Contribution to Special Fund and Norms

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Abstract

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1 Introduction

This study aims at highlighting whether individuals are willing to pay in order to increase the probability to punish evaders. To that purpose, our experiment designs the essential features of the voluntary income reporting and tax assessment system used in many countries. It should be emphasized that, from previous experiments, we know that risk aversion may come into play in such game, so that we also elicited our participants’ risk preferences using Dohmen, Falk, Huffman, Sunde, Schupp, and Wagner (2011)’s procedure. To analyze to what extent individuals are sensitive to inequity, and if this sensitivity affects both reported income decisions and the willingness to pay to increase the probability of punishment, we also elicited individual estimates of inequity aversion with the procedure of Blanco, Engelmann, and Normann (2011). Finally, we have adapted Krupka and Weber (2013) social norms elicitation procedure to further analyze decisions of our initial sample of subjects in the tax game.¹

The underlying idea is that honest taxpayers may be affected when they learn that their other group members do not share their degree of honesty. By contributing to the special fund, these individuals can simultaneously indicate their type (honest) and their disapproval. Such contributions may support honest taxpayers and stigmatize dishonest taxpayers. We assume that honest taxpayers should contribute to the special fund in order to uphold their norm of honesty. The absence of public goods in the game implies that the contribution cannot be justified by any monetary reward since in the absence of any counterpart to taxation there is no increase in the final payoff. Conversely, it is expensive because any voluntary contribution is deducted from the final payoff after payment of the potential penalty.

Suggesting that individual contributions may be the result of a desire to comply with social norms means that there are collectively recognized rules of conduct that prescribe socially acceptable behaviors in a given situation (e.g., López-Pérez, 2008).

In our experiment, this means that individuals may be willing to contribute to the funding if they perceive the situation inappropriate. Since individuals learn the average declaration of their other group members, this means that if individuals believe that this latter does not comply with social norms, they may be willing to contribute to the funding in order to increase the probability of punishment of individuals who do not comply with social norms. Explaining phenomena by appealing to the influence of social norms can be problematic because of the difficulties of precisely identifying and measuring norms. In particular, often what may or may not constitute a norm is based on intuition or casual empiricism. For a more objective approach toward identifying whether social norms are

¹Because the main purpose of our experiment concerns (i) individuals’ declaration, (ii) conditions that favor individuals’ financial participation to the increase in the probability to punish evaders, and (iii) the impact of the cost of punishment, the details of experimental designs regarding inequity aversion, risk preferences and social norms are reported, for exposition purposes, in Appendix A, B and C respectively.
relevant to our experimental environment, and whether they can explain individual contributions to the funding of the special fund, we adapt the experimental norms elicitation procedure recently introduced by Krupka and Weber (2013).

2 Experimental design

This study consisted of two separated experiments conducted from different subjects. The first one refers the declaration game while the second aims at eliciting an independent measure of social norms regarding the choices made in the first experiment.

2.1 Experiment 1 - Declaration game

We ran a pure declaration game, without redistribution and so without public goods, with fixed groups of 6 players who could not identify their other group members. At the beginning of each period, each participant is provided with a constant income of $X = 100$ points and have to pay a tax at a rate of $30\%$.\footnote{In order to isolate the effect of inequalities in taxes or declarations on declaration decisions, we made sure that all subjects are fiscally identical, this means that they had the same income and they faced the same tax parameters.} We set the fine rate in case of detected evasion at $\pi = 350\%$ (i.e., participants have to pay evaded taxes plus a penalty of $250\%$ of unpaid taxes in the case of an audit).\footnote{Parameters have been set such that a risk neutral subject maximized his expected utility if he declared his entire income. The condition $\pi \geq \frac{1}{\rho}$ is satisfied.} Audits are assumed to be random, perfect and without retro-action that occur with a fixed and announced probability equal to $\rho = 1/3$.\footnote{We used the same random sequence of audit to facilitate data comparisons between experimental sessions.}

At the time they make their decisions, participants have to determine the amount of income they will self-report to the tax authorities. They can choose to report any integer amount from 0 to 100 inclusive. At the end of each period, they are informed about whether they have been audited, their net payoff and the average income reported by the other members of their group. If the participant has an under-reported tax liability and is audited, then a fine is imposed. Then, a new period begins. This process is repeated over 20 periods, each representing a tax year. Participants are informed that they will be paid their after-tax earnings, obtained in 5 out of the 20 periods, at the end of the entire experiment. The randomly chosen periods are the same for all participants in the same experimental session. The earned points are converted into euros at the end of the experiment and the conversion rate used was $100\text{ points}=3.80\text{ euros}$.

Because groups are fixed, with the repetition of the game, reciprocal behaviors may appear, through a reaction to other group members’ level of declaration. When other group members declare on average more (respectively less) than an individual $i$, this may induce this latter to increase (respectively decrease) his future declaration (see Bazart and Bonein, 2014). Negative reciprocal behaviors may therefore undermine tax collection. To
break this vicious circle, at the end of the 10th reporting period, but before subjects learn if they were audited or not in this period, they had the opportunity to contribute 2 points to a special fund dedicated to fight against tax evasion.\footnote{It is noteworthy that at the beginning of the experiment, subjects are aware that a change may intervene after period 10 but they do not know what it is. They are only informed that some instructions will appear directly on their computer screen at the end of period 10, just before learning their net payoff for this period. This would help minimize the potential impact of audit at period 10 on the willingness of subjects to contribute to this fund.} When collective contributions reach the threshold of 6 points determined exogenously by the experimenters, then the administration is supposed to have enough additional funds to increase the audit probability of the group to $1/2$ until the end of the game.\footnote{By setting an audit probability equal to $1/2$, it remains optimal for a risk-neutral taxpayer to report his entire income.} Given that each subject may contribute 2 points, this means that the threshold is reached and the punishment effective if and only if at least half members of the group contribute. Conversely, if the threshold is not reached, contributors are reimbursed and the audit probability of the group remains unchanged. Note that this procedure is usual in the public good literature and known as the refund rule.\footnote{Isaac, Schmidtz, and Walker (1989) demonstrated that subjects contribute more when their contributions are returned in case of non provision by comparison to their decisions if contributions are lost.} Thus the contribution may lead to a collective punishment, which can be deterrent and costly only for future tax evaders. Once all group members have determined their contribution, they learn whether the audit probability is increased or not for the 10 remaining periods; then period 11 began. From period 11, the game restarts with an audit probability of $1/3$ or $1/2$ if the threshold of 6 points has been reached. Other tax policy parameters as well as composition of experimental groups remain unchanged.

2.2 Experiment 2 - Norm elicitation task

We conducted a second experiment, with different subjects, to elicit subjects’ perceptions of the appropriateness of contribution to the special fund in the declaration game. We adapt the experimental norms elicitation procedure introduced by Krupka and Weber (2013). As Krupka and Weber (2013), our focus is on injunctive social norms, i.e., collective perceptions, among members of a population, regarding the appropriateness of different behaviors like tax evasion and contribution to a special fund dedicated to the funding of an increase in the probability of punishment. Because in the declaration game the set of possible combinations for the declaration of individual $i$ and the average of declarations made by his other group members is too large to be implemented, here we have selected some representative situations of declarations. We have set 5 possible declarations for the individual $i$: 0, 25, 50, 75 and 100 experimental points and 5 possible average declaration for the other group members: 0, 25, 50, 75 and 100 experimental points. In sake of simplification, we use the declaration of a representative individual $j$ as a proxy of the average declaration of other group members in the declaration game experiment. It results 25 possible situations of declarations reported in Table 1.
Table 1: Situations in the norms elicitation experiment

<table>
<thead>
<tr>
<th>Situation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 - 100</td>
<td>75 - 100</td>
</tr>
<tr>
<td>100 - 75</td>
<td>75 - 75</td>
</tr>
<tr>
<td>100 - 50</td>
<td>75 - 50</td>
</tr>
<tr>
<td>100 - 25</td>
<td>75 - 25</td>
</tr>
<tr>
<td>100 - 0</td>
<td>75 - 0</td>
</tr>
</tbody>
</table>

Comparison of judgments made per column highlight the impact of the evolution in the gap of declarations, for a given declaration of individual $i$, on the appropriateness of the situation and the decision to contribute or not to the funding in such situation. We are also able, for a given differential in declarations, to analyze whether the level of declarations themselves impact the degree of appropriateness of the situation and contribution decisions.

For each one of these situations, we present respondents with a description of a situation (i.e., the declaration made by an individual $i$ and the one of the representative individual $j$) and the choice environments. This means that for each situation, they have to indicate to what extent the situation is socially appropriate or inappropriate and for each possible choices available to individual $i$ (i.e., contribution or non contribution), the extent to which actions are socially appropriate or inappropriate. By asking respondents to judge the social appropriateness of each action, we use a four point scale that ranges over “very socially inappropriate”, “somewhat socially inappropriate”, “somewhat socially appropriate”, to “very socially appropriate”, like Krupka and Weber (2013). Finally, to help respondents in their decision, the payoff resulting from declarations and contributions decisions are given. In order to not introduce risk concern with the audit probability whose perception made differ across respondents, we provide them the expected payoffs individual $i$ and the representative agent earn. For example, the expected payoffs individual $i$ is computed as follows:

$$u_i = (1 - \rho) (W - \theta X_i) + \rho (W - \theta X_i - (W - X_i) \theta \pi)$$

Finally, we provide respondents with incentives not to reveal their own personal preferences but instead to match the responses of others. Thus, respondents play a pure matching coordination game in which their goal is to anticipate the extent to which others will rate an action as socially appropriate or inappropriate, and to respond accordingly. 2 out of the 25 situations were randomly selected; and for each selected situation, one of the decision (i.e., appropriateness of the situation, the no-contribution or contribution choice) is again randomly selected. If the choice of the respondent matches with the modal choice of all participants in the room, he earns 3 euros.
2.3 Participants and procedure

All experiments were conducted at the LABEX-EM, University Rennes 1, using the software Z-TREE (Fischbacher, 2007). Participants were recruited by means of the ORSEE system (Greiner, 2015). For the declaration game experiment, 120 subjects participated; each session lasted 90 minutes and the average payoff was 16.65 euros, including a show-up of 5 euros. For the norm-elicitation task experiment, 121 subjects participated; each session lasted 45 minutes and subjects earn on average 8.90 euros, including a show-up fee of 6 euros. For both experiments, before the game started, participants were told that money earned in the experiment would depend on their decisions and the decisions of others. Instructions are read aloud and all participants were required to answer several control questions to ensure that they understood the experimental procedures. Experiment did not start until all participants answer correctly. At the end of the experiment, participants answer a short questionnaire to collect their socio-demographic characteristics.

3 Results

We start by presenting the data from the declaration game experiment to examine whether subjects contribute to the special fund. Next, we examine data from the norm-elicitation task experiment to analyze whether the level of declaration and the gap in declaration impact the norms of contributing to the special fund. Finally, we study whether the contributing decision in the declaration game experiment can be explained by the elicited norms in the norm-elicitation task experiment.

3.1 Results for Experiment 1

This subsection summarizes the main results of the declaration game experiment. Our first result deals with the proportion of individuals who contribute to the special fund. We find that 30% of subjects contribute to the special fund, and this result is robust across the experimental sessions.

Our starting hypothesis was that honest taxpayers should contribute to the special fund in order to support their norm of honesty. Our results are in line with our hypothesis: even if only 4 out of the 20 subjects are perfectly honest, 75% of fully honest subjects contribute. More generally, we observe that subjects who contribute declare on average more than those who do not contribute (80.52% vs. 62.85% respectively), and this is true in all experimental groups, except the group 6 were the difference between the average declaration of contributors and non-contributors is not significant (Mann-Whitney U test, $z = 0.231, p = 0.8174$), as we can see on Figure 1. Thus, a first explanation in the contribution decision refers to the level of declared income, and potentially, to the gap.

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8The experimental instructions are reproduced in the Supplementary materials.
between the declaration of a given individual and the average declaration of his other group members. Note that this has been already observed in Bazart and Bonein (2014) where tax evasion was shown to increase by negative reciprocity. Therefore, the special fund may well be seen as an alternative to the increase in tax evasion when honest taxpayers observe the evasion of their peers.

Figure 1: Average declaration by experimental group depending on the contribution decision

We examine these patterns using a probit analysis for the determinants of the contribution decisions. The explanatory variables can be grouped into two blocks. The first block includes the declaration of the subject \( i \) at period 10, the difference in declarations between the declaration of an individual \( i \) and the average declaration of his other group members \( (X_i - X_{-i}) \), by distinguishing as recommended by Fehr and Gächter (2000), between advantageous \( (X_i > X_{-i}) \) and disadvantageous inequalities \( (X_i < X_{-i}) \). Because individuals have at their disposal the past declarations, we test the existence of a “memory effect” by including the observed difference in declarations over the last 2 periods. We also include a dummy variable that accounts for audit in the previous period.\(^9\)

The second block deals with intrinsic characteristics: the individual characteristics in terms of risk aversion using data obtained in the dedicated experiment, the judgment expressed by taxpayers in the post experimental questionnaire regarding the tax system as well as the behavior of other taxpayers and finally, the beliefs of subjects regarding the contribution decisions of their other group members. The success of the contribution

\(^9\)When making their contribution decision, subjects do not know whether they are audited in the current period.
decision depends on the contribution decision of their other group members since any individual contribution is not sufficient to increase the audit probability. It follows that one can assume that the contribution decision of a taxpayer depends on his belief regarding the contribution decisions of his other group members.10 Finally, to control for the experimental conditions, we include fixed effects for the experimental sessions.

The results are reported in Table 2. Results show that the current declaration has a positive and significant impact on the contribution decision. As expected, those who contribute more than the average of declarations made by their other group members are more likely to contribute and it is a long lasting effect. Conversely, the disadvantageous difference in declarations has a negative impact on contribution decisions and this is a short lasting effect. Finally, and as expected, those who believe that their other group members will contribute will be more likely to contribute too.

Table 2: Regression analysis of contribution decision

<table>
<thead>
<tr>
<th>Dep. variable: Contribution</th>
<th>Estimates</th>
<th>Marginal effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declaration</td>
<td>0.016***</td>
<td>0.003***</td>
</tr>
<tr>
<td>Adv. Difference in declaration in $t - 1$</td>
<td>0.037***</td>
<td>0.006**</td>
</tr>
<tr>
<td>Adv. Difference in declaration in $t - 2$</td>
<td>0.030*</td>
<td>0.005**</td>
</tr>
<tr>
<td>Disadv. Difference in declaration in $t - 1$</td>
<td>-0.031***</td>
<td>-0.005***</td>
</tr>
<tr>
<td>Disadv. Difference in declaration in $t - 2$</td>
<td>0.014</td>
<td>0.002</td>
</tr>
<tr>
<td>Audit in $t - 1$</td>
<td>0.739</td>
<td>0.118*</td>
</tr>
<tr>
<td>Beliefs</td>
<td>0.865***</td>
<td>0.138***</td>
</tr>
<tr>
<td>Risk preferences</td>
<td>0.192</td>
<td>0.031</td>
</tr>
<tr>
<td>Constant</td>
<td>-12.332***</td>
<td>(4.364)</td>
</tr>
</tbody>
</table>

Session fixed-effects | Yes  
Socio-demographic controls | Yes  
Statistics | 120  
N |  
Pseudo R-square | 0.6342  
Log likelihood | -27.938701

Notes: ***, **, * denote statistical significance at the 1%, 5% or 10% level, respectively. Robust standard errors in parentheses, clustered at the group level. Socio-demographic controls include: age, gender (Female = 1) and field of study (Economics=1). Marginal effects are computed at the mean of the independent variables. For dummy variables it corresponds to the discrete change from the base level.

10 However, if taxpayers’ declared beliefs depend on their decisions, then elicited beliefs would be endogenous in our analysis. To address this potential endogeneity problem it would have been preferable to conduct a two-stage IV probit regression analysis. But because we have no instrument for the beliefs to conduct such analysis, we limit ourself to a probit regression. See Bicchieri and Xiao (2009) for a more detailed explanation.
3.2 Results for Experiment 2

This subsection presents the data from the norms-elicitation task experiment to examine whether the level of declarations as well as the gap between declarations influence the norms of contributing or not.

Fig. 2 shows the results of the norms-elicitation task experiment. We proceed like Krupka and Weber (2013); this means that we transform subjects’ appropriateness rating into numerical score using the following scale: A rating of “very socially inappropriate” got a score of −1, “somewhat socially inappropriate” a score of −1/3, “socially appropriate” a score of 1/3, “very socially appropriate” a score of 1. This scoring allows to attribute a score of −1 to the least appropriate rating and a score of 1 to the most appropriate rating. Scores of −1/3 and 1/3 for the two intermediate ratings are evenly spaced over the interval −1 to 1. The average social appropriateness ratings of the situation of declaration, the decision of contribution as well as the decision of no-contribution are depicted for each of the 25 situations, break down by the level of declaration of the individual i.

Figure 2: Average appropriateness ratings for the situation of declarations, the No Contribution and Contribution choices

![Graphs showing average appropriateness ratings for different declarations and contributions.](image)

Notes: Subjects’ appropriateness rating range from −1 for the least appropriate rating to 1 for the most appropriate rating.

We report the full distributions of appropriateness ratings in Appendix.
We first observe that, for a given declaration of the individual $i$, the social appropriateness rating of a situation is the highest in case of identical declarations between the individual $i$ and the representative individual $j$. Second, from the identical declarations between the two considered individuals, we note that, for a given declaration of the individual $i$, the social appropriateness rating of the situations decreases with the decrease in the declaration made by the representative individual $j$. Third, for declarations of the individual $i$ higher than 50, we observe exactly the same trend between the average rating of the social appropriateness of the situation and that of the No Contribution choice. This observation is strengthened by the computation of Spearman rank correlation coefficient ($\rho = 0.6274$, $p < 0.0001$). Conversely, we observe two opposing trends for the average rating of the situation and that of the Contribution choice when individual $i$ declares more than 50 ($\rho = -0.6191$, $p < 0.0001$). Given that a low average appropriateness rating for the situation means that such situation is very socially inappropriate, we naturally observe in this case that a contribution to the special fund dedicated to increase the audit probability appears as very socially appropriate. More generally, it is considered as socially appropriate to contribute for the individual $i$ if this latter declares more than the representative individual $j$.

We examine these patterns more formally using regression analyses to control for differences in observable characteristics of the subjects. We conduct ordered logit regressions of the normative ratings of the decision (i.e., no contribution or contribution) varying from $-1$ for “very socially inappropriate” to 1 for “very socially appropriate”. The independent variables include the declaration of the individual $i$, the declaration of the representative individual $j$ called “peer”, as well as their squared values and their interaction terms. The regressions also include control variables for subjects’ gender (1 if female), age and field of study (1 if economics). Table 3 reports both the estimates and the odds ratio for each regression. Odds ratio correspond to factor changes in the odds of rating an action as more socially appropriate, a factor change higher than 1 implying a positive effect on the odds whereas a factor change smaller than 1 implying a negative effect. The results confirm that normative ratings of the contribution decision are positively affected by the declaration of the individual $i$ at a decreasing rate. Conversely, normative ratings of the contribution decision are negatively affected by the declaration of the representative individual “Peer” at an increasing rate. Further, the higher is the level of declarations of both individuals, the lower is the normative rating for the contribution decision. Naturally, we find opposite results for the decision to not contribute.
Table 3: Regression analysis of normative ratings – ordered logistic regressions

<table>
<thead>
<tr>
<th></th>
<th>No contribution decision Estimates</th>
<th>Odds ratio</th>
<th>Contribution decision Estimates</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declaration</td>
<td>-0.0319***</td>
<td>0.9686***</td>
<td>0.0678***</td>
<td>1.0701***</td>
</tr>
<tr>
<td></td>
<td>(0.0062)</td>
<td>(0.0060)</td>
<td>(0.0071)</td>
<td>(0.0076)</td>
</tr>
<tr>
<td>Declaration^2</td>
<td>0.0001***</td>
<td>1.0001***</td>
<td>-0.0002***</td>
<td>0.9997***</td>
</tr>
<tr>
<td></td>
<td>(4.4e-05)</td>
<td>(4.0e-05)</td>
<td>(4.6e-05)</td>
<td>(4.5e-05)</td>
</tr>
<tr>
<td>Peer declaration</td>
<td>0.0319***</td>
<td>1.0323***</td>
<td>-0.0356***</td>
<td>0.9650***</td>
</tr>
<tr>
<td></td>
<td>(0.0043)</td>
<td>(0.0044)</td>
<td>(0.0044)</td>
<td>(0.0042)</td>
</tr>
<tr>
<td>Peer declaration^2</td>
<td>-0.0002***</td>
<td>0.9997***</td>
<td>0.0002***</td>
<td>1.0002***</td>
</tr>
<tr>
<td></td>
<td>(3.1e-05)</td>
<td>(3.0e-05)</td>
<td>(3.7e-05)</td>
<td>(3.7e-05)</td>
</tr>
<tr>
<td>Declaration × Peer declaration</td>
<td>0.0004***</td>
<td>1.0003***</td>
<td>-0.0005***</td>
<td>0.9995***</td>
</tr>
<tr>
<td></td>
<td>(7.0e-05)</td>
<td>(7.0e-05)</td>
<td>(8.4e-05)</td>
<td>(8.4e-05)</td>
</tr>
<tr>
<td>Declaration × Peer declaration^2</td>
<td>4.11e-09</td>
<td>1</td>
<td>-5.44e-09</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(6.21e-09)</td>
<td>(6.17e-09)</td>
<td>(6.00e-09)</td>
<td>(6.00e-09)</td>
</tr>
</tbody>
</table>

Socio-demographic controls: Yes

Statistics
Observations: 3025
Pseudo R^2: 0.1181
Wald χ^2: 389.22
Prob > χ^2: 0.000

Notes: ***, ***, * denote statistical significance at the 1%, 5% or 10% level, respectively. Robust standard errors in parentheses, clustered at the individual level. The dependent variable is the social appropriateness rating of the decision (i.e., no contribution or contribution) varying from -1 for “very socially inappropriate” to 1 for “very socially appropriate”. Socio-demographic controls include: age, gender (Female = 1) and field of study (Economics=1).

3.3 Social norms as an explanation in contribution or non contribution decisions

Finally, we explore how such elicited norms may explain the decision to contribute to the special fund. To embed our definition of social norms in a simple utility framework which allows us to estimate the concern that individuals have for norm compliance, relative to money, we follow the formalization of Krupka and Weber (2013). We assume that an individual cares about both the monetary payoff produced by the selected action, \( \pi(a_k) \), and the degree to which the action is collectively perceived as socially appropriate:

\[
u(a_k) = V(\pi(a_k)) + \gamma N(a_k)
\]  

The function \( V(\cdot) \) represents the value the individual places on the monetary payoff, that is assumed increasing in \( \pi(a_k) \). \( N(a_k) \) is an empirically measurable collective judgment that assigns to each action a degree of appropriateness or inappropriateness. Therefore, we assume that if the action \( a_k \) is viewed as socially appropriate, then \( N(a_k) > 0 \), while if there is joint recognition that this action is inappropriate or socially proscribed then \( N(a_k) < 0 \). Thus, \( N(a_k) \) identifies the degree to which a specific action, \( a_k \), is collectively perceived as one that should or should not be taken. Finally, the parameter \( \gamma \geq 0 \) represents the degree to which the individual cares about adhering to social norms. An individual entirely unconcerned with social norms (\( \gamma = 0 \)) will always select the payoff-maximizing action. On the other hand, as \( \gamma \) increases, an individual will derive greater
utility from selecting actions that are socially appropriate relative to the utility from those that are not. By asking respondents to judge the social appropriateness of each action, we elicit $N(a_k)$, on a four point scale that ranges over “very socially inappropriate”, “somewhat socially inappropriate”, “somewhat socially appropriate”, to “very socially appropriate”, like Krupka and Weber (2013). However, it is noteworthy that the 25 situations of declarations implemented in the norms-elicitation task experiment may differ from the situation of declarations subjects face in the declaration game experiment. To overcome this issue, we first estimate the normative ratings of the decision to contribute using an OLS regression with the same independent variables as those used in ???. From the estimates obtained, we derive the predicted values of the acceptability to contribute to get $N(a_k)$.

We estimate eq. 2 using a conditional (fixed-effects) logistic regression, in which the dependent variable is whether an action was selected and the independent variables are characteristics of the possible action choices, i.e., the monetary payoff of the individual and the rating of the social appropriateness of the decision. The rating of the social appropriateness corresponds, for each alternative, to the predicted value derived from the OLS regression. The coefficient associated to $N(a_k)$ provides an estimate of the weight on social appropriateness in eq. 2, $\gamma$. To estimate the weight placed on monetary payoffs, we impose in a first step a linear restriction on $V$ such that $V(\pi) = \beta \pi$.

We use conditional logit to estimate the two weights, $\beta$ and $\gamma$ (McFadden, 1974) and bootstrap standard errors for the coefficients. Results for eq. 2 are reported in Column 1 of Table 4. Looking at the monetary payoff subjects earn according to their decision, we observe that the $\beta$ coefficient is positive and significant, meaning that subjects care about their own payoff. Turning to norm compliance, the coefficient associated to the social appropriateness rating is positive and highly significant, implying that the estimated appropriateness rating $N(a_k)$ has a positive impact on the decision made. In addition, we observe that the magnitude of the coefficient $\gamma$ is large compared to the $\beta$ coefficient. The ratio $2\gamma / \beta$ measures the willingness to pay of subjects to comply with social norms. In our experiment, subjects are willing to pay 43.89 experimental points (i.e., 1.67 euros) to comply with social norms. Finally, we observe that the monetary payoff of the subjects has a positive impact at a decreasing rate (Column 2).

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12 Note that one may assume heterogenous preferences for norm compliance across subjects and so use a mixed logit model as 3 did. However, from our behavioral data, the quality of the mixed-logit model is not good and the standard deviation of norm compliance fails to be significant at conventional level. Consequently, we retain a conditional (fixed-effects) logistic regression, assuming homogenous preferences for both money and norm compliance across subjects.

13 See Krupka and Weber (2013) for a detailed explanation.
Finally, to illustrate how well the ratings of social appropriateness of the choice made explain the behaviors observed, from estimated parameters reported in Table 4, we compute the predicted frequencies of contribution to the special fund for each possible situation. These predicted frequencies and the true frequencies of contribution observed in the tax game experiment are depicted in Fig. 3. Figure 3 depict the predicted frequencies and the observed frequencies in the declaration game experiment for 5 intervals of the appropriateness rating of a situation.

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Notes: ***, **, * denote statistical significance at the 1%, 5% or 10% level, respectively.

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Table 4: Conditional (fixed-effects) logit estimation of choice determinants including social appropriateness ratings

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social appropriateness rating</td>
<td>1.2420**</td>
<td>1.1460**</td>
</tr>
<tr>
<td></td>
<td>(0.6187)</td>
<td>(0.5720)</td>
</tr>
<tr>
<td>Monetary payoff $i$</td>
<td>0.0566*</td>
<td>0.6493**</td>
</tr>
<tr>
<td></td>
<td>(0.0337)</td>
<td>(0.3296)</td>
</tr>
<tr>
<td>Monetary payoff $i^2$</td>
<td>-0.0064***</td>
<td>-0.0024</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0024)</td>
</tr>
</tbody>
</table>

Statistics

<table>
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<th>(1)</th>
<th>(2)</th>
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<td>Observations</td>
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<tr>
<td>Pseudo R-square</td>
<td>0.1103</td>
<td>0.1756</td>
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<tr>
<td>Prob &gt; $\chi^2$</td>
<td>0.0008</td>
<td>0.0000</td>
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<tr>
<td>Log-likelihood</td>
<td>-74.0056</td>
<td>-68.5687</td>
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</tbody>
</table>

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To this purpose, we use estimates from Column 2 but similar results are obtained with estimates obtained from Column 1.

One could represent the predicted frequencies and the observed frequencies in the declaration game experiment for each of the 25 possible situation but due to the limited number of observations for some situation it would be difficult to interpret the result. For instance, we have only one observation for the situation where individual $i$ declares 75 and the average of other declaration is equal to 100 and this individual contributes, which means that we have an observed frequency equal to 100%.
4 Conclusion

To be completed

References


A Appendix