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The Effects of Rewards on Tax Compliance Decisions[*]

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Abstract

We analyze how the redistribution of tax revenues influences tax compliance behavior by applying different reward mechanisms. In our experiment, subjects have to make two decisions. In the first stage, subjects decide on the contribution to a public good. In the second stage, subjects declare their income from the first stage for taxation. Our main results are threefold: First, from an aggregated perspective, rewards have a negative overall effect on tax compliance. Second, we observe that rewards affect the decision of taxpayers asymmetrically. In particular, rewards have either no effect (for those who are rewarded) or a negative effect (for those who are not rewarded) on tax compliance. Thus, if a high compliance rate of taxpayers is preferred, rewards should not be used by the tax authority. Third, we find an inverse u-shaped relationship between public good contribution and tax compliance. In particular, up to a certain level, tax compliance increases with subjects' own contributions to the public good. Above this level, however, tax compliance decreases with the public good contribution.

Keywords

tax evasion, tax compliance, redistribution of taxes, tax affectation, rewarding, public good, behavioral economics, experimental economics

JEL-Classification

C91, D14, H24

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1 Introduction

Initiated by the paper of Allingham and Sandmo (1972), tax morale and tax evasion is discussed in many empirical and theoretical studies. The objective of these studies is to analyze determinants of tax evasion to give politicians advice how tax evasion can be delaminated. For example, a higher audit probability of the tax authority or a higher penalty in case of a detected tax evasion leads individuals to declare their income more truthfully.[1] The influence of the tax rate on tax evasion behavior, however, is ambiguous as studies observe both a positive and a negative relationship.[2] In addition to these factors which have a direct influence on the monetary payoff of individuals, the literature has identified further determinants. For example, the level of tax evasion decreases if taxpayers participate in the decision process (see, for example, Weck-Hannemann and Pommerehne, 1989; Feld and Tyran, 2002) or if the tax system is perceived as fair by the taxpayers (see, for example Spicer and Becker, 1980; Fortin et al., 2007). Furthermore, individuals, who observe that other individuals declare their taxes truthfully, are more willing to comply with the tax laws (see Feld and Tyran, 2002). For detailed overviews on tax compliance determinants see Torgler (2002) and Hofmann et al. (2008).

The findings of the tax literature on tax labeling and tax earmarking suggest that tax evasion is also influenced by the reason how taxes are collected and how the tax revenue is used. More specifically, this strand of literature shows that the tax label and the explanation of the use of the tax revenue influence tax perception and tax acceptance. Hardisty et al. (2010) observe, for example, that the demand for airline tickets is higher when the surcharge for emitted carbon dioxide is labeled as a carbon offset than when it is labeled as a carbon tax. Blaufus and Möhlmann (2014) show that taxpayers are more averse to taxation with the label “tax” than with the label “transaction cost”. Sussman and Olivola (2011) observe in different surveys that individuals have a stronger preference to avoid tax-related costs than to avoid equivalent costs without any relation to taxes. Kallbekken et al. (2011) find that a Pigouvian tax to internalize negative external effects is more supported when it is labeled as a “fee” than

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[1] Studies with the focus on the influence of the audit probability on tax evasion are for example: Spicer and Thomas (1982); Beck et al. (1991); Alm et al. (1995); Maciejovsky et al. (2001); Torgler (2003); Cummings et al. (2005); Fortin et al. (2007); Gërxhani and Schram (2006). Papers analyzing the effect of the penalty are for example: Alm et al. (1995); Maciejovsky et al. (2001); Feld and Tyran (2002); Cummings et al. (2005).

[2] A positive relationship between tax rate and tax evasion observe for example: Friedland et al. (1978) and Collins and Plumlee (1991). In contrast, Beck et al. (1991) and Alm et al. (1995) observe a negative relationship.

as a “tax”. Eckel et al. (2005) observe in a laboratory experiment that the willingness to donate is lower if the decision problem is embedded in a tax context. Hundsdoerfer et al. (2013) find that individuals perceive an additional income tax burden as less negatively if it is labeled as “health insurance premium” or “education allowance” than as an “income tax”. Löfgren and Nordblom (2009) reports that the tax label “gasoline tax” leads to stronger reluctance than the tax label “CO_2 tax on gasoline”. Following the authors, the reason for this label effect is that the label gasoline tax is associated with high prices on gasoline leading to a negative attitude. In contrast, a CO_2 tax on gasoline is associated with an environmental tax, leading people to be less reluctant to paying the tax. Kallbekken and Aasen (2010) and Sælen and Kallbekken (2011) show that the deliberate explanation of the use of the tax revenue leads to higher tax acceptance.

In addition to these findings, the literature on tax evasion shows that the fairness of the tax regime–which can be seen as the perceived balance between taxes paid and public goods received and the perceived justice of procedures and consequences of norm breaking–has an important influence on tax compliance. In this context, Hofmann et al. (2008) distinguish between distributive, procedural, and retributive justice as types of fairness and report that an increase of one type of fairness leads to a higher willingness to comply with the tax laws in general. With respect to procedural justice–which concerns the process of tax collection and redistribution of taxes–it is shown, that fairness perception increases if information on the tax laws is provided (Wartick, 1994), if taxpayers are informed about the social benefits of tax payments (Holler et al., 2008), if taxpayers are treated fairly (Spicer and Becker, 1980; Fortin et al., 2007; Wenzel, 2006), if taxpayers can participate in democratic decisions such as the decision how the tax revenue is used (Weck-Hannemann and Pommerehne, 1989; Feld and Tyran, 2002; Torgler, 2005), or if the tax authority is perceived as trustworthy (Kirchler et al., 2006).

All these results indicate that the mechanism of redistributing tax revenue has an important influence on tax compliance. A possible conjecture is that if the use of the tax revenue is perceived as positive by the taxpayers, this leads them to comply with the tax laws. In contrast, for a negative perception, lower tax compliance is expected. If this influence on tax compliance behavior can be proven, this has important policy implications. By a deliberate reporting of the positive use of collected taxes, for example, the government is then able to reduce tax evasion leading to an increase of tax revenue. If this additional revenue is invested usefully, the social welfare can be increased as well.

To the best of our knowledge, there is no study systematically analyzing the effect of a positive and negative perception of the use of tax revenue on tax compliance. With our study, we will fill this gap. For this purpose, we conduct a laboratory experiment with a tax evasion setting. In each period, a subject has to make two decisions. In the first stage, a subject decides on her contribution to a public good. In the second stage, the income from the first stage is taxed. For this reason, each subject has to declare her income in this stage where an underreporting is penalized. To analyze the influence of the use of tax revenue on tax compliance behavior, the mechanism how the tax revenue is redistributed to the taxpayer is varied across our treatments by applying different reward mechanisms. In our Equal-Distribution Treatment which serves as the benchmark treatment, the collected tax revenue is redistributed equally to all subjects. In our Pro-Social-Behavior-Reward Treatment, the collected tax revenue is redistributed to the subjects with the highest contribution to the public good. In this treatment, it can be expected that subjects with a relative high public good contribution perceive the use of the tax revenue as more positive than subjects with a relative low contribution and therefore comply more honestly with the tax law. The reason is that these subjects are more able to identify themselves with the tax regime because their (pro-social) behavior is rewarded. In our Anti-Social-Behavior-Reward Treatment, the tax revenue is redistributed to the subjects with the lowest public good contribution and, thus, it can be expected that subjects with a relative low public good contribution reveal higher tax compliance rates as these subjects receive a reward for their (anti-social) behavior.

Our conjecture that individuals who are rewarded reveal higher tax compliance rates than subjects who are not rewarded can, for example, be explained by the “slippery slope” framework initiated by Kirchler et al. (2008) and further analyzed by, among others, Wahl et al. (2010), Kastlunger et al. (2013), and Kogler et al. (2013). This concept implies that both the power of the tax authority and the trust of taxpayers in the tax authority are positively related to the tax compliance rate. While an increase of the power of authority leads to higher enforced tax compliance, an increase of the trust in authority leads to higher voluntary tax compliance. In our setting, rewarding taxpayers for their behavior and, therefore, the higher identification level of these subjects with the tax regime can be seen as a higher level of trust in authority while the power of authority remains unchanged by the reward mechanism. Following the slippery slope concept, higher tax compliance rates are expected as trust in authority has increased for these subjects.

Our main results are threefold: First, from an aggregated perspective, redistribution mechanisms which treat taxpayers asymmetrically have a negative overall effect. In particular, we observe that tax compliance is significantly higher in the Equal-Distribution Treatment than in the Pro- or Anti- Social-Behavior-Reward-Treatment. Second, we observe that rewards have asymmetric effects on tax compliance decisions. On the one hand, if pro-social behavior is rewarded, the tax compliance rate of high contributors does not differ significantly compared to when no rewards exist. The tax compliance rate of low contributors, however, is significantly lower in the Pro-Social than in the Equal-Distribution Treatment. On the other hand, if anti-social behavior is rewarded, the tax compliance rate of high contributors is significantly lower compared to the Equal-Distribution Treatment. However, the tax compliance rate of low contributors does not differ significantly between the Anti-Social and Equal-Distribution Treatment. As a consequence, rewards have either no effect (for those who are rewarded) or a negative effect (for those who are not rewarded) on tax compliance behavior. Thus, rewards should not be used by the tax authority. Third, we find an inverse u-shaped relationship between public good contribution and tax compliance. In particular, up to a certain level, tax compliance increases with subject's own contribution to the public good. Above this level, however, tax compliance decreases with the public good contribution. This finding is observed both on an aggregated level across all treatments and in each of the three treatments.

The remainder of the paper is organized as follows: The design and the treatments of our experiment are explained in section 2. The optimal behavior of a risk-neutral and self-interested taxpayer is derived for our setting in section 3. The experimental protocol is given in section 4. The results are presented in our section 5 and discussed in section 6.

2 Experimental Design and Treatments

Our experiment consists of 10 independent periods. In each period, each subject i makes two decisions. In the first stage, each subject plays a standard public good game with $N-1$ other subjects[3] and in the second stage each subject has to declare her income from the first stage. At the beginning of the first stage, each subject is endowed with a fixed endowment e. The endowment can be invested either in a private good or in a public good. The return of the private good is denoted by c. The return of the public good depends on the contribution of all

3 The group allocation remains constant over all 10 periods. That means that a participant is confronted with the same subjects in the 10 periods.

players to this good. The total amount invested in the public good is multiplied by α which gives then the public good size. The public good is shared by all subjects equally. Therefore, each subject receives α/N for each unit invested in the public good. Player's *i* contribution to the public good is b_i (with $b \in N \,|\, 0 \leq b \leq e$) and, therefore, the amount invested in the private good is $e - b_i$. The total income from the first stage PG_i is then:

$$PG_i = (e - b_i) \cdot c + \frac{\alpha}{N} \cdot \sum_{i=1}^{N} b_i \tag{1}$$

In the second stage, every subject's task is to declare the income from the first stage (income from private and public good). For this purpose, a subject decides what share x_i of PG_i she wants to declare ($0 \leq x \leq 1$).[4] As the declared share is limited to 100%, the declared income $z_i = x_i \cdot PG_i$ can be lower than the true income, but not higher. Dependent on the declared income, the subject has to pay a tax with a tax rate *t*.

A tax declaration is audited with probability *p* which is exogenously given and identical for all subjects across all treatments. In case of an observed tax evasion, the subject has to pay a penalty which is *f* times the evaded tax. Three cases are possible: (1) no audit, (2) audit and no tax evasion is disclosed, and (3) audit and tax evasion is disclosed. The total payment T_i (including penalty) is in all three cases:

1. No audit: $T_i = t \cdot z_i$
2. Audit and no tax evasion: $T_i = t \cdot PG_i$
3. Audit and tax evasion: $T_i = t \cdot z_i + f \cdot t \cdot (PG_i - z_i) = t \cdot PG_i + (f - 1) \cdot t \cdot (PG_i - z_i)$

After the tax declaration decision, the tax revenue collected from all group members is redistributed to the group members. The redistribution mechanism differs across three treatments (within-subject design): Pro-Social-Behavior-Reward, Equal-Distribution, and Anti-Social-Behavior-Reward Treatment. A random draw determines for each period, which of the three treatments occurs. The outcome of this draw is unknown before subjects decide on the contribution to the public good (stage 1), but is known before reporting their income (stage 2). The three treatments are as follows:

[4] Allowed are all integer numbers between 0 and 100 (in percentage points).

1. *Equal-Distribution Treatment:* Tax revenue is redistributed to all group members equally. So each group member receives $R_i = \frac{1}{N} \cdot t \cdot \sum_{i=1}^{N} z_i$ from redistribution.

2. *Pro-Social-Behavior-Reward Treatment (Pro-Social Treatment):* The three group members with the highest contribution to the public good share the tax revenue equally. These group members receive $R_i = \frac{1}{3} \cdot t \cdot \sum_{i=1}^{N} z_i$ from redistribution. The other group members receive nothing ($R_i = 0$). In this treatment, the group members with the highest contribution are rewarded for their pro-social behavior in the first stage.

3. *Anti-Social-Behavior-Reward Treatment (Anti-Social Treatment):* The three group members with the lowest contribution to the public good share the tax revenue equally. These group members receive $R_i = \frac{1}{3} \cdot t \cdot \sum_{i=1}^{N} z_i$ from redistribution. The other group members receive nothing ($R_i = 0$).[5] In this treatment, the group members with the lowest contribution are rewarded for their anti-social behavior in the first stage.

Consequently, the total payoff π_i depends on the income from the Public Good Game (PG_i), the tax burden and penalty (T_i) as well as the amount of redistribution (R_i). Thus, the total payoff π_i is determined in each period as follows:

$$\pi_i = PG_i - T_i + R_i \qquad (2)$$

3 Optimal Behavior of Risk-Neutral and Self-Interested Individuals

In the following, the optimal contribution and declaration decision is derived when 1) an optimization over stage 1 and 2 (section 3.1) or 2) the concept of backward induction (section 3.2) is used. We assume that each subject is risk neutral and only self-interested (no social preferences such as inequity aversion or reciprocity).

[5] If the redistribution of the tax revenue is not unambiguous in the Pro- or Anti-Social Treatment (since some subjects contributed the same amount to the public good), a random draw decides which subjects gain from redistribution.

3.1 Optimization over Stage 1 and 2

According to equation (2), we assume that each subject maximizes the following (expected) payoff function π_i.

$$\begin{aligned}\pi_i &= PG_i - T_i + R_i \\ &= (e-b_i)\cdot c + \frac{\alpha}{N}\cdot\sum_{i=1}^{N} b_i \\ &\quad - t\cdot z_i - p\cdot f\cdot t\cdot\left((e-b_i)\cdot c + \frac{\alpha}{N}\cdot\sum_{i=1}^{N} b_i - z_i\right) \\ &\quad + t\cdot\sum_{i=1}^{N} z_i\cdot\left(\frac{1}{3}\cdot\delta_{\text{Pro-Social}} + \frac{1}{N}\cdot\delta_{\text{Equal}} + \frac{1}{3}\cdot\delta_{\text{Anti-Social}}\right)\end{aligned} \tag{3}$$

where δ measures the probability that a subject benefits from tax redistribution in the three treatments. Each treatment occurs with probability $\gamma \in [0,1]$. Since all subjects benefit from the tax redistribution in the Equal-Distribution Treatment, the probability to benefit is γ_{Equal} in this treatment. In the other two treatments, whether to benefit or not from the tax redistribution depends on the decisions of all players. In the following $\varphi \in [0,1]$ reflects the probability that a subject benefits from redistribution given that she is in the Pro- or Anti-Social Treatment. The probability that a player benefits in, for example, the Pro-Social Treatment is therefore: $\delta_{\text{Pro-Social}} = \gamma_{\text{Pro-Social}} \cdot \varphi_{\text{Pro-Social}}$. Notice that we do not assume that φ is identical in both treatments since the probability is, for example, lower in the Pro- than in the Anti-Social Treatment for subjects who are more selfish than others. The (expected) profit function is then:

$$\begin{aligned}\pi_i &= (e-b_i)\cdot c + \frac{\alpha}{N}\cdot\sum_{i=1}^{N} b_i \\ &\quad - t\cdot z_i \\ &\quad - p\cdot f\cdot t\cdot\left((e-b_i)\cdot c + \frac{\alpha}{N}\cdot\sum_{i=1}^{N} b_i - z_i\right) \\ &\quad + t\cdot\sum_{i=1}^{N} z_i\cdot\left(\frac{1}{3}\cdot\gamma_{\text{Pro-Social}}\cdot\varphi_{\text{Pro-Social}} + \frac{1}{N}\cdot\gamma_{\text{Equal}} + \frac{1}{3}\cdot\gamma_{\text{Anti-Social}}\cdot\varphi_{\text{Anti-Social}}\right)\end{aligned} \tag{4}$$

Since $\varphi_{\text{Pro-Social}}$ and $\varphi_{\text{Anti-Social}}$ cannot be greater than 1, the following inequality holds:

$$\frac{1}{3}\cdot\gamma_{\text{Pro-Social}}\cdot\varphi_{\text{Pro-Social}} + \frac{1}{N}\cdot\gamma_{\text{Equal}} + \frac{1}{3}\cdot\gamma_{\text{Anti-Social}}\cdot\varphi_{\text{Anti-Social}} \le \frac{1}{3}\cdot\gamma_{\text{Pro-Social}} + \frac{1}{N}\cdot\gamma_{\text{Equal}} + \frac{1}{3}\cdot\gamma_{\text{Anti-Social}} \tag{5}$$

Each individual maximizes her payoff over b_i and z_i. The FOC are as follows:

$$\frac{\partial \pi_i}{\partial b_i} = \left(\frac{\alpha}{N} - c\right) \cdot \left(1 - p \cdot f \cdot t\right) \tag{6}$$

As long as $\left(\frac{\alpha}{N} - c\right) < 0$ and $p \cdot f \cdot t < 1$, subjects will not contribute to the public good since equation (6) is less than zero in this case.

$$\begin{aligned} \frac{\partial \pi_i}{\partial z_i} &= -t + p \cdot f \cdot t + t \cdot \left(\frac{1}{3} \cdot \gamma_{\text{Pro-Social}} \cdot \varphi_{\text{Pro-Social}} + \frac{1}{N} \cdot \gamma_{\text{Equal}} + \frac{1}{3} \cdot \gamma_{\text{Anti-Social}} \cdot \varphi_{\text{Anti-Social}}\right) \\ &= t \cdot \left(p \cdot f + \frac{1}{3} \cdot \gamma_{\text{Pro-Social}} \cdot \varphi_{\text{Pro-Social}} + \frac{1}{N} \cdot \gamma_{\text{Equal}} + \frac{1}{3} \cdot \gamma_{\text{Anti-Social}} \cdot \varphi_{\text{Anti-Social}} - 1\right) \end{aligned} \tag{7}$$

As long as $p \cdot f + \frac{1}{3} \cdot \gamma_{\text{Pro-Social}} + \frac{1}{N} \cdot \gamma_{\text{Equal}} + \frac{1}{3} \cdot \gamma_{\text{Anti-Social}} < 1$, subjects will not declare any income since equation (7) is less than zero in this case. Notice that this result is independent of $\varphi_{\text{Pro-Social}}$ or $\varphi_{\text{Anti-Social}}$.

In the following, the socially optimal solution is derived. The total profit of all subjects is

$$\Pi = \sum_{i=1}^{N} \pi_i \tag{8}$$

As we assume that all subjects are identical, the profits of all subjects are identical. Therefore, the total profit can be written as:

$$\Pi = N \cdot \pi \tag{9}$$

Plugging equation (3) into (9), leads to (notice that $N \cdot b_i = \sum_{i=1}^{N} b_i$, $N \cdot z_i = \sum_{i=1}^{N} z_i$, and that the tax revenue is redistributed to the subjects in each treatment):

$$\Pi = \left(N \cdot e - \sum_{i=1}^{N} b_i \right) \cdot c + \alpha \cdot \sum_{i=1}^{N} b_i$$
$$- t \cdot \sum_{i=1}^{N} z_i$$
$$- p \cdot f \cdot t \cdot \left(\left(N \cdot e - \sum_{i=1}^{N} b_i \right) \cdot c + \alpha \cdot \sum_{i=1}^{N} b_i - \sum_{i=1}^{N} z_i \right) \quad (10)$$
$$+ t \cdot \sum_{i=1}^{N} z_i$$

The FOC are:

$$\frac{\partial \Pi}{\partial \sum b_i} = -c + \alpha - p \cdot f \cdot t \cdot (-c + \alpha)$$
$$= (\alpha - c) \cdot (1 - p \cdot f \cdot t) \quad (11)$$

As long as $(\alpha - c) > 0$ and $p \cdot f \cdot t < 1$, the efficient solution is that all subjects invest their total endowment in the public good since (11) is greater than zero in this case.

$$\frac{\partial \Pi}{\partial \sum z_i} = p \cdot f \cdot t \quad (12)$$

Equation (12) is always greater than zero and, therefore, the efficient solution is that all income is declared. The reason is that the penalty (which is wasted in our setting) can be avoided.

3.2 Backward Induction

In addition, we derive the optimal contribution and declaration decision under backward induction. First, we assume that the subject is either in the Pro- or in the Anti-Social Treatment. In this case, the profit function is:

$$\pi_i = (e - b_i) \cdot c + \frac{\alpha}{N} \cdot \sum_{i=1}^{N} b_i$$
$$- t \cdot z_i$$
$$- p \cdot f \cdot t \cdot \left((e - b_i) \cdot c + \frac{\alpha}{N} \cdot \sum_{i=1}^{N} b_i - z_i \right) \quad (13)$$
$$+ \varphi_{\text{Pro-Social/Anti-Social}} \cdot t \cdot \frac{1}{3} \cdot \sum_{i=1}^{N} z_i$$

The FOC is:

$$\begin{aligned}\frac{\partial \pi_i}{\partial z_i} &= -t + p \cdot f \cdot t + \varphi_{\text{Pro-Social/Anti-Social}} \cdot \frac{1}{3} \cdot t \\ &= t \cdot \left(p \cdot f - 1 + \varphi_{\text{Pro-Social/Anti-Social}} \cdot \frac{1}{3} \right)\end{aligned} \tag{14}$$

As long as $p \cdot f + \frac{1}{3} < 1$, the optimal solution is to declare zero income. Since $\varphi_{\text{Pro-Social/Anti-Social}}$ is always less or equal to one, this holds independent of the true $\varphi_{\text{Pro-Social/Anti-Social}}$.

Second, we assume that the subject is in the Equal-Distribution Treatment. The profit function is then:

$$\begin{aligned}\pi_i = &\left(e - b_i\right) \cdot c + \frac{\alpha}{N} \cdot \sum_{i=1}^{N} b_i \\ &- t \cdot z_i \\ &- p \cdot f \cdot t \cdot \left(\left(e - b_i\right) \cdot c + \frac{\alpha}{N} \cdot \sum_{i=1}^{N} b_i - z_i \right) \\ &+ t \cdot \frac{1}{N} \cdot \sum_{i=1}^{N} z_i\end{aligned} \tag{15}$$

The FOC is:

$$\begin{aligned}\frac{\partial \pi_i}{\partial z_i} &= -t + p \cdot f \cdot t + \frac{1}{N} \cdot t \\ &= t \cdot \left(p \cdot f - 1 + \frac{1}{N} \right)\end{aligned} \tag{16}$$

As long as $p \cdot f + \frac{1}{N} < 1$, the optimal solution is to declare no income.

Given that all these conditions are satisfied, each subject will not declare any income in the second stage. Therefore, the tax revenue is zero. Consequently, the solution for the first stage is straight forward: individuals will not contribute to the public good.

As the penalty is wasted in our setting, the efficient solution from a social perspective is that all income is declared in the second stage (analogously to the procedure in section 3.1). Thus no penalty occurs in the first stage and therefore the total profit of all individuals (given by equation (10)) simplifies to

$$\Pi = \left(N \cdot e - \sum_{i=1}^{N} b_i \right) \cdot c + \alpha \cdot \sum_{i=1}^{N} b_i \tag{17}$$

The FOC is then:

$$\frac{\partial \Pi}{\partial \sum b_i} = -c + \alpha \tag{18}$$

As long as $\alpha - c > 0$, the efficient solution is that all subjects invest their total endowment in the public good in the first stage.

3.3 Parameter Specification

With respect to the specification of our variables, we use the following parameters: $p = 0.3$, $f = 2$, $t = 0.5$, $N = 6$, $c = 1$, $\alpha = 3$, and $\gamma_{\text{Pro-Social}} = \gamma_{\text{Equal}} = \gamma_{\text{Anti-Social}} = \frac{1}{3}$. Under this parameter constellation, all above-mentioned inequalities are satisfied and, therefore, a risk-neutral and self-interested individual will not contribute to the public good in the first stage and will not declare any income in the second stage. This holds irrespective of whether the backward induction approach or an optimization over stage 1 and 2 is used. Furthermore, the tax payment (stage 2) and the redistribution of taxes do not alter the standard conflict in public good games between individual and collective rational behavior. Thus, even if the consequences of stage 2 are taken into account, (1) the collective rational behavior is that all individuals contribute their total endowment to the public good and (2) the individual rational behavior is that each individual contributes nothing to the public good.

4 Experimental Protocol

The experiment was conducted at the computerized experimental laboratory of the Leibniz University Hannover (LLEW). 126 subjects (59 females and 67 males) participated in our experiment. Table 1 presents descriptive statistics for some individual characteristics of our subjects from a post-experimental questionnaire. As each group consists of 6 group members, we have 21 independent groups in total. Each group performs decisions in 10 independent periods and, therefore, we have observations from 210 periods in total. With respect to the treatment realization, we observe that in 77, 72, and 61 periods the Equal-Distribution, Pro-Social-Behavior-Reward, and Anti-Social-Behavior-Pro-Social Treatment was applied, respectively. By using a binominal test, we did not find that the realized frequency differs significantly from the probability of 1/3. Each session took approximately 90 minutes. The experimental software was programmed with z-Tree (Fischbacher, 2007). For reasons of simplification, we used Lab-points as currency units where 1 Lab-points exactly corresponds to 7 euro-cent.

To avoid income effects and strategies to hedge the risk across all periods, only one of the 10 periods is chosen randomly by the computer software. The payoff earned in this period is paid in cash immediately after the experiment. Although we use a very simple setting, each participant receives a pocket calculator and a computerized “what-if”-calculator for their own calculations. The latter allows subjects to automatically calculate their after-tax income (for the case with and without an audit) in the second stage.

Table 1: Descriptive statistics for individual characteristics

	frequency	**mean**	**median**	**standard deviation**
Female	46.83%			
economics major	30.95%			
bachelor’ degree	79.37%			
Age		23.96	23.00	5.58
risk attitude		4.54	4.00	2.49
income (in Euro)		294.11	250.00	377.51
no. of semesters studied		4.90	4.00	3.18

Note: “Economics major” (“bachelor’s degree”) denotes whether a subject studies economics or management (in a bachelor’s degree program). “Risk Attitude” gives subject’s self-reported willingness to take risk (measured on an 11-point scale where 0 = not willing to take risk and 10 = highly willing to take risk). “Income” is the monthly income after fixed cost.

5 Results

5.1 Contribution to Public Good

Table 2 gives descriptive statistics for the contribution to the public good. On average, each subject contributed half of her endowment to the public good. As the information of which treatment applies in each round is provided after an individual decides on the public good provision, no differences between the three treatments are expected. Indeed, we find no economically and statistically significant differences (all two-sided *p*-values of Mann-Whitney U tests are above the 10%-level of confidence). In line with the observations of the experimental literature on public goods, we find a negative relationship between public good provision and period. Especially, in the last period, we observe a sharp decrease of contribution (“last round effect”).

Table 2: Contribution to the public good

	all treatments	Pro-Social Treatment	Equal-Distribution Treatment	Anti-Social Treatment
Mean	50.05	48.08	51.10	51.05
Median	50.00	50.00	50.00	50.00
standard deviation	38.75	38.70	38.75	38.82
Minimum	0	0	0	0
Maximum	100	100	100	100
no. of observations	1,260	432	462	366

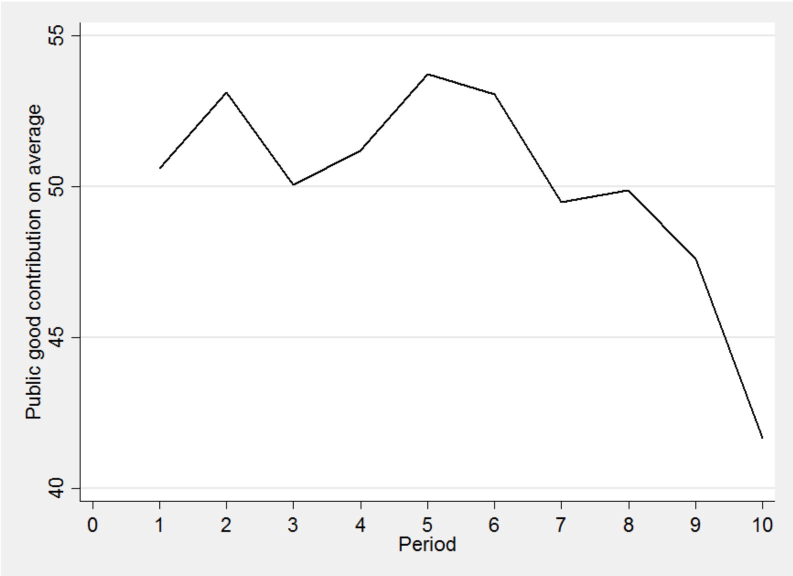

Figure 1: Public good contribution on average over all treatments over time

5.2 Tax Compliance Behavior

First, we analyze the data on an aggregated level. As a higher declared share of income in the second stage corresponds to a higher compliance with the tax law, we use the declared share of income as a measure for tax compliance. Table 3 depicts descriptive statistics for our tax compliance measure separated for each treatment. We observe that the declared share of income is highest in the Equal-Distribution Treatment (63.87%) and lowest in the Anti-Social Treatment (55.80%). By using the Mann-Whitney U test, we find that the difference between the Pro-Social (Anti-Social) and the Equal-Distribution Treatment is statistically significant at a 10%-level (1%-level) with a p-value of 0.0682 (0.0017). The difference between the Pro-Social and the Anti-Social Treatment is not significant. As a consequence, on an aggregated level, we observe the highest tax compliance rate in the Equal-Distribution Treatment and no different decision pattern between both treatments with rewards for pro-social and anti-social behavior.

Table 3: Declared share of income (in % of actual income)–aggregated level

	Pro-Social Treatment	**Equal-Distribution Treatment**	**Anti-Social Treatment**
Mean	59.16	63.87	55.80
Median	75.00	80.00	72.50
standard deviation	40.11	39.09	40.78
Minimum	0	0	0
Maximum	100	100	100
no. of observations	432	462	366

Second, we will split our data in two groups (high and low contributors) to analyze the treatment effects in more detail. As the mean and median contribution to the public good are approximately 50 Lab-Points (see table 2), we use this threshold for splitting. In particular, a subject who contributed at least (less than) 50 Lab-Points to the public good in one period is categorized as high (low) contributor in this period. Table 4 presents descriptive statistics for the declared share of income for each group and treatment and figure 2 depicts the mean values. The p-value resulting from a Mann-Whitney U test comparing the decision behavior of both groups within each treatment is presented in the last row of table 4. As a result, we observe that the high contributors declare a significant higher share of their actual income than the low contributors in the Pro-Social and Equal-Distribution Treatment. In the Anti-Social Treatment, however, we observe no significant difference between both groups.

Comparing the treatments within each group of contributors, we observe that the low contributors are more compliant with the tax law in the Equal-Distribution and in the Anti-Social Treatment than in the Pro-Social Treatment. The differences between the Pro-Social and the Equal-Distribution as well as the Anti-Social Treatment are significant at least at a 5%-level ($p = 0.0069$ and $p = 0.0455$, respectively). The difference between the Equal-Distribution and the Anti-Social Treatment is not statistically significant ($p = 0.4559$). In contrast, the high contributors are more tax compliant in the Pro-Social and Equal-Distribution Treatment. Now, we observe no significant difference between the Pro-Social and Equal-Distribution Treatment ($p = 0.7975$). However, the differences between the Anti-Social and the Pro-Social as well as the Equal-Distribution Treatment are significant at a 0.1%-level ($p = 0.0003$ and $p = 0.0005$, respectively). To summarize: (1) Tax compliance rate of low contributors is lowest in the treatment in which pro-social behavior is rewarded. If anti-social behavior is rewarded, no difference occurs compared to the Equal-Distribution Treatment. (2) Tax compliance rate of high contributors is lowest in the treatment in which anti-social behavior is rewarded. If pro-social behavior is rewarded, no difference occurs compared to the Equal-Distribution Treatment.

Table 4: Declared share of income (in % of actual income)–split data

	Pro-Social Treatment		**Equal-Distribution Treatment**		**Anti-Social Treatment**	
public good contribution	**< 50**	**>= 50**	**< 50**	**>= 50**	**< 50**	**>= 50**
Mean	49.12	68.66	59.98	67.22	58.22	53.58
Median	50.50	87.50	75.00	82.50	75.00	65.00
standard deviation	40.51	37.41	40.43	37.66	39.69	41.73
Minimum	0	0	0	0	0	0
Maximum	100	100	100	100	100	100
no. of observations	210	222	214	248	175	191
MWU test	p < 0.0001		p = 0.0173		p = 0.5168	

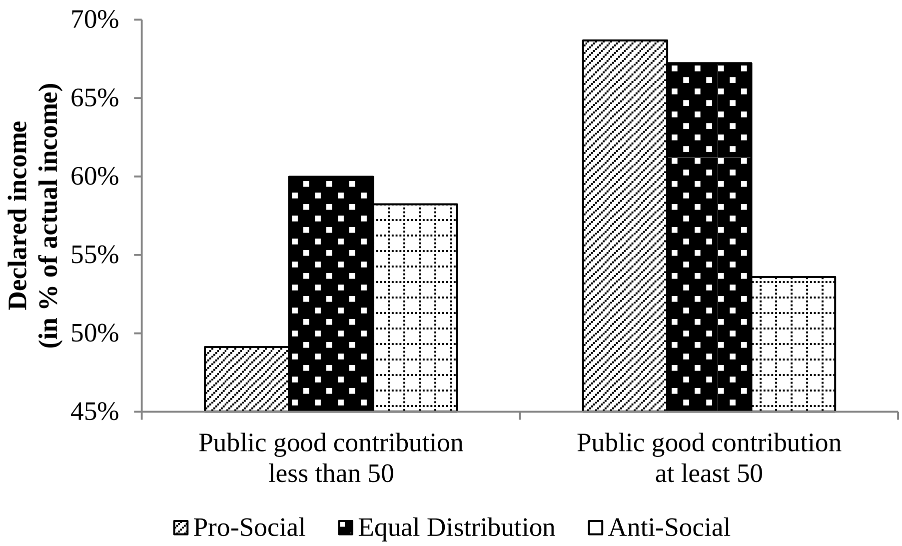

Figure 2: Declared share of income (in % of actual income) on average–split data

In addition to the descriptive statistics, we run regressions with the declared share of income as the dependent variable. As the variable is between 0 and 100% and, thus, we have left- and right-censored observations, we use Tobit regressions in the following analyses. First, we analyze how public good contribution and tax compliance behavior interact. In our model 1, we therefore regress on the contribution of an individual to the public good ("PG contribution"). The results are displayed in table 5 (standard errors in parentheses). We observe a significant positive relationship between public good provision and declared income, i.e., the higher the public good provision of an individual was in the first stage, the more tax compliant is this individual in the second stage.

In our model 2, we further include the variable “PG contribution squared” to analyze whether the relationship between public good contribution and tax compliance is linear or quadratic. We observe that both “PG contribution” and “PG contribution squared” are highly significant. The negative coefficient of the latter indicates that there exists an inverse u-shaped relationship between contribution and tax compliance. This means that, first, tax compliance increases with the contribution to the public good up to a certain level. But, second, tax compliance decreases for contributions above this level. To illustrate this relationship, figure 3 depicts the quadratic function which fits the observations of all our treatments. The grey area around the function is the 95% confidence interval. Figure 4 gives the quadratic function for each of the three treatments.

To control for game specific variables, we ran two more regressions (models 3 and 4) in which the following variables were included further: “last period redistribution participation” (1 if a subject participated in the redistribution of the tax revenue in the previous period, 0 otherwise), “last period audit” (1 if a subject was audited in the previous period, 0 otherwise), “own contribution over mean” (1 if the public good contribution of an individual was higher than the average public good contribution of the other five group members), “period” (gives the current period in the experiment). To control for individual characteristics, we ran two more regressions (models 5 and 6). Here we also include the following variables: “age”, “gender” (female = 0, male = 1), “economics major” (1 if the subject studies economics or management, 0 otherwise), “degree” (1 if the subject studies in a bachelor’s degree program, 0 otherwise), “number of semesters”, “risk attitude” (gives subject’s self-reported willingness to take risk, measured on an 11-point scale where 0 = not willing to take risk and 10 = highly willing to take risk), “income” (monthly income after fixed cost), and “what-if-calculations” (number of “what-if”-calculations, i.e., how often a subject used the computerized “what-if”-calculator provided in the second stage for own calculations).

If we include these variables, the statistically significant linear relationship between public good contribution and tax compliance disappears. The quadratic relationship, however, is still highly significant (models 4 and 6). With respect to the game specific variables, we observe that only the variable “last period audit” has a significant influence on our dependent variable.

In particular, individuals are less tax compliant if they were audited in the previous period.[6] Regarding the individual characteristics, we observe that only "age", "economics major", "risk attitude", and "income" have a significant influence in both models 5 and 6. In contrast to age where a positive coefficient is observed, the coefficients of the other three variables are all negative. This means, for example, that an individual who states that she is more willing to take risk or who has a higher monthly income, is less tax compliant.

To analyze whether the quadratic relationship between public good contribution and tax compliance occurs not only on an aggregated level, we ran further regressions separate for each treatment. The results are presented in table 6 (standard errors in parentheses). In all models, we observe a highly significant quadratic relationship. The only exemption occurs in model 15 (Anti-Social Treatment when all variables are considered). Here, the signs of the coefficients of "PG contribution" and "PG contribution squared" are identical, but the coefficients are not significant anymore. In all other models, however, we find the same relationship as we observed in table 5. As a consequence, we conclude that the relationship between public good contribution and tax compliance is inverse u-shaped both on an aggregated level and in each of the three treatments. The influence of the game specific and individual specific variables does not differ systematically to the effects observed in table 6.

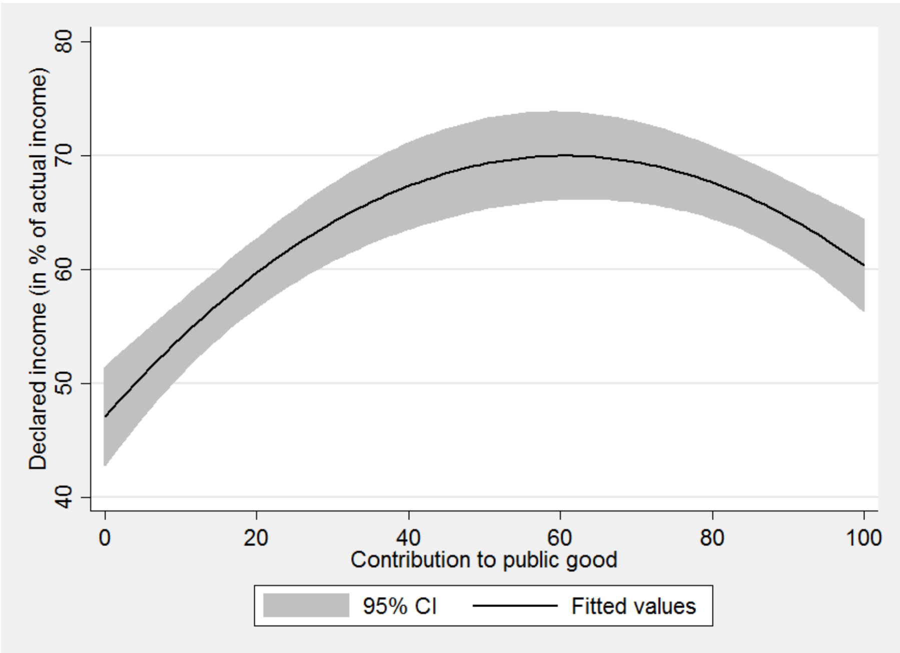

Figure 3: Relationship between public good contribution and tax compliance overall treatments

6 This result is in line with the "bomb crater effect" first observed by Mittone (2006) and further analyzed by, for example, Maciejovsky et al. (2007) and Kastlunger et al. (2009) which describes the tendency of subjects to decrease their tax compliance rates immediately after they were audited.

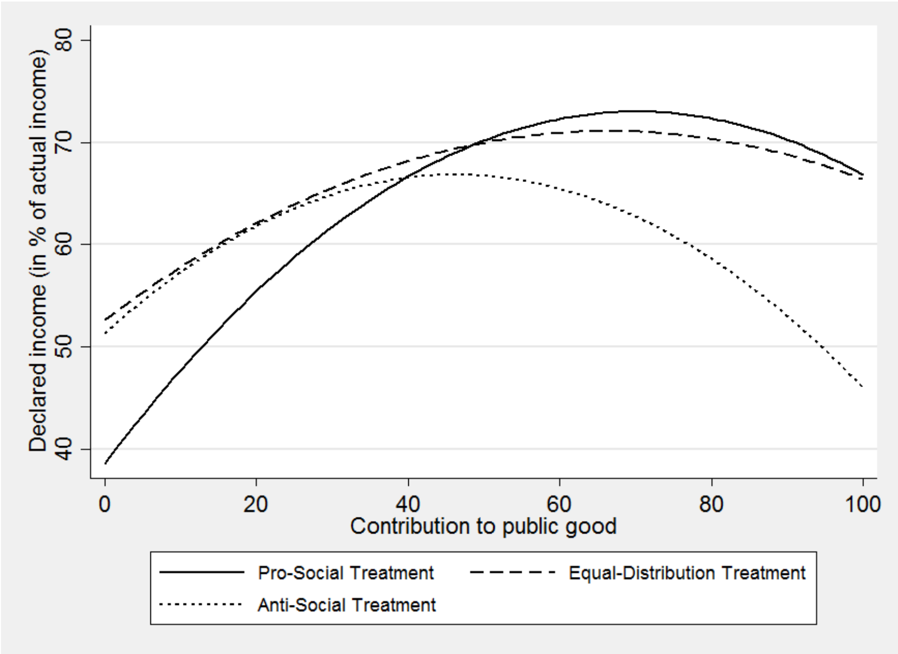

Figure 4: Relationship between public good contribution and tax compliance separated for each treatment

Table 5: Tobit regressions–relationship between public good contribution and tax compliance (aggregated data)

	model 1	model 2	model 3	model 4	model 5	model 6
PG contribution	0.0027***	0.0128***	0.0013	0.0121***	0.0007	0.0125***
	(0.0006)	(0.0022)	(0.0011)	(0.0026)	(0.0010)	(0.0028)
PG contribution squared		-0.0001***		-0.0001***		-0.0001***
		(0.0000)		(0.0000)		(0.0000)
last period redistribution participation			0.0199	-0.0014	0.0014	-0.0193
			(0.0499)	(0.0495)	(0.0474)	(0.0470)
last period audit			-0.1461***	-0.1559***	-0.1217**	-0.1288***
			(0.0499)	(0.0494)	(0.0475)	(0.0469)
own contribution over mean			0.1093	0.0895	0.1220	0.0846
			(0.0823)	(0.0816)	(0.0784)	(0.0779)
period			-0.0063	-0.0029	-0.0071	-0.0043
			(0.0090)	(0.0089)	(0.0086)	(0.0085)
age					0.0097**	0.0088*
					(0.0048)	(0.0047)
gender					-0.1021**	-0.0269
(male = 1)					(0.0475)	(0.0495)
economics major					-0.1038**	-0.0910*
(major in economics = 1)					(0.0492)	(0.0486)
degree					-0.0658	-0.0966
(bachelor = 1)					(0.0644)	(0.0640)
no. of semesters					0.0012	0.0033
					(0.0083)	(0.0082)
risk attitude					-0.0536***	-0.0545***
					(0.0097)	(0.0096)
income					-0.0002**	-0.0001*
					(0.0001)	(0.0001)
what-if-calculations					-0.0035	-0.0098
					(0.0123)	(0.0122)
constant	0.5161***	0.4046***	0.5917***	0.4745***	0.8422***	0.7120***
	(0.0349)	(0.0421)	(0.0762)	(0.0796)	(0.1545)	(0.1548)
observations	1,260	1,260	1,134	1,134	1,107	1,107
Pseudo R2	0.0093	0.0177	0.0126	0.0212	0.0412	0.0508

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Tobit regressions–relationship between public good contribution and tax compliance (separated for each treatment)

	model 7	model 8	model 9	model 10	model 11	model 12	model 13	model 14	model 15
PG contribution	0.0158***	0.0097***	0.0113***	0.0159***	0.0099**	0.0087*	0.0185***	0.0126***	0.0026
	(0.0035)	(0.0037)	(0.0043)	(0.0041)	(0.0045)	(0.0050)	(0.0042)	(0.0048)	(0.0052)
PG contribution squared	-0.0001***	-0.0001*	-0.0001***	-0.0001***	-0.0001*	-0.0001**	-0.0001***	-0.0001**	-0.0001
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
last period redistribution participation				-0.1166	-0.0108	0.1108	-0.1099	-0.0175	0.0585
				(0.0762)	(0.0907)	(0.0902)	(0.0727)	(0.0851)	(0.0839)
last period audit				-0.2012**	-0.0988	-0.1208	-0.1474**	-0.0994	-0.1405*
				(0.0783)	(0.0866)	(0.0900)	(0.0741)	(0.0818)	(0.0838)
own contribution over mean				0.1191	0.0585	0.1193	0.0507	0.0700	0.2026
				(0.1286)	(0.1378)	(0.1541)	(0.1227)	(0.1299)	(0.1430)
period				0.0146	-0.0006	-0.0274*	0.0130	0.0007	-0.0266*
				(0.0148)	(0.0159)	(0.0151)	(0.0142)	(0.0151)	(0.0142)
age							0.0127*	-0.0026	0.0175**
							(0.0076)	(0.0077)	(0.0089)
gender							-0.0003	0.0208	-0.1537
(male = 1)							(0.0765)	(0.0857)	(0.0932)
economics major							-0.0686	-0.1629*	-0.0359
(major in economics = 1)							(0.0751)	(0.0840)	(0.0898)
degree							-0.1577	0.1164	-0.2552**
(bachelor = 1)							(0.1050)	(0.1078)	(0.1125)
no. of semesters							0.0056	0.0169	-0.0091
							(0.0129)	(0.0141)	(0.0148)
risk attitude							-0.0233	-0.0715***	-0.0761***
							(0.0147)	(0.0168)	(0.0185)
income							-0.0002**	0.0000	-0.0002
							(0.0001)	(0.0001)	(0.0002)
what-if-calculations							-0.0022	-0.0383*	0.0206
							(0.0181)	(0.0230)	(0.0214)
constant	0.2697***	0.5066***	0.4665***	0.3304**	0.5607***	0.5889***	0.2950	0.8407***	1.0478***
	(0.0660)	(0.0703)	(0.0814)	(0.1315)	(0.1393)	(0.1413)	(0.2585)	(0.2491)	(0.3060)
observations	432	462	366	402	396	336	390	389	328
Pseudo R2	0.0508	0.0153	0.0123	0.0603	0.0142	0.0198	0.0964	0.0656	0.0783

*** p<0.01, ** p<0.05, * p<0.1

Second, we analyze how the redistribution mechanism and the tax compliance behavior interact. For this purpose, we regress on two treatment dummies. If the tax compliance decision was made in the Pro-Social (Anti-Social) Treatment, the Pro-Social (Anti-Social) Treatment dummy takes the value of 1, 0 otherwise. As the Equal-Distribution Treatment serves as the default, the coefficient of each treatment dummy measures the difference between the current treatment and the Equal-Distribution Treatment. In model 16, 17, and 18 (table 7) these treatment dummies are included. The difference between the three models is whether the game and individual specific variables are taken into account. In all models, we observe the quadratic relationship between contribution and tax compliance, again. Furthermore, we find that independent of whether the Pro-Social or Anti-Social Treatment occurs the tax compliance is less compared to the Equal-Distribution Treatment. However, the impact of the Anti-Social Treatment dummy variable seems to be much stronger than the Pro-Social Treatment dummy variable. Applying the Wald test after each regression analysis, we observe that the coefficient of the Anti-Social Treatment variable always differs significantly from the coefficient of the Pro-Social Treatment variable on a 10%-level in model 17 and 18. This confirms the previous results observed in table 3. Thus, we can summarize: In all cases in which a certain group of subjects is rewarded for the behavior in the public good game (high or low contributors), individuals are less compliant with the tax law compared to when no certain group is rewarded. However, rewarding the low contributors leads to the lowest tax compliance rates.

In the next step, we will further analyze the tax compliance behavior of high and low contributors in the models 19, 20, and 21. We use a dummy variable "high contributor" which is 1 if the subject contributed at least 50 Lab-Points to the public good in the first stage, 0 otherwise. Furthermore, we analyze the interaction between this variable and the Pro-Social and Anti-Social Treatment, respectively. Table 7 shows the results of the Tobit regressions (standard errors in parentheses). We find that the main effect of the variable "high contributor" is not significant in all our models. This means that subjects classified as high contributors are not per se more tax compliant. With respect to the treatment dummies, we observe a significant decrease of the tax compliance rate in case of the Pro-Social Treatment. In the Anti-Social Treatment, we observe no significant difference compared to the Equal-Distribution Treatment. However, for a complete analysis of the decision behavior, we have to take the interaction effects into account.

Whereas the main effect of the Pro-Social Treatment dummy is significantly negative, the interaction term “Pro-Social Treatment X high contributor” is significantly positive and has approximately the same level as the main effect. Applying the Wald test after each regression, we observe that the sum of the coefficients of the variables “Pro-Social Treatment” and “Pro-Social Treatment X high contributor” does not differ significantly from zero. In particular, this means that the tax compliance rate of low contributors (i.e., high contributor = 0) is significantly lower in the Pro-Social than in the Equal-Distribution Treatment. However, the tax compliance rate of high contributors does not differ significantly in the Pro-Social and Equal-Distribution Treatment. These findings hold irrespective of whether game or individual specific variables are taken into consideration.

With respect to the Anti-Social Treatment, we observe that the main effect of the treatment dummy is negative, but not significant. However, the interaction term “Anti-Social Treatment X high contributor” is significantly negative. Using the Wald test again, we find that the sum of the coefficients of the variables “Anti-Social Treatment” and “Anti-Social Treatment X high contributors” is negative and differs significantly from zero. In particular, this means that the tax compliance rate of low contributors does not differ significantly in the Anti-Social and Equal-Distribution Treatment. The tax compliance rate of high contributors, however, is significantly lower in the Anti-Social than in the Equal-Distribution Treatment. Again, these findings are observed in all our models. As a consequence, our results presented in figure 4 and described previously are confirmed by these regression analyses. In addition, the inverse u-shaped relationship between tax compliance rate and public good contribution is also observed in these models.

Table 7: Tobit regressions–treatment effects

	model 16	model 17	model 18	model 19	model 20	model 21
PG contribution	0.0127***	0.0121***	0.0122***	0.0144***	0.0145***	0.0126***
	(0.0022)	(0.0026)	(0.0027)	(0.0027)	(0.0030)	(0.0031)
PG contribution squared	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
high contributor				-0.1296	-0.2045	-0.0288
				(0.1100)	(0.1253)	(0.1201)
Pro-Social Treatment	-0.0857*	-0.0919*	-0.0932*	-0.1791**	-0.1910**	-0.1783**
	(0.0502)	(0.0543)	(0.0515)	(0.0715)	(0.0769)	(0.0729)
Pro-Social Treatment X high contributor				0.1890*	0.2020*	0.1743*
				(0.0996)	(0.1080)	(0.1025)
Anti-Social Treatment	-0.1713***	-0.1919***	-0.1933***	-0.0602	-0.1003	-0.0466
	(0.0524)	(0.0569)	(0.0543)	(0.0748)	(0.0811)	(0.0771)
Anti-Social Treatment X high contributor				-0.2183**	-0.1807	-0.2841***
				(0.1038)	(0.1127)	(0.1072)
constant	0.4849***	0.5755***	0.8197***	0.4744***	0.5643***	0.7836***
	(0.0506)	(0.0870)	(0.1575)	(0.0591)	(0.0911)	(0.1577)
game specific variables	no	yes	yes	no	yes	yes
individual specific variables	no	no	yes	no	no	yes
observations	1,260	1,134	1,107	1,260	1,134	1,107
Pseudo R2	0.0219	0.0261	0.0565	0.0284	0.0323	0.0648

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

6 Summary and Discussion

The findings of the tax literature suggest that the use of tax revenue can have an important influence on tax compliance. Up to now, however, there is no paper analyzing the effect of a positive and negative perception regarding the use of tax revenues. To fill this gap, we conduct a laboratory experiment with 126 subjects and vary the mechanism how taxes are redistributed by applying different reward mechanisms. In our Equal-Distribution Treatment, the collected tax revenue is redistributed equally among all subjects. In our Pro-Social-Behavior-Reward Treatment, the collected tax revenue is redistributed to the subjects with the highest contribution to the public good within a group. It can be expected that subjects with a relatively high contribution perceive the use of the tax revenue as more positive than subjects with a relatively low contribution as their pro-social behavior is rewarded in this treatment. As a consequence, we conjecture that these subjects reveal higher tax compliance rates than low contributors. In our Anti-Social-Behavior-Reward Treatment, the tax revenue is redistributed to the subjects with the lowest public good contribution. It can be expected that subjects with a relatively high contribution perceive the use of tax revenue as less positive than subjects with a relatively low contribution and therefore reveal lower compliance rates.

Our results are manifold. First, on an aggregated level, we observe that tax compliance is significantly higher in the Equal-Distribution Treatment than in the Pro- or Anti-Social Treatment. Between the Pro- and Anti-Social Treatments we find no significant differences. Thus, from an aggregated perspective, an asymmetric treatment of taxpayers by rewarding a special group of taxpayers has a negative overall effect. Second, we observe that rewards have asymmetric effects on tax compliance decisions. On the one hand, if pro-social behavior is rewarded, the tax compliance rate of high contributors does not differ significantly compared to when no rewards exist. The tax compliance rate of low contributors, however, is significantly lower in the Pro-Social than in the Equal-Distribution Treatment. On the other hand, if anti-social behavior is rewarded, the tax compliance rate of high contributors is significantly lower compared to the Equal-Distribution Treatment. However, the tax compliance rate of low contributors does not differ significantly between the Anti-Social and Equal-Distribution Treatment. As a consequence, rewards have either no effect (for those who are rewarded) or a negative effect (for those who are not rewarded) on tax compliance behavior. Thus, if a high compliance rate of taxpayers is preferred, rewards should not be used by the tax authority.

Third, we find an inverse u-shaped relationship between public good contribution and tax compliance. In particular, up to a certain level, tax compliance increases with subject’s own contribution to the public good. Above this level, however, tax compliance decreases with the public good contribution. This finding is observed both on an aggregated level across all treatments and in each of the three treatments individually. Fourth, in line with the bomb crater effect observed by Mittone (2006), we find that individuals are less compliant with the tax law after they were audited.

One possible explanation for the asymmetric effect of rewards is that the rewards can have opposing effects on the willingness to comply with the tax law. On the one hand, it can be assumed that rewarding taxpayers for their behavior leads to a higher level of trust in the tax authority and thus leads to higher tax compliance rates (see discussion in section 1). On the other hand, treating taxpayers not equally reduces procedural fairness which leads to lower compliance rates.[1] Both effects work in opposite directions and it is therefore possible that both effects canceled each other out in our experiment. As a consequence, no difference between a treatment with reward and the Equal-Distribution Treatment occurs for the group of taxpayers with a high possibility to be rewarded (high contributors in the Pro-Social Treatment and low contributors in the Anti-Social Treatment). For the group of taxpayers which is likely to receive no reward (low contributors in the Pro-Social Treatment and high contributors in the Anti-Social Treatment) the trust in authority is relative low leading to a lower tax compliance rate in the treatments with rewards. Additionally, treating taxpayers not equally reduces the compliance rate as procedural fairness is relatively low. In this case, both effects work in the same direction leading to a lower compliance rate in the treatments with rewards compared to the Equal-Distribution Treatment in total.

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[1] For example, Hofmann et al. (2008) and Murphy (2004) discuss that taxpayers perceive procedural fairness as relatively low if the treatment of taxpayers is not neutral or if a certain group is favored by the tax law. This finding could possibly be explained by inequity aversion (see, for example, Fehr and Schmidt, 1999, and Bolton and Ockenfels, 2000).

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