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Three Essays on Social Preferences, Social Dilemmas and Taxation

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Introduction to the Dissertation

Neoclassical economic models depict *homo economicus* (economic human) as a self-interested individual with a prime goal of maximizing her own wealth and other material goals (Camerer and Lowenstein, 2004). The economic human never cares about “social duties” per se. She is never concerned with the well-being of other members of the society. When facing such social dilemmas as provision of public goods (e.g. Isaac and Walker, 1988) or team production she neither cooperates with other economic humans (i.e. free rides) nor expects them to cooperate with her. When paying taxes the economic human juxtaposes the utility from successful cheating against the disutility from detection and punishment (Allingham and Sandmo, 1972), evading taxes whenever it pays off to do so. Hence, in a society of economic humans one should evidence neither philanthropy, nor contributions to public goods nor high compliance with taxes. Nevertheless, only in year 2012 in the US \$316.23 billion was donated to charity, with 72% of the donations made by individuals (GivingUSA, 2013). The contributions ranged from giving to individuals to giving to such fundamental public goods as environment, health and education. Moreover, a recent (2012) IRS (Internal Revenue Service) release on tax gap estimates illustrates that the voluntary compliance rate in the US (in Tax Year 2006) is approximated to be 83.7%.¹ Such compliance rate is much higher than classical models of tax evasion will predict, given the low probability of detection and the small expected penalty imposed by the state (Andreoni et al., 1998, page 821). Hence, substantial amount of people are indeed concerned with the well-being of the others, do exhibit cooperative behavior

¹http://www.irs.gov/pub/newsroom/overview_tax_gap_2006.pdf

when facing social dilemmas, do pay taxes honestly, even if it is against their pecuniary self-interest. Such inference is not only based on observations from real life, where many variables interact, making impossible to disentangle the real motives behind the behavior of individuals, but also on experimental evidence obtained by psychologists and experimental economists in the last three decades. Despite shortcomings (see the excellent discussion by Levitt and List, 2007) experimental studies are extremely useful, as the controlled environment of the experiments allows the scholars to disentangle behavioral explanations from standard ones (Camerer and Lowenstein, 2004). For instance, if in real life an individual donates to a charity organization publicly, the reasons can be manifold, ranging from individual reputation formation to pure other-regarding behavior. Nevertheless, in an anonymous, double-blind dictator game positive transfers can be attributed to other-regarding preferences with a high degree of confidence.

The current dissertation consists of three chapters.

In Chapter 1 I explore other-regarding behavior of individuals in the domain of losses in economic games. Despite the rich literature on other-regarding preferences ranging from economic models (e.g. Fehr and Schmidt, 1999, Bolton and Ockenfels, 2000) to field studies, lab and on-line experiments (e.g. Dreber et al., 2012, Eckel et al., 1996, Amir et al., 2012), to the best of my knowledge there is no evidence on other-regarding preferences of decision makers in the domain of losses in economic games. Given that monetary losses are integral part of daily life, and economic games are stylized representations of socio-economic phenomena, understanding other-regarding preferences of individuals in the domain of losses in economic games can help to uncover important features of micro-dynamics of human interactions. Indeed, having accumulated substantial knowledge on the transformation of social preferences in the domain of losses, one can apply such knowledge to shape more effective donation campaigns during economic downturns. For instance, if fairness motives in the loss domain prevail over other motives, campaigns emphasizing the fairness motives of a donation may be the most efficacious ones. An-

other possible application of such research can be at firms that face financial difficulties. If managers possess knowledge on how social preferences of their employees, who suffer material losses (e.g. job pay cuts, bonus cuts), may change in interpersonal relationships, they may be able to apply the correct tools in order to maintain healthy environment in the workplace. To understand social preferences in the domain of losses, I adopt the framework of the dictator game. Nevertheless, I modify the traditional framework by importing a bi-directional loss in the treatments under interest. Two research questions are under scrutiny. First, how will the dictator divide the pie with an anonymous recipient, after a bi-directional loss of equal amount? Second, how will the dictator divide the pie with a poor recipient from a third world country after a bi-directional loss, where the loss of the recipient is bigger than that of the dictator? I use a relatively novel device for experimental studies- Amazon Mechanical Turk- for data generation. Despite its shortcomings (see Rand, 2012), Amazon Mechanical Turk is a valid tool for experimental investigations, as various (even complex) studies have found behavioral similarities between the behavior of “turkers” and that of subjects in identical experiments in physical lab (e.g. Amir et al., 2012, Dreber et al., 2012, Horton et al., 2011, Paolacci et al., 2010, Suri and Watts, 2011).

Chapter 2 is concerned with how *heterogeneous* individuals cooperate and how they punish free-riders in social dilemmas. For this purpose I study the interaction of *heterogeneous* individuals in a linear public goods game with punishment opportunity, as it is a stylized representation of situations that require cooperation to achieve socially beneficial outcomes in the presence of a social dilemma (Herrmann et al., 2008). In general, while theoretical literature predicts no cooperation in linear public goods games, it is empirically well-documented fact that in linear public goods game without punishment opportunity cooperation does exist, albeit it follows a declining trend: in the initial periods vast majority of individuals are prone to cooperation, which diminishes over time with the emergence of free-riders (e.g. Ledyard, 1995). Such a pattern puts forth the concept of conditional cooperation: i.e. cooperation, conditional on the cooperation rate of

other individuals (Fischbacher et al., 2001). When punishment opportunity is introduced in the game, it completely alters the interaction dynamics among individuals. Despite huge material costs cooperators are willing to engage in punishment, in order to sanction free-riders, which boosts the rate of cooperation in groups (e.g. Fehr and Gächter, 2000). Moreover, while in the short-run costs of punishment may outweigh the benefits of cooperation, making peer punishment socially undesirable, in the long-run punishment is proven to be beneficial (Gächter et al., 2008).

Nevertheless, despite the extensive literature on linear public goods games (see Chaudhuri, 2011 for a recent review), the studies on cooperation and punishment in heterogeneous groups (to my knowledge) are quite few. Two recent papers by Reuben and Riedl (2013) and Nikiforakis et al. (2012) explore contributing and sanctioning behavior of individuals in such a setting (i.e. heterogeneous groups), where different behavioral rules co-exist, creating a normative conflict among group members. In the current chapter I study a novel source of heterogeneity-differences in the endowment sources of group members. Homogenous groups, in which subjects are exogenously assigned to the same endowments, are compared with heterogeneous groups, in which half of the group members invest real effort to earn their endowments, while the other half are granted with a windfall amount of equal size. To link such a setting with real life, one can imagine scenarios, in which individuals, who worked hard for their wealth, have to cooperate with “privileged” individuals, who inherited similar levels of wealth, without exerting significant effort, in order to provide public goods relevant not only for single communities (e.g. littering, street lights, pavements), but also for the society as a whole (e.g. education or health systems). Another possible example is the team production in the organizations, where employees with positions providing relatively “easy” money have to cooperate with employees with positions providing relatively “hard” money. If such a source of heterogeneity can be a potential cause of normative conflict, a manager, who is aware of such a problem, can design appropriate mechanisms to resolve the conflict.

In Chapter 3 I explore tax paying behavior of individuals, and study whether it is possible to increase the adequacy (acceptability) of the income tax burden. The pioneering model of Allingham and Sandmo (1972) depicts an isolated rational taxpayer at the moment of filing his income tax declaration. The isolated tax payer, who possesses von Neumann-Morgenstern utility function, maximizes the expected value of a risky tax evasion gamble, comparing the utility from successful cheating with the disutility from detection and punishment. Since then, the seminal model of Allingham and Sandmo (1972) has been extended in many directions (see Andreoni et al. 1998, Sandmo, 2005, Alm, 2012 among others, for excellent reviews on tax evasion literature). Nevertheless, in the models of tax evasion a l' Allingham and Sandmo (1972) the taxpayers are neither concerned how the government disposes their money, nor they possess preferences for provision of public goods that are in conflict with the actual spending of the government. However, the reality may be completely different. Studies illustrate, that information provided to taxpayers by the state can be crucial for the public acceptability of the taxes (Kallbekken and Aasen, 2010, Beuermann and Santarius, 2006, Klok et al., 2006, Holler et al., 2008). Moreover, if the individuals do not value the public goods provided by the state, the desire to pay taxes may vanish (Alm et al., 1993, Li et al., 2011).

Adopting survey experimental approach, the chapter aims at studying whether providing information on the national public expenditure to the taxpayers and whether involving them in the process of allocating tax revenues over public goods influence the level of the adequate tax rate- the fraction of income that taxpayers consider adequate to pay as taxes. We illustrate, that when taxpayers are required to express their preferences on how they would allocate tax revenues over the main functional items of the public expenditure, they report substantially higher adequate tax rates relative to a situation with no tax choice. In contrary, providing solely information on public expenditure to the taxpayers does not influence the level of the adequate tax rate.

The questions tackled can have direct relevance for the strand of literature, studying

the relationship between psychic costs of tax evasion and tax compliance. Stemming from the models developed in that direction, the decision to evade taxes bare not only financial, but also psychic consequences, as being caught on evasion is associated with shame of being exposed and loss of social reputation (e.g. Gordon, 1989, Hashimzade et al., 2012. Erard and Feinstein, 1994). Indeed, empirical literature testifies the theoretical conjectures. For instance, Baldry (1986) experimentally illustrates that tax evasion is not a gamble and ‘moral costs’ are involved in a tax evasion decision. Coricelli et al. (2010) manifest that tax evasion triggers emotional arousal driven by moral implications associated with public exposure of cheating behavior. Hence, if tax choice increases the acceptability and social relevance of the tax burden, psychic costs of evasion may prime, resulting in reduced evasion.

Another possible area this strand of research can be applied to is cause-related marketing and the promotion of charity-linked products. I consider “...charity-linked products as all the consumer goods marketed that may help a social cause or a nonprofit organization.” (Proença and Pereira, 2008, page 54). For instance, American Express launched a campaign to support the Statue of Liberty: each time a credit card was used 1 cent was donated to the restoration of the Statue of Liberty (Baker, 2003). Previous studies have manifested that cause-related marketing can impact the choice of the consumers. In particular, the latter may be willing to pay higher prices to support a cause (Elfenbein and McManus, 2010), which may depend on the fit between brand and charity (Pracejus and Olsen, 2004). So far, to my knowledge, the literature is concerned with consumer behavior under the mechanism of an exogenously fixed cause.² Nevertheless, granting the consumers the possibility of a charity choice (i.e. making the cause endogenous),³ may make cause relating marketing campaigns even more effective, as it may enhance consumers’ willingness to pay for charity-linked products.

²If Consumer A buys product B he knows that he is donating money for Cause C.

³For instance if Consumer A buys Product B he can choose to donate the money either for Cause C or for Cause D or can distribute the money between both causes.

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Loss and Other-Regarding Preferences: Evidence From Dictator Game

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Abstract

The paper aims at studying other-regarding preferences of decision makers in the domain of losses. For this purpose the framework of the Dictator Game is adopted, with two research questions under investigation. First, how will the dictator divide the pie with an anonymous recipient, after a bi-directional loss of equal amount? Second, how will the dictator divide the pie with a poor recipient from a third world country after a bi-directional loss, where the loss of the recipient is bigger than that of the dictator?

Interestingly, the data illustrate that other-regarding motives of the dictators do not vanish in any of the treatments in which losses are introduced. The results are explained from the perspective of power-dependence relationship between the dictator and the recipient (Handgraaf et al., 2008, van Dijk and Vermunt, 2000).

Keywords: Dictator Games, Loss, Other-Regarding Preferences

JEL Classifications: C90, D63, D64, I30

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1 Introduction

In recent years, social-psychologists and behavioral economists provide ample evidence that decision makers constantly violate the neoclassical assumption of self-interest, exhibiting other-regarding behavior (see Fehr and Schmidt, 2006 for an excellent review). Nevertheless, despite the rich literature ranging from theoretical models (e.g. Fehr and Schmidt, 1999, Bolton and Ockenfels, 2000) to laboratory and on-line experiments (e.g. Dreber et al., 2012, Eckel and Grossman, 1996, Amir and Rand, 2012), to the best of my knowledge, there is no sufficient testimony on other-regarding behavior of decision makers in the domain of losses in economic games.¹ Given that monetary losses are integral part of daily life, and economic games are stylized representations of socio-economic phenomena, understanding other-regarding preferences of individuals in the domain of losses in economic games can help to uncover important features of micro-dynamics of human interactions. For instance, while the latest financial crisis was at its peak in 2008, between 2008 and 2009 individual giving in the USA followed an estimated decline of 3.6% *only*. “Even through a period of economic stress and volatility, Americans have continued to give” (GivingUSA, 2011). Can (at least part) of such behavior be a consequence of other-regarding preferences? Applying the knowledge accumulated in social-psychology one can give a negative answer to this question, as there exists evidence that individuals in a loss condition are more own-outcome oriented (De Dreu et al., 1994, De Dreu, 1996), more individualistic (Poppe and Valkenberg, 2003) and more prone to unethical behavior (Kern and Chugh, 2009) than individuals in the gain condition. Hence, one should expect

¹Exceptional studies, that tackle decision making in the domain of losses in economic games, are Buchan et al. (2005) and Zhou and Wu (2011), who study human interactions in a Negative Ultimatum Bargaining Game (NUBG from here onwards), where counterparts have to bargain over losses rather than gains. Nevertheless, in a NUBG it is not possible to disentangle decision makers’ egoistically driven strategic concerns from their other-regarding behavior. Buchan et al. (2005) illustrate that in the loss domain both the offers by allocators and the demands by responders are higher than in an ordinary Ultimatum Bargaining Game (UBG from here onwards). Continuing this line of research, Zhou and Wu (2011) manifest that at similar levels of unfairness in wealth allocation, rejection rates are higher in a NUBG than in an UBG: “unfairness looms larger in losses than in gains” (page 582).

monetary losses to offset other-regarding preferences.

Stemming from the abovementioned paragraph, the main aim of the current paper is to understand the connection between monetary losses and other-regarding preferences of decision makers, who bare these losses. For my purposes I adopt experimental approach and select the Dictator Game (DG from here onwards). Nevertheless, I modify the framework of the DG, by imposing a bi-directional loss both on the dictator and on the recipient, in order to simulate a “crisis” scenario, where the society as a whole is embedded in losses. Two research questions are under scrutiny. First, how will the dictator divide the pie with an anonymous recipient, after a bi-directional loss of equal amount? Second, how will the dictator divide the pie with a poor recipient from a third world country after a bi-directional loss, where the loss of the recipient is bigger than that of the dictator?

DG is an ideal framework to study other-regarding preferences of the decision maker, given that the recipient is effectively helpless and cannot influence the behavior of the decision maker. In contrary to Nash equilibrium, which predicts the dictator to split the pie in a completely egoistic manner, empirical data demonstrate that other-regarding preferences do exist, as the dictator persistently transfers roughly 20%-30% of his wealth to the recipient (Camerer, 1997, 2003). Such variables as the name of the recipient (Charness and Gneezy, 2008), visual and oral impression (Burnham, 2003, Rosenblat, 2008), pre-play identification of participants and face-to-face communication (Bohnet and Frey, 1999a, 1999b), friend as a recipient (Jones and Rachlin, 2006, Leider et al., 2009, Goeree et al., 2010), wealth level of the recipient (Eckel and Grossman, 1996, Brañas-Garza, 2006) may affect the allocation decision of the dictator. To the best of my knowledge, no paper has tried to uncover other-regarding behavior of the dictators after a certain amount of bi-directional loss.

I run four between-subjects treatments- “Standard”, “Standard & Loss”, “Poverty” and “Poverty & Loss”- via Amazon Mechanical Turk. Anticipating the results, I find that other-regarding preferences of the dictators are preserved both in “Standard & Loss”

and “Poverty & Loss”. I explain the results from the perspective of power-dependence relationship between the dictator and the recipient (Handgraaf et al., 2008, van Dijk and Vermunt, 2000). The response justifications of the dictators support the ex-post rationalization of their behavior.

The rest of the paper is structured as follows. Section 2 provides brief literature review on DG and Amazon Mechanical Turk and poses predictions. Section 3 describes the experimental design of the current paper. Section 4 depicts the results. Section 5 provides a short discussion and concludes the paper.

2 Literature Review

2.1 Dictator Game

The first version of DG was run by Kahneman et al. (1986). Since then over 120 studies have been published on the topic, resulting in more than 600 treatments (Engel, 2011). In a context-free anonymous DG the behavior of the allocator is well-documented: on average allocators send 20%-30% of their wealth to the recipients (Camerer, 1997, 2003). Nevertheless, the allocation decisions made by the dictators have been proven to be sensitive to various treatment manipulations, ranging from (theoretically predicted) egoistic splits in situations where the dictators exert effort to earn their endowments (Cherry et al., 2002, Oxoby and Spraggon, 2008), to elevated benevolent splits in situations, where the recipients are “needy” (Eckel and Grossman, 1996, Brañas-Garza, 2006). Regarding DG with “needy” recipients, Eckel and Grossman (1996) compare allocations to an anonymous student subject with those to a charity organization (the American Red Cross). The authors find that “when an anonymous individual is replaced with an established charity, donations triple...” (page 188). Brañas-Garza (2006) conducts a similar experiment with Spanish participants. He compares an anonymous DG, with DGs in which i) the

recipients are poor, ii) the recipients are poor and they receive the donations in the form of medicines. In the treatment with poor recipients on average 66% of the total endowment is donated (15€), while in the treatment with medicine on average 80% of the total endowment is sent to the poor recipient.

Departing from abovementioned studies I introduce a bi-directional loss both in a context-free DG and in a DG with a “needy” recipient. To the best of my knowledge, the paper is the first one to study allocation decisions in such a setting.²

The literature in social-psychology predicts that self-interest may loom larger in the domain of losses than in the domain of gains. For instance, De Dreu et al. (1994) demonstrate that “...loss framed individuals are more own-outcome oriented than those with a gain frame” (page 504). In their experiment (in contrast to variations in the difference between one’s own and the other individual’s outcome) variations in the own outcome better explain satisfaction with outcomes in loss condition than in gain condition. Moreover types of outcomes (either gains or losses) affect the social value orientation of the individual (individualism, competition, pro-social orientation) (Poppe and Valkenberg, 2003). In the gain condition of the experiment decision makers start with nothing and allocate positive amounts to them and their counterparts (who also start with nothing). In contrary, in the loss condition both the decision makers and their counterparts start the game with pre-defined endowments and incur losses because of the decision makers’ choices. Unsurprisingly, there are more individualistic subjects in the loss condition than in the gain condition. A recent experimental study by Kern and Chugh (2009) illustrates that a problem framed in loss condition may induce more unethical behavior than an identical problem framed in gain condition. In the experiment “the entrepreneur was trying to acquire an as-yet-undefeated (hypothetical) competitor. The negotiating agent was trying to acquire an as-yet-unrealized (hypothetical) commission. The stereo seller was trying

²Since a complete discussion of different DG treatments is beyond the scope of the current paper, one can refer to Engel (2011).

to acquire an as-yet-unsecured (hypothetical) sale” (page 382). Even in a completely hypothetical scenario, where no real stakes are under risk, the subjects, who are in the loss condition, are more prone to obtain “insider information” and to cheat than subjects in the gain condition.

To conclude, stemming from abovementioned studies, one can expect losses to offset other-regarding preferences of the allocators.

2.2 Amazon Mechanical Turk

Amazon Mechanical Turk (AMT from here onwards) has recently turned into a popular means of experimental data generation for social scientists. AMT is a crowdsourcing marketplace, which allows individuals (businesses) to assign paid tasks (called HITs-Human Intelligence Tasks) to a big population of workers (also called “turkers”) all over the world. The advantage of AMT is that it is a relatively cheap and fast device for data collection (Rand, 2012). The median hourly wage paid to a “turker” can be as low as 1.38\$ (Horton and Chilton, in the press). Studies exploring the demographics of “turkers” find that “turkers” in the US are educated (69% possesses university degree) and have a median age of 30 (Ross et al., 2010).

However, AMT is not exempted from problems as well. The three most critical issues discussed in the literature that can affect the quality of experimental data are i) trust in experimental instructions, ii) apprehension of instructions by the subjects and iii) insufficient attention devoted to the experiment by the subjects (Rand, 2012). With respect to the first point, Horton et al. (2011) illustrate that “turkers” believe in experimenters almost as much as the subjects in physical lab. Regarding the second and the third points, “catch trials” and instructional manipulation checks, pinpointing inattentive subjects, can help to solve the problem (Paolacci et al., 2010, Oppenheimer et al., 2009).

Nevertheless, despite the shortcomings of AMT, the researchers have been able to

successfully replicate (even complex) experimental studies conducted in the physical laboratory. Paolacci et al. (2010) study whether “turkers” exhibit identical heuristics and biases as the subjects from a physical lab. For this purpose they use three classic experimental tasks from heuristics and biases literature: “*Asian disease problem*” (Tversky and Kahneman, 1981), “*The Linda Problem*” (Tversky and Kahneman, 1983) and the “*Physician Problem*” (Baron and Hershey, 1988). The authors find that the responses of AMT subjects are not different from those of students at a Midwestern U.S. university, concluding that AMT is indeed “...a viable alternative for data collection” (page 417). Horton et al. (2011) compare the behavior of AMT workers and that of physical lab subjects in a one-shot prisoner’s dilemma game, illustrating that the level of cooperation between the two settings is not different. Additionally, both AMT workers and physical lab subjects are equally likely to respond to framing effects. Suri and Watts (2011) go one step ahead of other scholars, running a repeated public goods game experiment via AMT, which requires direct interaction among group members. Even in such a complicated setting, the cooperation rate between “turkers” and physical lab subjects is not different.

Regarding DGs conducted via AMT, Amir and Rand (2012) depict that the mean level of allocations with \$1 stakes is around 33%. Similar value is reported by Dreber et al. (2012). Raihani et al. (2013) illustrate that allocation decisions made by US “turkers” (in contrast to those made by Indian “turkers”) are invariant to the stake size (\$1, \$5 and \$15).

3 The Experiment

The on-line experiment consists of 4 treatments with a between subjects design: “Standard”, “Standard & Loss”, “Poverty” and “Poverty & Loss”. “Standard” is used as a benchmark for “Standard & Loss”, while “Poverty” is a control for “Poverty & Loss”. “Standard” and “Standard & Loss” appear together in session 1, while “Poverty” and

“Poverty & Loss” appear together in session 2.³ Figure 1 graphically depicts the structure of the on-line experiment.

[Figure 1]

In each session subjects are faced with a loss scenario in 50% of the cases, which is randomly defined by the computer. The loss in the experiment is introduced as neutral as possible to prevent the language used to affect the results. Moreover, I did not provide the allocators any motivation why they may face a loss, as the main purpose of the paper is to check the effect of loss (and not the motivation of loss) on other-regarding behavior of the allocator. Additional information about the motives of loss (i.e. why the allocator suffered the loss) may interact with other-regarding preferences of allocators in unpredictable ways.

The starting message the subjects see is standardized across all treatments and appears as follows:

You have an initial endowment of 15\$. As soon as you click Next, there are two possible outcomes, which occur in 50% of the cases. Either you will still have 15\$ (there will be no changes in your initial endowment) or you will be left with 5\$ (your initial endowment will decrease with 10\$). Your task is to decide how to divide your remaining endowment (either 15 \$ or 5 \$) with a recipient. You are free to divide your endowment in any way you'd like to...⁴

In “Standard”, the dictator has to play an ordinary DG, dividing \$15 between him and an anonymous recipient according to his preferences:

³Regarding the procedure: an HTML link in the HIT of the AMT directed the “turkers” into a Qualtrics survey, which included the treatments.

⁴Why do I choose a \$10 loss? As already discussed in Section 1 of the paper, to the best of my knowledge, there are no papers discussing how bi-directional loss affects the preferences of the dictators. Hence, my idea is to check the relationship between a sufficiently big amount of loss and other-regarding preferences. \$10 (2/3 of the wealth) seems a plausible amount for my purposes. If other-regarding preferences are preserved in case of a \$10 loss, it will not pay off to check for smaller amounts. Increasing the size of the loss over \$10 and checking how the size of the loss influences other-regarding preferences is beyond the scope of this paper. Nevertheless, it will be an interesting line of research.

There are no changes in your initial endowment: you still have 15\$. Your recipient is a randomly chosen worker of Amazon Mechanical Turk. Unfortunately, we cannot provide you more information about the recipient. In the box below please indicate the monetary amount you are willing to contribute. (Your contribution cannot exceed 15\$).

In “Standard & Loss”, I preserve the anonymity condition of the recipient, albeit I introduce a bi-directional loss of \$10 before the allocation decision. The dictator is requested to split the residual pie of \$5.

Your initial endowment decreased by 10\$: you are left with 5\$. Your recipient is a randomly chosen worker of Amazon Mechanical Turk. He participated in a task, where by clicking NEXT (as you did in the beginning of the survey) he could have either 10\$ or 0\$, which he had to keep for himself. He ended up with 0\$. Unfortunately, we cannot provide you more information about the recipient. In the box below please indicate the monetary amount you are willing to contribute. (Your contribution cannot exceed 5\$) .

In “Poverty”, the dictator has to divide his endowment of \$15 with a poor representative of a third world country who has an income of 99 cents per day and no savings at all. This treatment is by-and-large similar to that of Brañas-Garza (2006), albeit diverges in several directions. Firstly, the resources are allocated among 2 agents (a dictator and a recipient) rather than 4 (a dictator and 3 identical recipients) stemming from my intention to study the behavior of the dictator vis-à-vis a single recipient rather than the egalitarian outcome across different agent-receivers. Secondly, I don’t constrain the donations of subjects assigning €5 bills, which might artificially increase allocations (Brañas-Garza , 2006). Thirdly, the recipient is a single person in a poor community, rather than a poor community as a whole.

There are no changes in your initial endowment: you still have 15\$. Your recipient is a real person, located in a poor community of a third world country. To prevent any sort of bias we do not provide you with the precise geographical destination of the recipient. According to the estimates of the UN (United Nations), representatives of the community your recipient is located in, live with an income of 99 cents per day and no savings at all. Your monetary contribution will be of great help for the recipient. Your contributions will be delivered through a famous NGO operating in the territory of the EU, hence there will be no issues connected with trust and corruption. In the box below please indicate the monetary amount you are willing

to contribute. (Your contribution cannot exceed 15\$).

In “Poverty & Loss”, I introduce a bi-directional loss. The dictator has to decide how to divide the residual amount of \$5.

Your initial endowment decreased by 10\$: you are left with 5\$. Your recipient is a real person, located in a poor community of a third world country. To prevent any sort of bias we do not provide you with the precise geographical destination of the recipient. According to the estimates of the UN (United Nations), representatives of the community your recipient is located in, live with an income of 99 cents per day and no savings at all. Moreover, the representatives of the community (including your recipient) suffered substantial material losses because of a natural disaster, which occurred lately. Your monetary contribution will be of great help for your recipient. Your contributions will be delivered through a famous NGO that operates on the territory of the EU, hence there will be no issues connected with trust and corruption. In the box below please indicate the monetary amount you are willing to contribute. (Your contribution cannot exceed 5\$).

In all treatments, after the allocators have made their decisions, they are requested to answer an open question, providing justification for their choice. The purpose of such a setting is three-fold. First, by reading the justifications of the decisions, I can control whether the subjects understood the task or not. Second, an open question will impose extra cognitive load on the participants, inducing them to think more deliberately before making a final decision, as the logic of qualitative justifications should match with quantitative responses.⁵ Thus, my design allows me (at least) to minimize the issues concerning “turkers”’ apprehension of instructions and “turkers”’ attention during the experiment (Rand, 2012). Third, using the open question, I can uncover the internal perspective of the dictators.

Regarding payoffs, it is publicly known that three subjects from each session are randomly picked to be paid the endowment they choose to keep for themselves. Moreover, the recipients of the respective turkers are paid as well.⁶ In the first session 1 “turker” is

⁵Obviously a subject cannot contribute \$0 and write: “I wanted to be generous”. Such a behavior will imply that the participant was either not attentive or did not understand the task. Such an answer will be discarded because of inconsistency.

⁶The participants know that their decision would have real consequences both for them and for their

randomly paid from “Standard” (\$10 contribution to the recipient), and 2 “turkers” from “Standard & Loss” (each made \$2.5 contribution to the recipient). In treatments with poor recipients 1 “turker” from “Poverty” and 2 “turkers” from “Poverty & Loss” are randomly selected. Overall \$15 (Turker 1: \$10, Turker 2: \$3, Turker 3: \$2) are donated to UNHCR (The UN Refugee Agency) to help Syrian Refugees, as the latter provide solid match with the description of the recipients in the treatments.

In fact, the incentives to exhibit self-centered behavior are quite high. A selfish choice by the subject can bring him a maximum of \$15 in treatments without losses and a maximum of \$5 in treatments with losses. These amounts are respectively 75 and 25 times higher than “the reward for the hit”. Moreover, these amounts are approximately 10.9 and 3.6 times more than the median hourly reservation wage (1.38\$/hour) (Horton and Chilton, in the press).⁷

4 Results

Overall 159 AMT workers living in the USA took part in the on-line experiment as allocators.^{8,9} I end up with 37 observations in “Standard”, 37 observations in “Stan-

recipient. The following message appears in the instructions: **"Please refer to the task as if you are making a real decision because the choices of 3 Workers will have real consequences both for them and for their recipients. We will randomly pick 3 answers: the chosen workers will get the money they kept for them, while their recipients will receive the money they decided to send to them."**

⁷Of course, one can argue that the magnitude of other-regarding behavior can be inflated, because of the fact that not all participants receive real monetary stakes. First, even in a completely hypothetical DG the evidence that the magnitude of other-regarding behavior will change compared to a DG with real stakes is not conclusive enough. For instance, Ben-Ner et al. (2008) illustrate that the behavior of allocators across incentivized and hypothetical dictator games is remarkably similar. Second, even if the magnitude of other-regarding behavior is inflated, it is so across all treatments. Hence, if all players get paid, one may evidence a decreasing trend in the average behavior with respect to the current experiment, but there is no prior reason to believe that the direction of the effects of treatment manipulations will differ compared to those in the current paper.

⁸80 other “turkers” participated in the experiment as recipients for “Standard & Loss” treatment. They took part in the task mentioned in “Standard & Loss” treatment. By clicking NEXT 40 of them ended up with \$0, while the other 40 ended up with \$10. The recipients of “Standard” treatment were randomly chosen from the population of “turkers” that worked for me for other, unrelated tasks.

⁹8 answers were rejected.

Standard & Loss”, 40 observations in “Poverty” and 37 observations in “Poverty & Loss” treatments . There are gender differences neither across “Standard” and “Standard & Loss” ($\chi^2=1.367$, p-value=0.242) nor across “Poverty” and “Poverty & Loss” treatments ($\chi^2=0.09$, p-value=0.76). Homogeneity in this variable is important, as previous evidence suggests that other-regarding preferences may be heavily influenced by the gender of the decision maker (Eckel and Grossman, 2008).¹⁰

4.1 “Standard” vs. “Standard & Loss”

Result 1: On average, other-regarding preferences of the dictator are not offset by loss in “Standard & Loss” treatment

Figure 2 illustrates the mean value of allocations in “Standard” and “Standard & Loss”.

[Figure 2]

The mean allocation in “Standard” equals to \$5.865 (39.100% of the endowment). The average is higher than usually evidenced in the laboratory setting (roughly 20%-30% of the endowment), albeit quite close to the average behavior found in DG played via AMT (around 33% of the endowment). The mean allocation in “Standard & Loss” equals to \$2.243 (44.865% of the endowment). Mann-Whitney U test cannot find significant differences in dictator behavior across “Standard” and “Standard & Loss” ($W=570.5$, p-value=0.212).¹¹ Figure 3 depicts the frequency of the allocations in the two treatments.

[Figure 3]

¹⁰Unfortunately I missed questions on age and education.

¹¹ The observations are individual donations on a percentage scale.

As it can be inferred from the figure, the amount of pure selfish allocators substantially increases, reaching from 1 in “Standard” to 7 in “Standard & Loss”. Interestingly, there are 6 allocators in “Standard & Loss”, that send their whole endowment to the recipient in contrast to 1 allocator in “Standard”. Such a behavior can be attributed to diminishing sensitivity to loss: the marginal effects in perceived well-being for changes close to one’s reference point are higher than for changes further away (Rabin, 1998). Hence, after having lost \$10, the allocator may be (almost) indifferent between keeping \$5 or giving it away, under the assumption that the initial message triggers a substantially high benchmark for a possible earning in case of \$15 endowment (i.e. no loss).

However, in both treatments, the vast majority of allocations are in the “fairness” range of [20%-50%], with the 50-50 split being more preferred in “Standard & Loss”, than in “Standard”.

4.2 “Poverty” vs. “Poverty & Loss”

Result 2: On average other-regarding preferences of the dictator are not offset by loss in “Poverty & Loss” treatment

Figure 4 illustrates the mean value of allocations between “Poverty” and “Poverty & Loss”.

[Figure 4]

The mean allocation in “Poverty” equals to 11.125\$ (74.167% of the endowment), while the mean allocation in “Poverty & Loss” equals to 3.58\$ (71.620% of the endowment). A non-parametric Mann-Whitney U test does not detect significant differences across treatments ($W=742$, $p\text{-value}=0.99$).¹²

¹² The observations are individual donations on a percentage scale.

Figure 5 depicts the histograms of allocations in “Poverty” and “Poverty & Loss”.

[Figure 5]

In “Poverty” 50 % of the Dictators (20 out of 40) choose to donate their full endowment to the poor recipient. 72.5 % of the dictators favor the recipient, opting for allocation decisions where more than half of the pie goes to the latter (29 out of 40). The results are similar to the “Poverty Condition” of Brañas-Garza (2006, p. 315), where the dictators, on average, donated $\frac{2}{3}$ of their endowment, with 40% of the whole sample exhibiting purely altruistic motives and 66.3% donating more than €7.5. In “Poverty & Loss” the quantity of dictators, who choose to donate their full residual endowment, is roughly the same in comparison with “Poverty” (21 out of 37, 56.757%). Moreover, the quantity of dictators, who opt for allocations that favor the recipients, does not bare significant changes as well (24 out of 37, 64.865%).

5 Conclusion

To my knowledge, the paper is one of the first to tackle social preferences of decision makers in the domain of losses in economic games. Two research questions are investigated. First, how will the dictator divide the pie in a DG, where both he and an anonymous recipient suffer simultaneous loss of equal amount before the allocation decision? Second, how will the dictator divide the pie with a poor recipient from a third world country after a bi-directional loss, where the loss of the recipient is bigger than that of the dictator?

Interestingly, the results reject the hypothesis, that self-interest looms larger in the domain of losses (at least in DG of the current paper). Neither in “Standard & Loss” nor in “Poverty & Loss” allocators act as outcome oriented, selfish individuals. An intriguing question is why such behavior occurs.

According to the “social utility model”, the decision makers extract utility from two sources: a) an absolute payoff component, reflecting the value of own outcome to the individual and b) comparative payoff component, reflecting the value an individual attaches to the outcomes of other interested parties in comparison with that of his own (e.g. Blount, 1995). Moreover, the power differential between the decision maker and his counterpart triggers feelings of social responsibility increasing the weight of the comparative payoff component in the utility function of the decision maker. Van Dijk and Vermunt (2000) illustrate that the fact that the recipient is powerless and can be easily exploited in DG induces allocators to act in a pro-social manner and conclude that “exploiting the powerless may be as easy as “stealing candy from a baby,” but, like the actual theft of a baby’s candy, increasing one’s own outcomes at the expense of the powerless may be considered as an inappropriate act” (page 19). In this vein, using a modified UBG, Handgraaf et al. (2008) testify negative relationship between recipients’ power and allocators’ offers: allocators act in a self-centered manner, if power difference shifts in their favor. Nevertheless, as soon as the recipients lose all their power (i.e. the modified UBG is converted to DG), the allocations become benevolent.

In case of a loss the interdependence between the dictator and the recipient is preserved: the dictator still possesses all the power residing within him, while the recipient can be easily exploited. Consequently, moral considerations and social responsibility of the dictators due to power asymmetry between the counterparts result in other-regarding allocations even in DGs with monetary losses. Such a conjecture is consistent with response justifications of the allocators, designed to uncover their internal perspective. Both in “Standard” and “Standard & Loss” allocators reveal concerns for their counterparts: *“I wanted to keep a large portion, but also be generous to a stranger”, “This way we both get something good out of it”, “Why not? It seemed fair. The golden rule, you know”, “I felt bad that they ended up with nothing and I wanted to be fair and share some of my endowment”, “He lost all his money”, “Hopefully, by splitting it in half, we would each*

end up with something".¹³ Furthermore, the more powerless the recipients become, the more are the allocators concerned for their counterparts: *"If I keep, it's barely anything, but it's half a month's pay for them"*, *"I feel the money that I give will help out a lot. It's a good feeling to help others in need"*, *"The person described needs the money more than I do"*, *"The person needs the money more than I do. I would love to help them. :)"*, *"I have plenty so I am willing to give a large amount of my money"*.¹⁴

To conclude, the data illustrate, that bi-directional loss on average does not vanish other-regarding motives of the allocators (at least in the current experiment).

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¹³The first three responses refer to "Standard", while the last three to "Standard & Loss"

¹⁴The first three responses refer to "Poverty", while the last two to "Poverty & Loss"

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6 Appendix

A Figures

Figure 1: The Structure of the On-line Experiment

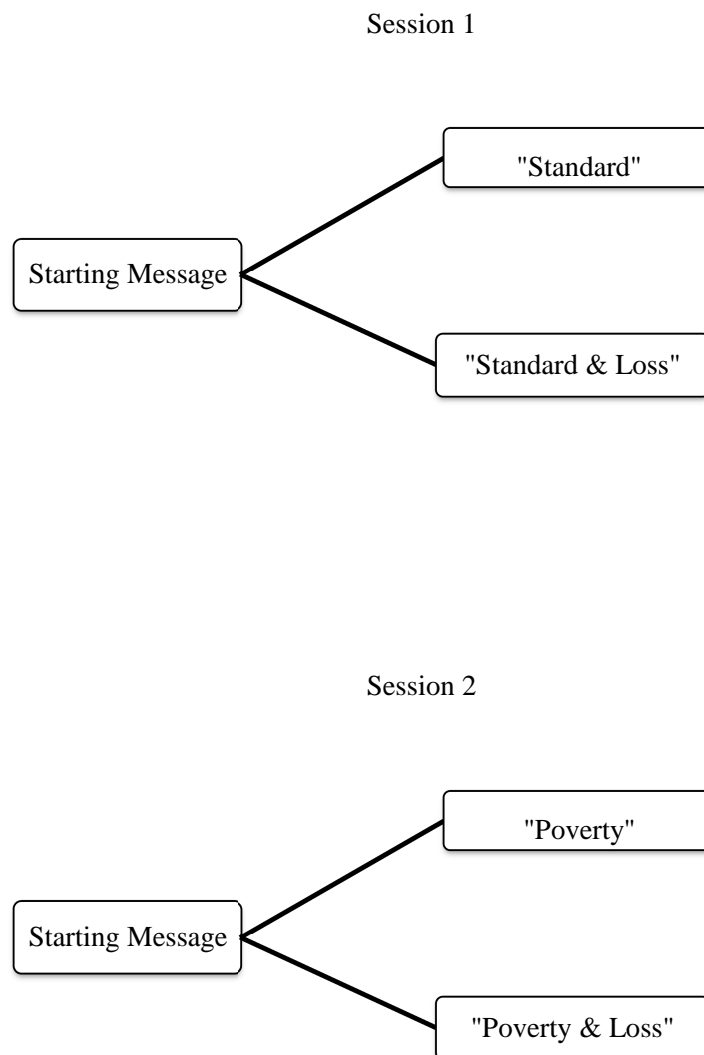


Figure 2: Mean Value of Allocations in “Standard” and “Standard & Loss”

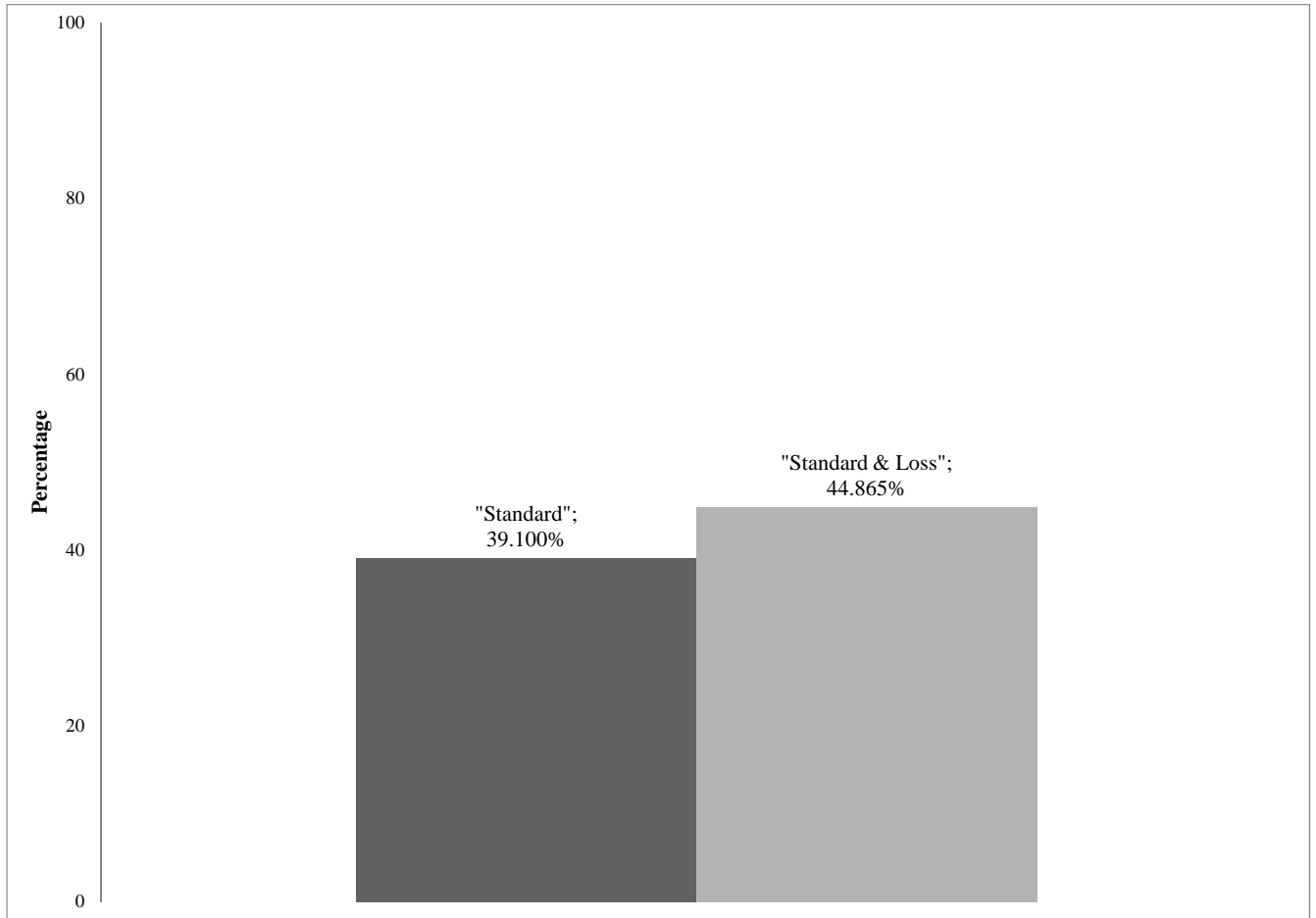


Figure 3: Histograms of Allocations in "Standard" and "Standard & Loss"

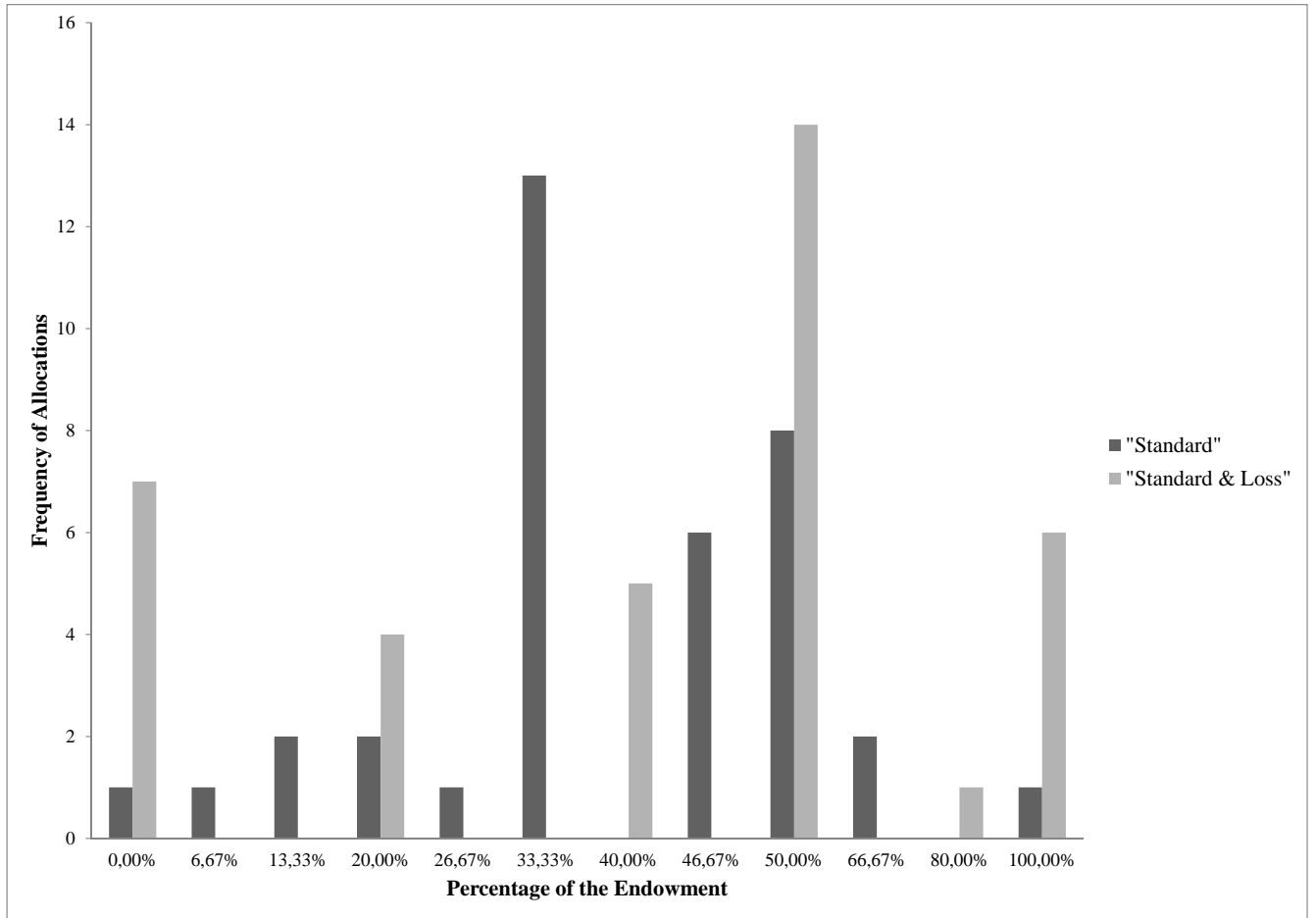


Figure 4: Mean Level of Allocations in “Poverty” and “Poverty & Loss”

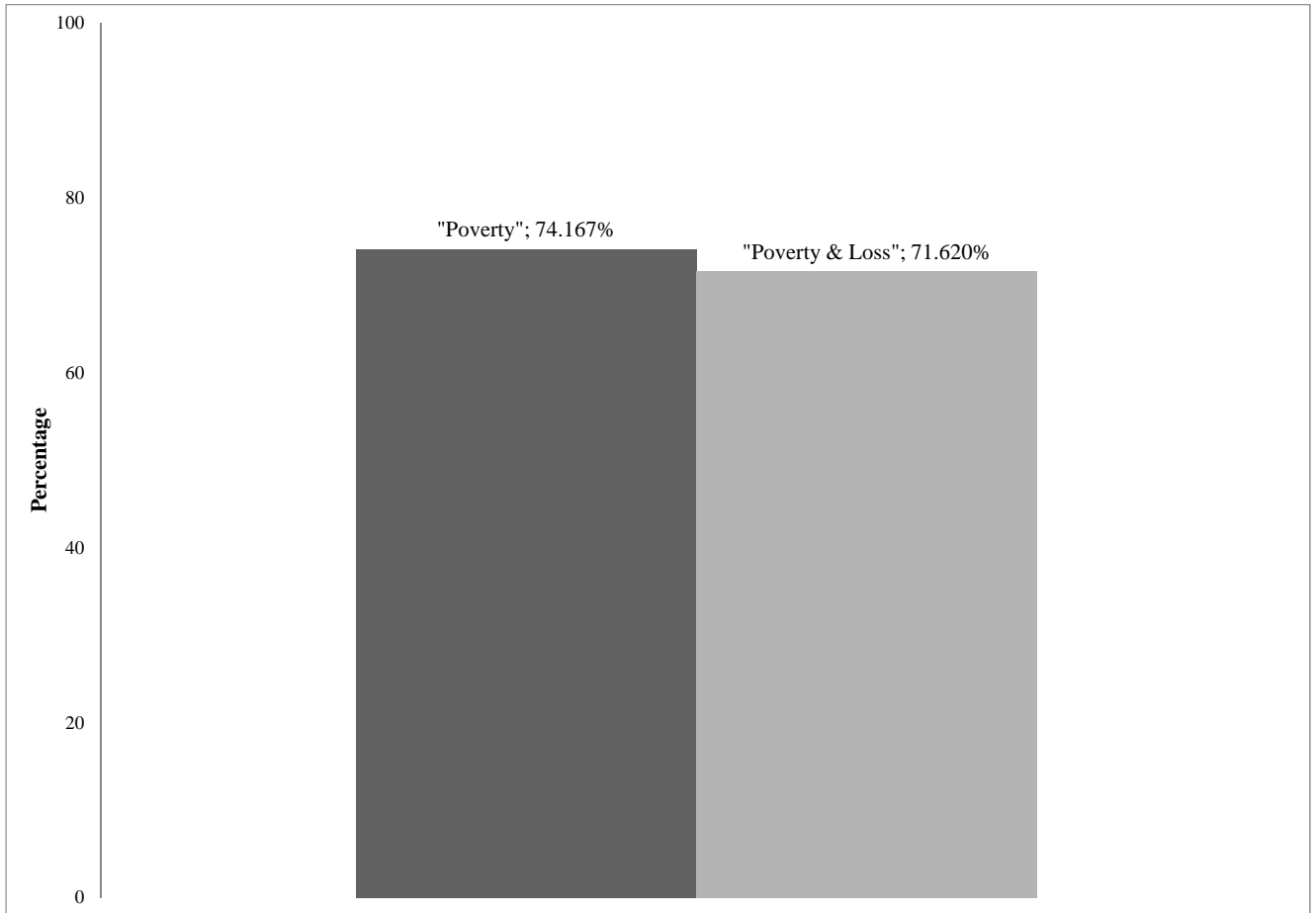
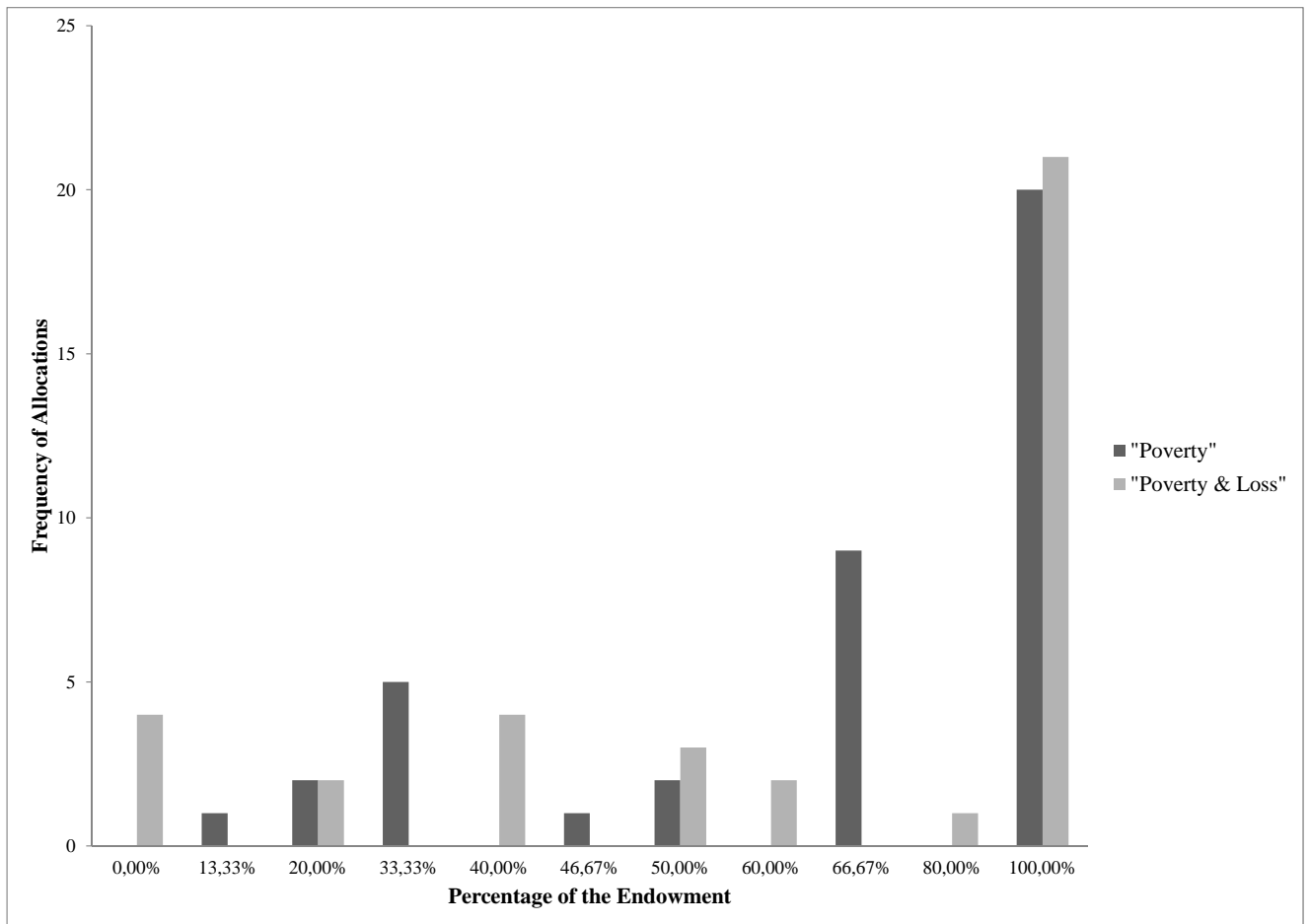


Figure 5: Histograms of Allocations in "Poverty" and "Poverty & Loss"



Public Good Provision, Punishment and the Endowment Origin: Experimental Evidence

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Abstract

We study contributions and punishment in a linear public goods game, where group members differ in the sources of their endowments. We compare homogenous groups in which subjects are exogenously assigned to the same endowments with heterogeneous groups in which half of the group members invest real effort to earn their endowments, while the other half are granted with a windfall amount of equal size.

We illustrate, that independent of group composition, free-riding becomes the ubiquitous form of behavior over time if group members cannot sanction each other. If punishment opportunity is present, contributions constantly increase over time, albeit we find differences neither in contributions nor in received punishment points across heterogeneous and homogenous groups. Furthermore, we also manifest that different subject types make similar contributions in heterogeneous groups. We conjecture that effort invested to earn the endowment seems not to cause conflicting normative views on appropriate contributions among subject types.

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Nevertheless, within heterogeneous groups subjects, who exert real effort to earn their endowments, punish less severely than those receiving windfall endowments.

Keywords: Endowment Origin, Linear Public Goods Game, Punishment

JEL Classifications: D63, H41, C91, C92

1 Introduction

In the society cooperation among entities with differential characteristics is a norm, rather than an exception. A notable example of cooperation among heterogeneous agents is that of Israeli kibbutz, where a common pool of resources created by community members was divided equally, with each member of kibbutz receiving an equal share, regardless her ability and effort (Abramitzky, 2008). In the mentioned example informal social sanctions are the main mechanism to mitigate the social dilemma, as no legal enforcement exists to deter free-riders unwilling to contribute to the public pool of resources. In this vein kibbutzim were effective in implementing peer pressure through negative emotions to stigmatize the shirking members: “Nobody said a word to him. But in the evening, in the dining hall, the atmosphere around him was such that the following morning he got up and left the *kvutza* [kibbutz]” (Near 1992, p. 38, cited in Abramitzky, 2008, p. 1148).

In general, when evaluating her contribution to the public good with those of other group members, an individual may be guided by either *equality* or *equity* norms of contributions (Reuben and Riedl, 2013). In public goods game with homogenous groups and punishment opportunity, where all individuals possess equal windfall endowments and extract the same benefits from the public good, equal contribution rule seems to be the norm, with any (positive or negative) deviation from the equality rule being subject to costly sanctions (e.g. Fehr and Gächter, 2000, Herrmann et al., 2008). In heterogeneous groups, where different subject types interact with each other, it is not obvious what con-

tribution rule will be established (and whether it will be established at all) (Nikiforakis et al., 2012, Reuben and Riedl, 2013). For instance, all other things equal, when individuals differ in the effort exerted to obtain the same endowment, a normative conflict may emerge. In particular, individuals exerting considerable effort to earn the endowment may be guided by equity contribution rules and perceive as genuinely fair that those investing low effort should make larger contributions (e.g. Winter et al., 2012). Meanwhile, low effort individuals may conform to less demanding social norms (e.g. Elster, 1989 and references therein) and contribute according to the equality contribution rule. Hence, which contribution norm will emerge during the interaction (and whether it will emerge at all) may be contingent on how the interested parties will enforce it over time and react to others' behavior.¹

In this paper, we study the behavior (contributions and punishment) of individuals in a linear public goods game, where (all other things equal) the endowment sources of group members are heterogeneous. For our purposes we design an experiment, with a 2x2 between subjects factorial design. On the one hand we manipulate the endowment source, comparing homogenous treatments (HOM) in which subjects are exogenously assigned to the same endowments with heterogeneous ones (HET) in which half of the group members invest real effort to earn their endowments (henceforth, "effort subjects"), while the other half are granted with a windfall amount of equal size ("windfall subjects"). On the other hand we either allow punishment opportunity (P) or exclude it (NP). The rest of the experiment replicates that proposed by Fehr and Gächter (2000).²

In heterogeneous groups without punishment opportunity, similar to Reuben and Riedl (2013), we evidence low and decreasing contribution levels, as "...there is no *a priori* reason to assume that general willingness to comply varies with the type of group hetero-

¹In the rest of the paper, when mentioning equity or equality rules of behavior, we refer to differences between subject types.

²We only consider groups with partner matching. Moreover, in line with the seminal paper by Fehr and Gächter, in our experiment group members cannot identify each other's type.

geneity...”.

In heterogeneous groups with punishment opportunity we document equal contribution levels by effort and windfall subjects. With respect to sanctions, the more an individual negatively deviates from the contributions of her group members the more she gets punished. Comparing contributions and received punishment points between homogenous and heterogeneous groups, we manifest non-significant differences. Based on a post-experimental question, we conjecture that such behavior stems from the fact that the subjects do not perceive differences in endowment origins as a source for divergent contribution rules conditional on a subject type.

Analyzing punishing behavior within heterogeneous groups only, we also illustrate that exerting effort in earning the endowment makes the subjects reluctant to sanction less cooperative behaviors: in heterogeneous groups effort subjects punish negative deviations of the peers less severe than windfall subjects (without knowing their type). As earning one’s endowment increases its subjective valuation (Muehlbacher and Kirchler, 2009), we presume that an assigned point is more costly for an effort than for a windfall subject, which results in the observed behavior.

The rest of the paper is structured as follows. Section 2 presents a brief literature review. Section 3 depicts the experimental design. Section 4 provides the results and section 5 concludes.

2 Literature Review

Experimental literature evidences that income source can have salient influence on individual behavior. In particular, earning own endowment may create property rights over the latter, which may vanish other-regarding preferences of individuals. For instance, in dictator games, where the allocators exert effort to earn their endowments, the average offer can be in line with the theoretical prediction of the game (e.g. Cherry et al., 2002,

Oxoby and Spraggon, 2008).

The issue of “earned *vs.* windfall” endowments has also been considered in the context of public goods game with non-conclusive results, evidencing that “...the role of asset legitimacy in experimental environments is both nuanced and context dependent (Oxoby and Spraggon, 2009, page 102)”. In homogenous groups, where all group members have to exert effort to earn their endowments, Clark (2002), Cherry et al. (2005) find no evidence that “the house money effect” alters the contributing behavior of individuals. Re-examining the data by Clark (2002), Harrison (2007) concludes that “the house money effect” changes the propensity to completely free-ride, but has no influence on the extent of the contribution, once the subject has decided to contribute something. Two recent papers study contributions in heterogeneous groups, where group members differ in the sources of their endowments. Muehlbacher and Kirchler (2009) investigate whether the effort invested into earning endowments for a public goods game affects the participants’ levels of contributions. The authors illustrate that contributions are in negative correlation with the effort exerted to obtain the endowments: the group members who earned their endowments through a greater amount of effort were less cooperative than the group members who earned the money with relative ease. In contrast, Oxoby and Spraggon (2009) find “inverse found money effect” in two-person public goods game: individuals, who earn their endowments, contribute more when they are matched with those, who receive windfall endowments.

Our paper departs from abovementioned references in several directions. First, unlike previous research on homogenous groups (i.e. Clark, 2002, Harrison, 2007), our focus is on heterogeneous ones. Such research agenda brings us close to the studies by Muehlbacher and Kirchler (2009) and Oxoby and Spraggon (2009). Nevertheless, departing from the latter, we i) investigate a multi-period public goods game, ii) introduce punishment opportunity into our framework and study the interplay between contributions, punishment and the endowment origin. Under these circumstances, we can also

understand the connection between effort exerted to earn the endowment and the propensity to punish, which to the best of our knowledge is understudied, despite the extensive literature on public goods games and punishment of free-riders.

The heterogeneity of group composition, the multi-period horizon of the game and the opportunity to sanction free-riders relate our work to the recent research by Nikiforakis et al. (2012) and Reuben and Riedl (2013). The latter study contributing and sanctioning behavior of individuals in heterogeneous groups, where different behavioral rules co-exist, creating a normative conflict among group members. In these studies normative conflict is conjectured to arise between equity and equality rules of contribution. Equality contribution rule implies equal contributions by group members, which in a linear public goods setting transfers into equal earnings. Meanwhile, equity contribution rule suggests contributions according to individual characteristics, which in a linear public goods setting transfers into different earnings among group members. For instance, should the group members who extract more utility from the public good contribute more than the others (all other things equal)? Should rich group members contribute more to the public good than poor group members, if everyone enjoys the same benefits from the public good? Should the group members who exert considerable effort for their endowments contribute as much as the group members, who receive their endowments as a windfall gift, if the benefits from the public good are equal?

Reuben and Riedl (2013) consider three sources of heterogeneity: i) differences in endowments (UUE treatment), ii) differences in endowments interacted with differences in contribution capacities (URE treatment) and iii) differences in marginal benefits from the public good (UMB treatment). The authors illustrate that without punishment possibilities group heterogeneity is of no relevance; in all treatments free-riding is common and increases over time. Nevertheless, with punishment opportunity distinct contribution norms are established due to the adopted enforcement strategy. A notable exception is the UMB treatment, where individuals cannot agree on a contribution norm. Similar

source of heterogeneity boils the disagreement among group members down to a feud in the framework of Nikiforakis et al. (2012), fully offsetting the efficiency gains from increased cooperation.

In our paper, we introduce a novel source of heterogeneity: differences in effort required to earn the endowments. Half of the group members receive their endowments conditional on succeeding in a real effort task, while the other half receive their endowments as a windfall gift. A point of departure between our study and the abovementioned references (i.e. Reuben and Riedl, 2013, Nikiforakis et al. 2012) is that group members cannot identify each other's type in our framework.

3 The Experiment

3.1 The Experiment

We adopt a 2x2 between subjects factorial design. On the one hand we manipulate the endowment source, comparing homogenous treatments (HOM) in which subjects are exogenously assigned to the same endowments with heterogeneous ones (HET) in which half of the group members invest real effort to earn their endowments (henceforth, "effort subjects"), while the other half are granted with a windfall amount of equal size ("windfall subjects"). On the other hand we either allow punishment opportunity (P) or exclude it (NP). Hence, we end up with 4 treatments: HOM&NP, HOM&P, HET&NP and HET&P. The rest of the experiment replicates that with partner matching proposed by Fehr and Gächter (2000).

3.1.1 Endowment Origin

The main difference between HOM and HET concerns the manipulation of the endowment origin. In particular, at the beginning of the experiment, subjects in HET are

randomly partitioned into groups of five, with three effort and two windfall members in each group. While the latter have their participation to the rest of the experiment assured, the continuation of the former is conditional on succeeding in a real effort, competitive task.³ The effort task is a 390-second digit-typing contest divided into three equal stages. In each stage, a different list of 56 10-digit numbers in 2 columns and 28 rows is presented to the subjects. The subjects are required to find a number in a row and a column and type it in an input field, with a correct input being worth 1 point. In all groups, the person obtaining the lower score in the real effort task leaves the lab with the show-up fee of 5 Euros. If present, ties are randomly broken.

We have chosen a "tournament" real effort task with the intent to make the differences between effort and windfall subjects sufficiently salient. The former, in contrast to their windfall group members (who are allowed to read a journal meanwhile), have not only to exert effort to obtain their endowments, but also to compete in a tense environment not to be the last in the group and leave the lab. We believe that such a specification is much "sharper" in comparison to a scenario, where competition among effort subjects is absent. Moreover, when taking part in the tournament, the subjects are not informed about the content and rules of the second phase of the experiment. Under these circumstances, "self-selection based on other-regarding preferences" is minimized (Erkal et al., 2011, Nikiforakis et al. 2012).

3.1.2 Punishment Opportunity

In the first stage, each subject chooses how much of an endowment of 20 tokens to invest in a public project that generates a return of 0.4 per invested token to all group members. Whatever not invested in the project is kept by the subject. At the end of the first stage, subjects are informed about the total contribution of the group, the return from

³There is no conventional wisdom on the nature of the task to be used (see Cherry et al. 2005).

the public project as well as their overall earnings in the stage. In the second stage, each subject observes individual contributions in her group. The main difference between P and NP conditions, is the opportunity to punish in the second stage. In particular in the second stage of P, having observed individual contribution in her group, every participant chooses whether and how much to punish each of the other group members. Every punishment point reduces the payoff of the punished subject by 10%. Inflicting punishment points is costly, with the cost of punishment being strictly increasing and convex in the number of inflicted points as shown by the following table.⁴

[Table 1]

To prevent individual reputation formation, which may interact with the endowment origin in unpredictable ways, we exclude the possibility that the subjects can identify each other (including the types) in line with the previous studies (e.g. Fehr and Gächter, 2000, Nikiforakis, 2010).⁵

At the end of the second stage in P condition the subjects are provided with feedback on the aggregate cost of assigning points, the number of points inflicted by the other group members and the payoff of the second stage (i.e. income from the round).

⁴Since punishment is a costly activity, rational money maximizers will not exercise it to sanction their group members neither in single-shot nor in multi-shot interactions. Anticipating such behavioral pattern, all rational money maximizers will defect, when contributing to the public good. Hence, the theoretical prediction of the linear public goods game will not change, irrespective of the introduction of the punishment condition. Nevertheless, there is robust evidence that group members are highly prone to punish defectors, even if the punishment is costly for them and will not provide any material gain in the future (Fehr and Gächter, 2002).

⁵“To prevent the possibility of individual reputation formation across periods in the Partner treatment each subject’s own contribution is always listed in the first column of his her computer screen and the remaining three subjects’ contributions are *randomly* listed in the second, third or fourth column, respectively. Thus subject i does not have the information to construct a link between individual contributions of subject j across periods. Therefore subject j cannot develop a reputation for a particular individual contribution behavior. This design feature also rules out that i punishes j in period t for contribution decisions taken in period $t' < t$ (Fehr and Gächter, 2000, page 983)”.

4 Results

The experiment took place at the University of Innsbruck between December 2012 and January 2013. The experiment was computerized by using z-Tree (Fischbacher, 2007). Overall 216 subjects (48 in HOM treatments, 60 in HET treatments, for a total of 12 independent groups per treatment) participated in the experiment. On average, subjects earned around 16 Euros for sessions lasting about 80 minutes.

4.1 No Punishment Condition

Without punishment opportunity, over time full free-riding emerges as the common social norm, irrespective of the group composition.

Figure 1 depicts average per period contributions in HOM&NP and HET&NP.

[Figure 1]

In both treatments the game starts with an approximate contribution of 10 tokens and ends with that of 3 tokens. A non-parametric Mann-Whitney U test ($W=69$, $p=0.887$) does not find significant differences across treatments.⁶ Consistent results emerge by performing formal parametric analysis.

[Table 2]

As it can be inferred from *HET* dummy in the first two regressions of Table 2, there are no differences between treatments with respect to contributions. Moreover, the insignificant coefficient of *Effort* in regressions 3 and 4 illustrates that endowment source

⁶Observations are average contributions of the groups over the entire time horizon. As we have 12 groups per treatment, we end up with 12 independent observations for each treatment.

does not affect contributing behavior of individuals in heterogeneous groups.⁷ Contributions decrease over time, which is reflected in negative and significant coefficient of *Time*.

4.2 Punishment Condition

Despite the presence or absence of heterogeneity in the group, punishment is an effective tool to deter free-riding.

As depicted in Figure 2, contributions increase over time in both HOM&P and HET&P.⁸

[Figure 2]

Mann-Whitney U test detects significant differences between HOM&P and HOM&NP ($W=130$, $p=0.000$) and HET&P and HET&NP ($W=121$, $p=0.000$). In contrary, there is no significant difference between HOM&P and HET&P (Mann-Whitney U test, $W=49$, $p=0.198$).⁹ Consistent result emerges by performing formal parametric analysis as well. We estimate two-way linear random effect models that take into account both potential individual dependency over time and dependency within each matching group. In the first regression we compare contributions between HOM&P and HET&P treatments by introducing *HET* dummy, while in the second regression we capture the differences in the time trends by the interaction term *Time*HET*. Similarly, we introduce *Effort* dummy and *Effort*Time* interaction term, in order to examine differences in contributions of effort and windfall subjects within HET&P and to test for divergence in time trends depending

⁷The graphical illustration of this result is depicted in Appendix C (Supplementary Analysis)

⁸The contribution level in the first period is approximately 10 tokens, which steadily increases over time, reaching to 13.625 and 17.458 tokens in the terminal round of HET&P and HOM&P, respectively.

⁹Observations are average contributions of the groups over the entire time horizon. As we have 12 groups per treatment, we end up with 12 independent observations for each treatment.

on a subject type.

[Table 3]

After controlling for other determinants, the treatment effect is not significant (the first two regressions in Table 3). Interestingly, as shown by the negative and significant coefficient of *HET*Time* and graphically illustrated in Figure 2, time trends in the two treatments are significantly different from each other. Regarding relative contribution rules, there are no significant differences in contributions of effort and windfall subjects, as shown by the coefficient of *Effort* (the last two regressions in Table 3).¹⁰ Hence, equality contribution rule seems to prevail between subject types in HET&P.

As a next step we analyze the use of punishment as a mechanism to deter free-riding. First, we check punishment severity in the first two periods, when contributions in the two treatments on average are the same. In fact in HET&P treatment on average 1.104 points are assigned in contrast to 2.208 points assigned in HOM&P. The difference is statistically significant according to Mann-Whitney U test ($W=34$, $p=0.030$).¹¹ Hence, the divergence of contribution trajectories over time discussed in the previous paragraph can be most probably attributed to differences in punishment behavior in the beginning of the game. Second we proceed to parametric analysis. Table 4 reports results on the determinants of the received points in the two treatments based on two-way linear random effect models, that take into account both potential individual dependency over time and dependency within each matching group. Variables in the regression models are specified in line with the existing literature (e.g. Fehr and Gächter, 2000, Nikiforakis, 2010) in order to check how deviations from contributions of one's peers affect the punishment

¹⁰The graphical illustration of this result is depicted in Appendix C (Supplementary Analysis)

¹¹Observations are group averages over 2 periods. Hence we have 12 independent observations per treatment.

behavior. Additionally, we include *HET* dummy to examine differences in received punishment points and an interaction term *Abs. negative dev.*HET* to capture the severity of punishment of negative deviations across HOM&P and HET&P treatments.

[Table 4]

In both treatments, sanctions seem to follow the logic of equality contribution rule. First, the insignificant coefficient of *HET* suggests that there are no differences between treatments. Second, an individual is sanctioned, if she contributes less than her group members, which is captured by the significant and positive coefficient of *Abs. negative dev.*¹² Finally, received points decrease over time.

To understand how different subject types use punishment (i.e. punish), we fix our attention on HET&P treatment only. For our purposes we change the metric of analysis from received points to assigned points.¹³ Following Nikiforakis (2010) we estimate a hurdle model where the decision to punish (Punishment Decision) is modeled separately from the decision of how much to punish (Assigned Points). Table 5 reports the results of the two-stage estimation.

[Table 5]

We do not observe any difference in the decision to punish between effort and windfall subjects, as captured by the non-significant coefficient of the *Effort* dummy in the first column. Nevertheless, as shown in the second column, effort subjects, who cross the hurdle, punish less severely than windfall punishers.

¹²Interestingly, the intensity of punishment of deviant behavior is less in HET&P than in HOM&P, as illustrated by the significant negative coefficient of *Abs. Negative dev.*HET*.

¹³Given that subject types cannot be identified in our framework, we cannot analyze how subjects get punished according to their type.

5 Concluding remarks

We study the behavior of individuals in a linear public goods game, where, all other things equal, the endowment sources of group members are heterogeneous. In particular, two individuals in each group have to succeed in a real effort task in order to obtain their endowments (effort subjects), while the other two are given a windfall gift of equal size (windfall subjects). In light of the literature dealing with heterogeneous populations (i.e. Reuben and Riedl, 2013, Nikiforakis et al. 2012), such setting is of great interest to us, as it is not obvious *ex-ante* how group members will behave.

In heterogeneous groups without punishment we evidence low and decreasing contribution levels. Following the discussion by Reuben and Riedl (2013), the emergence of a contribution norm is conditional on sufficiently many people's compliance with the norm. Whenever free-riding cannot be sanctioned, a positive contribution norm will be followed if it is fully internalized. Nevertheless, if a fully internalized contribution norm is absent and it is not possible to punish defectors, non-cooperation will emerge as an ubiquitous form of behavior. Given that "... there is no a priori reason to assume that the general willingness to comply varies with the type of group heterogeneity... (page 128)", contributions follow a declining trend, with (almost full) free-riding in the terminal periods.

In heterogeneous groups with punishment opportunity we could not find differences between contributions of effort and windfall subjects. Regarding sanctions, if a participant negatively deviates from the contributions of her group members, she gets punished, which is slightly more pronounced in homogenous than heterogeneous groups. Nevertheless, comparing received points between homogenous and heterogeneous groups, we manifest non-significant differences.

To explain our results, we hypothesize, that manipulation of the endowment origin does not trigger conflicting contribution rules between the subject types in our experiment, resulting in behavior in line with the equality rule. Our conjecture is motivated by a

post-experimental question, eliciting the fairness perceptions of participants regarding the experimental setting on a 7-point Likert scale. The mean responses of effort and windfall subjects are 4.04 and 4.087 respectively, with the difference being statistically non-significant according to a non-parametric Mann-Whitney U test ($W=270$, $p=0.715$, 48 observations at the subject level).¹⁴ Given that both subject types not only make similar contributions throughout the whole experiment but also perceive the manipulation of the endowment source as fair, we conclude that heterogeneous endowment origins do not create conflicting normative views on appropriate contributions among subject types.¹⁵ Such a result can be partially due to the fact that group members cannot identify each other's type in the experiment, making equal contribution rule the most salient behavioral norm. Nevertheless, it can also be the case, that heterogeneous endowment origins do not create conflicting normative rules. More research in this direction can spread additional light on this issue.

Comparing contributions across treatments, we manifest significant differences in time trends of contributions. Such a result may be attributed to the fact that punishment in the initial periods of the game is twice milder in heterogeneous than in homogenous groups. As a result, in the first period of homogenous treatment the efficiency loss because of punishment is 2.27 times higher than that in the first period of heterogeneous treatment. Nevertheless, over time punishment mechanism is much more efficient in homogenous groups than in heterogeneous ones. In particular, in the last period of the heterogeneous treatment efficiency gain from increased cooperation is approximately 2

¹⁴Subjects answered to the following question: *"You and 2 other group members of yours had to participate in the 'Contest Task' (the loser was leaving the experiment) to be allowed to participate in the 'Investment task', while the other 2 group members were not required to take part in the 'Contest Task' and directly participated in the 'Investment Task'. Please indicate how fair you consider the situation to be?"* (for windfall subjects the question was the same, albeit the role was reversed)

¹⁵According to Equity Theory (Adams, 1963), individuals compare their input-to-output ratio with that of a reference person or a group and suffer utility loss in case of differences. Equity theory would predict, that in our scenario effort subjects should earn more, for the situation to be fair. Nevertheless, in our experiment equal contributions imply equal earnings. Hence, if effort subjects are motivated by equity contribution rules, *equality* contribution rule should be perceived as unfair at least by effort subjects, as under these circumstances they are in an unfavorable situation vs. windfall subjects.

times less than that in the last period of homogenous treatment. In light of this discussion, it is important to check the long-run trajectories of contributions in homogenous and heterogeneous groups and assess, whether in heterogeneous groups long-term benefits of punishment are as efficacious as in homogenous groups (e.g. Gächter et al., 2008).¹⁶

Finally, we also illustrate that investing effort in earning the endowment makes individuals reluctant to sanction free-riders. Conditional on the decision to punish, in heterogeneous groups, effort subjects punish less severely than windfall subjects. As the subjective valuation of the endowment increases in the effort exerted to earn the endowment (Muehlbacher and Kirchler, 2009), bearing the monetary cost of punishing is relatively more demanding for effort subjects than for windfall ones, which perhaps makes the former punish less severely than the latter.

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¹⁶In short-run, over 12 periods, efficiency gains from increased cooperation due to punishment are offset by costs of punishment both in homogenous and heterogeneous groups. Average earnings in HET&P and HOM&P treatments equal to 16.366€ and 16.520€ respectively. In comparison subjects in HET&NP and HOM&NP earn on average 15.463€ and 15.426€, respectively.

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6 Appendix

A Figures and Tables

Figure 1: Average Contributions in No Punishment Condition

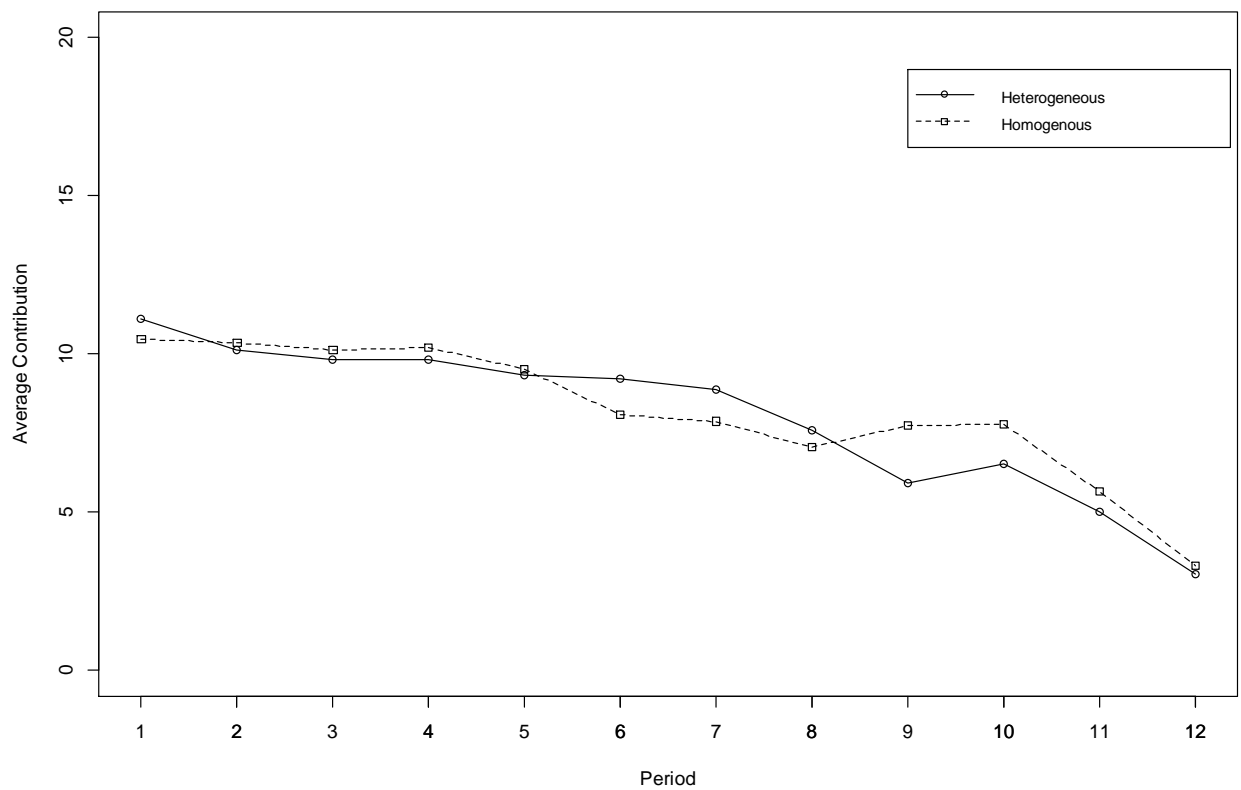


Figure 2: Average Contributions in Punishment Condition

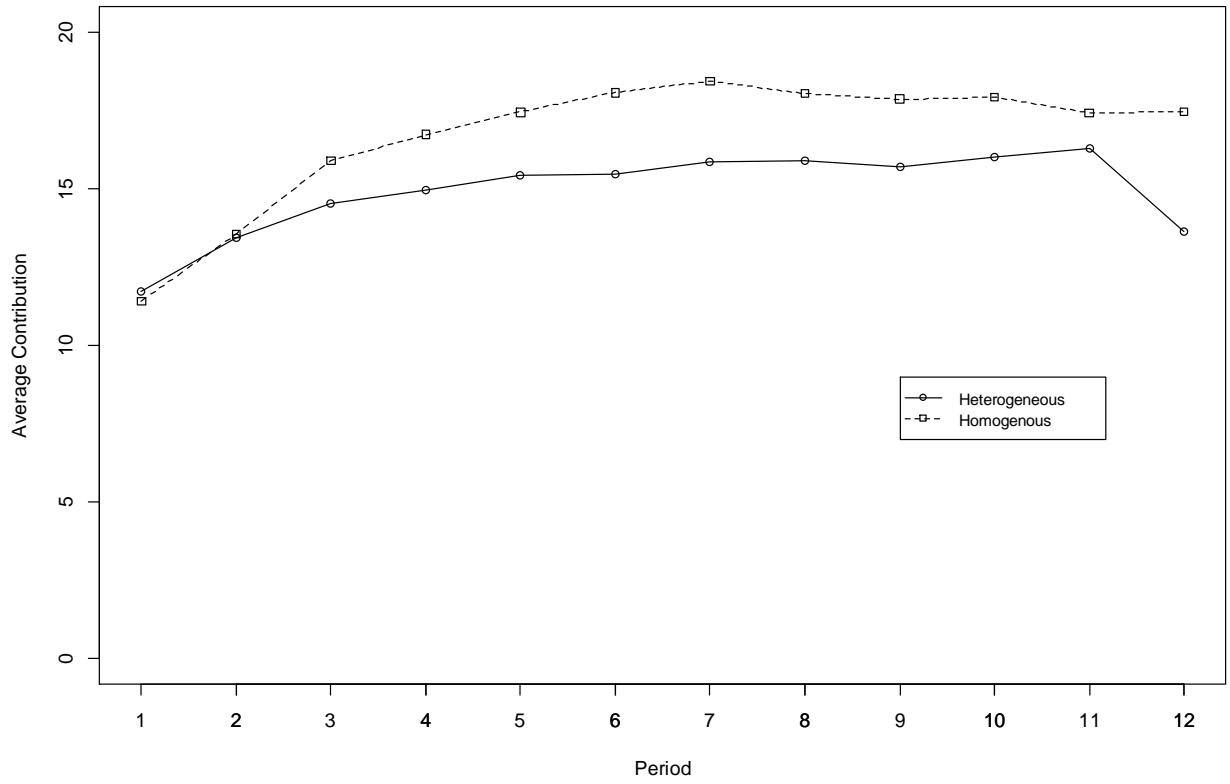


Table 1: The Monetary Cost of Punishing a Subject

<i>Punishment Points</i>	0	1	2	3	4	5	6	7	8	9	10
<i>Cost of Punishment</i>	0	1	2	4	6	9	12	16	20	25	30

Table 2: Contributions in HOM&NP and HET&NP

	(1) HOM&NP and HET&NP	(2) HOM&NP and HET&NP	(3) HET&NP	(4) HET&NP
Intercept	12.055*** (1.441)	11.759*** (1.468)	12.468*** (1.510)	12.293*** (1.552)
Time	-0.595*** (0.043)	-0.550*** (0.061)	-0.641*** (0.055)	-0.614*** (0.078)
HET	-0.146 (1.999)	0.447 (2.076)		
Effort			-0.524 (0.686)	-0.175 (0.994)
Het*Time		-0.091 (0.086)		
Effort*Time				-0.054 (0.111)
llr	-3581.933	-3582.905	-1737.862	-1739.026
Wald- χ^2	191.91	193.06	134.94	134.98
Prob.> χ^2	0.000	0.000	0.000	0.000
Obs.	1152	1152	576	576

Note. Two-way linear random effect model (standard errors in parentheses) accounting for both potential individual dependency over time and dependency within each matching group. Dependent variable: Subject's contribution to the public account. Independent variables: Time- Linear time trend; HET- treatment dummy which equals 1 in HET, 0 otherwise. Effort- dummy variable which equals 1 for effort subjects, 0 otherwise. Significance levels: * p<10%, ** p<5%, *** p<1%

Table 3: Contributions in HOM&P and HET&P

	(1) HOM&P and HET&P	(2) HOM&P and HET&P	(3) HET&P	(4) HET&P
Intercept	14.572*** (1.118)	13.875*** (1.139)	13.583*** (1.372)	13.488 (1.414)
Time	0.325*** (0.033)	0.432*** (0.047)	0.217*** (0.052)	0.232*** (0.074)
HET	-1.776 (1.551)	-0.382 (1.610)		
Effort			-0.180 (0.677)	0.009 (0.962)
Het*Time		-0.214*** (0.066)		
Effort*Time				-0.029 (0.105)
llr	-3291.094	-3287.723	-1708.930	-1710.226
Wald- χ^2	95.58	106.78	17.23	17.28
Prob.> χ^2	0.000	0.000	0.000	0.000
Obs.	1152	1152	576	576

Note. The same remarks of Table 2 apply.

Table 4: Received Points in HET and HOM

	(1)	(2)
Intercept	1.972*** (0.334)	1.681*** (0.330)
Time	-0.038*** (0.010)	-0.037*** (0.010)
Others' Average	-0.060*** (0.015)	-0.050*** (0.015)
Abs.negative dev.	0.279*** (0.011)	0.373*** (0.018)
Positive dev.	-0.009 (0.017)	-0.002 (0.017)
HET	-0.468 (0.319)	-0.273 (0.315)
Abs. negative dev. *HET		-0.140*** (0.022)
llr	-1777.188	-1760.172
Wald- χ^2	802.01	873.42
Prob > χ^2	0.000	0.000
Observations	1152	1152

Note. Two-way linear random effect model (standard errors in parentheses) accounting for both potential individual dependency over time and dependency within each matching group. Dependent variable: Received Points of a subject in each period. Independent variables: Abs. negative dev.-difference between mean contribution of group members and subject's contribution. Only defined if positive, otherwise 0. Positive dev.- difference between subject's contribution and the mean contribution of group members. Only defined if positive, otherwise 0. Others' Average- The average contribution of individual's group members in a given period. Significance levels: * p<10%, ** p<5%, *** p<1%

Table 5: Punishing Behavior in HET&P: Windfall vs. Effort Subjects

	Punishment Decision	Assigned Points
Intercept	-1.252*** (0.347)	1.248*** (0.277)
Time	-0.005 (0.010)	-0.052*** (0.019)
Others' Average	0.006 (0.024)	0.035* (0.019)
Abs. negative dev.	0.028* (0.016)	0.007 (0.018)
Positive dev.	0.088*** (0.023)	0.100*** (0.015)
Effort	-0.044 (0.121)	-0.157*** (0.080)
llr		-1054.043
Wald- χ^2	25.20	61.36
Prob > χ^2	0.000	0.000
Observations	1728	277

Note. Hurdle model. Dependent variable: punishing points assigned by a subject to each of the 3 group members. "Punishment Decision" is a probit with standard errors clustered at the group level. "Assigned Points" is a truncated linear regression with standard errors clustered at group level. The two parts are estimated separately and the likelihood function of the hurdle model is given by the products of the two separate likelihoods. The same remarks of tables 2,3 and 4 apply.

B Experimental Instructions

We provide the instructions for the HET&P treatment, which consists of the “Contest Task” and the “Investment Task” for reference. The instructions will be made available online. The instructions of the other treatments are similar, with treatment specific changes. The instructions were originally written in German. For the linear public goods game we used the instructions of Fehr and Gächter (2000).

Hello and thank you for your participation in the study!

Please do not communicate with each other!

Overall, the study consists of two phases: a “Contest Task” and an “Investment Task”. Some of you will directly participate in the “Investment Task”, while the others have to participate in the “Contest Task” first, in order to be allowed to participate in the “Investment Task” and get paid. A random generator will determine who has to participate in the “Contest Task” and who can start directly with the “Investment Task”. You will receive detailed instructions for each phase before the corresponding phase starts. If you have questions, please raise your hand we will assist you individually.

Those who have the worst result in the “Contest Task” will be granted with a consolatory fee of 5 Euros and will leave the lab. The other participants of the “Contest Task” can proceed with the “Investment Task”.

The study unfolds as follows: a. The participants of the study, who are those sitting in the lab, are divided into groups of 5. Please note that you will never learn the identity of your other group members and your other group members will never learn your identity. Therefore, it is not possible to associate your decisions to your person. b. In each group 3 individuals will participate in the “Contest Task” in order to gain right to participate in the “Investment Task”. c. Only 2 individuals out of 3 taking part in the “Contest Task” will be allowed to participate in the “Investment Task”. The individual, who has the worst result in the contest, will be given a consolatory fee of 5 Euros and leave the lab. If there are ties,

a random draw will define the loser. d. The other 2 members of the group, who do not participate in the “Contest Task” and have their place assured in the “Investment Task”, are allowed to read a magazine, while the three individuals participate in the contest. The magazines are already on all the experimental tables.

If you agree with the procedure we will move forward to the “Contest Task”. Otherwise, if you do not agree with the procedure please raise your hand, as soon as we ask you to do so. Please, note that if you object, you will be expelled from the experiment and have to leave the lab, without getting paid anything.

The Contest Task

As already mentioned 3 members of each group have to participate in the “Contest Task” in order to gain right to participate in the “Investment Task” while the other 2 group members can read a magazine meanwhile and are allowed to participate in the “Investment Task” directly.

In the “Contest Task“ you have to find the right numbers and tip them into the computer. You will receive a list with 56 numbers and you will be asked to tip 10 of the 56 numbers into specific input boxes (see screenshot 1). Your time limit for this task is 130 seconds. If you have tipped numbers into all input boxes before the 130 seconds are over you can click on the “Next” button and you will receive the second list with 56 numbers. If you have not tipped numbers into all the input boxes after 130 seconds the next list will appear automatically. All in all you will receive 3 lists with 56 numbers and 10 input boxes each and you have 130 seconds per list to tip numbers into the input boxes.

In this “Contest Task” you compete against two other members of your group. All participants of the “Contest Task” will get identical lists and have to tip identical numbers into the input boxes.

Screenshot 1: The Contest Task

Periode				Verbleibende Zeit[sec]: 129	
Nummern	Nummern				
553030375	780359164				
471785646	293218135	Spalte 1 Zeile 14	<input type="text"/> <input type="button" value="OK"/>	Ihre Eingabe:	7777
332488201	767639564				
739374352	266003130				
144086034	577092231	Spalte 2 Zeile 9	<input type="text"/> <input type="button" value="OK"/>	Ihre Eingabe:	0
475889788	493533735				
922883785	365283307				
953828349	859447290	Spalte 2 Zeile 24	<input type="text"/> <input type="button" value="OK"/>	Ihre Eingabe:	0
908930910	807187596				
103023889	917418728				
313395704	271633326	Spalte 1 Zeile 9	<input type="text"/> <input type="button" value="OK"/>	Ihre Eingabe:	0
910364178	962039786				
327361405	666186319				
121243975	827871045	Spalte 2 Zeile 16	<input type="text"/> <input type="button" value="OK"/>	Ihre Eingabe:	0
238961005	535900335				
833504797	270478877				
201042679	480168820				
924282449	933506088	Spalte 1 Zeile 20	<input type="text"/> <input type="button" value="OK"/>	Ihre Eingabe:	0
203507780	954823336				
617885342	279646381				
971115358	183717903	Spalte 1 Zeile 3	<input type="text"/> <input type="button" value="OK"/>	Ihre Eingabe:	0
605427490	638374074				
132283857	129742296				
488288456	553576637	Spalte 2 Zeile 19	<input type="text"/> <input type="button" value="OK"/>	Ihre Eingabe:	0
208189359	668704709				
616012465	262954979				
211730765	349181818	Spalte 1 Zeile 1	<input type="text"/> <input type="button" value="OK"/>	Ihre Eingabe:	0
851586163	771540642				
603014874	412912272				
637610482	287342365	Spalte 1 Zeile 18	<input type="text"/> <input type="button" value="OK"/>	Ihre Eingabe:	0
904885047	165928477				

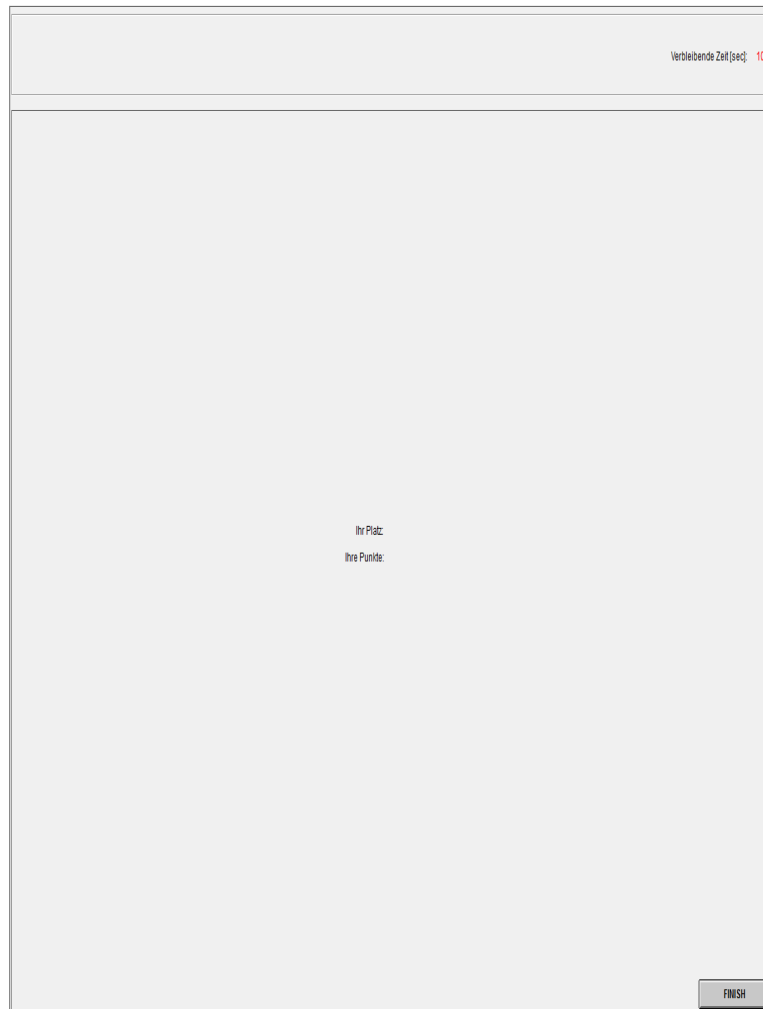
Right to the input box you see the number you already typed. You can change your entries as often as you want to. If you tip the correct number in the corresponding input box you will receive onetime a point. Therefore, it is not possible to increase your points by tipping the same number into the same input box several times. Please do not forget to confirm your entry with a click on the “OK” button. In the first two columns (“Numbers”) you see the 56 numbers. Right to the numbers you see the input boxes with the corresponding requests (for example: Column 1, Row 14). You are asked to tip the numbers corresponding to the requests into the input boxes.

“Column 1“ is the first column with numbers and “Column 2” is the second column with numbers (the columns are counted from left to right). The “rows” are the rows of the corresponding column. The rows are counted without the headline (“numbers”). As an example, let us consider the first request of screenshot 1. In this example (“column 1, row 14”) you are asked to tip the 14th number of the first column into the input box. To confirm your entry you have to click the “OK” button. After this your entry will be displayed right to the “OK” button. Our entry in the first input box of screenshot 1 was “77777”. You can change this entry by tipping another number into the input box and confirming the new entry with the “OK” button.

IT IS NOT NECESSARY TO DEAL WITH THE INPUT BOXES IN SEQUENCE. YOU CAN START WITH AN ARBITRARY INPUT BOX AND THEN PROCEED WITH AN ARBITRARY INPUT BOX.

At the end of the “Contest Task” you will learn your achieved points and your rank. The corresponding screen looks like screenshot 2:

Screenshot 2: Results of the Contest Task



Click the “Finish“ button after you have learned your points and your rank. Otherwise the screen will disappear after 10 seconds.

Subsequently, you will see one of the following screens:

a. In case you achieved the highest or the second highest score in your group, a screen identical to screenshot 3 will appear and you get a right to participate in the “Investment Task”.

Screenshot 3: You Won

Sie Haben Gewonnen!!!

b. In case you achieved the third highest score in your group, a screen identical to screenshot 4 will appear and you have to leave the experiment with a consolatory fee of 5 Euros.

Screenshot 4: You Lost

Sie Haben Verloren!!!

c. In case you achieved the second highest score together with another group member, a screen identical to screenshot 5 will appear. In this case a random generator will determine who has to leave the experiment with a consolatory fee of 5 Euros and who gets a right to participate in the “Investment Task”.

Screenshot 5: A Draw Between Two Group Members

Unentschieden mit einem anderen
Teilnehmer in Ihrer Gruppe!!

d. In case that all three of your group achieved the same score, a screen identical to screenshot 6 will appear and once again a random generator will determine who has to leave the experiment with a consolatory fee of 5 Euros and who gets a right to participate in the “Investment Task”.

Screenshot 6: A Draw Among All Group Members

Unentschieden zwischen allen
Teilnehmern in Ihrer Gruppe!!

After you have read these instructions once again individually, you will learn if you have to participate in the “Contest Task” or not.

The Investment Task

During the “Investment Task” we shall not speak of Euros but rather of Tokens. At the end of the study the total amount of tokens you have earned will be converted to Euros at the following rate:

1 Token = 3.5 Euro Cent

Each participant receives a lump sum payment of 20 tokens at the beginning of the “Investment Task”. This one-off payment can be used to pay for eventual losses during the “Investment Task”. However, you can always evade losses with certainty through your own decisions. At the end of the “Investment Task” your entire earnings from the “Investment Task” plus the lump sum payment and the show-up fee (5 Euros) will be immediately paid to you in cash.

As already told before, you were a member of a 5-member group. The group member, who obtained the lowest score in the “Investment Task”, left the study. Hence, in the “Investment Task” you are left with a 4-member group, two members of which participated in the “Contest Task”, while the other two did not. Please note that the composition of your group will remain the same throughout the “Investment Task”. Please note that you will never learn the identity of your other group members and your other group members will never learn your identity. Therefore, it is not possible to associate your decisions to your person.

The “Investment Task” is divided into different periods. In all, the “Investment Task” consists of 12 periods. There are two stages in each period. At the first stage you have to decide how many tokens you would like to contribute to a project. At the second stage you are informed on the contributions of the other three group members to the project. You can then decide whether or how much to reduce the earnings from the 1st stage by distributing points to them.

The following pages describe the course of the “Investment Task” in detail.

First Stage

At the beginning of each period each participant receives 20 tokens. In the following we will refer to this amount as the “endowment”. Your task is to decide how many of the 20 tokens of your endowment to contribute to a project and how many of them to keep for yourself (see screenshot 1).

Screenshot 1: Decision in Stage 1

Verbleibende Zeit [sec] 28

Periode 1-Stufe 1, "Ihre Wahl"

Ihre Ausstattung: 20

Ihr Beitrag zum Projekt

WEITER

In the top right corner you can see how many more seconds remain for you to decide on the distribution of your tokens. Your decision must be made before the time displayed is 0 seconds.

You have to decide how many tokens from your endowment (= 20 Tokens) you want to contribute to the project by typing a number between 0 and 20 in the input field. As soon as you have decided how many tokens to contribute to the project, you have also decided how many tokens to keep for yourself: This is $(20 - \text{"your contribution"})$ tokens. After entering your contribution you must press the OK button). Once you have done this

your decision can no longer be revised.

After all members of your group have made their decision a screen like in screenshot 2 will appear. This screen shows you:

- how many Tokens you have contributed to the project
- the total amount of Tokens contributed by all four group members
- how many Tokens you have earned at the first stage because of the tokens kept
- how many Tokens you have earned at the first stage because of the contributions to the project
- how many Tokens you have earned at the first stage in total

Screenshot 2: Results of Stage 1



Your income in stage 1 consists of two parts:

- 1) The tokens which you have kept for yourself ("Income from tokens kept").
- 2) The "income from the project" ("Your Income from the Project").

Your income through the project is calculated as follows:

= Your income from the project = $0.4 \times$ (the total contribution of all 4 group members to the project)

Your income in Tokens at the first stage of a period is therefore:

= $(20 - \text{Your contribution to the project}) + 0.4 \times (\text{total contributions to the project})$

The income of each group member from the project is calculated in the same way; this means that each group member receives the same income from the project. Suppose the sum of the contributions of all group members is 60 tokens. In this case each member of the group receives an income of $0.4 \times 60 = 24$ tokens from the project. If the total contribution to the project is 9 tokens, then each member of the group receives an income of $0.4 \times 9 = 3.6$ tokens from the project.

For each token, which you keep for yourself you earn an income of 1 token. Supposing you contributed this token to the project instead, the total contribution to the project would rise by one token. Your income from the project would rise by $0.4 \times 1 = 0.4$ tokens. However the income of the other group members would also rise by 0.4 tokens each, so that the total income of the group from the project would rise by 1.6 tokens. Your contribution to the project therefore also raises the income of the other group members. On the other hand you earn an income for each token contributed by the other members to the project. For each token contributed by any member you earn $0.4 \times 1 = 0.4$ tokens.

In all periods you have 35 seconds to view the income screen. If you are finished with it before the time is up, please press the NEXT button. The first stage is then over and the second stage commences.

Second Stage

At the second stage you now see how much each of the other group members contributed to the project. At this stage you can also reduce or leave the same the income of each group member by distributing points. The other group members can also reduce your income if they wish to. This is apparent from the input screen at the second stage:

Screenshot 3: Input Screen at the Second Stage

Verbleibende Zeit [sec]: 178

Periode 1-Stufe 2, "Wahl Ihrer Gruppenmitglieder und Vergabe von Punkten"

	SIE	Ihre Gruppenmitglieder		
	Sie bekommen 20 Tokens in jeder Periode, ohne an der Wettbewerbsaufgabe teilgenommen zu haben.	a) Gleich wie Sie, bekommt auch ein anderes Gruppenmitglied 20 Tokens in jeder Periode, ohne an der Wettbewerbsaufgabe teilgenommen zu haben. b) 2 andere Gruppenmitglieder haben an der Wettbewerbsaufgabe teilgenommen, um 20 tokens in jeder Periode zu erhalten.		
Anfangsausstattung	20	20	20	20
Beiträge zum Projekt				
Vergebene Punkte				

Ihre Kosten durch die Vergabe von Punkten: 0

Hilfe

Sie sehen die einzelnen Beiträge Ihrer Gruppenmitglieder zum Projekt und Sie können Punkte an Ihre Gruppenmitglieder vergeben.
 Bitte klicken Sie auf "WEITER" wenn Sie mit der Vergabe von Punkten fertig sind.
 Beachten Sie: Der Beitrag eines anderen Gruppenmitglieds wird nicht in jeder Periode in der selben Spalte angezeigt.

Besides the period and time display, you see here how much each group member contributed to the project at the first stage.

Your contribution is displayed in the first column (below the label "YOU", which is marked with blue), while the contributions of the other group members are shown in the remaining three columns (below the label "Your Group Members"). Please note that the order of the columns shuffles in each period (except the first column, which shows your contributions). For instance if the contribution of Member 2 is in column 3 in Period 1, it can move to column 4 in Period 2. Hence you can never guess how much Member 2

contributed in each period. The same refers to the other members as well.

You must now decide how many points to give to each of the other three group members. You must enter a number for each of them. If you do not wish to change the income of a specific group member then you must enter 0. If you distribute points, you have costs in tokens which depend on the amount of points you distribute.

You can distribute between 0 and 10 points to each group member. The more points you give to any group member, the higher your costs. Your total costs are equal to the sum of the costs of distributing points to each of the other three group members. The following table illustrates the relation between distributed points to each group member and the costs of doing so in tokens.

Points	0	1	2	3	4	5	6	7	8	9	10
Cost of These Points in Tokens	0	1	2	4	6	9	12	16	20	25	30

Supposing you give 2 points to one member this costs you 2 tokens; if you give 9 points to another member this costs you further 25 tokens; and if you give the last group member 0 points this has no costs for you. In this case your total costs of distributing points would be 27 tokens (2+25+0).

Every time you assign points to all group members you can check your cost by pressing the button “Check the Cost”. Unless you press the button “OK” you can revise the assigned points and check the costs again.

If you choose 0 points for a particular group member, you do not change his or her income. However if you give a member 1 point (by choosing 1) you reduce his or her income from the first stage by 10 percent. If you give 2 points to a member (by choosing 2) you reduce his or her income by 20 percent, etc. The amount of points you distribute to each member determines therefore how much you reduce their income from the first stage. Whether or by how much the income from the first stage is totally reduced depends

on the total of the received points. If somebody received a total of 3 points (from all other group members in this period) his or her income would be reduced by 30 percent. If somebody received a total of 4 points his or her income would be reduced by 40 percent. If anybody receives 10 or more points his/her income from the first stage will be reduced by 100 percent. The income from the first stage for this member would in this case be reduced to zero.

Your total income from the two stages is therefore calculated as follows:

Total income (in tokens) at the end of the 2nd stage = period income =

In case you receive less than 10 punishment points:

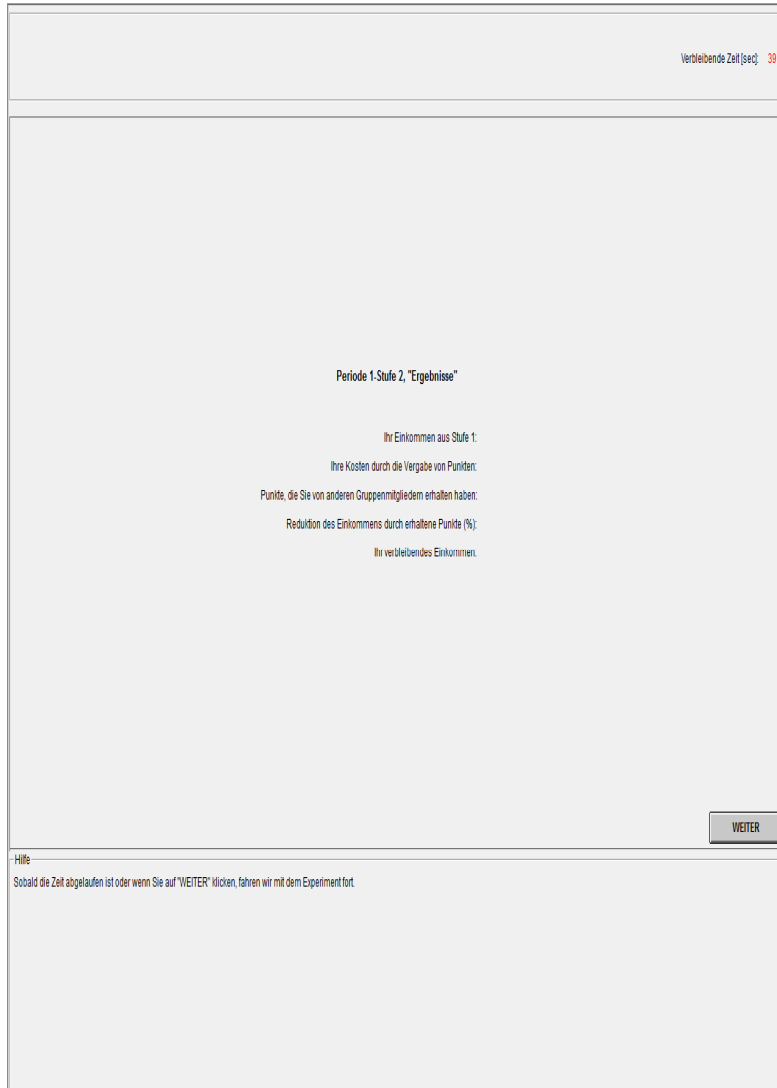
= (income from the 1st stage)*(10 - received points)/10 – (costs of your distributed points)

In case you receive 10 or more punishment points:

= 0 – (costs of your distributed points)

Please note that your income in tokens at the end of the second stage can be negative, if the costs of your points distributed exceeds your (possibly reduced) income from the first stage. You can however evade such losses with certainty through your own decisions. After all participants have made their decision, your income from the period will be displayed in screenshot 4. Your total income from the investment task will be the sum of all 12 period incomes.

Screenshot 4: Income Screen at the End of the Second Stage



You will have 40 seconds to review the screen. If you are done before the time expires, please click OK.

C Supplementary Analysis

Figure 3: Contributions of Effort and Windfall Subjects in HET&NP Treatment

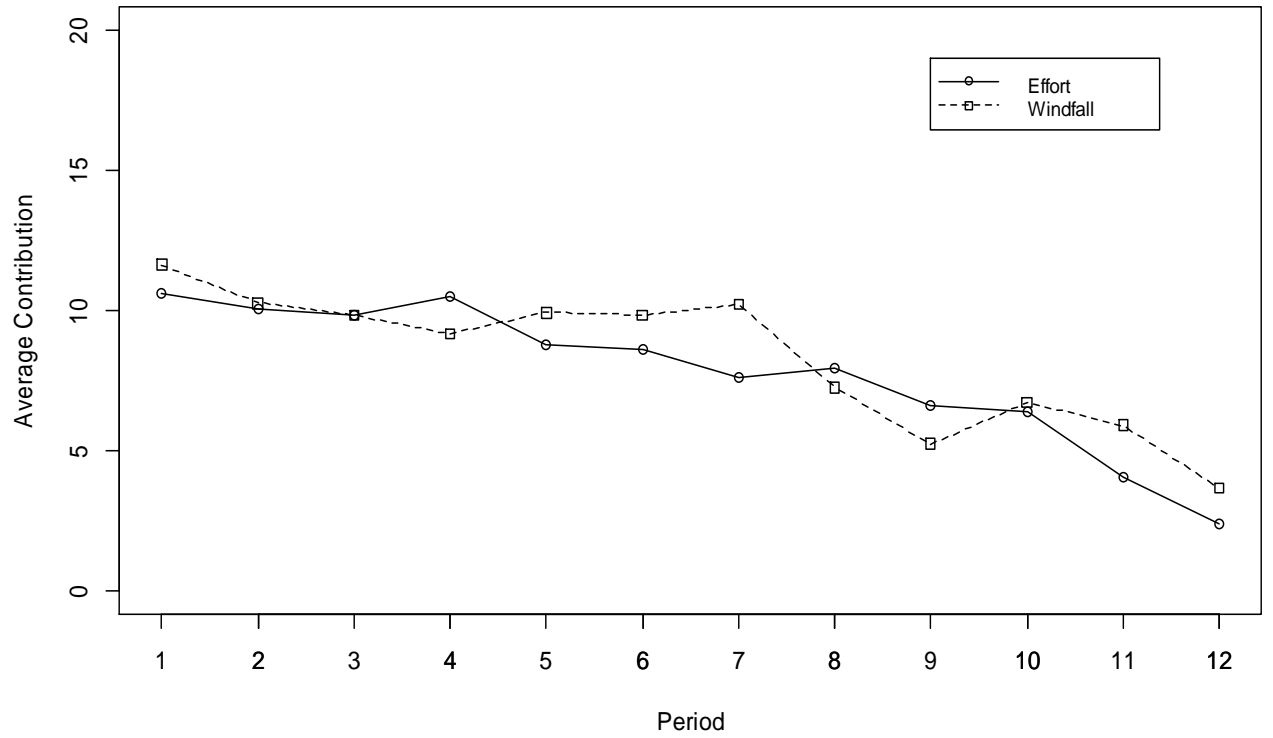
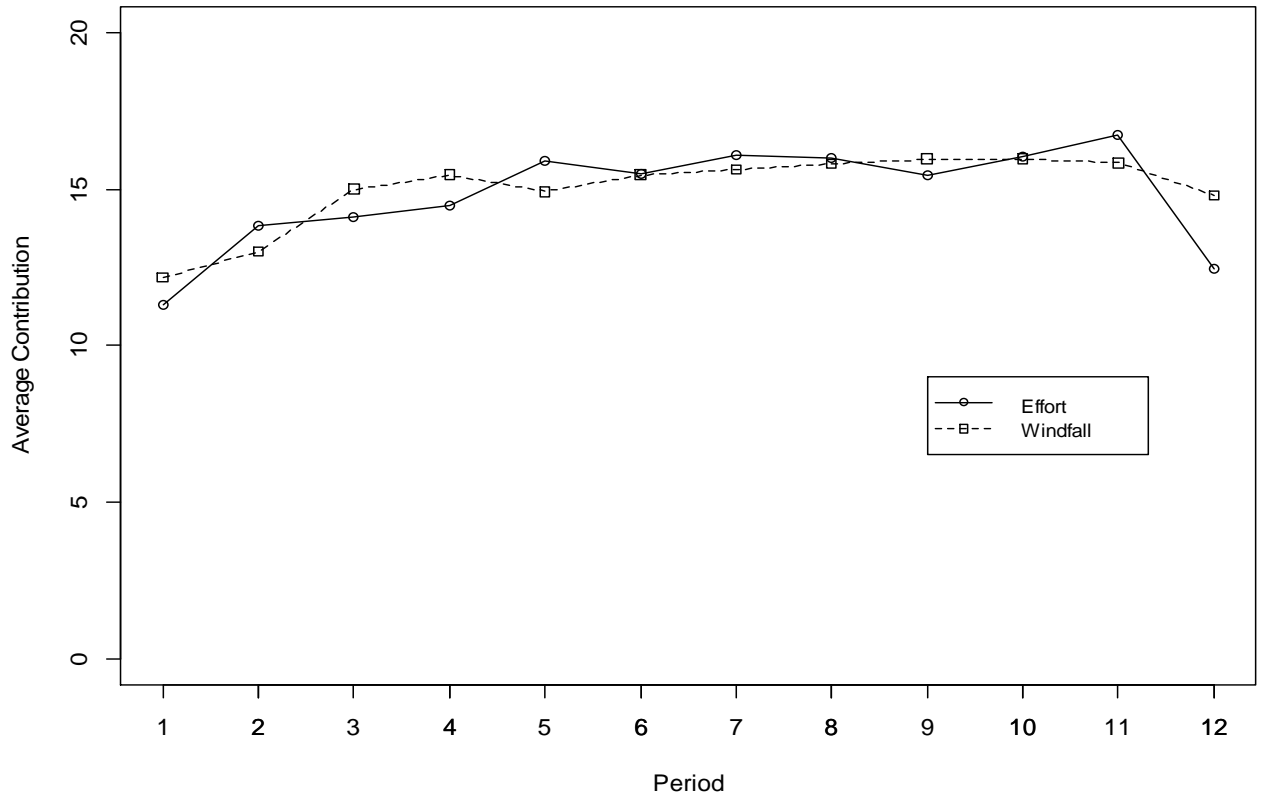


Figure 4: Contributions of Effort and Windfall Subjects in HET&P Treatment



Are Taxes Beautiful? A Survey Experiment on Information, Tax Choice and Perceived Adequacy of the Tax Burden

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Abstract

We report results from a survey experiment aimed at testing whether providing information on the national public expenditure to the taxpayers and whether involving them in the process of allocating tax revenues over public goods influence the level of the adequate tax rate - the fraction of income that individuals consider adequate to pay as taxes. We find that providing information on public expenditure does not influence the level of the adequate tax rate. On the contrary, the level of the adequate tax rate substantially increases when taxpayers can get to choose the public goods to finance through their taxation.

Keywords: Tax Burden, Tax Choice, Public Expenditure, Information

JEL Classifications: H24, H50, D31

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1 Introduction

In 2007, during a national TV program, the Italian finance minister, Tommaso Padoa-Schioppa (1940-2010) notoriously claimed that "we should have the courage to say that taxes are a beautiful thing, a very civilized way for everyone to contribute in essential areas like education, safety, healthcare and the environment."¹ Indeed, in line with Padoa-Schioppa's claim, citizens should perceive taxes as a beneficial policy instrument when used to finance fundamental public goods that advantage everyone in the community. Nevertheless, taxpayers often fail to recognize the positive aspects of taxes, exhibiting strong dissatisfaction with taxation. Reasons triggering such negative mood can be at least two-fold.

First, taxpayers may be unaware of how the government uses their taxes, what public goods it finances and in which proportions. The absence of such knowledge may induce taxpayers to perceive taxes as an exogenous deadweight loss. According to several recent studies, providing information about government spending may increase the public acceptability of the taxes (Kallbekken and Aasen, 2010, Beuermann and Santarius, 2006, Klok et al., 2006).² In general, informing the taxpayers about the (social) benefits of tax payments can stimulate taxpayers' cooperative attitude towards the state and can significantly reduce tax evasion (Holler et al., 2008).

Second, even in cases in which information is not an issue, the existence of a mismatch between citizens' priorities and the choices of the government can make taxpayers perceive the tax burden as an inefficient and inadequately high sacrifice. An experimental

¹The claim was made during the TV program "In mezz'ora" on the 7th of October, 2007. <http://www.ft.com/cms/s/0/ae1b99fe-76cb-11dc-ad83-0000779fd2ac.html#axzz215tnJ3uJ>

²For instance, the main concern of Norwegian participants in the study was to know "...what the revenues (of ecological taxes) are spent on" (Kallbekken and Aasen, 2010, page 2189). Similarly, German taxpayers were unsatisfied with the "...insufficient information policy" regarding ETR (Ecological Tax Reform) (Beuermann and Santarius, 2006, page 922). Danish taxpayers claimed that "...they could not accept something (ETR) they did not understand" and "...wanted to get enlightened about some of the positive results brought forth" (Klok et al., 2006, page 913).

study by Alm et al. (1993) illustrates that compliance with taxes is low when taxpayers do not value how the government uses fiscal revenues. When the public expenditure is exogenously imposed, tax evasion results to be higher than in case, when the public expenditure is endogenously chosen by the taxpayers. By implementing a "real donation" experiment, where individuals can donate money either to a government agency or to a private charity, Li et al. (2011) identify the characterizations that make private charities more attractive for charitable donations in comparisons with governmental agencies performing similar functions. The authors conclude that taxpayers' antipathy towards taxation may be due to lack of control over the use of resources or coercion.

We present results of a survey experiment aimed at studying whether providing information on the national public expenditure to the taxpayers and whether involving the latter in the process of allocating tax revenues over public goods affect the adequate tax rate—the proportion of income that taxpayers consider adequate (acceptable) to pay as taxes. Although, surprisingly understudied by economists, the potential benefits of involving taxpayers in the decision process of allocating tax revenues over public goods is getting increasing support in the popular press, as it is conjectured that tax choice will increase social acceptance of taxation.³ The first formal insight for this hypothesis is provided by Lambertson (2013), where the author exogenously fixes the tax burden, allows for a tax choice and measures taxpayers' satisfaction with taxation. In contrary, we let the taxpayers define the level of the tax burden endogenously and we assess whether tax choice results in a higher tax burden the taxpayers are willing to accept compared to the tax burden with no tax choice. Such a setting is in line with Lambertson's call for additional research to understand "... other downstream consequences of allocation beyond satisfaction" (Lambertson, 2013, page 236). Our study is also different from that of Djawadi and

³"...but if people were allowed to direct at least a portion of their taxes to what they care about most, wouldn't they be happier paying taxes? Wouldn't they be willing to pay more?" (Boston Globe, 2013:<http://www.bostonglobe.com/opinion/columns/2013/04/29/what-could-choose-where-our-taxes/HgUvdhYEIP1UNI3hknoe0N/story.html>)

Fahr (2013), as the latter focus on the effects of tax choice on tax compliance.

We illustrate, that when taxpayers are required to express their preferences on how they would allocate tax revenues over the main functional items of the public expenditure, they report substantially higher adequate tax rates relative to a situation with no tax choice. In contrary, providing solely information on public expenditure to the taxpayers does not influence the level of the adequate tax rate. The rest of the paper is structured as follows. Section 2 discusses the survey experiment. Section 3 depicts the results. Section 4 concludes the paper.

2 The Survey Experiment

2.1 The Design

The aim of the present study is to assess whether providing information on the national public expenditure and eliciting preferences on how to allocate tax revenues across functional items of the government influence the proportion of income that taxpayers perceive as adequate to pay in the form of taxes. In order to disentangle the two effects - information and tax choice - we administer a survey experiment. There are relevant methodological issues that justify our design choice. First, like laboratory studies, survey experiments allow researchers to identify causal relationships between the treatment stimulus and subjects' actual choice. Second, the possibility of both using a concrete, context-specific language and avoiding artificial environments (such as the lab) make the survey experiment an adequate instrument to investigate into our real-world research question.⁴

In details, our survey experiment consists of three treatments: NI&NTC (standing for "No Information & No Tax Choice") that represents our benchmark, I&NTC ("Information & No Tax Choice") and I&TC ("Information & Tax Choice"). In all treatments,

⁴See Noch and Guterbock (2010) for a discussion on the methodological advantages of survey experiments.

subjects living in Italy are invited to take part in an online questionnaire that is composed of two parts. The first part, kept constant across treatments, includes questions about the demographic and socio-economic conditions of the respondents. The second part of the questionnaire focuses on subjects' perception of the tax burden and represents our treatment variable. In particular, subjects in NI&NTC are asked to state the income tax rate that they consider as adequate to pay in order to finance the Italian public expenditure. Subjects are required to give an answer that is included between 0 and 100 percent. The only difference between NI&NTC and I&NTC is that, before stating the tax rate, subjects in I&NTC are presented with the 10 first level COFOG components of the Italian public expenditure ranked in descending order.⁵ Apart from the labels, no other information on the 10 items (such as their relative size in terms of overall public expenditure) is provided. Thus, by comparing responses in NI&NTC with those in I&NTC, we are able to assess the effects of information about the public expenditure on subjects' perception of the adequate tax rate. Finally, the questionnaire section dealing with subjects' perception of the adequate tax rate in I&TC is split into two consecutive tasks. First, subjects are presented with the same list of functional items used in I&NTC and, for each item, are asked to state the income tax rate that they consider as adequate to finance that specific component. The stated percentages are required to be included between 0 and 100 percent and their sum not to exceed 100 percent. Once completed the first task, subjects are asked, as in the other two treatments, to report the adequate tax rate to finance the (overall) Italian public expenditure. Thus, by comparing responses in I&NTC with those in the second task of I&TC, we are able to assess how tax choice influences the level of the adequate tax rate, net of the effects of information on the main functional items of the Italian public expenditure.

After 15 days from the first phase of the survey experiment, participants in NI&NTC

⁵This information is publicly available online. See the COFOG (Classifications of the Functions of the Government) scale elaborated by the OECD. <http://www.oecd.org/gov/48250728.pdf>

and I&NTC are unexpectedly invited to take part in the tax perception questionnaire used in I&TC. Such a design provides within-subject evidence of the effects of choosing how to use taxes on the adequate tax rate. Figure 1 summarizes the structure of the survey experiment.

[Figure 1]

2.2 Procedures

The survey experiment took place between May and July 2013 and was administered by using Qualtrics (<http://www.qualtrics.com/>). Subjects, mainly students of economics from three different universities in North Italy,⁶ were recruited by email after the advertisement of the experiment through Facebook university groups. Once agreed to participate in the study, each subject was randomly and anonymously assigned to (only) one of the three different treatments. In order to guarantee anonymity and correctly match the responses across the two phases of NI&NTC and I&NTC, subjects were required to provide the first 6 digits of their personal (16 alpha-numeric character) tax code.

3 Results

Overall, 282 subjects took part in the survey experiment: 105 participated in NI&NTC, 102 in I&NTC and 75 in I&TC. As explained above, subjects in NI&NTC and I&NTC were also invited to take part in the second phase of the experiment. In particular, in the second phase, we collected data from 48 out of 105 subjects in NI&NTC and from

⁶Bocconi University in Milan, University of Varese-Insubria, and University of Padova.

43 out of 102 subjects in I&NTC. The following table shows some socio-demographic characteristics of participants in the three treatments:

[Table 1]

As reported by the previous table, we detect differences in the distributions of gender ($\chi^2(2)=16.482$, $p<0.001$) and professional status ($\chi^2(6)=20.339$, $p<0.01$) across the three treatments. In order to properly account for these differences, we will present results of both nonparametric tests and parametric regressions that explicitly control for subjective characteristics of respondents. The following figure shows the frequency of the stated adequate tax rates in the first phase of the three treatments.

[Figure 2]

Figure 2 suggests that the proportion of subjects reporting an adequate tax rate greater than 30% is 58% in I&TC, 31% in I&NTC and 27% in NI&NTC. According to a proportion test, both the difference between I&TC and NI&NTC and the difference between I&TC and I&NTC are significant (for the former comparison, $\chi^2(1)=4.271$, $p=0.039$; for the latter comparison, $\chi^2(1)=2.721$, $p=0.099$).

Table 2 reports the (mean) adequate tax rates in the three treatments and in the two phases of NI&NTC and I&NTC.

[Table 2]

In order to assess differences in the adequate tax rates across treatments and phases, Table 3 reports results of econometric models that control for the socio-demographic characteristics of the participants.

[Table 3]

As a first step, we focus on the adequate tax rates stated by subjects in the first phase. We can reject the null hypothesis of equality of the adequate tax rates across treatments as suggested by Kruskal-Wallis test ($\chi^2(2)=7.368$, $p=0.025$). In particular, as revealed by the positive and highly significant coefficient of I&TC dummy in the first regression of Table 3, subjects in I&TC report significantly higher adequate tax rates than in the other two treatments (for the difference between the coefficients of I&TC and I&NTC, $F(1;275)=4.74$, $p=0.030$). These results are also confirmed by nonparametric tests. According to a Mann-Whitney U-test, the mean adequate tax rate in I&TC is higher than those in I&NTC ($W=3203$, $p=0.061$) and NI&NTC ($W=3009.5$ and $p=0.007$), while no significant difference is detected by comparing I&NTC and NI&NTC ($W=5028$, $p=0.443$).

Overall, the abovementioned evidence suggests that providing information on the Italian public expenditure does not influence the tax rate that subjects consider as adequate to pay in order to finance the public expenditure. On the contrary, the reported adequate tax rate substantially increases when subjects express their preferences on how to allocate their taxes over the fiscal domains.⁷

In order to assess within-subject effects of tax choice on the adequate tax rates in I&NTC and NI&NTC, the second and the third columns of Table 3 show results of panel regressions that use the two phases of the experiment as longitudinal dimensions. In line with the previous evidence, we find that subjects increase the reported adequate tax rates

⁷Sometimes "the whole is less than the some of its parts" (Van Boven and Epley, 2003). This phenomenon is known as "unpacking effect" (Rottenstreich and Tversky, 1997) and has been observed in several domains, including voluntary contributions to public goods (Bernasconi et al. 2009). We detect a similar effect in our experiment. Indeed, by looking at the first phase of I&TC, we find that the sum of the percentages stated in the first task is significantly higher than the adequate tax rate reported in the second task (Wilcoxon Signed-Rank test, $V=220$, $p=0.000$). We also observe similar results in the second phase of the other two treatments, albeit differences are statistically non-significant (Wilcoxon Signed Rank test: $V=306.5$, $p=0.255$ in NI&NTC; $V=99$, $p=0.148$ in I&NTC).

between the two phases, with the effect being marginally stronger in I&NTC (as highlighted by the coefficient of the interaction term Ph.2.*I&NTC). Again, these findings are supported by nonparametric tests. A Wilcoxon Signed-Rank test confirms that subjects respond to the tax choice manipulation by significantly increasing the reported adequate tax rates in both NI&NTC (V=222, p=0.004) and I&NTC (V=68, p=0.000).⁸

Interestingly, when comparing the adequate tax rates in the first phase of I&TC with those in the second phase of the other two treatments, differences in responses disappear (according to a Kruskal-Wallis test, $\chi^2(2)=1.314$, p=0.518; according to a pairwise Mann-Whitney U test between the first phase of I&TC and the second phase of NI&NTC, W=1685, p=0.550, while between the first phase of I&TC and the second phase of I&NTC, W=1405.5, p=0.244). Thus, rather than being determined by the presence of a second phase per se, results are driven by the tax choice manipulation of the questionnaire.

As discussed in the introduction, the mismatch between taxpayers' preferences and government priorities represents a reasonable explanation of the positive effects of tax choice manipulation on the adequate income tax rate. In order to shed light on this aspect, as final step, we turn to subjects' reported percentages for the 10 functional items of the Italian public expenditure. Figure 3 pools subjects' stated percentages in the first phase of I&TC and in the second phase of NI&NTC and I&NTC⁹ and compares them with the 2011 Italian public expenditure (according to the COFOG scale).

[Figure 3]

As shown by the figure, there are remarkable discrepancies between the ranking pro-

⁸The test only considers the responses of those who completed both phases of the experiment (48 in NI&NTC and 43 in I&NTC).

⁹In order to compare responses with the COFOG scale, we pull subjects' reported percentages for the 10 components in the first phase of I&TC and in the second phase of NI&NTC and I&NTC and report corresponding means on a 100% scale.

duced according to subjects' choices in our experiment and that defined by the real expenditure of the government. While the major functional items of the 2011 Italian public expenditure were social protection and general public services (17.86% and 19.90%, respectively), subjects in the experiment attach the highest weights to education and the health system (41.02% and 17.27%, respectively). Moreover, as a Kendall rank coefficient test suggests, we cannot reject the null hypothesis of independence between the real expenditure of the state and the expenditure defined by subjects' tax choices ($z= 1.257$, $p=0.209$).

4 Conclusion

"When it comes tax time or when a person first signs on for a new job, the government should let them as an individual decide where they want the money deducted from their paychecks for taxes to go. [...] Let the individual decide - and, once they decide, make sure that their money gets to the place that they have rightfully chosen" (Forbes, 2012).¹⁰ The present paper provides supporting evidence in favor of the previous claim as it shows that involving taxpayers in the decision of allocating tax revenues over the main functional items of the public expenditure substantially increases the proportion of the income taxpayers perceive adequate (acceptable) to pay in the form of taxes.

Our results inform the literature on tax evasion that "non-classical" interventions aimed at sensibilizing and motivating taxpayers can be as important as "classical" interventions in the form of increased penalty rate and detection probability (e.g. Allingham and Sandmo, 1972). If the government allows taxpayers for a tax choice (at least partially), the acceptability of the tax burden may be increased, resulting in reduced tax

¹⁰<http://www.forbes.com/sites/brittanybinowski/2012/06/18/how-to-get-americans-to-pay-taxes-willingly/>.

evasion. Indeed, the more taxation is perceived as acceptable and socially relevant, the more evading is likely to impose substantial psychological costs (in the form of guilt and shame; see Erard and Feinstein, 1994) on the taxpayer and the higher the incentive to comply with taxes will be (see Hashimzade et al. 2012, Andreoni et al. 1998 for excellent reviews on psychological costs of tax evasion). The recent (working) paper by Djawadi and Fahr (2013) can serve as a first evidence for such a conjecture, as it illustrates that tax choice enhances tax compliance. The authors explain their findings in terms of enhanced trust towards the government, though direct quantitative evidence on enhanced trust (and how it is measured) is missing from the analysis. We provide alternative explanation for the findings of Djawadi and Fahr (2013) as, stemming from our paper, tax choice increases the perceived adequacy (acceptability) of the tax burden.

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Appendix A

Figures and Tables

Figure 1: The Structure of the survey experiment

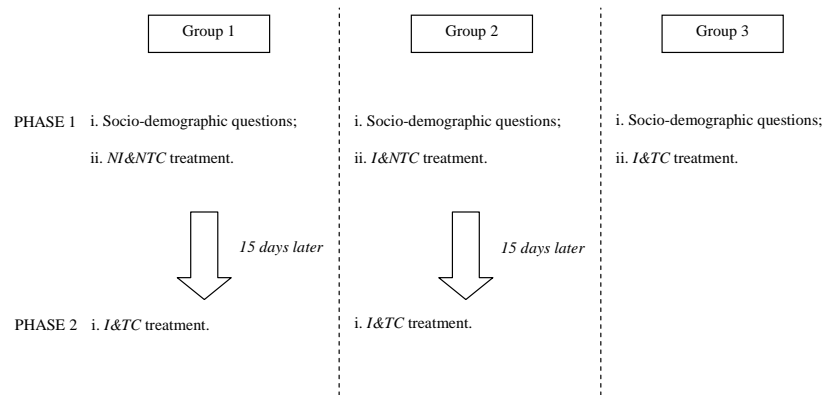


Table 1: Respondents in the Three Treatments

Variable	NI&NTC		I&NTC		I&TC	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Age	24.590	4.064	23.333	2.288	26.413	8.264
Male	0.410	0.494	0.353	0.480	0.133	0.342
Professional Status						
Student	0.590	0.494	0.676	0.470	0.480	0.503
White Collar	0.276	0.449	0.157	0.365	0.213	0.412
Unemployed	0.038	0.192	0.098	0.299	0.067	0.251
Other	0.095	0.295	0.069	0.254	0.240	0.430
N	105		102		75	

Note. Socio-demographic characteristics of subjects in the three treatments of the survey experiment.

Figure 2: Distribution of the Adequate Tax Rate in the Three Treatments

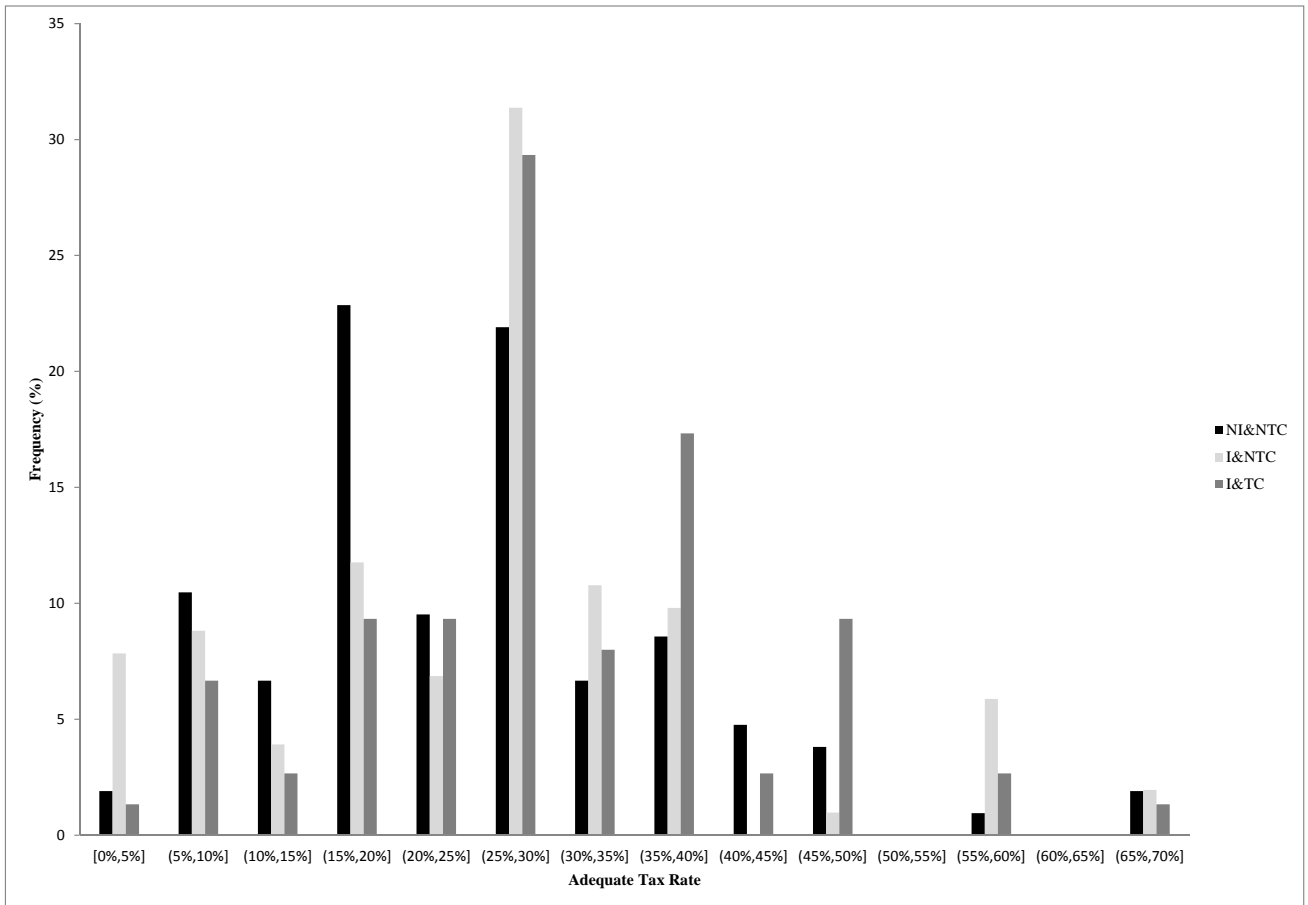


Table 2: Adequate Tax Rates in the Three Treatments

Phase 1	NI&NTC	I&NTC	I&TC
mean	0.273	0.284	0.319
Std.dev.	0.129	0.145	0.127
N	105	102	75
Phase 2	I&TC	I&TC	
mean	0.329	0.337	
Std.dev.	0.096	0.085	
N	48	43	

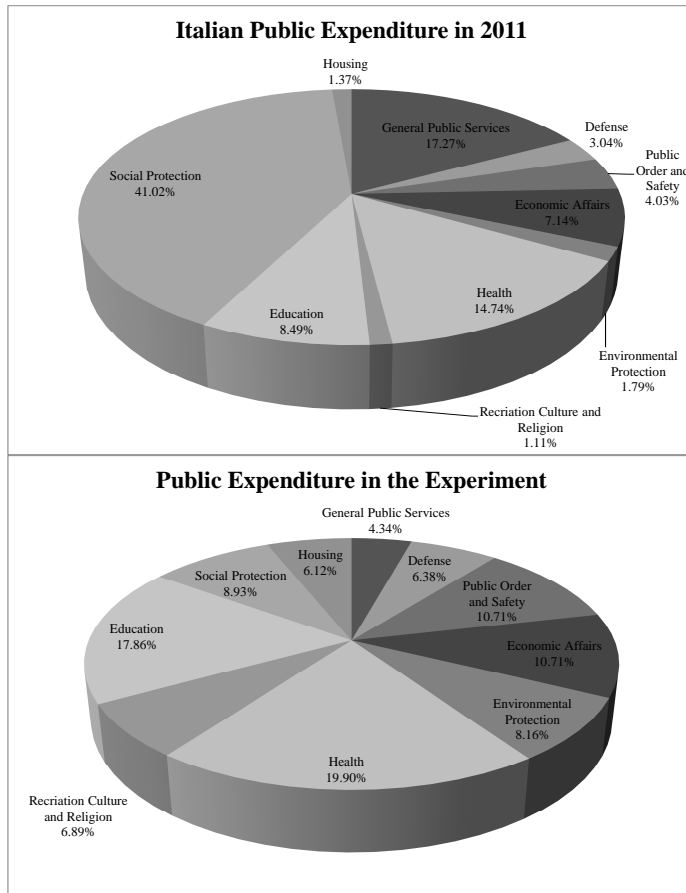
Note. The table reports means and standard deviations of the adequate tax rates reported by subjects in (both phases of) the three treatments of the survey experiment.

Table 3: Parametric Regressions

	OLS, ph. 1	Panel, ph. 1&2	Panel, ph 1&2
Intercept	0.228*** (0.026)	0.320*** (0.042)	0.332*** (0.045)
Male	0.026 (0.019)	0.023 (0.022)	0.022 (0.022)
Student	0.027 (0.025)	-0.046 (0.044)	-0.045 (0.044)
White Collar	0.059** (0.028)	-0.052 (0.049)	-0.052 (0.049)
Unemployed	0.042 (0.036)	-0.056 (0.053)	-0.054 (0.053)
I&NTC	0.015 (0.019)		-0.026 (0.025)
I&TC	0.059*** (0.020)		
Ph.2		0.049*** (0.010)	0.032*** (0.014)
Ph. 2 * I&NTC			0.037* (0.020)
R^2	0.046	0.071	0.079
F or Wald- χ^2	2.91	30.22	36.23
p > F or Wald- χ^2	0.009	0.000	0.000
Obs.	282	182	182

Note. The first column includes results from an OLS model while the second and the third columns show results from GLS random-effects models (robust standard errors in parentheses). Dependent variable: adequate tax rates reported by subjects. Independent variables: Male, Student, White Collar, Unemployed - Dummies = 1 if the respondent is male, student, white collar and unemployed, respectively, = 0 o/w; I&NTC, I&TC - Treatment dummies = 1 in I&NTC and I&TC, respectively, = 0 o/w; Ph.2. - dummy = 1 in the second phase of the survey experiment, = 0 o/w; Ph.2.*I&NTC - interaction term. Significance levels. * p<10%, ** p<5%, *** p<1%.

Figure 3: COFOG Scale and Subjects' Tax Choice



Appendix B

The Questionnaire

As follows, we report the questions used in the three treatments to elicit the adequate tax rate. The questions were originally written in Italian.

NI&NTC (Phase 1)

Overall, what percentage of your income do you think is adequate to pay as taxes to finance the Italian Public Expenditure? (between 0 and 100%): —%

I&NTC (Phase 1)

In Italy, taxes are used to finance the following components of the Public Expenditure (ranked in decreasing order in terms of incidence on the Public Budget):

1. Social Protection
2. General Public Services
3. Health
4. Education
5. Economic Affairs
6. Public Order and Safety
7. Defense
8. Environmental Protection
9. Housing
 - Recreation, Culture and Religion

Overall, what percentage of your income do you think is adequate to pay as taxes to finance the Italian Public Expenditure? (between 0 and 100%): —%

I&TC (Phase 1), NI&NTC (Phase 2) and I&NTC (Phase 2)

Task 1

1. Social Protection—%
2. General Public Services—%
3. Health—%
4. Education—%
5. Economic Affairs—%
6. Public Order and Safety—%
7. Defense—%
8. Environmental Protection—%
9. Housing—%
10. Recreation, Culture and Religion—%

Task 2

Overall, what percentage of your income do you think is adequate to pay as taxes to finance the Italian Public Expenditure? (between 0 and 100%): —%

Estratto per riassunto della tesi di dottorato

L'estratto (max. 1000 battute) deve essere redatto sia in lingua italiana che in lingua inglese e nella lingua straniera eventualmente indicata dal Collegio dei docenti.

L'estratto va firmato e rilegato come ultimo foglio della tesi.

Studente: ___Armenak Antinyan___matricola: ___955833___

Dottorato: _____Economia Aziendale-Management _____

Ciclo: ___26___

Titolo della tesi : ___Three Essays on Social Preferences, Social Dilemmas and Taxation___

Abstract: The dissertation consists of three chapters. Chapter 1 studies other-regarding preferences of decision makers in the domain of losses. The framework of the Dictator Game is modified by introduction of a bi-directional monetary loss. Chapter 2 studies the interaction of individuals with heterogeneous characteristics in a social dilemma. The framework of the Public Goods Game is modified, by manipulating the endowment sources of the individuals included in the same group. Chapter 3 studies whether providing information on the national public expenditure to the taxpayers and whether involving taxpayers in the process of allocating tax revenues over public goods influence the level of the adequate tax rate- the fraction of income that individuals consider adequate to pay as taxes.

La tesi è composta di tre capitoli. Il primo capitolo presenta uno studio riguardante le preferenze sociali degli agenti economici a seguito di una perdita monetaria. A questo fine la tipica struttura del *Dictator Game* viene modificata introducendo perdite monetarie per entrambe le parti. Il secondo capitolo prende in considerazione l'interazione in un dilemma sociale tra individui con diverse caratteristiche. Rispetto alla struttura tradizionale del *Public Goods Game*, la provenienza della dotazione iniziale d'individui appartenenti allo stesso gruppo viene modificata. Il terzo capitolo propone uno studio sulla percezione di un adeguato livello di tassazione tra i contribuenti, ovvero sulla quota del reddito che gli individui considerano adeguata pagare sotto forma di tassazione. A tal fine vengono analizzati il ruolo dell'informazione fornita ai contribuenti riguardante la spesa pubblica e il ruolo della possibilità concessa ai cittadini di prendere parte al processo decisionale di ripartizione della stessa.

Firma dello studente

