ^a (0.29)
deviate after partner coop		0.18 (0.29)	
cooperate after partner coop		0.48 (0.33)	
deviate after player coop			-0.09 (0.24)
cooperate after player coop			0.72 ^b (0.34)
Observations	520	520	520
Pseudo R ²	0.344	0.351	0.356

Standard errors in parentheses

^c p<0.1, ^b p<0.05, ^a p<0.01

NOTES. This table reports the estimations of a probit regression of the indicator variable taking the value 1 if the observer gave a rating of 5 on the player's characteristics and behaviors. Standard errors are clustered at the participant/observer level.

TABLE 13: COOPERATION ALL ROUNDS

	(1)	(2)	(3)
	cooperate	cooperate	cooperate
first mu	-0.02 ^c	-0.00	-0.01
	(0.01)	(0.01)	(0.01)
Observed			0.53 ^c
			(0.29)
interaction image * observed			0.01
			(0.01)
Observations	640	608	1280
Pseudo R^2	0.055	0.063	0.089

Standard errors in parentheses
^c p<0.1, ^b p<0.05, ^a p<0.01

NOTES. This table reports the estimations of a probit regression of the indicator variable taking the value 1 if the player cooperated. Column (1) and (4) include the full sample. Column (2) only the observations where the players are not observed and column (3) those where the players are observed. Standard errors are clustered at the participant level.

TABLE 14: COOPERATION LAST GAME

	(1)	(2)	(3)
	cooperate	cooperate	cooperate
first mu	-0.03 ^b	0.00	-0.03 ^b
	(0.01)	(0.01)	(0.01)
Observed			0.50
			(0.34)
interaction image * observed			0.02 ^c
			(0.01)
Observations	120	114	240
Pseudo R^2	0.156	0.185	0.205

Standard errors in parentheses
^c p<0.1, ^b p<0.05, ^a p<0.01

NOTES. This table reports the estimations of a probit regression of the indicator variable taking the value 1 if the player cooperated. Column (1) and (4) include all observations for the last game. Column (2) only the observations for the last game where the players are not observed and column (3) those where the players are observed. Standard errors are clustered at the participant level.

TABLE 15: COOPERATION AS A FUNCTION OF PLAYER'S LAST ROUND ACTION ALL ROUNDS

	(1) cooperate	(2) cooperate	(3) cooperate
first mu	0.01 ^b (0.01)	-0.00 (0.01)	0.00 (0.00)
subject cooperated in game 1 period 1	0.58 ^a (0.19)	0.14 (0.23)	0.31 ^b (0.15)
interaction image concern * previous coop	-0.05 ^a (0.01)	0.01 (0.01)	-0.04 ^a (0.01)
player cooperated in previous period	2.33 ^a (0.30)	1.67 ^a (0.32)	2.00 ^a (0.23)
interaction image concern * previous coop * observed			0.03 ^a (0.01)
Observed			0.04 (0.18)
Observations	520	494	1040
Pseudo R ²	0.389	0.345	0.383

Standard errors in parentheses

^c p<0.1, ^b p<0.05, ^a p<0.01

NOTES. This table reports the estimations of a probit regression of the indicator variable taking the value 1 if the player cooperated. Column (1) and (4) include all observations. Column (2) only the observations where the players are not observed and column (3) those where the players are observed. Standard errors are clustered at the participant level.

TABLE 16: COOPERATION AS A FUNCTION OF PLAYER'S LAST ROUND ACTION IN LAST GAME

	(1) cooperate	(2) cooperate	(3) cooperate
first mu	-0.01 (0.01)	-0.02 (0.01)	-0.02 ^b (0.01)
subject cooperated in game 1 period 1	1.00 ^c (0.53)	0.24 (0.37)	0.50 ^c (0.30)
interaction image concern * previous coop	-0.04 ^c (0.02)	0.08 ^b (0.03)	-0.02 (0.01)
player cooperated in previous period	1.89 ^a (0.50)	1.28 ^b (0.64)	1.40 ^a (0.34)
interaction image concern * previous coop * observed			0.09 ^a (0.02)
Observed			-0.19 (0.32)
Observations	80	76	160
Pseudo R ²	0.466	0.453	0.459

Standard errors in parentheses

^c p<0.1, ^b p<0.05, ^a p<0.01

NOTES. This table reports the estimations of a probit regression of the indicator variable taking the value 1 if the player cooperated. Column (1) and (4) include all observations for the last game. Column (2) only the observations for the last game where the players are not observed and column (3) those where the players are observed. Standard errors are clustered at the participant level.

TABLE 17: EXPLAINING THE LOTTERY PARTICIPATION

	(1)	(2)	(3)
	transfer to lottery	transfer to lottery	transfer to lottery
first bid for anonymity	0.41 ^a (0.10)		
risk aversion	0.64 (0.71)	0.77 (0.72)	0.58 (0.75)
economist	-1.20 (3.85)	-2.04 (3.64)	1.40 (3.36)
age	0.09 (0.15)	-0.01 (0.16)	0.08 (0.15)
married	2.70 (3.20)	3.67 (3.14)	5.19 (3.13)
french	-1.04 (5.27)	-0.20 (4.97)	0.95 (4.41)
average mu		0.54 ^a (0.11)	
Observations	101	101	101
R^2	0.249	0.297	0.243
Pseudo R^2			

Standard errors in parentheses

^c p<0.1, ^b p<0.05, ^a p<0.01

NOTES. This table reports the estimations of a regression of the amount transferred by the dictator in the image concern game on image concern measures and socio economic characteristics. Standard errors are clustered at the participant level.

FIGURE 7: SCREEN SHOT

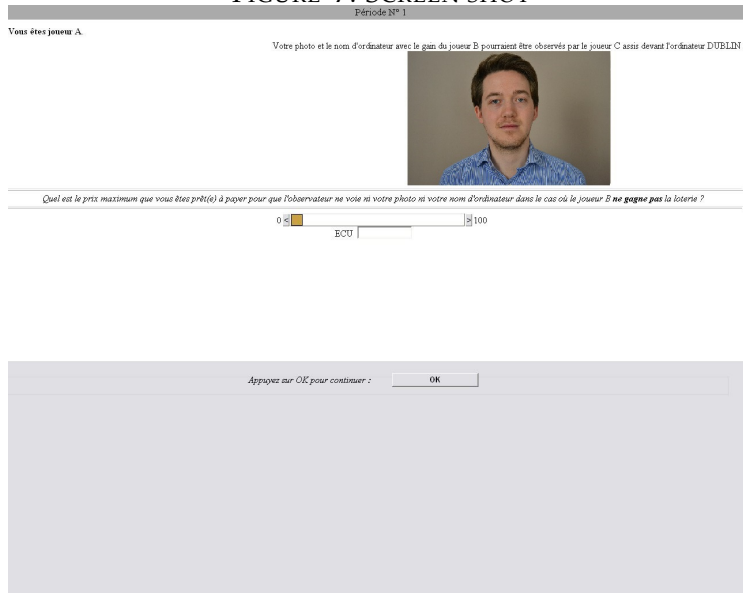


FIGURE 8: DISTRIBUTION OF IMAGE CONCERN USING THE RANDOM OBSERVATION GAME

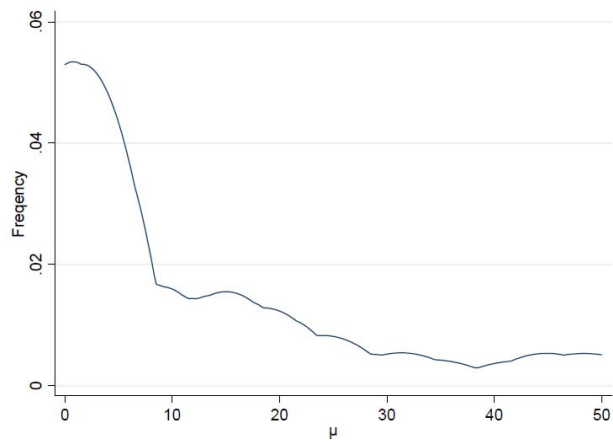


FIGURE 9: DISTRIBUTION OF ANSWER TO QUESTION ON SELFISHNESS

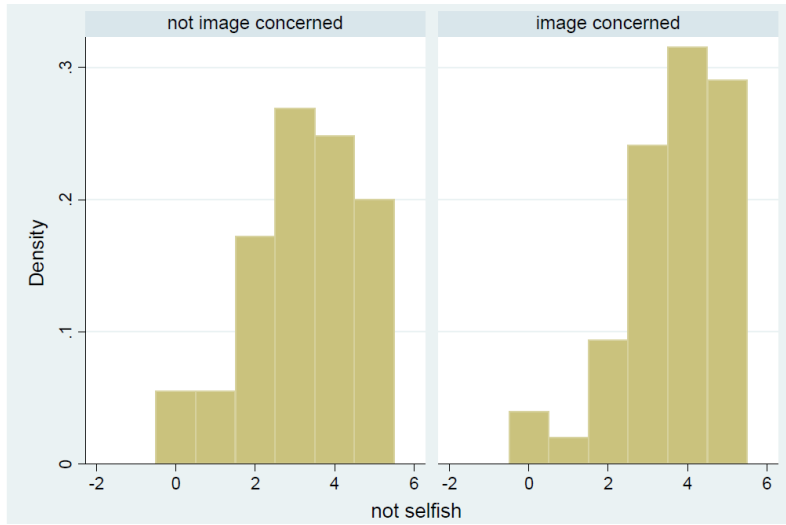
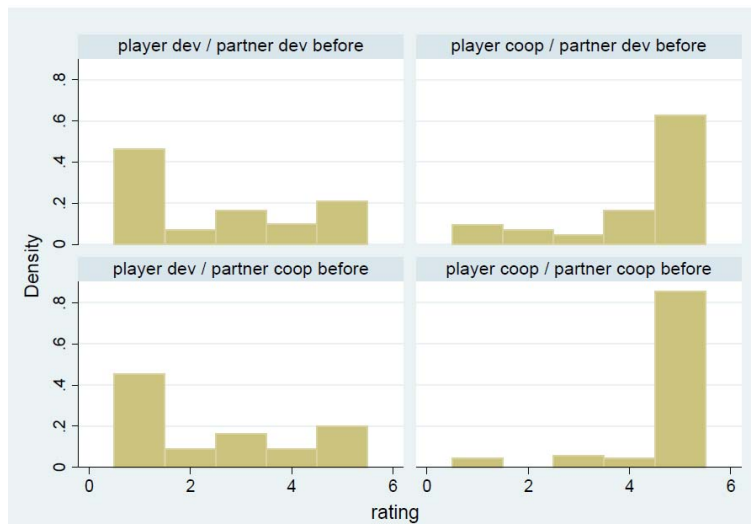


FIGURE 10: RATING OF BEHAVIOR BY OBSERVER DEPENDING ON PAST CHOICES OF PARTNER



8 Appendix A2: Illustrative model

We consider a simple model to clarify some interpretation of our results.

The dictator has two choices to make: the amount X he transfers to the lottery and the amount μ he bids to remain anonymous in case the lottery is a failure. We denote:

- $u(1)$ the utility of the dictator if the lottery is a success (and the recipient receives the 50 tokens), while $u(0)$ is the utility in case of a failure. We thus have that $u(1) - u(0)$ is an indicator of the level of altruism of the dictator.
- $-I$ is the disutility the dictator suffers if the failure of the lottery is revealed to the observer. It is proportional to the image concern of the individual.
- There is an increasing and concave cost function of giving to the lottery $c_1(X)$ and an increasing and concave cost function of bidding for anonymity $c_2(\mu)$. We assume these two costs are separable, corresponding to the idea that these two decisions are made sequentially. It is clear that this assumption guarantees that the choice of μ will be independent of X . We believe in any case that if this assumption was not satisfied, the effect of X on μ would be of second order.

The expected utility of the dictator if he chooses X and μ is given by:

$$(0.01X)u(1) + (1 - 0.01X) [u(0) + (1 - \mu)(-I) - c_2(\mu)] - c_1(X)$$

A sender with image concern I will therefore choose $\mu^*(I)$ such that

$$c_2'(\mu^*) = I$$

We note two things. First, the choice of μ is indeed an indicator of image concerns. Second, the choice of μ is independent of the choice of X , and incidentally of the value of $u(1) - u(0)$. **The experiment therefore does allow us to separate altruism from image concerns.**

In turn the choice of X in equilibrium will satisfy

$$c_1'(X^*) = 0.01 (u(1) - u(0)) - [(1 - \mu^*(I))(-I) - c_2(\mu^*(I))]$$

Naturally X^* is increasing in the generosity $(u(1) - u(0))$. Furthermore, by the envelope theorem, $[(1 - \mu^*(I))(-I) - c_2(\mu^*(I))]$ is decreasing in I , so that X^* increases in I . **More**

image concerned individuals will tend to invest more in the lottery to avoid having to pay for anonymity.

REFERENCES

- Algan, Y., Y. Benkler, M. F. Morell, and J. Hergueux (2013): "Cooperation in a Peer Production Economy Experimental Evidence from Wikipedia", Working Paper.
- Algan, Y., E. Henry, Y. Benkler, and J. Hergueux (2014): "Social Motives and the Organization of Production: Experimental Evidence from Open Source Software" Working Paper.
- Andreoni, J. and R. Petrie (2004): "Public goods experiments without confidentiality: a glimpse into fund-raising", *Journal of Public Economics*, 88, 1605-1623.
- Ariely, D., A. Bracha, and S. Meier (2009): "Doing good or doing well? Image motivation and monetary incentives in behaving prosocially", *The American Economic Review*, 99, 544-555.
- Benabou, R. and J. Tirole (2006): "Incentives and Prosocial Behavior", *The American Economic Review*, 96, 1652-1678.
- Benabou, R. and J. Tirole (2011): "Laws and norms," working paper.
- Bursztyn, L. and R. Jensen (2015): "How does peer pressure affect educational investments", *Quarterly Journal of Economics*, 1-40.
- Camerer, C. F. and E. Fehr (2004): "Measuring social norms and preferences using experimental games: A guide for social scientists, Foundations of Human Sociality."
- Carpenter, J. and C. K. Myers (2010): "Why volunteer? Evidence on the role of altruism, image, and incentives," *Journal of Public Economics*, 94, 911-920.
- Charness, G. and U. Gneezy (2008): "What's in a name? Anonymity and social distance in dictator and ultimatum games", *Journal of Economic Behavior and Organization*, 68, 29-35.
- Chaudhuri, A. (2010): "Sustaining cooperation in laboratory public goods experiments: a selective survey of the literature", *Experimental Economics*, 14, 47-83.
- Dal Bo, P. (2005): "Cooperation under the shadow of the future: experimental evidence from infinitely repeated games," *American Economic Review*, 95, 1591-1604.
- Dal Bo, P. and G. Fréchet (2011): "The Evolution of Cooperation in Infinitely Repeated Games: Experimental Evidence." *American Economic Review*, 101, 411-429.
- Dana, J., D. M. Cain, and R. M. Dawes (2006): "What you don't know won't hurt me: Costly (but quiet) exit in dictator games", *Organizational Behavior and Human Decision Processes*, 100, 193-201.
- Dana, J., R. A. Weber, and J. X. Kuang (2007): "Exploiting moral wiggle room: experiments demonstrating an illusory preference for fairness", *Economic Theory*, 33, 67-80.
- DellaVigna, S., J. A. List, and U. Malmendier (2012): "Testing for altruism and social pressure in charitable giving," *The Quarterly Journal of Economics*, 127, 1-56.

Dohmen, T., A. Falk, D. Huffman, U. Sunde, J. Schupp, and G. G. Wagner (2011): "Individual risk attitudes: measurement, determinants, and behavioral consequences", *Journal of the European Economic Association*, 9, 522-550.

Ekstrom, M. (2012): "Do watching eyes affect charitable giving? Evidence from a field experiment", *Experimental Economics*, 15, 530-546.

Ellingsen, T. and M. Johannesson (2008): "Pride and prejudice: the human side of incentive theory," *The American Economic Review*, 98, 990-1008.

Engel, C. (2010): "Dictator Games: A Meta Study, Preprints of the Max Planck Institute for Research on Collective Goods."

Fehr, E. and U. Fischbacher (2004): "Third-party punishment and social norms", *Evolution and Human Behavior*, 25, 63-87.

Fudenberg, D., D. G. Rand, and A. Dreber (2012): "Slow to Anger and Fast to Forgive: Cooperation in an Uncertain World", *American Economic Review*, 102, 720-749.

Glaeser, E., Laibson, D., Scheinkman, J.A. and Soutter, C.L. (2000). "Measuring trust", *Quarterly Journal of Economics*, 115, 811-46.

Lacetera, N. and M. Macis (2010): "Social image concerns and prosocial behavior: Field evidence from a nonlinear incentive scheme", *Journal of Economic Behavior and Organization*, 76, 225-237.

Mellstrom, C. and M. Johannesson (2008): "Crowding out in blood donation: was Titmuss right?", *Journal of the European Economic Association*, 6, 845-863.

Peysakhovich, A. and D. G. Rand (2013): "Habits of virtue: creating norms of cooperation and defection in the laboratory", forthcoming *Management Science*.

Rege, M. and K. Telle (2004): "The impact of social approval and framing on cooperation in public good situations", *Journal of Public Economics*, 88, 1625-1644.

Samek, A. S. and R. M. Sheremeta (2013): "Recognizing contributors: an experiment on public goods", *Experimental Economics*, 17, 673-690.

Sutter, M., P. Lindner and D. Platsch (2009): "Social norms, third-party observation and third-party reward", *working paper*.