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Identification, signaling and exploitation of social preferences

An experimental analysis

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Abstract

The Doctoral dissertation centers on social preferences. Three experimental studies address the identification methods and the implications of distributional preference types and pro-sociality on economic decision-making.

In Chapter 1, the identification of social preference types using distributive choices is discussed. A thorough review shows that the two main approaches - parametric and non-parametric- have been productively used but produced inconsistent results in previous studies. The experiment in this Chapter is designed to examine the categorical agreement between the two methods: whether they classify the same subject into the same type.

Chapter 2 presents a laboratory experiment investigating whether people strategically signal a certain type of social preferences. I consider four different distributional types and compare the distribution of these types under two settings: with and without strategic reasoning.

In Chapter 3, I report an experimental study on the strategic exploitation of others' pro-sociality for own's benefit. This study is conducted within the principal-agent framework and aims to test whether employers make use of workers' pro-social motivation, offering a compensation scheme which is tailored with workers' pro-sociality.

Table of Contents

List of Tables

List of Figures

Figure **Page**

INTRODUCTION

Over the past 40 years, economists have been conducting experiments to explore how human economic decision-making works, providing strong evidences on the substantial deviation of human economic reasoning from the prediction of standard game theory under risk and uncertainty, bargaining problems, cooperation dilemmas, etc. (Henrich, 2000). One of the most remarkable findings in behavioral and experimental economics is the recognition of social preferences.

Even though the idea of non-selfish motives has been rooted long time ago (e.g., Jevons, 1871; Edgeworth, 1881; Adams, 1963), it was a game-changing point when Werner G*ü*th and his coauthors published the first experimental results on the so-called Ultimatum Game (UG), which efficiently explains the notion of social preferences. Two people, randomly assigned as a Proposer and a Recipient, are given an amount of money (i.e., endowment), the Proposer can decide how much he/she wants to keep for himself/herself and how much he/she wants to offer to the Recipient while the Recipient can decide whether to accept the offer. If the Recipient accepts the offer, they will earn the amount of money as divided. If the Recipient rejects the offer, they will earn nothing. UG experiments have been run in many different countries and with numerous modification but its result is robust and at odds to traditional economics: on average, Proposers give about 30% to 45 % of the endowment; the rejection rate of Recipients is typically from 0% to 30%; offers larger than 40% are rarely rejected and offers smaller than 20% are frequently rejected (for an extensive review of UG see Oosterbeek, Sloof & Van De Kuilen, 2004). These results clearly oppose to the subgame-perfect equilibrium with selfish individuals. The plausible explanation for Proposers' and Recipients' behavior in the UG is that people are not solely motivated by material own payoffs but also care about the well-being of others.

Since the publication of G*ü*th et al. (1982), social preferences have received massive attention and research on social preferences have made profound contributions to the growing body of behavioral and experimental economics. The literature on social preferences consists of three main streams including experimental evidence of social

preferences, theoretical framework of social preferences and the relationship between social preferences and other variables.

The first stream aims at proving the existence of social preferences which also go under other different names including other-regarding preferences, social motives and social value orientation. Experimentalists have used a variety of economic games and have found social preferences in various settings. To disentangle the fairness concern from the strategic reasoning of Proposers in UG, Forsythe et al. (1994) introduced the Dictator Game (DG) in which Proposers are asked to split up an endowment and Recipients cannot reject the offer. On average, people share about 20-30% of the endowment (see Engel (2011) for a meta-analysis). Despite the fact that the result of DG is highly sensitive to the experimental variation, it is usually far different from the prediction of neoclassical economic theories. Due to its simplicity and non strategic feature, DG has become a popular tool to measure pro-sociality and identify some forms of other-regarding preferences such as *altruism*, *maximin* or *inequality aversion*.

The second popular economic game is the Trust Game (TG). The TG is a sequential-move game in which two players are given equal endowments; Player 1 sends an amount of money to Player 2; Player 2 can decide whether to send back some money. The amount of money received by Player 1 would equal the amount sent by Player 2 multiplied with a factor larger than 1. TG has been introduced since 1995 by Berg, Dickhaut & McCabe but the first successful attempt to discover the embedded other-regarding preferences in the TG is Cox (2004). He found that the both players exhibit a clear deviation from the game-theoric prediction with selfishness and rationality: Player 1 sends a substantially positive amount of money to Player 2; Player 2 returns a positive amount of money which increases in what Player 1 has sent. The two motives in the TG are identified as *trust* and *positive reciprocity*.

The experimental evidence of the gift-exchange game (GEG) particularly plays an important role in the recognition of social preferences, as stated in Cooper & Kagel (2009):“If there is any one reason why economists who are not experimenters should care about other-regarding behavior, the literature on gift-exchange is it." The GEG captures the principal-agent relationship in which principals typically decide on the compensation scheme to offer to agents, agents then decide on the costly effort level. The higher the effort level is, the more profit principals earn. Previous experimental studies (e.g., Fehr, Kirchsteiger & Riedl, 1998; Brandts & Charness, 1999) have shown that the average effort level is positively correlated to the wage offer, which adheres to the reciprocal pattern.

Last but not least, another important game that has changed the exclusive reliance on the self-interest hypothesis is the Public Good Game (PGG). PGG is important because like the GEG, PGG mimics a real-world situation. In a basic PGG, n subjects decide how much they would contribute to a public good and keep the amount of money they do not contribute. The total contribution is multiplied with a factor larger than 1 and then divided between n subjects. Selfish and rational people would not contribute anything. A typical result of PGG is that with one-shot game, the average contribution is about half the socially optimal level whereas with repeated game, the contribution starts high, gradually reduces across rounds and is close to zero at the last round (see Dawes & Thaler, 1988 for a review). The decline of contribution is a sign of *negative reciprocity*: high contributors observe other people free-riding and hence, contribute less or also free-ride. Within the realm of repeated PGG, to capture the reaction of subjects towards what others do previously, subjects may be classified into *conditional cooperators* who are *reciprocators* and *unconditional cooperators* who are *altruists*.

The above results and those from many other experiments have proved that people systematically deviate from the self-regarding Nash prediction and hence, social preferences are not just the exception. Evidence of social preferences made economists start questioning the descriptive validity of the standard economic model of individual behavior and looking for alternatives. This leads to the next stream of studies, which focuses on the development of other-regarding preference models. These models attempt to define and rationalize the non-selfish motives and hence, attain a unifying explanation of social preferences.

The “classic" social preference models are distributional preferences or outcome-based preferences which assume that people care only about the final distribution of payoffs among themselves and others. The most influential models of this type are Fehr & Schmidt (1999), Bolton & Ockenfels (1998, 2000) and Charness and Rabin (2002). The essence of these models is to assume that in a decision maker’s utility function, he/she also places some weight on the payoffs of others. People would still decide so as to maximize their utility and hence, the rationality assumption is maintained. These models have been received an enormous attention due to their simplicity and tractability as they summarize a lot of anomalies of expected utility theory into only two to four motives: *inequality aversion*, *efficiency concerns*, *maximin* and *competitive* preferences (a review of these studies is in Chapter 1).

The above models of outcome-based preferences apparently do not cover the reciprocal motives found in experiments with TG, GEG and PGG. As a result, the models of

reciprocity are introduced and can be divided into two categories: (1) intention-based reciprocity which is defined as a behavioral response to a friendly or hostile action (e.g., Dufwenberg & Kirchsteiger, 2004; Falk & Fischbacher, 2006; Charness & Rabin, 2006); (2) type-based reciprocity which is defined as a behavioral response to others' preferences (e.g., Levine, 1998). These models incorporate only intentions (e.g., Dufwenberg & Kirchsteiger, 2004) or both intentions and outcomes (e.g., Falk & Fischbacher, 2006; Charness & Rabin, 2006). Experimental works have shown that reciprocity is a prominent determinant (see Fehr & Fischbacher, 2002 for a review) and might be stronger motive compared to a certain type of outcome-based preferences in some circumstances (e.g., Falk et al., 2000). Nevertheless, models of reciprocity are extremely difficult to understand and not tractable. Measuring reciprocity empirically is also challenging as it usually deals with beliefs and beliefs are not easily assessable. As a consequence, models of outcome-based preferences are used more often as tools for understanding experimental data.

Studies in the third stream of the literature work on the interplay between social preferences and economic outcomes (e.g., productivity, contracting, charity giving) and other socio-demographic characteristics (e.g., gender, political attitude) both in the lab and in the field. Social preferences have been proved to be associated with social intelligence (e.g., Andeou, 2006); charity giving (e.g., DellaVigna, List & Malmendier, 2012); competitiveness (Bartling et al., 2009); strategic uncertainty aversion (e.g., Cabrales et al., 2010); productivity (e.g., Carpenter & Seki, 2011); incentives (e.g., Bandiera, Barankay & Rasul, 2005); group identity (e.g., Chen & Li, 2009). These findings have brought about practical significance for not only theorists and experimentalists but also far-reaching implications for policymakers.

Studies on social preferences concur that all distributional, reciprocal and selfish motive have important and significant effect in many economic decisions. In some situations, even a (small) proportion of people with other-regarding preferences could lead to the deviation in behaviors of the whole population. Theoretically, Fehr & Schmidt (1999) have shown that a few inequality-averse subjects can create incentives and induce other selfish counterparts to contribute in the PGG and vice versa, a minority of selfish subjects can induce reciprocal or inequality-averse subjects to free-ride in simultaneous social dilemmas. With regard to experimental evidence, the most typical example is how some people with social preferences can change incentive and effort provision in a principal-agent setting. Fehr, Klein & Schmidt (2007) have provided evidence that the presence of some fair-minded workers can make fairness concern become a good enforcement device and hence, bonus contracts would outperform the explicit incentive

ones.

By all means, not everyone exhibits social preferences and not all findings on social preferences can provide reliable inferences in the real-world situation (see Levitt & List, 2007 for a discussion). That being said, it is safe to say that there is a substantial proportion of people who have other-regarding preferences and there are economic consequences caused by these preferences at both individual and aggregate level. In other words, the presence of agents with other-regarding preferences have become undeniable and have enriched the characterization of economic agents.

Motivation of the dissertation

The topic of social preferences is the most popular one in experimental economics, accounting for 35.4% of all papers (Noussair, 2011). One may agree with Brandts & Fatas (2012) that research in experimental economics has produced abundant evidence on how people care about others' well-being. Yet, there are still many aspects of social preferences that remain ambiguous.

The first one is the identification method. Different economic games and decision tasks have been used when identifying distributional preferences. Despite the overwhelming number of studies on social preferences, there has been no agreement on the identification as well as the distribution of social preferences. This lack of a unified, overarching identification method is problematic since the identification of social preference types are critical and indispensable regardless of the stream of research on social preferences. As such, one's type has to be identified reliably and validly, especially when social preference types serve as predictors. Yet, it remains unknown how the different identification methods work and how to use them effectively.

The second aspect is how people manipulate their own's social preferences and react to others' social preferences. As mentioned earlier, there is ample evidence of how social preferences associate with other constructs and a (even minor) proportion of a specific social preference type may affect the incentives or behaviors of other types in the population. However, there are very few experiments that convincingly and explicitly study how people utilize social preference types. In a real-world setting, the observability of social preference types is inevitable as each individual has hundreds of interactions with others in the daily basis. Hence, a legitimate conjecture is that one can make use of his/her own or others' social preference types for their own benefit. It would be interesting to adopt this idea into a well-controlled laboratory setting in which subjects

can reveal their social preferences to their partners or they can observe their partners' social preferences before making economic decision.

Before proceeding, it should be noted that in Fisman, Kariv & Markovits (2007), social preferences (i.e., preferences on others' payoffs) and preferences for giving (i.e., preferences on one's payoff and others' payoffs) are defined as two types of distributional preferences. However, these two types of preferences rarely operate separately. Within the scope of this dissertation, the two terms "distributional preferences" and "social preferences" would be used interchangeably.

Outline of the dissertation

The dissertation is composed of three main chapters.

The first chapter documents a narrative review on the distributional type identification approaches using distributive choices. There are two methods which have been used in experimental economics namely parametric and non-parametric one. By figuring out the differences between the two approaches, I discuss potential benefits and shortcomings of using these methods in lab-controlled environment. As a by-product, the influential theories of social preferences which initiate the categorization of distributional preference types are also reviewed. This chapter is particularly relevant and crucial for the methodological approach used in the next experimental chapters of the dissertation.

Given the inconsistency of results on the distribution of social preference types across studies, I implement an online experiment in which subjects are asked to complete two allocation tasks designed by the non-parametric and parametric approach for the identification of social preference types. Those allocation tasks have been used previously in other papers. The aim of the online experiment is to examine the categorical agreement of the two methods: whether they categorize the same subject into the same type.

In Chapter 2, social preference types are experimentally examined as a signaling device. The research question is whether people can manipulate the signal about their own social preference types to gain higher economic benefits. We compare the distribution of social preference types under two settings: with and without strategic reasoning. In the lab, subjects' social preferences are elicited with a distribution task before they play a modified Dictator Game in which the Dictator may observe his/her matched Recipient's type before making offer.

The experimental set-up with the signal-revising and signal-sending option for Recipients allows us to conduct both within- and between-subject analysis. Using the

belief-dependent framework, we hypothesize that Recipients would strategically signal as inequality averse type to get higher offer in DG: (1) non inequality-averse Recipients would revise their choices in the distribution task to signal as inequality averse; (2) the distribution of signal senders' social preference types is different from the one of Recipients who do not send signal. The novelty of our study resides in the introduction of an allocation task with four distributive choices which corresponds to four social preference types including *selfish*, *efficiency concern*, *inequality averse* and *competitive*, rather than only two categories: selfish and pro-social as in previous studies on signaling social preferences. We also depart from the focus on signal receivers in previous studies to signal senders.

If Chapter 2 clarifies how one strategically uses *his/her own social preference type*, Chapter 3 reports an experimental study on the strategic exploitation of *others' social preference types* for own's benefit. We conduct the study within the classical principal-agent setting and investigate how employers make use of workers' pro-social motivation. In the lab, we use two DGs as proxy for subjects' pro-sociality: one in which Recipients are participants in the experiment and another one in which Recipients are charity organizations. Then, subjects who are assigned as employers will offer a compensation scheme to their matched workers. Workers will perform a real-effort task and get paid according to the chosen scheme. There are two contract options: (1) a piece-rate contract; (2) a flat pay contract with effort-contingent charity giving (i.e., the charity's donation depends on the number of completed sliders).

We compare workers' effort, employers' contract choice and profit in two situations: when employers can observe workers' pro-sociality before making the contract offer and when they cannot. To my knowledge, it is the first experimental study on how employers condition their contract choice on workers' pro-sociality. Moreover, it is also the first to take into account two dimensions of pro-sociality: pro-sociality towards a similar person and towards a deserving party and find the actual driver of workers' effort among the two dimensions.

In the last section, the results reported in this dissertation and their implications will be summarized.

CHAPTER 1

IDENTIFYING DISTRIBUTIONAL PREFERENCE TYPES WITH DISTRIBUTIVE CHOICES: APPROACHES AND EXPERIMENTAL EVIDENCE

The identification of social preference types is a key research area in experimental economics. There are two major approaches using distributive choices in this literature: parametric and non-parametric. Notwithstanding the large number of papers using these methods, little is known about how the two approaches relatively work. I present here a review of distributional preference identification methods and discuss the results obtained from previous studies using these different approaches. Furthermore, I conduct an online experiment in which subjects perform two allocation tasks developed within the parametric and non-parametric approach and their social preference types are identified accordingly. This would allow us to compare the practical efficiency of the two methodologies and to examine whether they classify subjects in the same way.

Keywords: distributional preferences; allocation task, distributive choices, Equality Elicitation Task
JEL Codes: C81, C90, C91, B41

For between the two extremes Pure Egoistic and Pure Universalistic there may be an indefinite number of impure methods; where in the happiness of others as compared by the agent (in a calm moment) with his own, neither counts for nothing, nor yet "counts for one," but counts for a fraction.

_Francis Edgeworth, Mathematical Psychics

1.1 Introduction

The heterogeneity of distributional preferences is no longer questioned. Prior research has been mainly using so-called *decomposed games* to assess the individual variation in social preferences. A decomposed game is basically a choice task in which preference considerations are decoupled from strategic considerations. It is also known as "allocation tasks" or "distributive choices" to emphasize the non-strategic nature of social preference elicitation. A typical example of a decomposed game is the Dictator Game. Another illustration of the task is to present subjects with a series of allocation decisions and ask them to select the most preferred apportionment. This kind of game is an attractive tool to precisely identify the outcome-based preferences because of its simplicity and because subjects will not be driven by reciprocity.

Allocation tasks have been constructed within two main methodological paradigms, whether parametric or non-parametric. The parametric one assumes a certain form of interdependent utility function whereas the non-parametric approach identifies types based on core features of preferences. Previous studies have assumed different forms of utility functions, namely linear, piece-wise linear and constant elasticity of substitution (CES) which then lead to different experimental designs of allocation tasks. The allocation task designed with the non-parametric approach is commonly called as the Equality Equivalence Test (EET).

Even though studies on social preference abound, there is still no unified, overarching identification method of social preference types as well as any guidance for researchers in deciding which approach to use. The allocation tasks, even generated with the same approach, and the set of distributional preferences have been varied across studies. More importantly, the literature on social preferences is nearly silent about how different identification methods perform: whether they are efficient in terms of the expenditure of time and effort in the identification process and whether they produce consistent results. Therefore, in this chapter, I implement a review on distributional preference identification methods by looking at three specific questions:

1. What are the main features of the identification approaches?
2. How have they been used in laboratory experiments?
3. Do they classify a subject into the same type?

In the following sections, I examine the first two questions by doing a review on previous experimental studies. For the last question, I conduct an online experiment on Prolific Academy - a crowdsourcing platform, in which subjects will complete two allocations tasks designed with the two identification approaches. This allows us to test the categorical agreement of those methods.

To the best of my knowledge, this present study would be the first review exclusively on the identification issue of social preference types using distributive choices and the first to discuss the categorical agreement of the identification methods. My review could be a complement to Murphy & Ackermann (2011) and Kerschbamer (2013). The former offers a qualitative overview of predictive validity of existing social preference measurement methods mainly in social psychology while the latter provides a review of the parametric approach. I would add to the literature an up-to-date and current discussion about social preference types by doing an intensive retrieval of both relevant published and grey papers and offer my own perspective on these ever-expanding works. I conclude with a summary of the underlying properties of the identification approaches and some suggestions for future research.

1.2 Classification of distributional preferences

1.2.1 Parametric approach

The parametric approach relies on the assumption of a specific functional form of utility to capture distributional preferences. The parametric method is primarily and commonly designed for theory-testing: it requires to estimate distributional preference parameters under the assumption that subjects decide according to a structural model of social preferences. The different allocation tasks in this approach would be designed based on three different types of utility functions: linear, piece-wise linear and CES, which are discussed respectively as follows.

1.2.1.1 Linear utility

The most representative method of this utility family is the Social Value Orientation (SVO) measures which include Ring Test, the SVO Slider Measure and the Triple-

Dominance measure. Murphy & Ackermann (2011) and Murphy, Ackermann & Handgraaf (2011) provide a review and examine the test-retest reliability (i.e., a statistical technique to estimate the precision of the measurement by repeating the measurement process on the same subjects) as well as the convergent validity (i.e., a statistical technique to examine if two methods which measure the same construct are related) among these tests. These measures share many similarities so I will only discuss about the most commonly used SVO measure which is the Ring test.

The Ring test quantifies the SVO at individual level, which consists of 24 or 32 allocation decisions. The allocations lie equally spaced on a circle with the origin of the outcome plane serving as center. In each allocation decision, subjects are given two allocation options which can be illustrated as two adjacent points located next to each other on the circle in the (x,y) space where one own's and another person's payoffs are represented on the x- and y-axis respectively. For instance, in Figure 1.1, subjects have to choose between (10,20) and (12.6,19.7) and between (12.6,19.7) and (15,18.7) and so on. The payoffs can be either positive or negative.

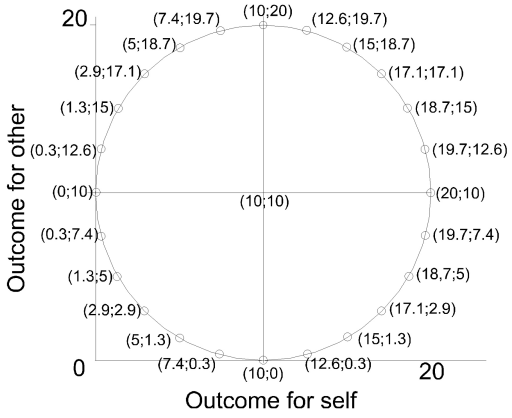

Figure 1.1: An example of ring test used in van Dolder & Buskens (2014)

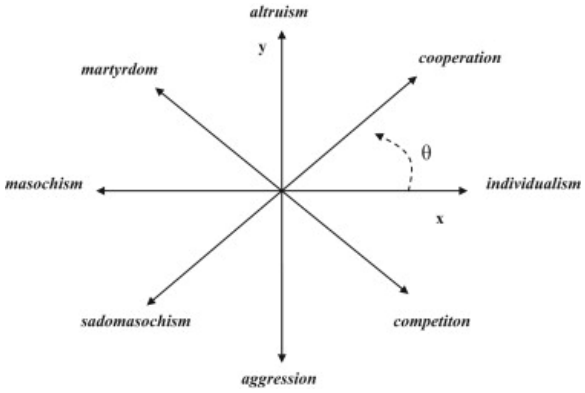

Figure 1.2: Outcome space (Balafoutas et al., 2013)

The objective function of a subject is given by

$$U_i = \mu_i.x + \lambda_i.y,$$

where μ_i and λ_i are unrestricted and constant and measure how one weights own's and other's payoffs respectively. Given the linearity of utility function, each subject has one most preferred point on each circle on the (x,y) space which maximizes his/her utility. By choosing the most preferred allocation option in the "ring", a subject will reflect his/her most dominant motivation (see Figure 1.2). A preferences type will be defined

by the sign the parameters μ and λ may take. There are eight SVO categories listed in Table 1.1 with their corresponding definitions and signs of parameters.

Type	Motivation	μ	λ	θ
Altruistic	To maximize others' payoff	0	+	67.5° - 112.5°
Cooperative	To maximize the joint payoffs	+	+	22.5° - 67.5°
Individualistic	To maximize own's payoff	+	0	0° - 22.5° 337.5° - 0°
Competitive	To maximize the positive difference between own's and other's payoff	+	-	292.5° - 337.5°
Sadistic (Aggressive)	To minimize the other's payoff	0	-	292.5° - 337.5°
Sadomasochistic	To minimize the difference between payoffs	-	-	202.5° - 247.5°
Masochistic	To minimize own's payoff	-	0	157.5° - 202.5°
Martyr	To maximize the negative difference between other's and own's payoff	-	+	112.5° - 157.5°

Table 1.1: Classification of types with Ring test

On the (x,y) space, the utility function is represented as a motivational vector with the origin is the center point. The vector is computed by adding the subject's chosen options together, yielding two numbers: the sum of selected own's payoffs ($\sum x$) and the sum of selected payoffs allocated to another person ($\sum y$). One's SVO can be then identified by measuring the angle of this vector which equals

$$\theta = arctan(\frac{\sum x}{\sum y})$$

The subject is then categorized according to his/her vector's angle. For example, the angle of an altruists would lie between 67.5° to 112.5° while the one of a cooperator would be between 22.5° to 67.5° (see Table 1.1).

Practically, subjects in experiments do not always make choices that are exactly consistent with the utility maximization. The inconsistency will lead to a shorter vector while with the perfect consistency, the length of the vector would equal twice the radius of the circle.

According to Murphy & Ackermann (2011), the most considerable weakness of the Ring test is that it fails to classify any type which is inconsistent with linearity. For instance, the *inequality averse* type can be misclassified as either “altruistic" or “co-operative". Another drawback of the Ring test is that it contains a large number of allocation decisions (24 or 32 allocations) so it usually produces a substantial proportion of inconsistent choices. Nevertheless, compared to the other methods, the Ring test and also the SVO Slider Measure produce a single index for one’s social preferences which makes it convenient for both inter- and intra-person comparison.

1.2.1.2 Piece-wise linear utility

Allocation tasks built on the assumption of piece-wise linear utility are mainly designed within the realm of three pioneering studies modeling distributional preferences including Fehr & Schmidt (1999) (FS), Bolton & Ockenfels (2000) (BO) and Charness & Rabin (2002) (CR). As we will see later, the non-parametric method also adopts the same set of prominent distributional preference types with the same properties. Hence, it would be necessary to briefly discuss the aforementioned influential works and their associated distributional preference types.

FS propose the heterogeneity of preferences in a population with the presence of *inequality averse* agents: those who care not only about their own material payoff but also about the fairness of their own material payoff relative to the payoff of others. This self-centered fairness consideration is formally presented using a utility function for n players as follows:

$$U_i = x_i - \alpha_i \frac{1}{n-1} \Sigma_{j \neq i} max[x_j - x_i, 0] - \beta_i \frac{1}{n-1} \Sigma_{j \neq i} max[x_i - x_j, 0],$$

where x_i is the material payoff of player i, α_i measures player i’s disutility of having less than player j (often called envy parameter) and β_i measures player i’s disutility of having more than player j (often called guilt parameter). Equivalently, a player will be characterized by two parameters and identified as an inequality averse one if $\beta_i \leq \alpha_i$ and $0 \leq \beta_i < 1$.

The BO’s model differs from the FS’s on the premise that apart from their pecuniary payoff, people are motivated by their relative payoff standing. This means that their utility function depends not only on their own payoffs but also on the proportion of total payoffs they receive. Hence, player i’s utility according to BO is

$$U_i(x_i, x_{-i}) = v(x_i, \delta(x_i, x_{-i}))$$

where $\delta(x_i, x_{-i}) = \frac{x_i}{\sum_{j=1}^{n} x_j} if \sum_{j=1}^{n} x_j > 0; \frac{1}{n}$ otherwise.

Even though the functional forms are different, both FS and BO imply that people dislike to have more or less than a fair share.

In the CR's model, apart from the *inequality averse* type considered in FS, the utility function also incorporates two motives, namely *social-welfare* and *competitive preference*. People with *social-welfare* preferences always seek for Pareto improvements: they prefer higher payoffs for themselves and other people, especially those who are worst-off. People with *competitive* preferences, on the contrary, care about their own payoffs and prefer higher payoffs than others.

For simplicity, consider the case of two players, the CR utility function is as follows:

$$U_j(x_i, x_j) = (\rho.r + \sigma.s)x_i + (1 - \rho.r - \sigma.s)x_j,$$

where $r = 1$ if $x_j > x_i$ and r = 0 otherwise; $s = 1$ if $x_j < x_i$ and s = 0 otherwise.

In words, one's utility is a weighted sum of his/her own material payoff and another person's payoff and the weights are captured by the parameter ρ and σ. CR also do not place any restriction on these parameters and hence, are able to offer a richer framework for distributional preferences than FS and BO. In addition, CR distinguish two kinds of social-welfare preferences, namely *efficiency-seeking* preference (i.e., a desire for maximizing the total payoff or social surplus) and *maximin* preference (i.e., concern for the person with the lowest payoff). To do so, the above utility function is written in another form as:

$$U_j = (1 - \lambda)x_i + \lambda\{\theta.min[x_i, x_j] + (1 - \theta).(x_i + x_j)\},$$

where $\lambda \in [0, 1]$ measures how player j cares about the social welfare versus his own material payoff; $\theta \in [0, 1]$ measures how player j cares about helping the worst-off player versus maximizing the total social surplus. We can see that $\rho = \frac{\lambda}{1+\lambda(1-\theta)}$ and $\sigma = \frac{\lambda(1-\theta)}{1+\lambda(1-\theta)}$.

Assume subjects' rationality, each preferences type would determine a specific region for each of the parameters in the aforementioned utility functions. As such, experimentally, allocation tasks are designed to fulfill the structural assumptions in a specific model. An example of two-player allocation tasks used in Iriberri & Rey-Biel (2013) within the realm of CR's model is shown in Figure 1.3. There are 16 decision tables; 3 options each table. Subjects are asked to choose their preferred option for each table.

Table 1 (*s*=7)	Option 1	Option 2	Option 3
Decider	7	7	8
Receiver	10	24	17

Table 2 (*s*=5)	Option 1	Option 2	Option 3
Decider	16	17	16
Receiver	3	8	13

Table 3 (*s*=2)	Option 1	Option 2	Option 3
Decider	20	19	19
Receiver	5	7	3

Table 4 (*s*=7)	Option 1	Option 2	Option 3
Decider	10	10	11
Receiver	21	7	14

Table 5 (*s*=4)	Option 1	Option 2	Option 3
Decider	17	16	16
Receiver	8	12	4

Table 6 (*s*=3)	Option 1	Option 2	Option 3
Decider	8	7	7
Receiver	17	14	20

Table 7 (*s*=3)	Option 1	Option 2	Option 3
Decider	17	16	16
Receiver	8	11	5

Table 8 (*s*=5)	Option 1	Option 2	Option 3
Decider	8	7	7
Receiver	17	12	22

Table 9 (*s*=6)	Option 1	Option 2	Option 3
Decider	13	14	13
Receiver	5	11	17

Table 10 (*s*=4)	Option 1	Option 2	Option 3
Decider	4	5	4
Receiver	24	20	16

Table 11 (*s*=7)	Option 1	Option 2	Option 3
Decider	16	16	17
Receiver	1	15	8

Table 12 (*s*=4)	Option 1	Option 2	Option 3
Decider	20	19	19
Receiver	5	1	9

Table 13 (*s*=2)	Option 1	Option 2	Option 3
Decider	4	4	5
Receiver	22	18	20

Table 14 (*s*=6)	Option 1	Option 2	Option 3
Decider	7	7	8
Receiver	23	11	17

Table 15 (*s*=3)	Option 1	Option 2	Option 3
Decider	13	13	14
Receiver	8	14	11

Table 16 (*s*=5)	Option 1	Option 2	Option 3
Decider	10	10	11
Receiver	19	9	14

Figure 1.3: An example of allocation tasks used in Iriberri & Rey-Biel (2013)

The construction of a decision table is described in Figure 1.4. Three options are constructed in such a way that the first option gives the highest payoff to the decider (*selfish* action); in the second option, the decider earns 1 unit of payoff less than the first option but the receiver would increase by more than 1 unit (*surplus-creating* action); the third option, contrastingly, reduces the receiver's payoff by more than 1 unit of payoff while the decider earns 1 unit less compared the first option (*surplus-destroying* action). The 16 allocation decisions differ in (1) the gap between the decider's and the receiver's payoff ($|x-y|$); (2) the relative payoff standing between the decider and the receiver ($x > y$ or $x < y$); (3) the size of the surplus-creating or surplus-destroying action (s). There are four types identified by this procedure, which are also four main distributional preference

types in the literature, including *selfish*; *inequality averse*; *social welfare* and *competitive*.

	S (Selfish Action)	C (Surplus Creating Action)	D (Surplus Destroying Action)
Decider	*x*	*x-1*	*x-1*
Receiver	*y*	*y+s*	*y-s*

Figure 1.4: Construction of a decision table in Iriberri & Rey-Biel (2013)

As can be seen, the parametric identification method with piece-wise linear utility function can only identify a certain set of social preferences as characterized by a model. As pointed out by Kerschbamer (2015), this predefined set of types is a considerable weakness of this method.

1.2.1.3 CES utility

While the key of the parametric method with piece-wise linear utility function lies on the assumption of a specific utility form and a predefined set of social preference types, a number of other studies do not specify any priori about the form of utility function but estimate individuals' preferences with different structural functions of utility and find the one that best fits the experimental data.

The most renowned paper adopting this approach is Andreoni & Miller (2002). They provide subjects with a series of DG including 8 allocation decisions with different budgets and price of giving (see Figure 1.5). A subject would be asked how many tokens he/she would keep for himself/herself and how many tokens he/she would give to another person given the value of a token.

Budget	Token Endowment	Hold Value	Pass Value	Relative Price of Giving	Average Tokens Passed
1	40	3	1	3	8.0
2	40	1	3	0.33	12.8
3	60	2	1	2	12.7
4	60	1	2	0.5	19.4
5	75	2	1	2	15.5
6	75	1	2	0.5	22.7
7	60	1	1	1	14.6
8	100	1	1	1	23.0
9[a]	80	1	1	1	13.5
10[a]	40	4	1	4	3.4
11[a]	40	1	4	0.25	14.8

[a] Were only used in session 5, others used in all sessions.

Figure 1.5: Andreoni & Miller (2002)'s allocation decisions

The experimental result has shown that the piece-wise linear utility function can rationalize only 43% of subjects' behaviors. These subjects can be classified into three main types: *Selfish*; *Leontief* and *Perfect substitutes*. The *Leontief* and *Perfect substitutes* are respectively equivalent to the *maximin* and *efficiency concern* preference discussed in Charness & Rabin (2002).

With regard to the rest 57% of subjects which are clustered by similarities of their choices and identified as *Weak Selfish*; *Weak Leontief* and *Weak Perfect substitutes*, Andreoni & Miller (2002) considered three different utility functions including Cobb-Douglas, Linear Expenditure and CES and later found the CES utility best fits the experimental data and all six types of subjects can be described with different range of parameters of the CES utility function. The CES two-player utility function can be written as follows:

$$U_s = [a{\pi_s}^{\rho} + (1-a){\pi_o}^{\rho}]^{(1-\rho)},$$

where a is the degree of selfishness and ρ captures the elasticity of substitution. A subject would solve his/her utility maximization given the budget constraint $p_s\pi_s + p_o\pi_o = m$, where p_s and p_o are respectively the value of each kept and each given token respectively; π_s and π_o are respectively the material payoff of the decision maker and of another person; m is the token endowment.

In the same vein, Fisman, Kariv & Markovits (2007) employ a series of 50 allocation decisions and allow for non-linear budget sets so as to classify subjects into four types including *Selfish*, *Lexself*, *Social Welfare*, and *Competitive*.

The design of both Andreoni & Miller (2002) and Fisman et al. (2007) contain a large number of complex allocation decision items with different convex budget sets and price of giving. Since their design also serve for other research objectives, those papers specialize on giving protocol and hence, an important distributional preference, *inequality aversion*, cannot be identified. Even though their allocations tasks can be enhanced to identify other types, these tasks would be relatively more complex than the ones with linear and piece-wise linear utility because of the different values of kept and given token across allocations. More importantly, the identification process would be more time-consuming as there is no assumption on the utility function in advance.

In summary, the parametric approach offers a well-constructed theoretical framework for the identification of a predefined set of social preferences which commonly includes *inequality averse*; *maximin*; *efficiency concern* and *competitive*.

1.2.2 Non-parametric approach

Compared to other approaches, non-parametric one, named as The Equality Equivalence Test (EET), is relatively new. It is first introduced by Kerschbamer (2015) who aims at relaxing strong structural assumption when identifying social preference types.

The EET identifies the archetypes using the core features of preference. A decision maker is given a list of binary choices in two domains: advantageous inequality (i.e., the decision maker's payoff is always higher than the other person's payoff) and disadvantageous inequality (i.e., the decision maker's payoff is always lower than the other person's payoff). In each choice, there is one symmetric and one asymmetric allocation. The symmetric allocation is also the reference one which is kept constant. In each domain, the decision maker's payoff in asymmetric allocations increases while the other person's payoff is constant. The decision maker's preferred allocations would generate the range of indifference points in each domain. His/her type is then determined by the two sections of the indifference curve through a reference point: a section passing the advantageous inequality and a section passing disadvantageous inequality domain.

A basic EET is characterized by four variables: (1) the equal-material-payoff denoted as e; (2) the "gap" between the other payoff and the equal-material-payoff g; (3) the "step size" s measuring the difference in one's own payoff between two consecutive options in the same domain; (4) the "test size" t measuring the number of steps of size s when comparing one's own payoffs across domains. The construction of allocation choices in the disadvantageous inequality domain is shown in Figure 1.6. The construction of allocation choices in the advantageous inequality domain is similar: the only difference is the passive person's payoff which is e-g instead of e+g.

Alternative: Left			Alternative: Right		
Please mark below if you prefer Left	You receive tokens	The passive person receives tokens	You receive tokens	The passive person receives tokens	Please mark below if you prefer Right
□	$e - ts$	$e+g$	e	e	□
...	...	...	...	...	...
□	$e - s$	$e+g$	e	e	□
□	e	$e+g$	e	e	□
□	$e+s$	$e+g$	e	e	□
...	...	...	...	...	...
□	$e+ts$	$e+g$	e	e	□

Figure 1.6: Construction of allocation choices in the disadvantageous inequality domain

Figure 1.7 presents an example of a symmetric EET designed by Kerschbamer (2015) in which the above variables are set so that e=10, g=3, s=1 and t=2. The symmetric EET consists of (4t+2) binary allocations: (2t+1) allocations in each inequality domain.

Dec. Nr.	LEFT		Your Choice	RIGHT	
	you receive	other person receives		you receive	other person receives
1	8 Euros	13 Euros	LEFT ○ ○ RIGHT	10 Euros	10 Euros
2	9 Euros	13 Euros	LEFT ○ ○ RIGHT	10 Euros	10 Euros
3	10 Euros	13 Euros	LEFT ○ ○ RIGHT	10 Euros	10 Euros
4	11 Euros	13 Euros	LEFT ○ ○ RIGHT	10 Euros	10 Euros
5	12 Euros	13 Euros	LEFT ○ ○ RIGHT	10 Euros	10 Euros

Dec. Nr.	LEFT		Your Choice	RIGHT	
	you receive	other person receives		you receive	other person receives
6	8 Euros	7 Euros	LEFT ○ ○ RIGHT	10 Euros	10 Euros
7	9 Euros	7 Euros	LEFT ○ ○ RIGHT	10 Euros	10 Euros
8	10 Euros	7 Euros	LEFT ○ ○ RIGHT	10 Euros	10 Euros
9	11 Euros	7 Euros	LEFT ○ ○ RIGHT	10 Euros	10 Euros
10	12 Euros	7 Euros	LEFT ○ ○ RIGHT	10 Euros	10 Euros

Figure 1.7: The Kerschbamer (2015)'s EET

Given this design, in each of the domain, rational subjects would switch at most once from the symmetric to the asymmetric allocation. The switching point in both domains would convey the information about subjects' distributional preference types and preference intensity. For instance, in the disadvantageous inequality domain, a subject who chooses the asymmetric allocation from the first decision item is benevolent: he/she is willing to give up 2 euros to increase the other person's payoff. On the contrary, if he/she always chooses the symmetric allocation, he/she is strictly malevolent as he/she is willing to give up their own payoff to reduce the other person's payoff.

Nine distributional preference types are identified with the EET, including *selfish*; *altruisic*; *spiteful*; *envious*; *maximin*; *inequality averse*; *equality averse*; *kick-down*; *kiss-up*. Kerschbamer (2015)'s *altruistic* preference is equivalent to *efficiency concern* in Engelmann & Strobel (2004) and Charness & Rabin (2002) or *cooperative* in the Ring test. The envious preference has been studied in Bolton (1991) and in Mui (1995). People with envy would be malevolent towards those who have higher payoffs and neutrality towards those who have lower payoffs. The *kick-down* and *kick-up* preference are included only for completeness. Kick-down preference implies malevolence towards those who have lower payoffs and neutrality towards those who have higher payoffs. In contrast, kiss-up preference implies benevolence towards those who have higher payoffs and neutrality towards those who have lower payoffs. Other types are compatible with distributional preference models discussed previously.

The distributional preference types are determined with a two-dimensional index (x, y). The x-score measures pro-sociality in the domain of disadvantageous inequality and equals (t+1.5) points minus the row number in which the decision maker chooses the asymmetric allocation for the first time. The y-score measures pro-sociality in the domain of advantageous inequality and equals the row number in which the decision maker chooses the asymmetric allocation for the first time minus (t+1.5) points. Both scores range from -2.5 to +2.5 in integer steps. Positive scores imply benevolence while negative scores implies malevolence. The higher score one has, the more benevolent he/she is. The magnitude of x and y indicate the preference intensity. The classification of types in (x,y) space is presented in Figure 1.8.

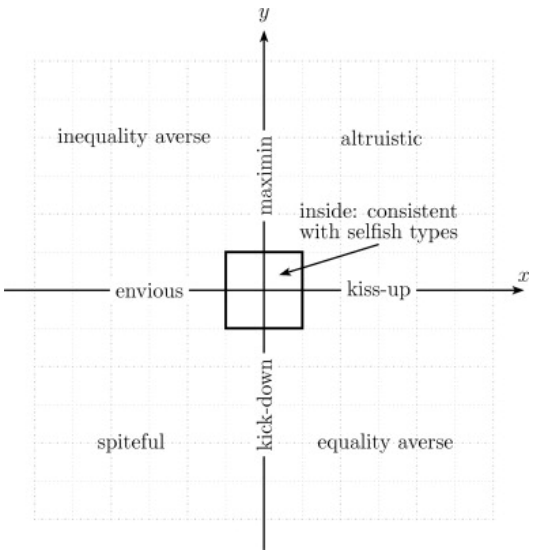

Figure 1.8: Distribution of types in (x,y) space (Kerschbamer, 2015)

The most considerable drawback of the EET's symmetric version is that any type involving neutrality in benevolence or malevolence cannot be identified exactly or in Kerschbamer (2015)'s words, can only be identified with "arbitrary precision". Those types are *selfish*, *maximin*, *kick-down*, *envious* and *kiss-up*. For example, subjects who have x=$\frac{-1}{2}$ and y > 0 can be identified as *inequality averse*; subjects who have x=$\frac{1}{2}$ and y > 0 can be identified as *altruistic* but those who have (x,y) scores lie at the border between inequality aversion and altruism (x $\in \{\frac{-1}{2}; \frac{1}{2}\}$; y > 0) can be also identified as *maximin*. Notably, those who have x- and y-score equal ± 0.5 can be either identified as *selfish* or weak form of other types. As Kerschbamer (2015, p.95) stated, researchers then have to set an ex ante condition in which subjects are classified as selfish.

1.3 Previous experimental evidence

Both identification approaches have been adopted in the lab and in the field. I list in Table 1.2 and Table 1.3 a number of papers that employ the parametric or the non-parametric approach by their research question, experimental design and a short description of the allocation task. I include only lab experimental papers with student subject pool, incentivized payment and anonymity (i.e., subjects choose an allocation between him/herself and another participant whom they do not know and will never meet). Another criterion for the paper inclusion in my review is that social preference types are elicited under role uncertainty: all subjects make decision in the allocation task as if they are the decider; they would be randomly assigned a role at the end of the experiment and one or several allocations would be chosen for payment. I also exclude papers identifying only two types of preferences such as selfish vs. pro-social or inequality-averse vs. efficiency-seeking (e.g., Erkal et al., 2011). The chosen papers are ordered chronologically.

The design of allocation tasks within the realm of the piece-wise linear and CES utility function varied across studies: (1) the number of allocations ranges from 5 to 64; (2) each decision item could contain from 2 to 4 options; (3) each decision group could consist of 2 or 3 persons; (4) the outcome could be either categorical or continuous. This variation is partly due to the different choice of social preference models and the different predefined set of social preference types. On the one hand, this diversion would cause the incomparability of experimental findings across studies. On the other hand, it reflects the flexibility of the parametric approach: this identification approach can serve any research objective and any output resolution requirement.

Abbreviated citation	Subject	Research question	Design of identification method
Linear utility			
Liebrand (1984)	Dutch students	The impact of social preference types on behavior in an n-person game	- 32 allocations with two options each allocation; two-person group - 4 types found: altruistic, cooperative, individualistic and competitive
Liebrand & McClintock (1988)	U.S students	The relationship between the cognitive processing time and social preference types	- 24 allocations with two options each allocation; two-person group - 4 types found: altruistic, cooperative, individualistic and competitive
Offerman, Sonnemans & Schram (1996)	Dutch students	How social preferences shape voluntary contribution for public good	- 24 allocations with two options each allocation; two-person group - 4 types found: altruistic, cooperative, individualistic and competitive
Van Lange (1999)	Dutch students	The relationship between social preferences, the tendency to enhance both joint outcome and equality, reciprocity and cooperation	- 24 allocations with two options each allocation; two-person group - 3 types found: prosocial, individualistic, competitive
Van Dijk, Sonnemans & van Winden (2002)	Dutch students	Whether social ties can be formed in an experiment	- 32 allocations with two options each allocation; two-person group - 4 types found: altruistic, cooperative, individualistic and competitive
Smeesters et al. (2003)	Belgian students	The relationship between social value orientation and cooperative behavior	- 24 allocations with two options each allocation; two-person group
Quirin, Beckenkamp & Kuhl (2009)	German students	Whether dispositional power motivation and affective states shape social value orientation	- 24 allocations with two options each allocation; two-person group
Balafoutas et al. (2013)	Austrian students	Trade-offs among equality, efficiency and incentives	- 24 allocations with two options each allocation; two-person group

Table 1.2a: Studies using parametric allocation tasks

Piece-wise linear utility			
Kritikos & Bolle (2001)	German students	Disentangling altruism and inequality aversion	- Using FS model - 5 allocations with 2 options each allocation; two-person group - 3 types found: selfish, inequality averse and efficiency concern
Engelmann & Strobel (2004)	German students	Testing the relative importance of FS, BO and CR model of social preferences	- 3 games, 4 treatments each game - 1 allocation with 3 options each allocation; three-person group
Roe &Wu (2005)	U.S students	Is there a link between social preference types and individual outcomes in relational contracts?	- Using CR model - 8 allocations with 2 options each allocation; two- and three-person group - 5 types found: selfish, disadvantageous inequality averse, efficiency concern, maximin and competitive
Cox & Sadiraj (2005)	U.S students	Testing the inequality aversion and quasi-maximin model	- 1 allocation with continuous outcome; 2 allocations with 3 options each allocation; two- and three-person group
Chen & Li (2009)	U.S students	How group identity affect social preferences	- Using CR model - 5 allocations with 2 options each allocation; two-person group
Cabrales et al. (2010)	Spanish students	Are social preferences significant determinants of choices in market and contract?	- Using FS model - 24 allocations with 4 options each allocation; two-person group - 4 types found: selfish, inequality averse, efficiency concern and status seeking
Kamas & Preston (2012)a[1]	U.S students	Do people with different social preference types behave differently in strategic environment?	- Using FS and CR model - 10 allocations with 3 options each allocation; three-person group - 4 types found: selfish, inequality averse, efficiency concern and compassionate social surplus maximizing

[1] Kasmas & Preston work on other two papers using the same allocation task as well as the same set of distributional preference types in their experimental design and find similar results. We only report the result of one of those papers.

Table 1.2b (Continued): Studies using parametric allocation tasks (continued)

Kamas & Preston (2012)b[2]	U.S students	Do social preferences differ in gender in the US?	- Using FS and CR model - 10 allocations with 3 options each allocation; three-person group - 3 types found: selfish, inequality averse, social surplus maximization
Iriberri & Rey-Biel (2011)	Spanish students	The difference in the distribution of distributional preference type under role certainty and role uncertainty	- Using CR model - 16 allocations with 3 options each allocation; two-person group - 4 types found: selfish, inequality averse, efficiency concern and competitive
Kranton et al. (2013)	U.S students	How are social preference types, identity and party affiliation related?	- Using FS and CR model - 26 allocations with 2 options each allocation; two-person group - 4 types found: selfish, inequality averse, efficiency concern and dominance seeking
Chen & Fischbacher (2015)	German students	The cognitive processes of distributional preferences: whether different types have different response time	- Using FS and CR model - 64 allocations with 2 options each allocation; three-person group - 6 types found: selfish, efficiency concern, disadvantageous inequality averse, advantageous inequality averse, maximin and envy
CES utility			
Andreoni & Miller (2002)	American students	Whether costly giving is consistent with GARP	- 5 continuous-DG allocations, two-person group - 3 types found: selfish, perfect substitute and Leontief
Fisman, Kariv & Markovits (2007)	American students	Whether giving behavior is consistent with utility maximization; disentangle between social preferences and preferences for giving	- 50 continuous-DG allocations; two- and three-person group - 5 types found: selfish, social welfare, lexself, competitive and mixed preference

[2] The allocation tasks in Kamas & Preston (2012)b are different from Kamas & Preston (2012)a.

Table 1.2c (Continued): Studies using parametric allocation tasks (continued)

Table 1.3 listed papers using the EET. The design of allocation tasks is restricted to 2-person group and a fixed option of an equal share in both disadvantage and advantage domain. Previous studies have adopted only the symmetric basic version of the EET: there are 10 allocations with 5 allocations each decision block. Another feature which stays the same across studies is the resolution of the test which is measured by the quotient $\frac{s}{g} = \frac{1}{3}$. The only difference among studies is the payment protocol. It is either the role-uncertainty (i.e., a subject is randomly assigned as decision maker or passive person, one out of ten allocation decisions chosen by the decision maker will be chosen for payment) or the double-role-assignment one (i.e., a subject is paid with two allocation decisions, one as the decision maker and one as the passive person). The reliance on the symmetric version of the test is apparently to maintain its simplicity.

Abbreviated citation	Subject	Research question	Design of identification method
Balafoutas, Kerschbamer, & Sutter (2012)	Austrian students	The relationship between distributional preferences and competitive behavior	- 10 allocations, 2 options each - 2 allocations chosen for payment - 4 types found: inequality averse, altruistic, equality averse, spiteful
Sheremeta & Shields (2013)	American students	Beliefs, risk attitudes and social preferences of receiver and sender in receiver-sender game	- 4 allocations, 2 options each. - 1 allocation is chosen for payment. - 3 types classified including behind averse, ahead averse and prosocial
Balafoutas, Kerschbamer & Kocher (2014)	Austrian students	How distributional preferences of individuals differs from teams	- 10 allocations, 2 options each - 2 allocations chosen for payment - 4 types found: inequality averse, altruistic, equality averse, spiteful
Höchtl et al. (2015)	Austrian students	The effect of advocacy on the success of redistribution policies	- The EET works as a control - 10 allocations, 2 options each - 1 allocation chosen for payment
Galeotti & Zizzo (2016)	French students	How voters trade off the competence and honesty of candidates in elections	- The EET works as a control - 10 allocations, 2 options each - 1 allocation chosen for payment - 4 types found: altruistic, inequality averse, equality averse, sipteful
Kerschbamer, Sutter & Dulleck (2017)	Austrian students	How the heterogeneity of social preferences affect incentives in market for credence goods	- 1 allocations, 5 options - 4 types found: altruistic, inequality averse, equality averse, spiteful
Kittel, Kanitsar & Traub (2017)	Austrian students	Effect of individual characteristics and social condition on preference for redistribution	- The EET works as a control - 10 allocations, 2 options each - 2 allocations chosen for payment
Balafoutas, Kerschbamer & Oexl (2017)	Austrian students	Impact of ego depletion on distributional preferences	- 10 allocations, 2 options each - 2 allocations chosen for payment - 4 types found: altruistic, selfish, maximin and other types
Kerschbamer, Neururer, Gruber (2017)	Austrian students	The relationship between distributional preferences and lying aversion	- 10 allocations, 2 options each - 2 allocations chosen for payment - 4 types found: altruistic, inequality averse, selfish and other types

Table 1.3: Studies using the EET

Regarding research areas, the parametric approach has been mainly used for two research objectives: (1) to test theories; (2) to examine the relationship between social preferences and economic outcomes or other socio-economic characteristics while the non-parametric method has been adopted for the second research aim or as a control questionnaire. This is understandable as the parametric approach requires assumption on utility function and allows for the quantification of utilities, which is particularly useful for testing specific theories and inducing predictions. Undoubtedly, the main advantage of the parametric approach is to connect experimental results with theories while the one of non-parametric one is its simplicity.

An interesting exercise would be to review the distribution of types produced by each identification method. Due to the restrictive criteria in choosing papers, there are not enough papers for a thorough quantitative review. Especially, papers which employed the allocation tasks developed by the parametric approach do not always report the distribution of social preference types since they only need the continuous measures of social preferences and do not analyze data at the individual level. Nonetheless, a comparison among some papers with similar experimental details would still bring about some insights into the outcomes of each method. Table 1.4 tabulates the results of the identification of social preference types in those papers.

As can be seen, experimental results have shown that the distribution of types vary both within and between identification methods. Nevertheless, both methods concur that the majority of subjects can be defined into the four types: *selfish*, *inequality averse*, *efficiency concern* and *competitive*.

Since the EET cannot distinguish between *selfish* and weak form of other preferences, there have been three possible alternatives tackling that issue: (1) the *selfish* type is eliminated from the analysis (e.g., Balafoutas et al., 2014); (2) subjects of this kind will be considered as both *selfish* and other types (e.g., Galeotti & Zizzo, 2016); (3) subjects of this kind are considered to be *selfish* (e.g., Mimra & Waibel, 2017). This disagreement on dealing with *selfish* type might be the reason for the inconsistency of the distribution of social preference types.

Abbreviated citation	N	Inequality averse	Efficiency concern	Competitive	Equality averse	Maximin	Selfish	Other types[a]
Parametric method								
Kritikos & Bolle (2001)	80	15%	55%				30%	
Roe & Wu (2005)	84	1.4%	5.6%	26.4%		12.5%	54.2%	
Iriberri & Rey-Biel (2011)	56	14%	64%	2%			20%	
Kamas & Preston (2012)a	226	27.4%	16.4%			14.6%	11.5%	30.1%
Kamas & Preston (2012)b	207	23.7%	10.1%	3.4%		14.5%	13.5%	34.8%
Kranton et al (2013)	141	33%	37%	5%			25%	
Cabrales et al. (2010)	72	31.9%	20.8%	20.8%			19.4%	6.9%
Non-parametric method								
Balafoutas, Kerschbamer, & Oexl (2015)	180		38%		1%	19%	36%	6%
Galeotti & Zizzo (2016)*[b]	90	12.2%	66.7%	8.9%	7.8%		45.6%	4.4%
Balafoutas et al. (2014)	195	9.7%	74.9%	11.3%	4.1%			
Balafoutas, Kerschbamer & Sutter (2012)	144	14.6%	65.27%	11.8%				4.17%
Balafoutas, Kerschbamer & Oexl (2017)	224	3.7%	40%			20%	30%	6.3%
Kerschbamer, Neururer & Gruber (2017)	344	10.8%	38.1%				45.9%	5.2%
Mimra & Waibel (2017)	392	9.9%	4.1%	2.0%		20.2%	55.9%	7.9%
Paetzel, Sausgruber & Traub (2014)*	320	20.3%	53.1%	10.9%	3.1%		50.9%	12.5%

Table 1.4: Distribution of types found in previous studies

[a] Other types can be those who are not listed here or unclassified one.

[b] In studies with * mark, the sum of proportion of types does not sum up to 100% because the selfish type cannot be distinguished from weak form of other types.

In summary, the two aforementioned methods have been used productively in experimental economics for a variety of research objectives. Even though criteria on selecting reviewed studies does not allow us to have a large number of observations, one certain issue with the identification of social preference types is that there is absolutely no agreement in identifying one's type regardless of the identification approach: the experimental design, the identified set and the distribution of social preference types all vary across papers. Each identification method has its own strength: the parametric one is useful for theory-driven research as subjects behave in line with a utility function while the non-parametric one's identification process is simple and fast. The experiment I present below will clarify how these approaches relatively work and whether there exists a trade-off between simplicity and accuracy.

1.4 The online experiment

1.4.1 Motivation

Choosing an identification method is potentially problematic and yet, its importance is underestimated. An example of how the identification method may impact on research outcome is the difference in findings between He & Villeval (2017) and Balafoulas et al. (2014). They both examine the revealed social preferences in individual and group decision-making. Whereas He & Villeval (2017) find no difference in the degree of disadvantageous and advantageous inequality aversion between individual and group decision-making, Balafoulas et al. (2014) show that when subjects make allocation in group, they reveal less inequality averse and spiteful but more efficiency concern. One of the possible causes for that difference is their adoption of different identification methods: He & Villeval (2017) use the parametric one while Balafoulas et al. (2014) use the non-parametric one.

The non-parametric method has been introduced very recently and yet used productively because it is relatively short and simple. Especially, compared to the parametric method, it saves researchers a considerable amount of time and effort in the social preference type identification stage. As mentioned earlier, previous studies seem to overlook the fact that the EET cannot make a distinction *selfish* type from the weak form of other types. This would certainly weaken both explanatory and predictive power of the estimates, especially when there is ample evidence that the selfish type accounts for about half of the population (Iriberri & Rey-Biel, 2013). Therefore, it is a must to see how

subjects who are identified as *selfish* with the parametric approach are distributed on the type space built with the EET.

When there are more than one measure for a construct, it is fundamental to question if they capture a common characteristic or trait. As the parametric method with the piece-wise linear utility function and the non-parametric method essentially adopt the same set of distributional preference types, I believe that a systematic comparison between these two methods, as I undertake in this chapter, would be a valuable addition to the literature. Specifically, I would examine whether the two methods classify the same subject into the same category. To do so, I carry out an online experiment on Prolific Academy in which subjects are asked to complete two allocation tasks: one is the EET designed by Kerschbamer (2015) (see Figure 1.7); one is designed by Iriberri & Rey-Biel (2013) (see Figure 1.3). I particularly chose the allocation tasks from those papers because they both adopt a design with two-person group and, apart from *selfish*, subjects in those papers are classified into the similar set of social preference types including *inequality averse*, *efficiency concern*, *competitive*.

1.4.2 Experimental design

120 British students (69 women and 51 men) from various majors were recruited to participate in two sessions of a decision-making experiment. Each session includes two allocation tasks: one designed by Kerschbamer (2015) and one designed by Iriberri & Rey-Biel (2013). The two sessions differ in the order of the allocation task: in Session 1, the Kerschbamer (2015)'s allocation task is the first task while in Session 2, Iriberri & Rey-Biel (2013)'s one is first task. Each session lasted, on average, 10 minutes.

In each allocation task, each subject is asked to choose his/her preferred option to allocate earnings between him/herself and another participant. We have a measure of all subjects' social preferences by using the role-uncertainty protocol: in each allocation task, each subject chooses a preferred option and they are randomly matched with another participant and assigned a role as either allocator or recipient. Only one decision item of the allocator is effective for payment. Subjects are randomly matched with a different participant in each task while their roles can be the same or different across the two tasks. The decision items in each task are presented one-at-a-time in random order. Some studies (e.g., Balafoutas et al., 2014; Galeotti & Zizzo, 2018) provide subjects the whole 10 allocation decisions or 5 allocations in a domain at once and/or ask subjects to indicate only the allocation decision from which they switch from right to left choice. However, I employ the randomization of allocation decisions from Balafoutas, Kerschbamer &

Sutter (2012) which would make consistent choices more difficult to achieve but increase the robustness of the experimental results.

An example of a decision item in each task is presented in Figure 1.4 and Figure 1.5.

Option A		Option B	
You receive	Another person receives	You receive	Another person receives
8 tokens	7 tokens	10 tokens	10 tokens

Figure 1.7: An item in Kerschbamer (2015)'s allocation task

Option A		Option B		Option C	
You receive	Another person receives	You receive	Another person receives	You receive	Another person receives
10 tokens	19 tokens	10 tokens	9 tokens	11 tokens	14 tokens

Figure 1.8: An item in Iriberri & Rey-Biel (2013)'s allocation task

All values were expressed in tokens and were converted at the end of the experiment at the rate of 1 pound for 20 tokens. Subjects knew the conversion rate in advance and were paid on average 1.75 pounds per person which includes 0.84 pounds for participation. Each subject can only participate in one session.

Before proceeding, it is noteworthy to clarify how the identification of social preference types work in each method practically.

As stated before, the symmetric EET identifies one's type by the switching point in each decision block, meaning the number of allocation in which subjects choose the unequal share for the first time. Each switching point is equivalent to a given value of x- or y-score. For example, in the disadvantageous inequality block (decision number 1-5 in Figure 1.4), the x-score equals to 2.5 if the decision maker always chooses the allocation on the left (or unequal allocation) and equals to -2.5 if he/she always choose the equal allocation. The decision maker is then classified into types based on their (x,y) score. Those who switch preferred choices from the left to the right allocation in each inequality domain or switch more than once are classified as other types. The identification is thus rather simple and basically requires econometric-free technique. Figure 1.9 illustrates the absolute frequency of (x,y)-score after excluding participants who are classified as other types (33 out of 120 participants).

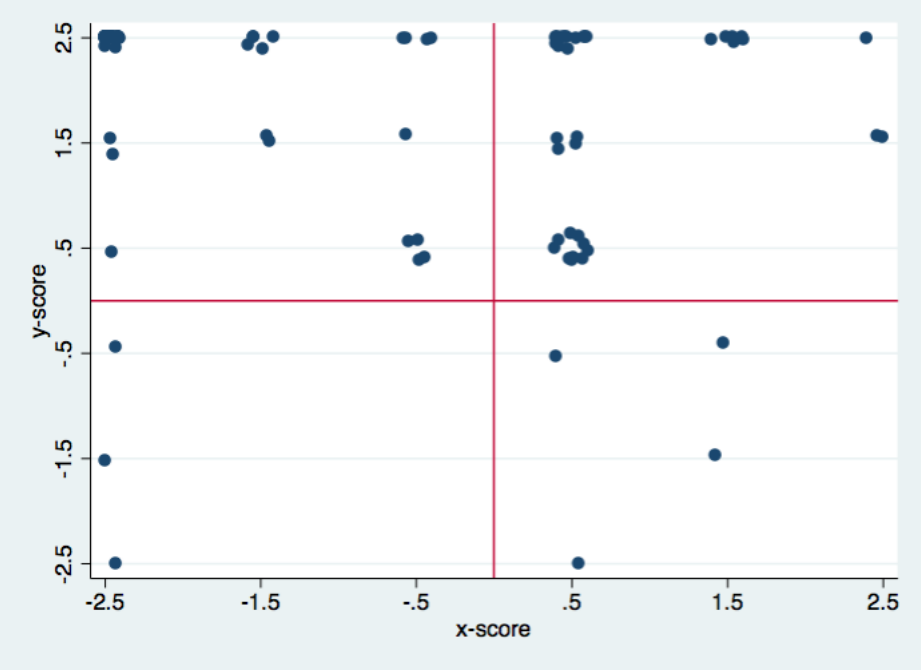

Figure 1.9: The absolute frequency of (x,y) score

The identification procedure of the parametric method requires substantially more time and effort. Iriberri & Rey-Biel (2013) provide a theoretical guidance for the parameter estimation and type identification. The identification strategy is to apply the mixture-of-type models into the econometric specifications. Since they are not interested in the actual individual estimation of the parameters but the population level estimations, they report the results using uniform errors. In the older version of the paper, they used both logit and uniform specifications of error and found the same type classification. To show how the parametric method generates both continuous and categorical outcomes, I would use the logit specification of error for the maximum-likelihood estimation (MLE).

After getting the MLEs of the parameters, I tested if both of them are significantly different from 0. If they are not, subjects are classified as *selfish*. Otherwise, their types are determined by the sign of the parameters: (1) if $\rho > 0$ and $\sigma > 0$, their type is *efficiency concern*; (2) if $\rho > 0$ and $\sigma \leq 0$, their type is *inequality averse*; (3) $\rho < 0$ and $\sigma < 0$, their type is *competitive*. Those whose are not identified as one of the above types are grouped as *Others*. In Figure 1.10, I plot the estimated ρ and σ of each subject in the subject pool, excluding those who are classified as other types (5 out of 120 participants)[1].

[1]It should be noted that with the symmetric version of EET we employ here, the parameters of the piece-wise linear model cannot be estimated since the symmetric choices are the same in all 10 decision items. The two scores, x and y, however, can be translated into the model's parameter ranges (see Kerschbamer (2015, p.96) for more details).

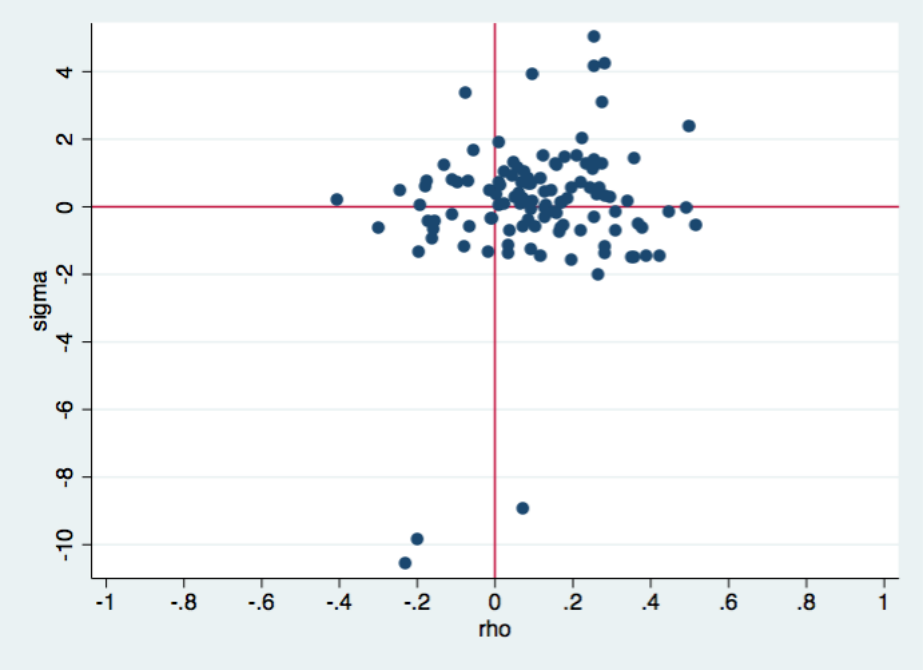

Figure 1.10: The estimated social preference parameters

1.4.3 Results

Figure 1.11 presents the number of individuals that were assigned to each of different social preference types identified by two methods, ordered by experimental session. For convenience, we classified those who have $x = \pm 0.5$ and $y = \pm 0.5$ as *Selfish* with the non-parametric method. We also denote the four types: selfish, inequality averse, efficiency concern and competitive as *Selfish*, *Fair*, *Efficiency* and *Competitive* respectively. With the non-parametric method, the *Equality Averse* type is also identified.

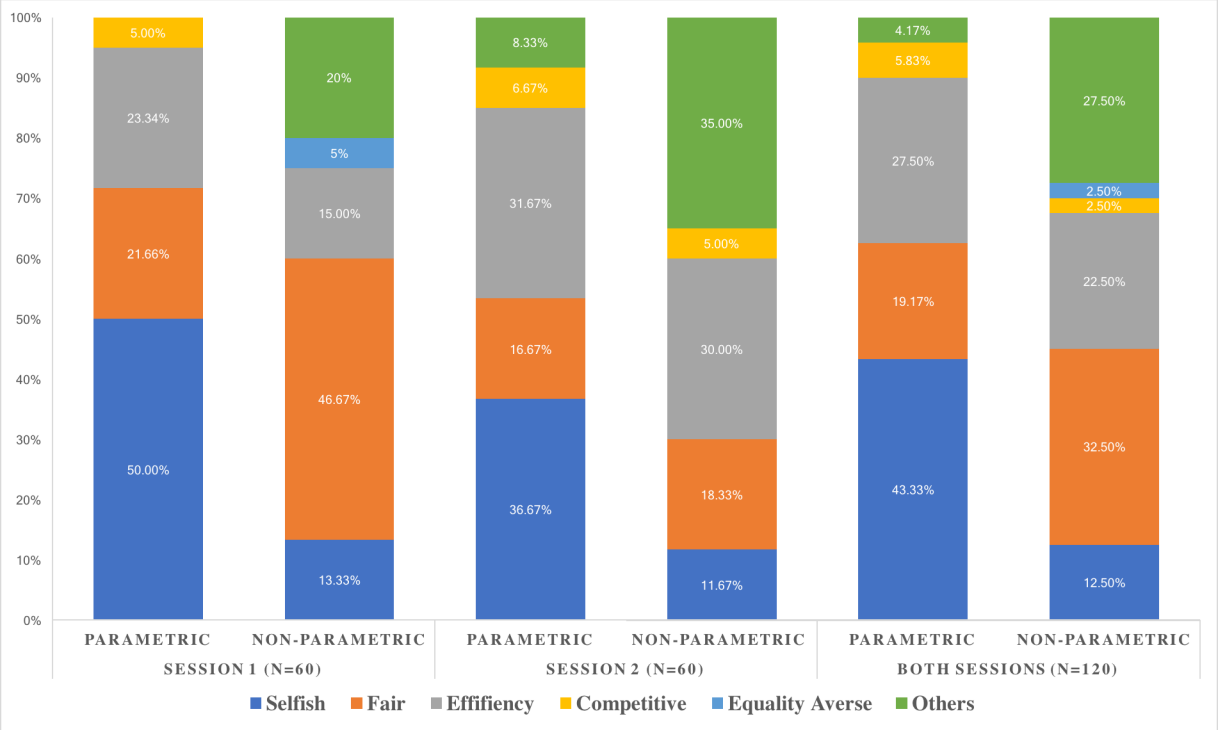

Figure 1.11: Distribution of types across sessions

The distribution of types identified with the parametric method is not significantly different across the two sessions ($p > 0.1$, chi-squared test) but the one identified with the non-parametric is. This is partly due to the substantially higher proportion of subjects unclassified by the non-parametric approach in Session 2.

We pooled the distribution of types of the two sessions together and build a cross tabulation showing how the two methods categorize the same subjects (see Table 1.5). The distribution of social preference types identified with the parametric method is substantially different from the one identified with the non-parametric method. With the parametric approach, the most popular type is *Selfish* (43.33%), followed by *Efficiency* (27.50%) and *Fair* (19.17%) whereas according to the EET, the proportion of *Selfish* is only 12.50% which is significantly less than the one of *Fair* (32.50%) and *Efficiency* (22.50%).

The reason for the difference in the distribution of social preference types between the two methods is twofold. First, the EET produced a high number of unclassified subjects (27.50%). It is understandable as the EET result is highly sensitive to the switching point in each domain of allocations and hence, a deviation of the right to the left allocation even in only one decision block would add up the proportion of the unclassified type. Particularly, in our setting, the randomization of the order of allocations

would increase the inconsistency of choices. In contrast, there are only 5 subjects whose type are unidentified using the parametric method.

Second, the *Selfish* type is not well-identified with the non-parametric method. It should be reminded that subjects who are classified as *Selfish* in the EET could have been identified as having (weak) other-regarding preferences. Yet, they are statistically demonstrated to be *Selfish* in the parametric method. Moreover, there are 22 subjects (16.67%) which are classified as *Selfish* with the parametric approach but as *Fair* or *Efficiency* with the EET while other 14 *Selfish* subjects (11.67%) are unclassified with the EET. In particular, a large proportion of the *Fair* type (46.15%) identified with the non-parametric approach are identified as *Selfish* with the parametric approach. This could be due to the saliency of the equal-share option in the EET.

		Parametric					
		Selfish	*Fair*	*Efficiency*	*Competitive*	*Others*	Total
Non-parametric	*Selfish*	14	0	0	0	1	15 (12.50%)
	Fair	18	15	3	3	0	39 (32.50%)
	Efficiency	4	0	22	0	1	27 (22.50%)
	Competitive	0	2	0	1	0	3 (2.50%)
	Equality averse	2	0	1	0	0	3 (2.50%)
	Others	14	6	7	3	3	33 (27.50%)
	Total	52 (43.33%)	23 (19.17%)	33 (27.50%)	7 (5.83%)	5 (4.17%)	120

Table 1.5: Distribution of types across methods

Overall, the non-parametric and parametric method identified the same subjects into the same type about 46.7% of the time. It is called the observed agreement between the two methods. The table below presents the kappa test for the inter-rater categorical agreement of the two methods. The expected agreement shows the percentage of agreement that could occur by chance. However, we reject the hypothesis that the categorical agreement is random. The kappa statistics value from 1 to -1 with 1 indicating perfect agreement and -1 indicating perfect disagreement. The kappa value (0.33) indicates a fair categorical agreement and calls for caution between two identification approaches as the kappa value for a substantial agreement should be larger than 0.61 (Landis & Koch, 1977).

Observed agreement	Expected agreement	Kappa	Stand. Error	Z	Prob>Z
46.67%	20.03%	0.3331	0.0589	5.66	0.0000

Table 1.6: The Kappa test

1.5 Conclusion

Experiments have been using distributive choices to identify social preference types extensively. Each identification approach has its own advantages and disadvantages. The parametric method offers a highly flexible design of the allocation task at the cost of efficiency as it often requires some knowledge of econometrics. Moreover, it is more suitable in theory-driven research and offers both categorical and continuous measurement of social preferences. The identification process of the non-parametric approach is more efficient in terms of time and effort. As a result, the parametric approach, especially with piece-wise linear and CES utility assumption would not be suitable when the identification of social preferences works as a post-experiment questionnaire or in a large sample while the non-parametric one could not be used for theory-testing purposes or when a continuous measurement of social preferences is needed.

In this study, apart from an overview of the identification methods, I implemented an online experiment, examining the categorical agreement of the two approaches: the parametric one with piece-wise linear utility function and the non-parametric one with the symmetric EET. The experimental result shows a fair categorical agreement between the two methods which means that the difference between the two methods is indeed problematic. A recommendation for future studies using the non-parametric approach is to present subjects all of allocation choices in a block at once or to explicitly ask subjects

about their switching point. In this way, it is easier for subjects to make consistent choices, reducing the proportion of the unclassified type.

As Kerschbamer (2015) suggest that the discrimination between *selfish* type and other types could be more accurate if an asymmetric version of the EET or another design with higher resolution (lower $\frac{s}{g}$) is used. Future research should also develop and implement experiments with other versions of the EET in order to fully evaluate the performance of the non-parametric approach. In addition, as the non-parametric approach fails to distinguish the *selfish* type which plays an vital role in economic studies, a potential solution is to add a secondary component (e.g., other allocation choices) to differentiate between the *selfish* and the weak forms of other types.

In conclusion, the identification of social preference types still appears to be an unsettled issue. The present review of literature and the experimental evidence on the categorical agreement between different identification approaches offer some valuable insights and helpful guide for future works on identifying social preference types in the lab.

Appendices: Experiment instructions

Instruction for Task 1

In each decision item, there are two different allocation options in two columns "Option A" and "Option B". Your task is to choose your preferred option: "Option A" or "Option B" in each decision item. Your preferred option would be your preferred distribution of earnings between you and the other person.

At the end of the questionnaire, you will be randomly matched with another participant and two of you will be randomly assigned into one of the two groups: Group 1 and Group 2. If you are assigned to Group 1, your decision in this task will become effective and one of your 10 decisions will be randomly chosen and determine the earnings of you and your matched partner. If you are assigned to Group 2, your decision will be ineffective. Your earning thus will be determined by the option chosen by your matched partner. One of his/her 10 decisions will be randomly selected for payment.

Each decision will be presented in a table like the below example:

Option A		Option B	
You receive	**Another person receives**	**You receive**	**Another person receives**
14 tokens	7 tokens	10 tokens	10 tokens

In this example, you will choose either Option A in which you receive 14 tokens and the other person receives 7 tokens or Option B in which you receive 10 tokens and the other person receives 10 tokens.

The tokens will be converted into pounds at the end, at the rate of 1 pound every 20 tokens.In this task, you will make 10 decisions that affect not only your own earnings but also the earnings of another person whom you do not know and will never meet.

In each decision item, there are two different allocation options in two columns "Option A" and "Option B". Your task is to choose your preferred option: "Option A" or "Option B" in each decision item. Your preferred option would be your preferred distribution of earnings between you and the other person.

At the end of the questionnaire, you will be randomly matched with another participant and two of you will be randomly assigned into one of the two groups: Group 1 and Group 2. If you are assigned to Group 1, your decision in this task will become effective and one of your 10 decisions will be randomly chosen and determine the earnings of you and your matched partner. If you are assigned to Group 2, your decision will be

ineffective. Your earning thus will be determined by the option chosen by your matched partner. One of his/her 10 decisions will be randomly selected for payment.

Each decision will be presented in a table like the below example:

Option A		Option B	
You receive	**Another person receives**	**You receive**	**Another person receives**
14 tokens	7 tokens	10 tokens	10 tokens

In this example, you will choose either Option A in which you receive 14 tokens and the other person receives 7 tokens or Option B in which you receive 10 tokens and the other person receives 10 tokens.

The tokens will be converted into pounds at the end, at the rate of 1 pound every 20 tokens.

Instruction for Task 2

In each decision item, there are three different allocation options in three columns "Option A", "Option B" and "Option C". Your task is to choose your preferred option: "Option A" or "Option B" or "Option C" in each decision item. Your preferred option would be your preferred distribution of earnings between you and the other person.

At the end of the questionnaire, you will be randomly matched with another participant who is different from your matched participant in Part 1. Two of you will be randomly assigned into one of the two groups: Group 3 and Group 4. If you are assigned to Group 3, your decision in this task will become effective and one of your 16 decisions will be randomly chosen and determine the earnings of you and your matched partner. If you are assigned to Group 4, your decision will be ineffective. Your earning thus will be determined by the option chosen by your matched partner. One of his/her 16 decisions will be randomly selected for payment.

Each decision will be presented in a table like the below example:

Option A		Option B		Option C	
You receive	**Another person receives**	**You receive**	**Another person receives**	**You receive**	**Another person receives**
7 tokens	10 tokens	7 tokens	15 tokens	9 tokens	12 tokens

In this example, you will choose either Option A in which you receive 7 tokens and the other person receives 10 tokens or Option B in which you receive 7 tokens and the

other person receives 15 tokens or Option C in which you receive 9 tokens and the other person receives 12 tokens.

The tokens will be converted into pounds at the end, at the rate of 1 pound every 20 tokens.In this task, you will make 16 decisions that affect not only your own earnings but also the earnings of another person whom you do not know and will never meet.

In each decision item, there are three different allocation options in three columns "Option A", "Option B" and "Option C". Your task is to choose your preferred option: "Option A" or "Option B" or "Option C" in each decision item. Your preferred option would be your preferred distribution of earnings between you and the other person.

At the end of the questionnaire, you will be randomly matched with another participant who is different from your matched participant in Part 1. Two of you will be randomly assigned into one of the two groups: Group 3 and Group 4. If you are assigned to Group 3, your decision in this task will become effective and one of your 16 decisions will be randomly chosen and determine the earnings of you and your matched partner. If you are assigned to Group 4, your decision will be ineffective. Your earning thus will be determined by the option chosen by your matched partner. One of his/her 16 decisions will be randomly selected for payment.

Each decision will be presented in a table like the below example:

Option A		Option B		Option C	
You receive	**Another person receives**	**You receive**	**Another person receives**	**You receive**	**Another person receives**
7 tokens	10 tokens	7 tokens	15 tokens	9 tokens	12 tokens

In this example, you will choose either Option A in which you receive 7 tokens and the other person receives 10 tokens or Option B in which you receive 7 tokens and the other person receives 15 tokens or Option C in which you receive 9 tokens and the other person receives 12 tokens.

The tokens will be converted into pounds at the end, at the rate of 1 pound every 20 tokens.

CHAPTER 2

THE WOLF IN SHEEP'S CLOTHING - AN EXPERIMENTAL ANALYSIS ON SIGNALING SOCIAL PREFERENCES

This paper presents a novel experiment on signaling social preferences. We conduct a two-stage experiment to examine whether people manipulate social preferences upon the observability of these preferences. In the first stage, by a simple distribution task, subjects are classified into four types including inequality averse, competitive, efficiency seeking and selfish. Then they play a modified Dictator Game in which recipients' choices in the distribution task may be observed by their matched dictators in the second stage. We found a strong evidence that given the exposure of their preferences, people strategically employ a certain type of social preferences: selfish recipients signaled themselves as inequality averse aiming at receiving higher offers. These findings highlight the strategic motive of revealed social preferences and may contribute to the long-standing discussion on whether people naturally have social preferences or they are rather gamesmen.

Keywords: social preferences; signaling; distribution task; dictator game
JEL Codes: C91, D63, D64

Beware of false prophets, which come to you in sheep's clothing,
but inwardly they are ravening wolves.

_Gospel of Matthew 7:15, King James Version

2.1 Introduction

The present study is inspired by Engelmann & Strobel (2004) in which two critical issues related to previous studies in social preferences have been addressed. First, studies on social preferences have usually treated strategic reasoning as confounding effects or just absent from the experimental design. They believe that strategic reasoning might change the prominence of social preferences. Yet, there has been no study which explicitly examines the difference in the distribution of social preferences with and without strategic thinking.

Second, a tricky issue for both economists and experimentalists is that :"... deviations from pure selfishness have been interpreted that subjects are better people (i.e., more altruistic or fair), but maybe they are just better economists" (Engelmann & Strobel, 2004, p.868). This quote refers to an on-going discussion in economics. On the one hand, the classic economic paradigm posits that people act out of their own self-interest which got support from both human history and empirical studies (e.g., Alesina, Baqir, & Easterly, 1999; Alesina & La Ferrara, 2005; Miguel & Gugerty, 2005). On the other hand, there has been a series of evidences in economic experiments in which subjects have been found to give up their own's payoffs to attain a more efficient or more equitable allocation of payoffs among themselves. Engelmann & Strobel (2004) has suggested a bridge between the two views: people may behave nicely for their own benefit. Empirical work that sheds light on this conjecture will be definitely of great value.

This paper would delve into the aforementioned issues. We integrate strategic reasoning into the social preference elicitation and compare the distribution of social preferences with and without strategic reasoning. Under the assumption of the stability of social preferences, the strategic situation is created with the observability of these preferences.

We conduct a two-stage experiment including an one-shot distribution task (DT) in the first stage and Dictator Game (DG) in the second stage. We interpret the choices made in the DT as a signal of the players' social preferences, and classify subjects into four categories: inequality averse (i.e., those who choose the most egalitarian distribution of payoffs), competitive (i.e., those who are interested in minimizing unfavorable inequality and in maximizing favorable payoffs), efficiency seeker (i.e., those who are interested in

maximizing the total sum of payoffs) and selfish (i.e., those who are only interested in maximizing their own payoffs). The DG is a binary game that excludes any form of direct reciprocity or strategic uncertainty, but where the decision maker- the Dictator- has to cope with a tradeoff between his pocketbook interest and his social preferences such as inequality aversion or altruism. In this setting, we predict that upon the observability of recipients' types before dictators make offer, each type of recipients will have different behavioral patterns: some recipients may consciously "change" their preferred option in DT and signal as other types so as to receive higher offer in DG. For brevity, our research question would be:"Would people strategically reveal a certain type of social preferences?"

To my knowledge, this is the first experiment in which a distributive choice is treated as a signaling device on economic decision-making context. The signal senders (i.e., recipients in DG) will manipulate the signal if they believe that the signal receivers (i.e., dictators in DG) will reason their decision based on those signals. This study is then also related to the theoretical literature on psychological games, in which players have belief-dependent preferences (e.g., Geanakoplos, Pearce & Stacchetti, 1989; Battigalli & Dufwenberg, 2008).

The rest of the chapter is organized as follows. In Section 2, the most closely related literature to our research is reviewed. The experimental design and behavioral predictions are presented in Section 3. Next, the results are discussed in Section 4. The last section concludes and suggests potential enhancement and extension of our study.

2.2 Literature Review

It has been widely accepted that beliefs directly affect one's utility, not just his/her material final outcomes since Geanakoplos, Pearce & Stacchetti (1989) introduce their model in which the decision makers are belief-dependently motivated and incorporating beliefs into the utility function. Based on their work, a considerable number of studies have presented models of belief-dependent preferences. One of the most remarkable papers is Battigalli & Dufwenberg (2009) which generalize Geanakoplos et al. (1989) to construct a framework of belief dependent motivation to capture psychological effects such as reciprocity, regret or anxiety on decision making process: individuals' belief about themselves and their partners would determine their behaviors towards others and once a belief on others' intention is founded, individuals would not change it.

A variety of experimental evidence supports the importance of the belief-dependent

preferences. Dufwenberg & Gneezy (2000) measure beliefs in the lost wallet game and the DG. The same behavioral pattern of giving is found in both game: one's offer is positively correlated to his belief on others' expectation of the offer as the wallet owner in the lost wallet game and the Dictator in the DG do not want to let his partner down by giving him less than his expectation. This is in line with the framework of Geanakoplos et al. (1989).

In the same vein, Dana, Cain & Dawes (2006) introduce a version of DG with an exit choice: given a 10$ endowment, a significant number of dictators were willing to take 9$ and left the game to eliminate recipients' expectation on their offers and also avoid appearing selfish. It means that apart from monetary interest, people are also motivated to make a decision that they think that others expect them to make even in a non-strategic setting. Thus, the lack of transparency between the beliefs about dictator's actions and the beliefs about recipient's reactions would deteriorate generosity. Similarly, Broberg, Ellingsen & Johannesson (2007) find that roughly two-thirds of participants were willing to accept the dictator-exit option, giving up part of their endowment to avoid sharing. The findings of both Dana et al. (2006) and Broberg et al. (2007) have provided experimental evidences for the belief-dependent utility introduced by Battigalli & Dufwenberg (2009): if the Dictator is adequately sensitive to the Recipient's expectation, he will conform her behavior to that expectation but he is also willing to pay a price to lower the Recipient's expectation and avoid showing selfish.

Both aforementioned studies pointed out one important motivation in economic decision making which is to avoid letting others down. Charness & Dufwenberg (2006) define this motivation as guilt aversion and successfully incorporate it into the utility function. By doing so, they persuasively rationalize the impact of communication on trust and cooperation in trust game as communication brings about messages which can induce commitment: cooperation is much higher if the message contains a statement of promise than otherwise. Other evidences on the importance of belief-dependent preferences can be found in the field experiments (Andreoni et al., 2011) and in a large-scale newspaper dictator game (Ockenfels & Werner, 2012).

These above studies do concur on a principle that beliefs and beliefs about others' beliefs directly enter the utility function, which captures the concern about others' expectation on one's own behavior. As such, there may be other important motives of revealing a type of social preferences rather than a concern for fairness or others' welfare, especially when one's social preference is transparent to others. Chmura et al. (2005) explicitly examine the role of beliefs on social preferences using coordination game by

comparing the likelihood of a successful coordination on a Pareto superior distribution and the one of an equal distribution. They pointed out that the larger difference in subjects' payoff would lead to the less coordination, which supports the model of inequity aversion. Interestingly, subjects reason their strategy using their anticipation of other subjects' choices and what really drives a decision maker is their belief that their partner has a certain kind of preference, not their own preference.

Theoretical studies have successfully modeled the evolution of a certain type of social preferences as signaling device. The first attempt to model signaling of social preferences is probably Frank (1987) which aims at characterizing non-rational behaviors in a utility function without violating utility maximization motive. The most critical point in Frank (1987)'s model is that tastes are endogenously determined and hence, Frank's utility function could be used to rationalize people's concern for fairness, anger and vengeance when those tastes work as a commitment device. A more explicit study is Levine (1997) where altruistic and spiteful acts are arisen with signaling effect under the ordinary assumptions of game theory and the incomplete information about preference characteristics. However, Levine's model departs from the traditional economic theory in the specification of utility function: people do not only care about their own monetary payoffs but also their opponent's. A player's action would send a pre-play message to signal how altruistic he is and his opponent would take reaction based on that signal. Examined quantitatively on experimental results of several repeated games such as ultimatum, centipede and public good game, Levine's model fits observations quite well, especially in comparison with the model with only selfish agents, which then affirms the vital role of the signaling of types.

Most recently, Golman (2015) introduces a model of social preferences which characterizes many motives including altruism, spitefulness, reciprocity and social images. Under the assumption that people want others to like them, Golman (2015) claims that people are incentivized to signal their social preferences, more precisely, their degree of altruism, spitefulness and reciprocity through actions or direct communication, which then affect their own and others' utilities. Golman (2015) proves that altruistic people want others know that they are altruistic while spiteful ones want others to be aware of their spitefulness. An important implication of this model is that individuals may actually reveal their social preferences so as to communicate to their partners, which can be used to explain several puzzling experimental results such as dictator game giving, gift giving or voluntary contribution in public good game. A noteworthy point is that in our study, the motivation of signaling social preference is not to create social images as

in Golman (2015) but in a pure strategic context.

Little is known about signaling social preferences in the lab. The most closely related paper to ours is Fehrler & Przepiorka (2013) which treats altruism as unobservable but signal-able quality of subjects. They conducted experiments in which an altruistic act is manifested by charity giving and their predictions rest on two hypotheses: (1) people who perform charity giving are more trustworthy; (2) in comparison between people who perform charity giving and who do not, donors are trusted more. The experiment is designed in such a way that before committing in a social exchange, a player can observe his opponent's action revealing his opponent's altruism (i.e., charitable giving). In the lab, players are asked to play a dictator game and an exchange game afterwards. Experimental results support for both stated hypotheses as altruistic acts (e.g., charity giving) can compensate cooperators with signaling benefits through social exchange insofar as the benefit from sending signal is positive. Nevertheless, there can be other explanations on their experimental results (i.e., kin or multi-level selection) rather than the signaling benefit of an altruistic act only. An underlying difference between Fehrler & Przepiorka (2013) and our study is that they focus only on signal receivers' decisions while contrastingly, we would also examine the ones of signal senders with all four different signals.

Gambetta & Przepiorka (2014) also consider social preferences as strategic signals: they compare the signaling effect of a generous choice when it is made naturally or strategically. Subjects will play a DG followed by a Trust Game under two conditions: (1) Trustees make decision in the DG without any knowledge about the Trust Game; (2) Trustees make decision in the DG knowing that they can reveal or conceal or lie about their decision in the DG to Trustors. They posit that trustors condition their decision in the Trust Game on Trustees' choice in the DG. Knowing this, most Trustees who have made a "not generous" decision in the DG lie about it. Nevertheless, trustors behave also strategically in how they handle the information: a generous choice made naturally by uninformed trustees and reliably revealed is more effective than a generous choice that could be strategic, which highlights the reliability of the signal display.

In this study, we conjecture that sending information about this preferred option in the DT is a signal of one's type of social preferences and a form of communication about one's expectation. These signals may be credible and sending a certain signal but not others may be a strategic decision. The present research would entail a rigorous test on these issues: whether and how people change the signal of their social preferences strategically under the observability of these preferences.

2.3 Experimental Design

The aim of the present experimental design is twofold. First, the design is meant to test whether the observability of social preferences entails a strategic manipulation of social preferences' types. Second, if this strategic manipulation of social preferences holds, do people really condition their decision on the signal they receive? Three tasks in the experiment are introduced, and then three treatments are described below.

In all treatments, subjects take part in three monetarily-incentivized tasks including a distribution task (DT), a modified Dictator Game (DG) and a guessing game (GG). The DT is designed to elicit subjects' social preferences. Specifically, the DT presents subjects with four different allocations of payoff between three persons (the subject him/herself and two other participants), of which the subject has to choose one. Each option corresponds to one of the four social types as tabulated in Table 2.1. Subjects would see only the allocation options but not the corresponding types.

Option	Allocator	Recipient 1	Recipient 2	Type
A	160	160	160	*Fair*
B	160	130	340	*Efficient*
C	190	40	250	*Selfish*
D	170	65	65	*Competitive*

Table 2.1: Options of distribution and the corresponding type of social preferences

We link the four alternatives to four social preference types using the inequality aversion model of Fehr & Schmidt (1999).

$$U_i = x_i - \alpha_i \frac{1}{n-1} \Sigma_{j \neq i} max[x_j - x_i, 0] - \beta_i \frac{1}{n-1} \Sigma_{j \neq i} max[x_i - x_j, 0],$$

where x_i is the material payoff of player i, α_i measure player i's disutility of having less than player j (often called envy parameter) and β_i measure player i's disutility of having more than player j (often called guilt parameter). Notice that we relax Fehr & Schmidt (1999)'s constraint on the parameters so that the four types of social preferences are captured in the model by parameter restrictions tabulated in Table 2.2.

Type	Parameter restrictions
Fair	$\frac{2}{7} < \beta < 1$ and $\alpha \geq \beta$ or $\frac{2}{21} < \beta \leq \frac{2}{7}$ and $\alpha > \frac{1}{2}(2\text{-}5.\beta)$
Efficient	$\frac{3}{7} < \beta < 1$ and $\alpha < \frac{-\beta}{6}$ or $0 \leq \beta \leq \frac{3}{7}$ and $\alpha < \frac{1}{2}(\text{-}1\text{+}2.\beta)$
Selfish	$\alpha = \beta = 0$
Competitive	$\beta \leq \frac{-2}{3}$ and $\alpha > 0$ or $\frac{-2}{3} < \beta < 0$ and $\alpha > \frac{1}{3}.(2\text{+}3.\beta)$

Table 2.2: Parameter restrictions of types

The four alternatives are illustrated on the subjects' screens, by means of a bar plot (see Figure 2.1). The order of which the four alternatives were presented was randomized to avoid any conceivable influence of a preference for the center or right allocation (Engelmann & Strobel, 2004). Subjects were informed that at the end of the experiment, each subject would be randomly matched with other two participants and randomly assigned a role as “Allocator", “Recipient 1" or “Recipient 2". Only the choice of the participant selected as “Allocator" mattered.

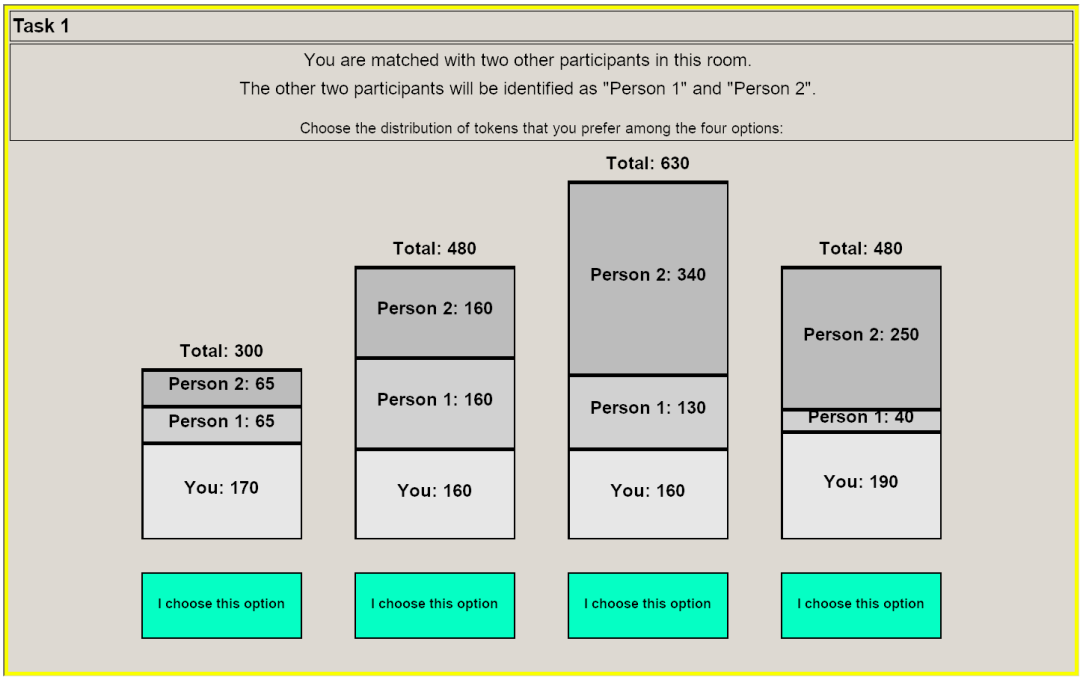

Figure 2.1: Screen shot of the distribution task

In the DG, subjects are randomly assigned as recipients or dictators. In our version of DG, there are 200 tokens on the table, the dictator can decide to give X tokens to the recipient and keep 200-X (tokens) for his/herself while the recipient has no opportunity to reject the offer. Accordingly, payments are finalized.

The GG is the same in all three treatments: subjects are asked to guess the option in the DT which is chosen by the majority of subjects in the session. If their guess is correct, they will earn 40 tokens.

There are three different treatments: (1) *Revise*; (2) *ExanteSend*; (3) *ExpostSend*. In *Revise* treatment, participants do DT then their role in DG is announced. Before playing DG, recipients are told that in DG, their choices made in the DT will be revealed to their matched partner and they are given a chance to revise their choices. Both dictators and recipients are told that with a probability of 0.5, the observed choice is the revised one and with a probability of 0.5, the observed choice is the recipients' choice before revision. dictators will make decision in the DG after observing recipients' choices (hereinafter as conditional DG). This treatment is used to test the within-subject variation of social preference type due to the disclosure of types.

The next two treatments would be used for examining the difference in the distribution of social preference types between subjects who send signal and subjects who do not send signal about their types. In *ExanteSend* treatment, before doing the DT,

participants are provided the instructions and their roles in the DG. Besides, recipients are asked whether they want to send the information about their choices to dictators in the second stage. If yes, their choices would be given to the dictators before the dictators make offer (i.e., conditional DG). Otherwise, dictators will make decision without any information (hereinafter as unconditional DG). After all recipients made decision, all participants do the DT and afterwards, the DG.

The *ExpostSend* treatment only differs from the *ExanteSend* treatment in the order of the *Send* option. In *ExpostSend* treatment, participants first do the DT. After they complete, they are introduced the DG and assigned as a recipient or a dictator. recipients are then asked whether they want to send the information about their choices to dictators in the second stage. If yes, participants play the conditional DG. Otherwise, they would play the unconditional DG.

Notice that in any treatment, both recipients and dictators will do the DT so that the dictators can fully understand how the choices of recipients are elicited and their implications.

Before proceeding, it is worth noting that there is no strategic interaction in either the DT or the DG itself. The DG is defined as a *decomposed game*[1] commonly used to elicit intrinsic preferences (Murphy & Ackermann, 2011). Yet, our experimental design allows us to disentangle strategic interaction from outcome-equalizing transfers as well as any reciprocity motive: we use a perfect-stranger procedure in which it is emphasized that the matched partners of a subject in DT will be definitely different from their matched partner in DG and subjects are paid for both tasks but will not receive any feedback or payment until the end of the experimental session. In this way, the strategic manipulation was captured by our experimental design without any confounding effect, especially reciprocity between subjects and other participants to whom they interact in the DT and they are matched with in the DG.

The study was conducted in April, May and December 2017 at the Computable and Experimental Economics Lab (CEEL) at the University of Trento using z-Tree (Fischbacher, 2007). The experiment involved 162 students the University of Trento recruited through an online recruitment software. The number of subjects in the *Revise*, *ExanteSend* and *ExpostSend* treatments are respectively 60, 54 and 48.

Due to the difference in the number of decisions made by recipients and dictators in DG, participants were seated in two different rooms in order to eliminate any “unfit"

[1]A decomposed game is basically a choice task in which preference considerations are decoupled from strategic considerations.

action which may cause confusion to the subjects. Upon arrival, subjects were randomly assigned a number and accordingly, a cubicle in one of the two rooms. A paper copy of the instruction for Task 1 or the DT (see Appendix A) was distributed, read by each subject in private and then read aloud to assure common knowledge. Subjects had the opportunity to ask questions, which were answered in private. They are told that the experiment includes two stages; at the end of Task 1, they would receive instructions for Task 2 (i.e., the DG) and at the end of Task 2, they would receive instruction for Task 3 (i.e., the GG), directly on their computer screen. Subjects were explicitly asked not to communicate in any way with other participants until the end of the study.

The experiment started as soon as all subjects in both rooms fully understood the first task and the experimental procedure. Each session ended with a questionnaire. A session lasted, on average, 40 minutes. All values were expressed in tokens and were converted at the end of the experiment at the rate of 1 Euro for 40 tokens. Subjects knew the conversion rate in advance and were paid privately their earnings plus a show-up fee of 3 euros. Subjects earned, on average, 7.2 euros which excludes a show-up fee of 3 euros. A total of 6 sessions (2 sessions each treatment) were conducted.

2.4 Behavioral predictions

Under conventional assumptions of selfishness and rationality, both the revise and send option are ineffective. Dictators offer nothing to recipients. Recipients, anticipating this, always choose the selfish option to earn the highest payoffs. As such, recipients will not revise their options and there will be no difference in the distribution of types between those who send the signal and those who does not.

Assume subjects have a belief-dependent utility function (Battigalli & Dufwenberg, 2009), a Dictator's objective function is as follows.

$U \equiv E - m - \theta . \mid \mu - m \mid,$

where E is the endowment of the DG, m is the dictator's offer to the recipient, μ is the dictator's belief on the recipient's expected offer and $\theta \geq 0$ is a constant that measures the psychological sensitivity to the recipient's expectation. θ is assumed to be heterogeneous in the population.

The Dictator would make an offer which equals to his belief about the Recipient's expectation if and only if

$E - \mu \geq E - m - \theta . \mid \mu - m \mid$ or equivalently, $\theta \geq 1$

In words, the Dictator will conform his/her behavior to the Recipient's expectation if she/he is sensitive enough. Recipients are assumed to have a distribution of probability of expected offers and dictators would form belief about the mean of recipients' expectation which is at most half of the endowment (i.e., no-more-than-half constraint (Dufwenberg and Gneezy, 2000)).

Each option in the DT is a signal on one's preference which then contains a statement on his/her expected offer in the DG. Under the no-more-than-half constraint, both *Selfish* and *Competitive* signal are not effective as they imply an expectation for having more than half or the entire endowment. Between *Fair* and *Efficient*, the first reveals a concern for relative payoffs and contains a straightforward statement of a fair-share expectation while the second only reveals an expectation for any positive offer. Notice that dictators also play the DT so they are completely aware of the difference among the four allocations. If the Recipient send signal as being *Fair*, the Dictator would believe that the Recipient's expectation, given his belief of being matched with a sensitive enough Dictator, is to receive a 50% share of the endowment. Hence, on average, we conjecture that in the conditional DG, dictators will offer more to those who signals as *Fair*.

Prediction 1: Recipients who signal as Fair *receive higher offer than others.*

In terms of recipients' behaviors, on the one hand, we predict that recipients will manipulate the *Revise* or *Send* option, sending a message which they believe is the most effective one. On the other hand, they only change their types to send a different signal if and only if the expected payoffs in the DG compensates the loss caused by choosing an option inconsistent with their preferences. We conjecture that there are both within-subject and between-subject variation in the distribution of types given the observability of Recipients' choice in the DT. We have the following predictions:

Prediction 2: In the Revise *treatment, a significant number of non-fair recipients revise their choices in the DT in order to signal as* Fair.

Prediction 3: In the ExanteSend *and* ExpostSend *treatment, the distribution of disclosed types is significantly different from the one of concealed types.*

2.5 Results

We first present the results of the DT. The distribution of types without any strategic reasoning can be obtained from the *Revise* (before revision), the *ExpostSend* treatment and the distribution of dictators' types in the *ExanteSend* treatment. Since the distribution

of types without strategic reasoning is consistent across treatments ($p > 0.1$, chi-squared tests), we pooled the data and obtained the result illustrated in Figure 2.2. The most and the least common type are *Selfish* and *Competitive* respectively while the two types *Fair* and *Efficient* together account for more than 50% of the sample.

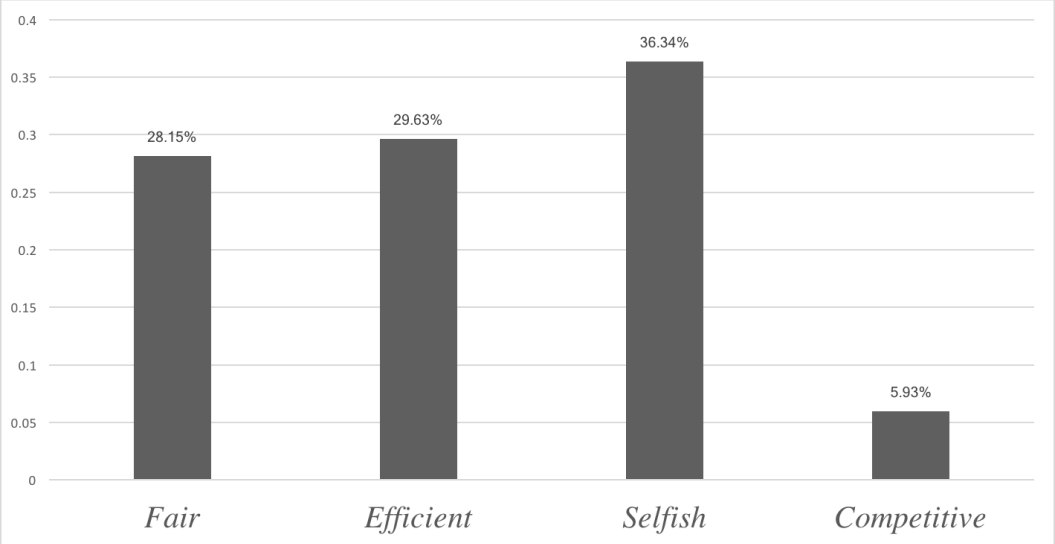

Figure 2.2: Distribution of types without strategic reasoning (N=135)

Next, the within- and between-subject variation of social types due to strategic reasoning will be shown respectively.

RESULT 1: Given the exposure of types, a significant number of recipients changed their choices and signaled as either Fair *or* Efficient.

Support for Result 1 is found in Figure 2.3 which illustrates the within-subject variation of recipients and dictators before and after their social types are disclosed in the *Revise* treatment. There are 11 out of 30 recipients who changed their choices: 7 out of 10 *Selfish* ones signaled as either *Fair* (2) or *Efficient* (5); 3 out of 12 *Efficient* ones signaled as *Fair* and particularly, 1 out of 7 *Fair* recipients signaled as *Selfish*. Therefore, subjects revised their choices to signal as either *Fair* or *Efficient*. This variation is statistically significant ($p < 0.1$, mid-p McNemar test).

Recall that in the *Revise* treatment, recipients are asked to revise their choices in the DT before dictators make decision while dictators are asked to revise choices after they made their offers to recipients. The comparison between the variation in recipients' and dictators' types is a finer check on whether this variation is driven by pure strategic reasoning or also by social image concern. We can confirm that our design allows us to disentangle strategic reasoning from social image concern because among 30 dictators,

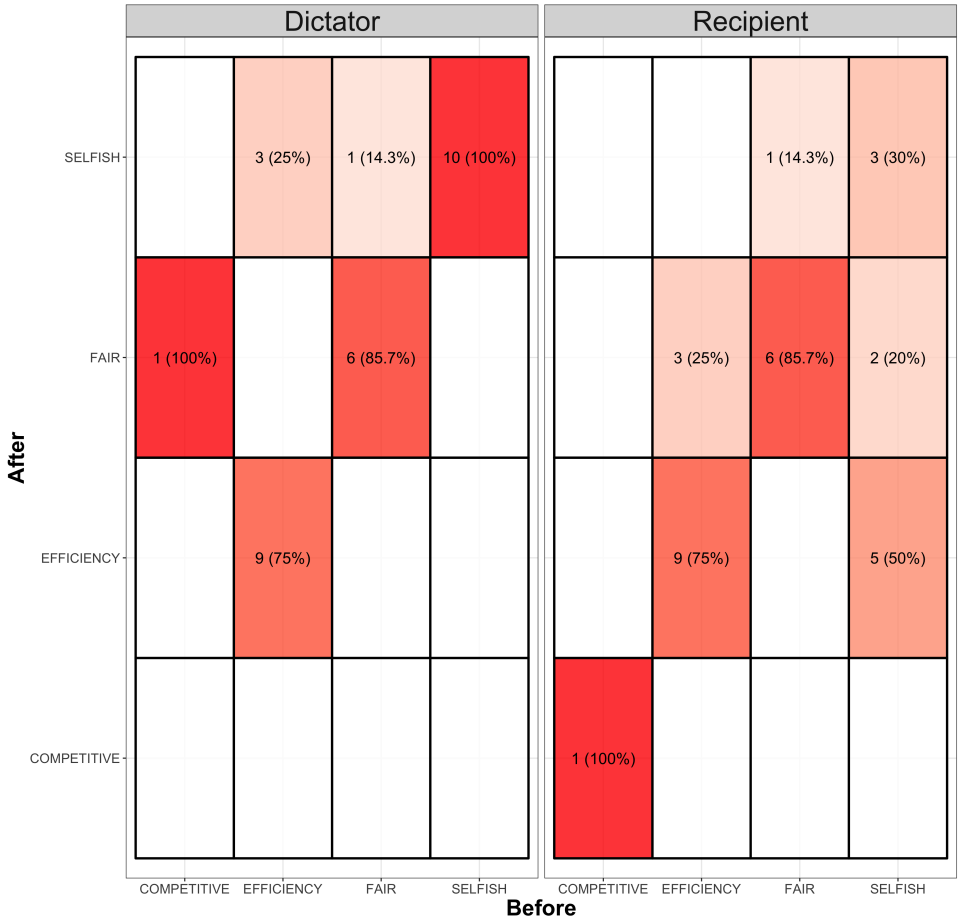

Figure 2.3: Distribution of types before and after revise option

only 5 subjects changed their choices, surprisingly in an opposite dimension compared to that of recipients: 1 *Fair* and 3 *Efficient* dictators chose a *Selfish* option when given the revise option; only 1 *Competitive* changed to *Fair* option.

The *ExanteSend* and *ExpostSend* treatment will bring more insight into whether people perceive social preferences as strategically relevant and hence, manipulate these preferences.

RESULT 2: Compared to Fair *and* Efficient *recipients,* Competitive *and* Selfish *ones are less likely to send the information about their types to their matched dictators.*

Support for Result 2 can be derived from Table 2.3 and Table 2.4. Table 2.3 summarizes the distribution of recipients' types across treatments with the Send option.

As can be seen, in the *ExanteSend* treatment, signals are only either *Fair* or *Efficient* whereas more than half of recipients who did not send signal were classified as *Selfish*,

Treatment	#*obs*	*Fair*	*Efficient*	*Selfish*	*Competitive*
ExanteSend					
All	27	13	6	6	2
		(42.59%)	(20.37%)	(29.63%)	(7.41%)
Sent	16	10	6		
	(59.26%)	(62.50%)	(37.50%)		
Not Sent	11	3		6	2
	(40.74%)	(27.27%)		(54.55%)	(18.18%)
ExpostSend					
All	24	11	8	3	2
		(29.17%)	(22.92%)	(39.58%)	(8.33%)
Sent	20	10	8	1	1
	(83.33%)	(50%)	(40%)	(5%)	(5%)
Not Sent	4	1		2	1
	(16.67%)	(25%)		(50%)	(25%)

Table 2.3: Distribution of types in *ExanteSend* and *ExpostSend* treatment

only 27.27% of them is *Fair* and none is *Efficient*. In the same manner, among 20 signalers in the *ExpostSend* treatment, 90% of them are *Fair* and *Efficient* while the majority of those who did not send signal is *Selfish* and *Competitive*. This difference adheres to the effect of the observability of types upon the Send option: the distribution of disclosed types is significantly different from the one of concealed types in both *ExanteSend* and *ExpostSend* treatment ($p < 0.05$, chi-squared test). The majority of signal senders (more than 80% in both treatments) claimed that they sent the information as they believed their partners would make offer based on this information in the post-experiment questionnaire.

Table 2.4 tabulates the logit regressions on the probability of sending signals, controlling for the recipients' types (*Efficient*, *Selfish* and *Competitive*), the HEXACO-Pi-R scales[2], individual characteristics including gender, field of study and age as well as whether recipients had the ex ante or ex post Send option (1 = ex ante). The regression results suggest that compared to *Fair* recipients, both *Selfish* and *Competitive* type are less likely to send information about their types to their partners. Interestingly, among the HEXACO-Pi-R scales, the Honesty-Humility score reflect one's willingness to manipulating others for personal gain: people with high scores on the Honesty-Humility scale avoid

[2]The HEXACO Personality Inventory-Revised is an instrument that assesses the six major dimensions of personality including Honest-Humility, Emotionality, eXtraversion, Agreeableness versus Anger, Conscientiousness and Openness to Experience.

manipulating others for personal gain. It is thus reasonable when the Honesty-Humility score has a negative effect on the probability of sending signal.

Dependent variable: **Signal sent**	(1)	(2)
Exante	-2.351*	-1.547*
	(1.326)	(0.859)
EFFICIENT	17.04	
	(2,904)	
SELFISH	-4.372***	
	(1.535)	
COMPETITIVE	-3.633**	
	(1.659)	
Honesty_Humility		-2.493**
		(1.269)
Emotionality		-0.293
		(1.158)
Extraversion		-0.506
		(1.502)
Agreeableness_Anger		2.133
		(1.699)
Conscienciousness		-0.732
		(1.253)
Openess_Experience		1.549
		(1.318)
Individual characteristics	Yes	Yes
Constant	4.506	-3.934
	(8.580)	(7.875)
Observations	51	51
Pseudo R-squared	0.565	0.185

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

Table 2.4: Logit regression of sending signals

An underlying result is that the order of the Send option also has a significant effect: the probability of sending is higher if recipients cope with the Send option after they already made decision on the DT. It seems to be counterintuitive as it means that people are less likely to signal when they can decide which signal to be sent than when they cannot. Nevertheless, we can rationalize subjects' behaviors by incorporating the concept of commitment in experiment: the types of subjects were already exposed as soon as they made their decision and hence, participants are more willing to send signal in the *ExpostSend* treatment.

RESULT 3: When types are disclosed, the proportion of Fair *and* Efficient *is much higher while the proportion of* Selfish *and* Competitive *is smaller.*

At the aggregate level, the tendency of signaling either *Fair* or *Efficient* is even more substantial when we pool the data of all three treatments and compare the two distributions of types between those whose signals are observed and those whose signals are unobserved (see Figure 2.4). The chi-squared test result indicates a very strong evidence of the significant difference between these two distributions ($p < 0.01$).

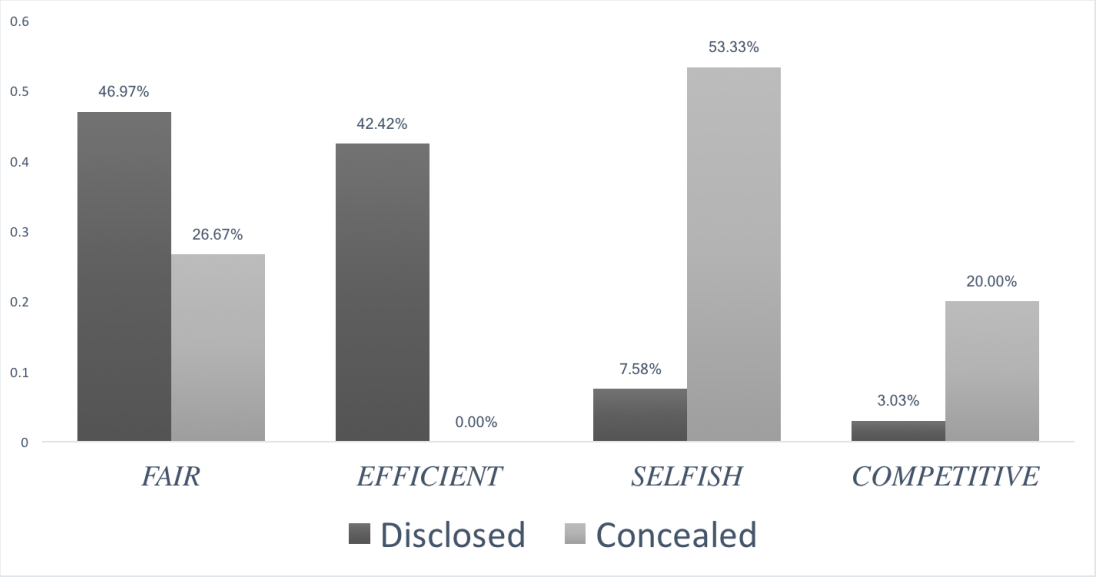

Figure 2.4: Distributions of disclosed and concealed recipients' types (N=81)

Since any variation on recipients' choices in the DT arises from recipients' belief on dictators' behaviors in the DG, it is critical to examine whether dictators condition their offers on recipients' signals. Notice that the conditional DG in the *Revise* treatment and the other two treatments are different because in the *Revise* treatment, dictators know that the signals they received may be manipulated while in the other treatments, signals are genuine. Hence, to distinguish between the two kinds of conditional DG, we named the one in the *Revise* treatment as *Revise* DG.

RESULT 4: Recipients who signaled as Efficient *are offered less than recipients who signaled as* Fair *and who did not send any signal.*

Table 2.5 which summarizes the average DG offers across types[3] and treatments[4].

[3]Recipients' types in the *Revise* treatment are the ones actually observed by their matched dictators, which may be either the original or revised choice.

[4]The DG results in the *ExanteSend* and *ExpostSend* treatment are pooled.

Types	#obs	*Fair*	*Efficient*	*Selfish*	*Competitive*	Mean
Revise DG						
recipients	30	48.89 (n=9)	43.42 (n=12)	51.88 (n=8)	0 (n=1)	45.87
dictators	30	52.5 (n=7)	43.63 (n=12)	16.1 (n=10)	100 (n=1)	45.87
Conditional DG						
recipients	36	47.75 (n=20)	24.29 (n=14)	75 (n=1)	80 (n=1)	40.28
dictators	36	37 (n=10)	48.33 (n=6)	37.06 (n=17)	53.33 (n=3)	40.28
Unconditional DG						
recipients	15	78.75 (n=4)		51.25 (n=8)	30 (n=3)	54.33
dictators	15	46.67 (n=3)	50 (n=3)	53.33 (n=8)	95 (n=1)	54.33

Table 2.5: Mean offers (tokens)

On average, dictators offered about 40.95 tokens or equivalently, 22.48% of the endowment. There were 34.47% of pure gamesman who offered nothing and 13.58% dictators who made an equal share offer. These observations are consistent with those of the previous studies (e.g., Engel, 2011). The average offers across different settings are not significantly different ($p > 0.1$, t-tests).

In the *Revise* DG, there is no evidence on how dictators condition their offers on recipients' types (p-value > 0.1, t-tests). An explanation for this ineffectiveness of signals is because recipients' types may not be genuine: a *Fair* signal, given the revise option, is no longer credible. Since dictators question the truthfulness of the signal they received, their decision will not be influenced by that signal. According to Gambetta & Przepiorka (2014), signal receivers are even more careful in relying their decision on positive signals like *Fair* or *Efficient*. Hence, the credibility of the signal would cloud the impact of signaling one's social preferences and the ineffectiveness of signals in the *Revise* treatment shows that recipients, unlike our assumptions, fail to anticipate the response of dictators.

In the *Conditional* and *Unconditional* DG, we found: (1) dictators offer significantly less when recipients signaled as *Efficient* than when they did not receive any signal ($p<0.1$, t-test) ; (2) dictators offer significantly less when recipients signaled as *Efficient* than when they signaled as *Fair* ($p< 0.1$, t-test). About other types, we do not have enough

observations since very few recipients disclosed their types as *Selfish* or *Competitive*.

In summary, our experimental results provide conclusive evidence that social preferences are considered to be a strategic factor in decision making: recipients are less likely to expose their types if their signals are *Selfish* or *Competitive*. They also strategically manipulate the information about their type of social preferences: (1) the distribution of types when recipients know beforehand their types are observed is significantly different from the one when they do not know that; (2) only *Selfish* type changes their choices in order to signal as *Efficient* and *Fair*.

2.6 Conclusion

We set up a laboratory experiment involving a distribution task and a Dictator Game to test the empirical implication of signaling the social-preference types. We employ the fact the idea of belief-dependent motivation on economic decision making: any information or message one sends to the others will contain a statement of his/her expectation and if people are are sensitive enough, they will conform others' expectation. Our experimental results show that subjects understand the link between their signal of social preference types and others' belief about their expectation and use it appropriately in order to gain higher benefit: recipients whose type of social preferences observable mainly signaled as either *Fair* or *Efficient*. We confirm Gambetta & Przepiorka (2014)'s conclusion on the existence of strategic thinking on signaling even in an artificial setting with low stakes.

We have proposed and tested a strategic motive of revealing social preferences. It should be noted that by all means, we do not neglect the presence of people naturally having social preferences. Quite the opposite: without strategic reasoning, about 50% of people have other-regarding preferences (i.e., inequality averse and efficiency seeking). However, our study also reinstates the selfishness in human economic behaviors and confirms the conjecture of Engelmann & Strobel (2004): the presence of strategic reasoning does change the relative importance of distributional preferences.

Appendices

Appendix A: Experiment instructions (translated from Italian)

Welcome! This is a study of economic decision making. The study includes three tasks and a questionnaire. After completing a task, you will participate the next task and earn more money. All tasks will be computerized. We will now provide you with the instructions for Task 1. At the end of Task 1, you will receive instructions for Task 2, directly on your computer screen. Instructions for Task 3 will be provided only at the end of Task 2. In all instructions, we will always provide you true information that never deceives you in any way.

Participants in this session have been randomly allocated to this room or another room. All participants in both rooms are now reading the same instructions. In Task 1 and 2, you will be randomly matched with other participants. In Task 3, you will not be matched with anyone. If you are matched with a participant in Task 1, for sure you will not be matched with him or her again in Task 2.

The choices made by each participant will be confidential unless explicitly specified. Anonymity will be maintained both during and after the study: your identity will not be made known to any participant at any time.

You will have the opportunity to earn tokens in each of the three tasks. The tokens you earn in each task cumulate and will be converted into Euro at the end, at the rate of 1 Euro every 40 tokens. You will also receive 3 euros for showing up in this study. The money you earn will be paid to you in private, and in cash, at the end of the study.

Instruction for Task 1

In this task, you will be matched with two other participants, chosen at random among those in this room. We will denote the other two participants in your group as “Person 1" and “Person 2". Your task is to choose your preferred allocation of tokens among you and the other two participants in your group. You can choose between four options:

A. You earn 160 tokens, Person 1 earns 160 tokens and Person 2 earns 160 tokens.

B. You earn 160 tokens, Person 1 earns 130 tokens and Person 2 earns 340 tokens.

C. You earn 190 tokens, Person 1 earns 40 tokens and Person 2 earns 250 tokens.

D. You earn 170 tokens, Person 1 earns 65 tokens and Person 2 earns 65 tokens.

At the end of the study, one person in each group will be randomly selected and her/his choices will define her/his earnings and those of the other two in the group. If

you are randomly selected, the option you choose in Task 1 will become effective and determine your payoff and the payoff of other two participants in your group. If you are not selected and assigned as “Person 1" or “Person 2", your decision will be ineffective. Your payoff thus will be determined by the option chosen by the selected participant in your group and by the role you are assigned (Person 1 or Person 2).

We ask you to turn off your phone now and not to communicate in any way with the people present in the room until the end of the study. If you have any question, please raise your hand and we will assist you in private. You are free to leave the study if you want to, however, you will not receive any sum of money.

Appendix B: Decision screens

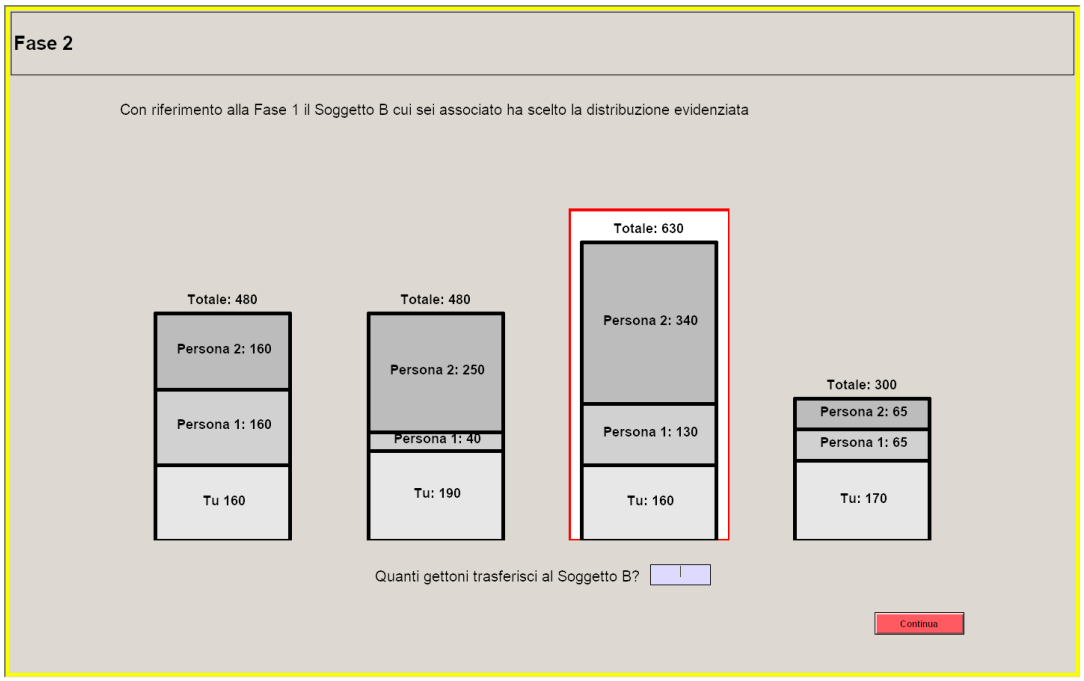

Figure 2.5: An example of Dictators' decision screen when Recipients' types are disclosed

CHAPTER 3

PRO-SOCIALITY AND CONTRACT DECISION: A LAB EXPERIMENT

with **Matteo Ploner** (University of Trento)
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A unifying theme in the literature on organizations is the importance of workers' pro-social motivation on effort provision: in a task yielding a pro-social outcome, effort levels of pro-socially motivated workers under no incentive pay contract can approach those generated by high powered piece-rate contract. This suggests that employers could save monetary incentives by attaining the information about their workers' pro-sociality to make an optimal compensation scheme offer. Our study examines if employers are able to make use of workers' pro-social motivation in a profitable way. Using a classic principal-agent setting, we present the first experimental evidence on how employers' and workers' pro-sociality have effect on employers' contract decision and profit.

Keywords: Pro-social motivation; Warm-glow and pure altruism; Real-effort task; Charity giving
JEL Codes: C91, D64, J41, M52

3.1 Introduction

Among the substantive issues in labor economics that have been addressed by means of lab experiments, the most important contribution is the integration social preference into workers' motivation (Dohmen, 2014). There has been a great deal of research studying the role of workers' pro-social motivation (i.e., the desire to exert effort to benefit others) for the design of incentive contracts, the selection of workers, the provision of effort and organizational design (see Charness & Kuhn (2011) for a review). These studies do concur on two underlying findings: (1) compared to non pro-social workers, pro-social ones provide more effort in pro-social task (i.e., a task yielding an outcome that benefits others); (2) pro-social workers require less monetary compensation. This suggests to both non-profit and for-profit organizations that they could take advantage of their workers' pro-social incentives by making the workers' effort tied directly to their pro-social motivation.

While the vast majority of research has focused on the effect of pro-social motivation on workers' behavior and optimal incentive design, little is known about how employers handle their workers' pro-sociality. In real-world labor relationship, employers usually have access to an employee's personal information and pro-sociality proxies even before recruiting them (e.g., a track record of extra-circular activities and charity activities on employee's CV). Yet, they can make two possible mistakes: (1) they fail to initiate pro-social motivation and thus, fail to take advantage of their pro-social workers; (2) they mistakenly offer a pro-social compensation scheme to non pro-social workers. Whether employers make those mistakes or successfully exploit pro-socially motivated workers remains ambiguous as little research has explicitly explored employers' reaction towards pro-social motivation at work.

In the lab, Dictator Game has been commonly used to measure one's pro-sociality. The recipient in the DG can be either a deserving entity (e.g., charity, NGOs) or another unknown participant. Prior experimental studies have only used the donation to the former one as a proxy of participants' pro-sociality (e.g., Fehrler & Kosfeld (2014); Banuri & Keefer (2016); Tonin & Vlassopoulos (2010)). Even though this measure can closely capture social preferences of workers in non-profit sector, it does not provide the full picture of workers' pro-social motivation: a worker's effort provision is also driven by his/her concern about other people like his employers. Both dimensions of workers' pro-sociality, hence, should be examined to establish a link between pro-social motivation and effort provision.

In this study, we collect evidence from a lab experiment which, to our knowledge, is the first attempt to unearth whether and how employers can make use of workers' pro-sociality. We consider a framework where an employer can observe a worker's pro-sociality before offering a compensation scheme to that worker whose effort determines the quantity of output. The set of compensation schemes contains a piece-rate pay scheme and a pro-social scheme (i.e., agents are paid a flat wage but a charity of agents' choice will receive a donation which increases in agents' effort). Screening is a thrust of the setting: pro-social scheme may be a win for employers, but also may cause losses to them if this compensation scheme is offered to workers who are unmotivated or selfish. In other words, the incentive scheme should be tailored with the worker's social preferences. We depart from previous studies in studying two different dimensions of workers' pro-sociality: towards another person and towards a charity.

Using the set up described above, we ask three questions with respect to pro-sociality, effort provision and contract choice. First, does the pro-social compensation scheme actually encourages pro-social workers in a productive way and between the two dimensions of workers' pro-sociality, which is the stronger driver of effort provision? Second, does employers' contract choice aligns with workers' pro-sociality? If so, there should be a difference in the average workers' pro-social motivation between contracts offered by employers who are exogenously given the information about their workers' pro-social motivation. The third question is whether the information about workers' pro-sociality is profitable in such a way that employers with information about workers' pro-sociality earn more than their counterparts without that information.

Our main results are the following. Under the pro-social compensation scheme, pro-social workers provide higher effort compared to selfish ones. Between two pro-sociality dimensions: towards another person or towards a charity, the former one is the stronger driver of effort provision. Both employers' and workers' pro-sociality have an impact on employers' contract decision: the more pro-social employers or workers are, the more likely employers are to choose the pro-social scheme. Without the information about workers' pro-social motivation, the piece-rate pay contract always outperforms the pro-social one. In contrast, with that information, employers who offer the pro-social scheme earn no less than those who offer the piece-rate pay scheme.

The rest of the paper is organized as follows: the next section reviews the relevant literature followed by the theoretical framework. Section 4 describes the experimental design. The experimental results are presented in Section 5. Section 6 offers some concluding remarks.

3.2 Literature Review

There is a well-established literature on the interplay between pro-social motivation and effort. Particularly, research in public economics has studied a common approach of pro-social motivation namely public service motivation which is developed from the idea of mission motivation in public bureaucracies (e.g., Wilson, 1989). Perry & Wise (1990) offered three propositions: (1) the greater an individual's public service motivation, the more likely the individual will choose to work in public sector; (2) in public organizations, public service motivation is positively related to performance; (3) the monetary incentive is less pronounced in public organizations with highly pro-socially motivated workers. According to Lerry, Hondeghem & Wise (2010), despite the variety of measures and constructs, research in public service motivation lead to similar inferences as the above three propositions.

Experimentalists have found evidences in line with the above propositions[1]. Tonin & Vlassopoulos (2010) disentangle the two sources of workers' pro-social motivation, namely pure and warm-glow altruism and found that warm-glow altruism accounts for an increase in effort provision. In the same line, Imas (2014) demonstrates that the striking findings on warm-glow altruistic motivation which might benefit firms are: (1) workers perform better when their effort is tied directly to charitable contribution than when they have only standard incentive scheme; (2) an increase in charity piece rate does not lead to an increase in their effort.

Banuri & Keefer (2016) experimentally studies the interaction between pro-social motivation and wages by comparing two pay schemes in public and private sectors. Specifically, subjects' pro-social motivation are measured by a modified DG in which the recipient is the Indonesian Red Cross and then, subjects' efforts are measured by a real-effort task in different compensation schemes including pro-social and piece-rate pay: Effort for Charity (i.e., subjects' effort will only benefit the charity); Pay-for-Effort (i.e., piece rate pay scheme); Pro-social task (i.e., subjects are paid a flat salary and their effort will also benefit the charity). They conducted both lab experiment on university students in Indonesia and field experiment on workers in the Indonesian Ministry of Finance. Their main findings are: (1) pro-socially motivated workers exert more effort in pro-socially motivated task; (2) higher wage increases the likelihood of recruiting non-pro-social workers in public sector.

There are a number of studies which offer different evidences on when and how

[1]See Francois & Vlassopoulos (2008) for a review

workers' pro-sociality works. Koppel & Regner (2015) disentangle the two possible explanation for the increase of effort in workers' pro-social motivation: (1) workers care about the mission of the job; (2) workers care about whether employers have the same mission preference like them. They set up a principal-agent lab experiment in which the charity donation is conditional on workers' performance and either employers or workers choose the charity to which they send donation, depending on the treatment. Their lab experimental results show that the two play an equal role in workers' effort exertion.

In the same line, Cassar & Meier (2018) study how the perceived objective of employers can be a core factor on workers' performance by comparing workers' effort when the charity donation is conditional and unconditional to the effort level. By running an online experiment on MTurk, they provide striking findings on how pro-social motivation of workers can backfire: when the charity donation is tied directly to workers' performance, workers exert less effort compared to both cases when the donation is independent of the effort level and when there is no incentive at all. This is because the employers' intention for the offered compensation scheme can be interpreted as strategic or "unkind". The reduction of effort is even more severe if the charitable incentive is offered to workers who do not care about the charity. The authors then call for caution on using pro-social incentives at workplace.

Most recently, Jones, Tonin &Vlassopoulos (2018) explore the interaction between monetary incentives, pro-social motivation and performance in an environment with multi-tasking. The novelty of this paper is the inclusion of two performance dimensions: quantity and quality. Running a real-effort lab experiment, they compare the quantity and quality of workers' effort with a flat and a piece-rate pay as well as with or without the presence of a mission. They found that without a mission, the piece-rate pay scheme outperforms the flat one in the quantity causes a reduction in terms of quality whereas with the presence of a mission, the piece-rate pay scheme's impact on the quality and quantity of effect is lessen.

Prior studies have shown how other-regarding preferences affect employers' contract decision. Fehr, Klein & Schmidt (2007) report the results of a lab experiment that examines whether fairness can work as an enforcement device. Among a fixed menu of contracts including an incentive, a trust and a bonus contract, principals choose a contract to offer and agents choose an effort level with a given effort cost function. They found that bonus contract is more efficient than incentive contract if there are some fair-minded workers while trust contract is not. Principals anticipate that fairness concern matters to agents' decision and thus, predominantly offer bonus contract to agents.

Cabrales, Miniaci, Piovesan & Ponti (2010) explicitly investigate if social preference acts as a determinant in contract choice. In their settings, subjects' distributional and reciprocal preferences are measured with DG and Effort Game and then, they played a Market Game in which within each matching group, four subjects are randomly assigned as Principals and select one contract offered to the four teams of agents. Those who are assigned as Agents then choose their preferred contract within the set of offered contracts. Experimental results have shown that subjects' social preferences play an underlying role in their effort decisions. Interestingly, while principals usually offer contracts aligned with their estimated distributional preferences, the agent is more likely to choose a contract which minimizes the distance between her estimated preferences and the one of the principal.

In a more general setting, Kupper & Sandner (2018) takes into account the heterogeneity of social preferences including rivalry, pure self-interest and altruism on profitability of firms. They showed that a firm can increase its profit by adjusting compensation in such as way that competitive agents are privileged over altruistic ones. A firm does not pay all altruistic agents equally to motivate them but incentives would motivate selfish and competitive agents to exert higher efforts. Hence, firms can make use of the variety of social preferences in a team and optimize the wage compensation system.

In terms of research question, the most closely related study to ours is Gerhards (2013) which examines whether principals take advantage of workers in saving monetary incentives. In a principal-agent setting, agents are offered a piece-rate pay to exert effort which benefits not only principals but also a third party which can be either a charity or a project. Agents are either real full-time workers in non-profit organizations or students while principals are always students. Principals are provided information about the non-profit organization the agents are working for or about agents' preferred charity organization before choosing a piece-rate pay from the set of three possible piece rates. Due to the setup of the experiment, agents made decision using strategy method to state their effort level and principals chose the piece rate level knowing that agents already selected their effort level. They found that principals failed to make use of the information about agents' mission choice, choosing rather high piece-rate level. One of the possible explanations for this finding is that the charity donation is not subtracted from principals' profit, which is usually the case in reality.

Whereas there has been a great deal of experimental evidences on the link between pro-social motivation and effort or how other-regarding preferences shape workers'

behavior, previous research barely test experimentally whether and how principals deal with agents' pro-social motivation. Our study would be the first laboratory experiment which explicitly examines how principals exploit information on the agents' pro-social motivation, regardless of the working sector. Our design more closely resembles the real world: principals can always observe workers' pro-sociality before offering a contract and hiring workers while workers know about the observability of their pro-sociality in advance.

3.3 Experimental Design

Our experiment consists of three stages as follows.

- Stage 1: Pay-for-effort Slider Task
  Subjects are asked to complete the slider task introduced by Gill & Prowse (2019) under a piece-rate pay scheme. Their task is to use the mouse and adjust the cursor to the desired position in a slider. They are given 150 seconds to complete as many sliders as they can. They earn 5 tokens for every correctly positioned slider. This stage provides a control for ability and motivation to work under a piece-rate compensation of subjects. Besides, this stage also works as practice so that all subjects are fully aware of what a person has to do and how hard the task is.

- Stage 2: Dictator Games
  Subjects play two Dictator Games (DG) with two different Recipients who are respectively another participant (PDG) and a charity (CDG). All subjects make choices in the role of Dictators and decide how much to keep for themselves and how much to give to the Recipient given an endowment of 100 tokens. In the CDG, subjects are provided a list of six charity organizations and some information about these organizations[2]. They will choose their preferred charity before making decision on their donation. At the end of the experiment, one of the two Dictator Games will be randomly selected for payment: if the PDG is chosen, subjects will be randomly assigned as Dictators or Recipients and decisions of those who are assigned as Dictators will be taken for payment; if the CDG is chosen, subjects will

[2]The six organizations include Save the Children, Red Cross, EMERGENCY, Telefono Azzuro (an association protecting children's rights and preventing any kind of child abuse), Fondo Ambiente Italiano (a non-profit organization protecting and conserving the Italian historical, artistic and landscape heritage) and Fondazione ANT Italia (a non-profit organization providing home-based care for cancer patients and free prevention).

earn the amount of tokens they keep for themselves while their donation will be sent to a charity of their choice. We use subjects' decisions in these two DGs as proxies for their pro-social motivation.

- Stage 3: Contracted Slider Task
  At the beginning of this stage, subjects are randomly matched with another participant who is definitely different from the one with whom they may be matched in the PDG. In each pair, subjects are randomly assigned as a worker or an employers.

  Those who are assigned as workers receive a pay scheme offer from employers to do the slider task which is similar to the one in Stage 1. There are two possible pay schemes called Contract A and Contract B: Contract A offers agents a flat pay of 60 tokens regardless of how many sliders they completed but for each slider completed, they will give 2 tokens to the charity; Contract B offers workers a piece-rate pay of 5 tokens for each slider completed. Those who are assigned as employers choose which pay scheme to offer to their matched workers. In both options, for every slider the agents completed, the employer's revenue is 10 tokens. His earnings (profit) are given by his revenues net of the wage payment to his/her worker and the charity donation (if any).

To avoid deceiving subjects, we delivered instructions for Stage 2 and Stage 3 at the same time and told subjects in advance (before they make decision in DGs) that there are two possibilities of how the pay offer is made: (1) With a probability of 1/2, the employer cannot observe their decisions in the two DGs before choosing the pay scheme; (2) With a probability of 1/2, the employer can observe the agent's decision in the two DGs before choosing the pay scheme offered to the agent. The worker will not know whether their matched employers can observe their decision in the second stage. In any case, the agents' performance in Stage 1 will never be revealed and they cannot reject the pay offer.

For convenience, we assume that employers who observe the information about their matched worker's pro-sociality are in the *With Information* treatment and those who do not receive any information are in the *No Information* treatment. In the *With Information* treatment, employers will have the access to the information about their workers by clicking on the screen and they can only observe workers' decision in the PDG and CDG one at a time so that we can control whether and for how long they really read that information.

In Stage 3, the slider task will be repeated for three times which gives the employers a chance to see how their workers respond to the contract parameters, and to adapt their contract offers accordingly. After each period, both employers and workers will receive feedback about the number of completed sliders and their earnings in that period. One of three periods will be randomly selected for payment. The role and how employers choose the pay scheme, whether he/she can observe the worker's pro-sociality would be kept constant across three periods. However, the matched partners of a subject across three periods will be definitely different.

Subjects' final earnings will equal to the sum of their earnings in each stage. They will only receive feedback about their final payment at the end of the session.

3.4 Theoretical framework

Consider the following model which is based on the benchmark model of Besley & Ghatak (2017): a single agent is matched with a principal who offers a compensation scheme under which the agent exerts his effort. There are two options: Contract A offers workers a fixed pay F (tokens), independent of his effort and additionally, a charity will be sent k (tokens) for every unit of output; Contract B offers workers a piece-rate pay of w (tokens) for every unit of output ($w > k$). In both options, the principal would get a revenue of p (tokens) for every unit of output, where $p > w > k$.

If agents are selfish profit maximizers, then they will not exert any effort under contract A, hence a rational principal should always offer contract B.

3.4.1 Agents

Assume that some agents are pro-socially motivated, apart from the direct utility from their wage, there is also an outcome-contingent component of motivation. The agent i's utility depends on his wage, his cost of effort and the generated output which goes to the principal and a charity (if Contract A is offered).

$U(W, e_i) = W - C(e_i) + G(e_i, \theta_i^c, \theta_i^p)$,

where W is the agent's material payoff. The agent's disutility of effort $C(e_i)$ increases in effort. The non-pecuniary payoffs including the charity giving and the earnings of the principal is denoted as $G(.)$ which depends on the pro-social motivation of the agent

towards a charity and towards another person respectively measured by θ_i^c and θ_i^p, $\theta_i^c \geq 0$, $\theta_i^p \geq 0$.

Assume the cost of effort is given by $C(e) = \frac{1}{2}e_i^2$ and the agent cares only about his/her actual contribution to the charity of his/her choice and the principal. The agent i's utility in Contract A and Contract B respectively are

$U_A = F - \frac{1}{2}e_i^2 + \theta_i^c.k.e_i + \theta_i^p.(p.e_i - F - k.e_i)$

$U_B = w.e_i - \frac{1}{2}e_i^2 + \theta_i^p.(p.e_i - w.e_i)$,

The agent will then choose effort to maximize his/her utility. Given θ_i^c and θ_i^p, the agent's optimal efforts across contracts are

$$e_A = \underset{e}{\text{argmax}}(U_A) = \theta_i^c.k + \theta_i^p.(p-k) \tag{1}$$

$$e_B = \underset{e}{\text{argmax}}(U_B) = w + \theta_i^p.(p-w) \tag{2}$$

3.4.2 Principals

Consider the case where the information about agents' pro-sociality is exogenously given. Under the assumption the principals are not pro-socially motivated, Principal j's objective function is

$p.e_i - P(e_i)$,

where $P(e_i)$ is the financial cost of provision. In our setting, $P(e_i)$ includes the cost of wage payments and charity donation.

Given the agent's optimal response to an offered compensation scheme, the principal's utility across contracts are as follows:

$\pi_A = (p-k)[\theta_i^c.k + \theta_i^p.(p-k)] - F$

$\pi_B = (p-w)[w + \theta_i^p.(p-w)]$

Since in our set-up, parameters F, k and w are exogenously given, this model predicts that the Principal should offer Contract A iff $\pi_A > \pi_B$, that is, if

$(p-k)[\theta_i^c.k + \theta_i^p.(p-k)] - F \geq (p-w)[w + \theta_i^p.(p-w)]$

Equivalently, $\theta_i^c.k.(p-k)+\theta_i^p.[(p-k)^2-(p-w)^2] \geq F+w.(p-w)$ (3)

On the one hand, if the principal does not know θ_i^c, θ_i^p, he/she has to form a belief $\widehat{\theta_i^c}$ and $\widehat{\theta_i^p}$. In a one shot interaction, since the principal cannot update her belief by observing behavior in previous periods, assume that her/his belief is given by the mean of the prior distribution of θ_i^c, θ_i^p which are respectively $\mathrm{E}(\theta_i^c)$ and $\mathrm{E}(\theta_i^p)$. On the other hand, if the principal can observe the extent of the agent's pro-social motivation, he will choose Contract A if the agent's θ^c and θ^p fulfill (3) and the agent's optimal effort choice is then given by (1). Otherwise, he will choose Contract B and the agent's optimal effort choice is then given by (2).

There are two implications which are worth drawing from the above framework. First, in the pro-social scheme, motivated agents may receive lower payment than if they get piece-rate pay and yet may exert as high effort level depending on their pro-sociality. It means that hiring a motivated agent can be profitable for principals since effort can be incentivized at lower cost. Hence, the extent of agents' pro-sociality measured by θ^c and θ^p is a crucial determinant in principals' contract offers for two reasons: (1) to minimize the wage payment to motivated agents; (2) to avoid erroneously offer a charitable scheme to unmotivated agents because for these agents, fixed wage means no effort.

Second, observing an agent's pro-social motivation, the principal chooses Contract A when the agent is highly pro-social towards either a charity (i.e., θ^c is large enough) or another participant (i.e., θ^p is large enough) or both.

We have the following hypotheses:

- **Hypothesis 1**: *For agents who are offered Contract A, their effort is positively correlated to both their charity donation in the CDG and their offer to another participant in the PDG.*

  Offered Contract A, agents are not monetarily incentivized. Only pro-social agents would put effort to do the slider task because they care about the beneficiary, in the case, a charity of their choice, and their matched principals. Hence, we hypothesize that the number of correctly-positioned sliders agents complete increases in agents' charity donation and offer in the two DGs.

- **Hypothesis 2**: *For agents who are offered Contract A, between the two dimensions of pro-sociality, the one towards another person is the stronger driver of workers'*

effort exertion.

In our experiment, $p = 10$ and $k = 2$ which implies that $p - k > k$. Thus, the weight of agents' pro-sociality towards another person is larger than the one of agents' pro-sociality towards a charity ($p - k > k$ in (1)), we expect that between the two dimensions of pro-sociality, the one towards another person is the stronger driver of workers' effort provision: an increase in agents' offer in the PDG has larger positive effect on effort exertion than the same increase in agents' charity donation in the CDG.

- **Hypothesis 3**: *In the* With Information *treatment, the likelihood of choosing Contract A is positively correlated to their matched agents' charity donation and offer to another person.*

  Given the information about agents' pro-sociality, principals would be able to make an optimal contract offer: the pro-social compensation scheme is only offered to pro-social workers. We should observe this contingency of contract offer on agents' pro-sociality only in the *With Information* treatment.

- **Hypothesis 4**: *In the* With Information *treatment, offering Contract A, the principal earns no less than those who offer the piece-rate contract to the worker.*

  In the *With Information* treatment, if principals condition their contract choice on the information about agents' pro-sociality, the pro-social motivation generated by effort-contingent charity donation and profit should compensate for the lack of monetary incentive. As a result, principals' profit under the pro-social compensation scheme should be no less than the one under piece-rate pay contract.

- **Hypothesis 5**: *On average, profit of principals in the* With Information *treatment is higher than the one in the* No Information *treatment.*

  With the information about agents' pro-sociality, principals can avoid offering pro-social compensation scheme to unmotivated agents, making use of the contingency of effort exertion on pro-social motivation and saving monetary incentive by offering the fixed pay contract to pro-social ones. Hence, the profit of these principals should be higher than those who have no information about their agents' pro-sociality.

3.5 Experimental results

We ran 8 experimental sessions between May 2018 and March 2019 at the Cognitive and Experimental Economics Lab (CEEL) at the University of Trento using z-Tree (Fischbacher, 2007). The experiment involved 160 subjects who are students of the University of Trento recruited through an online recruitment software. Among 160 subjects, 75 subjects are male and 85 subjects are female.

A session lasted, on average, 1 hour 30 minutes. All values were expressed in tokens and were converted at the end of the experiment at the rate of 1 Euro for 25 tokens. Subjects knew the conversion rate in advance and were paid privately their earnings. Subjects earned, on average, 10.8 euros which excludes a show-up fee of 3 euros and the charity donation they made (if any).

We first summarize the results of the first two stages and then focus on the three main research issues in our study which are the contingency of effort and compensation scheme on pro-sociality and how information about workers' pro-sociality can be profitable for employers.

In the Slider Task, on average subjects complete 19 sliders, the minimum and maximum number of correct sliders are 9 and 28 respectively. The distribution of subjects' effort in the first stage is presented in Figure 3.1.

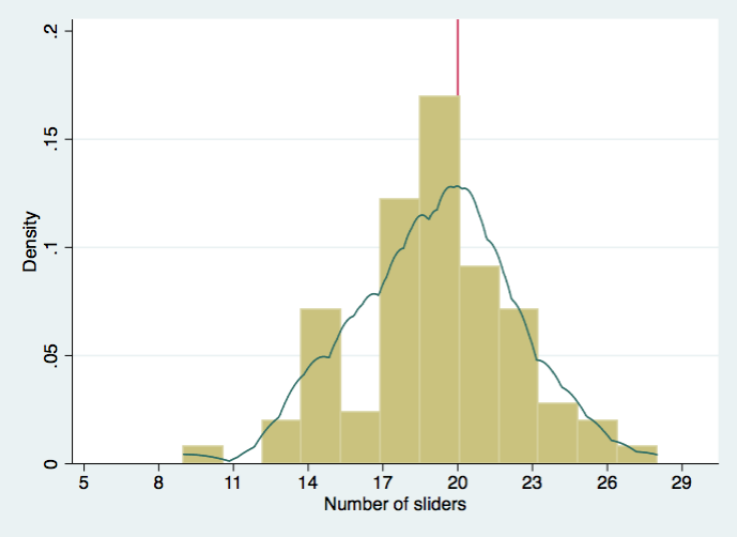


Figure 3.1: The distribution of effort in the Slider Task

In the two dictator games, on average, subjects give 32.3 and 29.7 tokens to a charity of their choice and to another participant respectively. Figure 3.2 illustrates the frequency distribution of subjects' decision in the two dictator games, which is similar to the findings

of Eckel & Grossman (1996): there are fewer subjects keeping all for themselves and more subjects giving everything in the CDG than the PDG[3].

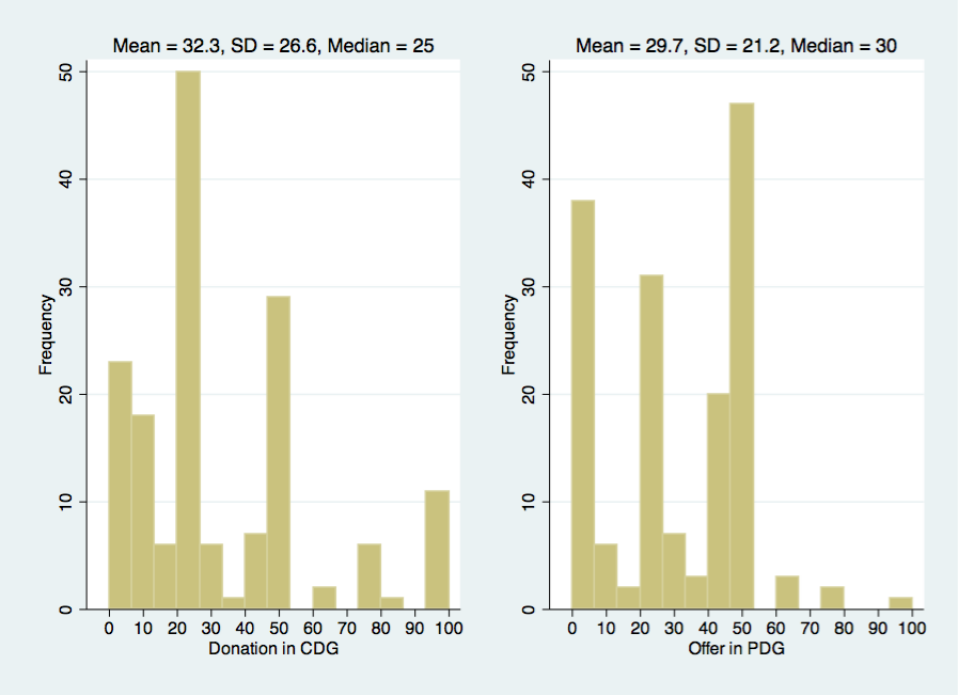


Figure 3.2: The distribution of donation and offer in the DGs

3.5.1 Pro-sociality and effort

Since workers do not know whether employers observed the information about their decision in the two DGs before making contract choice, for workers, there is no difference in experimental setting across two treatments. Thus, we pool the data of workers' effort in both treatments.

In Figure 3.3, we present the distribution of ability-adjusted effort of workers across contracts in the last period and over all periods. The ability-adjusted effort is defined as the ratio of the number of correctly-positioned sliders in Stage 3 to the number of correctly-positioned sliders in Stage 1. We use the ability-adjusted effort because subjects are likely to differ in their ability to do the slider task.

[3]Since the charity donation in the CDG and the giving to another person in the PDG are not perfectly correlated ($r=0.28$, $p < 0.01$), we include both of them in the same regression.

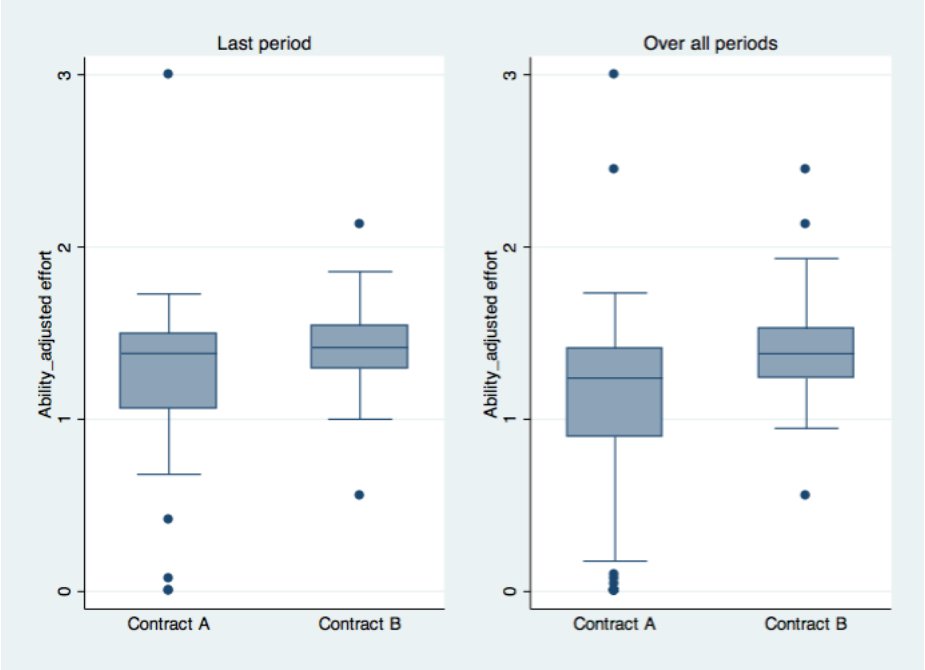


Figure 3.3: Ability-adjusted effort across contracts in the last period and over all periods

Workers who are offered Contract A significantly deviate from the optimal level of pure-selfish workers in the last period and over all periods (p-value < 0.01, t-tests). On average, workers exert higher effort under Contract B than under Contract A (p-value < 0.01, t-tests).

Our first result concerns the contingency between workers' pro-sociality and their effort exertion.

RESULT 1: Offered the pro-social compensation scheme, workers with higher pro-sociality exert more effort.

Support for Result 1 can be derived from Table 3.1 which reports Tobit regressions of ability-adjusted effort on contract choice and pro-sociality of workers with the data from the last period and over all three periods. The pro-sociality measures include workers' charity donation in the CDG denoted as CDG and workers' giving to another participant in the PDG denoted as PDG. These variables are divided by 100 for presentational convenience. The individual characteristics include gender, age and field of study.

Dependent variable:	M1		M2	
ability-adjusted effort	Coefficient	SE	Coefficient	SE
Contract A	-0.61***	0.17	-0.68***	0.17
PDG	-0.26**	0.12	-0.31	0.26
CDG	-0.09	0.11	-0.10	0.21
Contract A x PDG	0.66**	0.29	0.72*	0.43
Contract A x CDG	0.35	0.32	0.84**	0.34
Individual characteristics	Yes		Yes	
sigma	0.38***	0.04	0.37***	0.03
Constant	1.21***	0.34	0.70	0.50
Observations	240		80	

Note: $***p < 0.01, **p < 0.05, *p < 0.1$. Standard errors are clustered at individual level. Contract A is a dummy for Contract A. PDG and CDG are workers' decisions in the PDG and CDG respectively. Contract A x PDG and Contract A x CDG are the interaction between Contract A and pro-sociality measures. M1 is estimated with the data from all three periods, M2 is estimated with the data from only the last period.

Table 3.1: Tobit regression of the ability-adjusted effort on workers' pro-sociality

The negative coefficient of Contract A confirms the outperformance of the piece-rate pay contract in incentivizing workers compared to the fixed payment. However, as we predict, there is a positive relationship between workers' pro-sociality and their effort exertion when Contract A is offered. Especially in the last period, both dimensions of workers with pro-sociality are positively correlated with their ability-adjusted effort. Over all three periods, offered Contract A, workers with higher pro-sociality towards another participant exert higher effort while that dimension of pro-sociality negatively affects workers' effort if they are offered Contract B.

Our second result establishes that the two dimension of workers' pro-sociality positively relate to their effort provision although each to different extent. This is one of the key contributions of our paper.

RESULT 2: Workers' pro-sociality towards another person is the stronger driver of their effort exertion than the one towards a charity.

Evidence for the above result is that over all periods, only the coefficient for the interaction between Contract A and workers' pro-sociality in Model M1 (Table 3.1) is

significantly different from 0 (p-value < 0.05, F-test).

The above findings suggest that pro-social motivation can substitute the monetary incentive as workers' effort is positively correlated with their pro-sociality. Offering the right contract to the right worker is highly important in optimizing a compensation scheme: piece-rate pay contract is undoubtedly powerful, generally outperforming the pro-social contract but offering it to highly pro-social workers is not optimal.

3.5.2 Pro-sociality and contract choice

Next, we examine whether there exists a contingency of pro-sociality on contract choice when employers are given any information about workers' pro-social motivation. Among 40 subjects assigned as employers in the *With Information* treatment, there is one subject who did not open the information box in all three periods. We exclude this subject in our analysis. Employers' contract choice across treatments over all periods is tabulated in Table 3.2.

	With Information	*No Information*	Total
Contract A	45 (37.61%)	44 (36.67%)	89 (37.55%)
Contract B	72 (61.54%)	76 (63.33%)	148 (62.45%)
Total	117	120	237

Table 3.2: Contract choice across treatments

RESULT 3: In the With Information *treatment, employers condition their contract choice on workers' pro-sociality towards another participant.*

Support for Result 3 can be seen on Table 3.3. Table 3.3 presents logit regressions of employers' contract choice on employers' and workers' pro-sociality measures and their interaction with the data of the *With Information* treatment. Interestingly, not workers' and employers' pro-sociality towards a charity but their pro-social motivation towards another person has significant effect on employers' contract choice: the higher the offer of a worker/an employer in the PDG, the more likely the employer chooses Contract A. More importantly, the coefficient of the interaction between employers' and workers' offer

is significantly negative, which implies that the effect of a worker' pro-sociality on the contract choice will decrease as employers are more pro-social towards another person.

Dependent variable:	M3		M4		M5	
Contract choice (1 = Contract A)	Coef	SE	Coef	SE	Coef	SE
PDG_employer	2.63*	1.35			6.49**	2.61
CDG_employer	0.23	1.00			-0.90	1.58
PDG_worker			0.31	1.18	3.69*	2.23
CDG_worker			-0.73	0.89	-1.70	1.41
PDG_employer x PDG_worker					-11.88*	6.42
CDG_employer x CDG_worker					3.01	3.26
total_time	0.05	0.04	0.05	0.04	0.06	0.04
Individual characteristics	Yes		Yes		Yes	
Constant	3.40	3.67	1.75	3.93	3.57	4.15
Observations	117		117		117	
Number of id	39		39		39	

Note: Logit specification for panel data, standard errors in parentheses. $***p < 0.01, **p < 0.05, *p < 0.1$. PDG_employer and CDG_employer are respectively employers' offer in the PDG and employers' donation in the CDG. PDG_worker and CDG_worker are respectively workers' offer in the PDG and workers' donation in the CDG. The variable total_time measures the total number of seconds that employers spent to observe workers' pro-sociality. Other variables are interactions between employers' types and workers' decision in the PDG and CDG.

Table 3.3: Pro-sociality and contract choice

A key feature of the results bears emphasis: the effect of workers' pro-sociality towards another person on contract choice is larger when employers are not pro-social. In other words, employers who are selfish are those who attempt to make use of their workers by means of the information about workers' pro-sociality, especially about how workers care about other people like them.

3.5.3 Information and profit

In this section, we present two main results on how information about workers' pro-sociality benefits employers.

RESULT 5: In the last period of the With Information *treatment, the profit of employers who choose Contract A is as high as the one of employers who choose Contract B.*

RESULT 6: In the last period, on average, employers in the With Information *treatment have higher profit than their counterparts in the* No Information *treatment.*

Support for both results is provided by Table 3.4 which tabulates employers' profit across treatments in the last period and over all periods.

	With Information					No Information				
	N	Avg	SE	Min	Max	N	Avg	SE	Min	Max
Last period										
Contract A	11	137.8	6.7	100	172	17	98.1	22.4	-60	244
Contract B	28	135	3.3	105	160	23	135.9	5.7	50	175
Both contracts	39	135.8	3.0	100	160	40	119.8	10.4	-60	244
Over all periods										
Contract A	45	96.1	11.4	-60	188	44	103.5	10.6	-60	244
Contract B	72	130.3	2.3	95	175	76	132.6	2.6	50	175
Both contracts	117	117.2	4.8	-60	188	120	121.9	4.2	-60	244

Table 3.4: Contract and profit across treatments

Over all periods, in both treatments, employers always earn less by offering the pro-social contract (p-value < 0.01, t-tests) and there is no significant difference in profit across treatments. Nevertheless, in the last period, without information about workers' pro-sociality, employers earn significantly more when they offer the piece-rate payment scheme to workers (p-value < 0.05, t-test) whereas in the *With Information* treatment, there is no significant difference in profit between the two contracts (p-value > 0.1, t-test). Also in the last period, thanks to the information about workers' pro-sociality, employers avoid having negative earnings if they choose Contract A. As a result, on average, employers in the *With Information* treatment significantly have higher profit than those in the *No Information* treatment (p-value < 0.1, t-test).

These outcomes of the last period support both Hypothesis 5 and 6. It means that the information about workers' pro-sociality would be profitable for employers when they are allowed to learn. More specifically, given the information about workers' pro-sociality, employers avoid offering the pro-social contract to non pro-social workers. Employers, thus, should not forgo the opportunity to screen on workers' pro-sociality.

In summary, we have found that under the pro-social compensation scheme, workers' pro-sociality is positively correlated with their effort provision. Employers do condition their contract choice on workers' pro-sociality and they are able to make use of pro-social compensation scheme by making the contract choice contingent with workers' pro-social motivation.

3.6 Conclusion

In this paper, we use employers' and workers' decision in two DGs which differ in the recipient of the game, a charity and another participant, as measures of their pro-sociality and study the contingency of effort, contract choice and profit on their pro-sociality. With regard to workers, we observe that effort provision is increasing in not only workers' pro-sociality towards a charity but also and more importantly, their pro-sociality towards another participant. This finding is consistent with the one of Fehrler & Kosfeld (2014) but at odds with other previous studies (e.g., Tonin & Vlassopoulos, 2010; Tonin & Vlassopoulos, 2013; Banuri & Keefer, 2016). The difference can be due to two factors. First, in our settings, workers cannot choose their preferred compensation scheme but are offered one by employers. Second, while previous studies have used only workers' donation to a charity or an NGO as a measure of their pro-social motivation, we take into account two dimensions of pro-sociality at the same time.

Our study is the first one which pins down how employers handle workers' pro-sociality: they condition their contract decision on workers' pro-sociality to avoid erroneously offering the pro-social contract to unmotivated workers. It should be kept in mind that the piece-rate pay contract may work poorly in some situations when the measurement of workers' performance is difficult or when the monetary incentive crowds out. Our findings are thus promising as both for-profit and non-profit organizations can replace the piece-rate pay contract by the pro-social one when offering a contract to pro-socially motivated workers. Further studies with field experiments with different target populations would be interesting to test the external validity of our results.

Appendices

Appendix A: Experiment instructions (translated from Italian)

Welcome! This is a study of economic decision making. The study includes three tasks and a questionnaire. After completing a task, you will participate the next task and earn more money. All tasks will be computerized. We will now provide you with the instructions for Task 1. At the end of Task 1, you will receive instructions for Task 2 and Task 3. In each task, all participants will receive the same instruction. In all instructions, we will always provide you true information that never deceives you in any way.

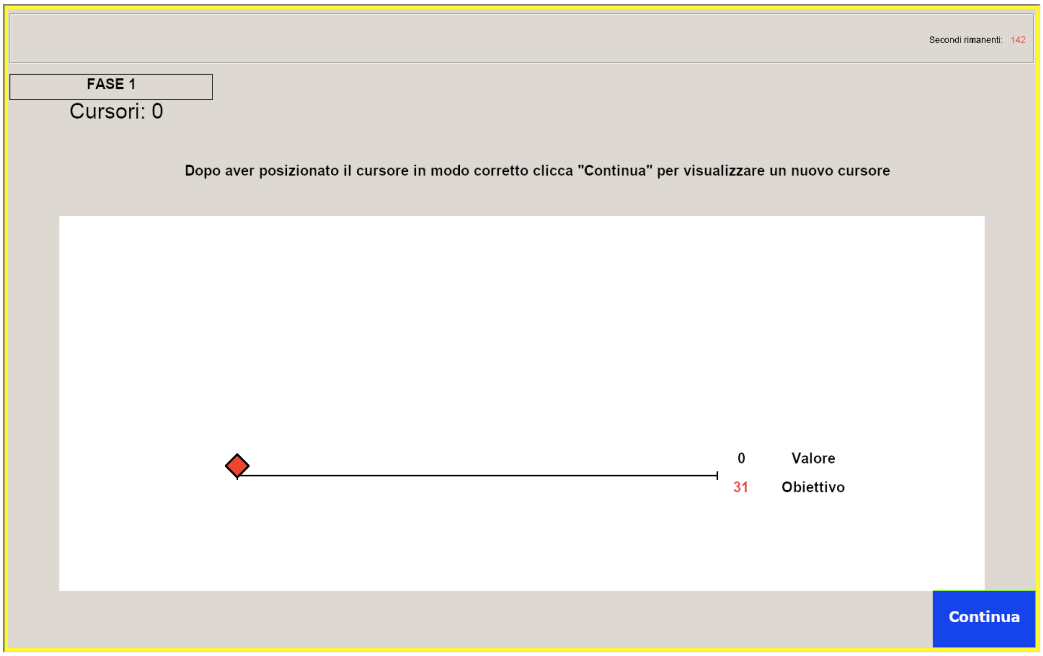
The choices made by each participant will be confidential unless explicitly specified. Anonymity will be maintained both during and after the study: your identity will not be made known to any participant at any time.

You will have the opportunity to earn tokens in each of the three tasks. The tokens you earn in each task cumulate and will be converted into Euro at the end, at the rate of 1 Euro every 25 tokens. You will also receive 3 euros for showing up in this study. The money you earn will be paid to you in private, and in cash, at the end of the study.

We ask you to turn off your phone now and not to communicate in any way with the people present in the room until the end of the study. If you have any question, please raise your hand and we will assist you in private. You are free to leave the study if you want to, however, you will not receive any sum of money.

1. Task 1

You will be provided a number of sliders. An example of a slider is as below:



Your task is to adjust each slider from the initial position at 0 to the desired position by pressing the cursor with your mouse and dragging it. When you drag the cursor, the black number (Value) will tell you the current position of the cursor whereas the red number (Objective) will tell you the desired position of the cursor. The cursor is positioned correctly when the “Value" equals the “Objective". In that case, the number of “Objective" will turn green. After that, by clicking “Continue", you will see a new slider to complete.

There will be a counter of time which would tell you how many seconds you have left and another counter which would tell you how many sliders you have correctly positioned. Before doing this task, you will be given an example of a slider to get familiar with the task.

You will have 150 seconds to do Task 1. You earn 5 tokens for each slider that is correctly positioned. You will know the result of the task as soon as the task finishes.

2. Task 2

There are two parts in this task: Part 1 and Part 2. At the end of the study, one of these subtasks will be randomly selected for the final payment.

Part 1

In this task, you will be randomly matched with another participant who is definitely different from those who you may be matched in later tasks. You and your matched participant will be randomly assigned as Subject A and Subject B. Subject A will be given 100 tokens . Subject B will not be given any token.

Subject A will decide how many tokens from 0 to 100 to transfer to Subject B.

You and other participants will now make decision as if you are Subject A.

At the end of the study, if Part 1 is selected for payment and you are randomly assigned as Subject A, the transfer you make in this task will become effective and determine your payoff and the payoff of your matched Subject B.

Part 2

In this task, you are given 100 tokens. You can send some tokens from 0 to 100 to a charity of your choice.

If Part 2 is selected for payment, the transfer you make in this task will become effective and determine your payoff and the amount of money the charity will be sent.

At the end of the study, if this task is chosen for payment, we would total the transfer of all participants in this room across charities and the university will make donation to those charities on your behalf.

3. Task 3

In Task 3, you will be randomly matched with another participant, who is definitely different from those with whom you may be paired with in Task 2. In each pair in Task 3, one participant will be randomly assigned as "Worker" and the other will be randomly assigned as "Employer".

- For those who are randomly assigned as a Worker

  The Worker will receive a pay offer to complete a task similar to Task 1. There are two pay options: Option A and Option B.

  - If the Worker is offered Option A, he/she will earn 60 tokens for Task 3, independent of how many sliders he/she can adjust. Additionally, for every slider he/she correctly adjusts, 2 tokens will be donated to a charity chosen by him/her in Task 2.

  - If the Worker is offered Option B, he/she will earn 5 tokens for every correctly adjusted slider.

- For those who are randomly assigned as an Employer

  The earnings of those who are randomly assigned as Employer will depend on the number of sliders his/her matched Worker can complete and on the chosen pay option.

  - If Option A is chosen, the earnings of Employer is:

  10 x N - 60 - 2 x N

  where N is the number of sliders correctly adjusted by the Worker, 60 is the number of tokens sent to the Worker and 2 x N is the number of tokens sent to a charity chosen by the Worker.

  - If Option B is chosen, the earnings of Employer is:

  10 x N - 5 x N

  where 5 xN will be paid to his/her matched Worker.

- How the pay offer is selected
  The payment scheme is chosen in the following way: - With a probability of 1/2, the Employer will see their matched Worker's decision in Task 2 before choosing the pay offer;

- With a probability of 1/2, the Employer will not see their matched Worker's decision in Task 2 before choosing the pay offer.

The Worker will not know whether their matched Employer can observe their decision in the Task 2.

You will do Task 3 for 3 rounds and your matched Employer/Worker will be different each round. Your role in Task 3 and how your pay offer is chosen will be kept the same while your pay offer may be different across 3 rounds. At the end of the study, the result of one round among three rounds will be randomly selected for payment and determine the Employer's, the Worker's payoff and the donation to a charity organization chosen by the Worker.

Final payment

The final payment is the sum of your payoffs in Task 1, Task 2 and Task 3. As stated before, one of the two parts in Task 2 and one of three rounds in Task 3 will be randomly chosen for the final payment. The total of your payoffs in Task 2 and 3 will be summed with your payoff in Task 1.

Your payoffs will be concerted in euro and paid in cash at the rate of 1 euro for every 25 tokens.

The donation for charity organizations will be made with bank transfer.

Appendix B: Pro-sociality information screens

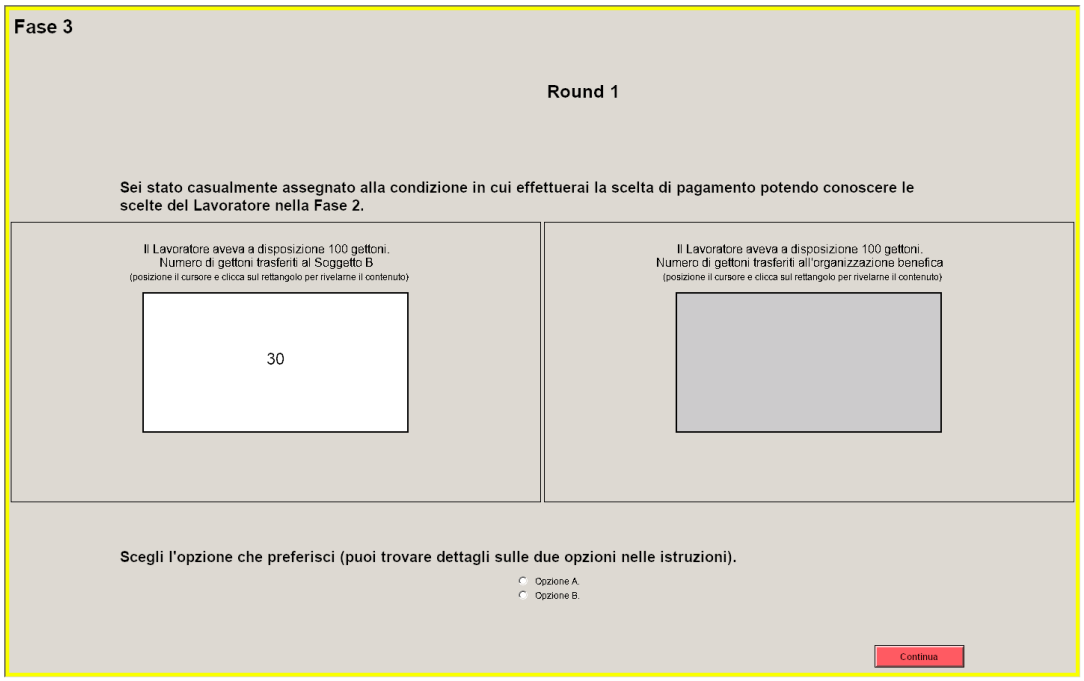


Figure 3.4: Information about worker's offer to another person in the PDG

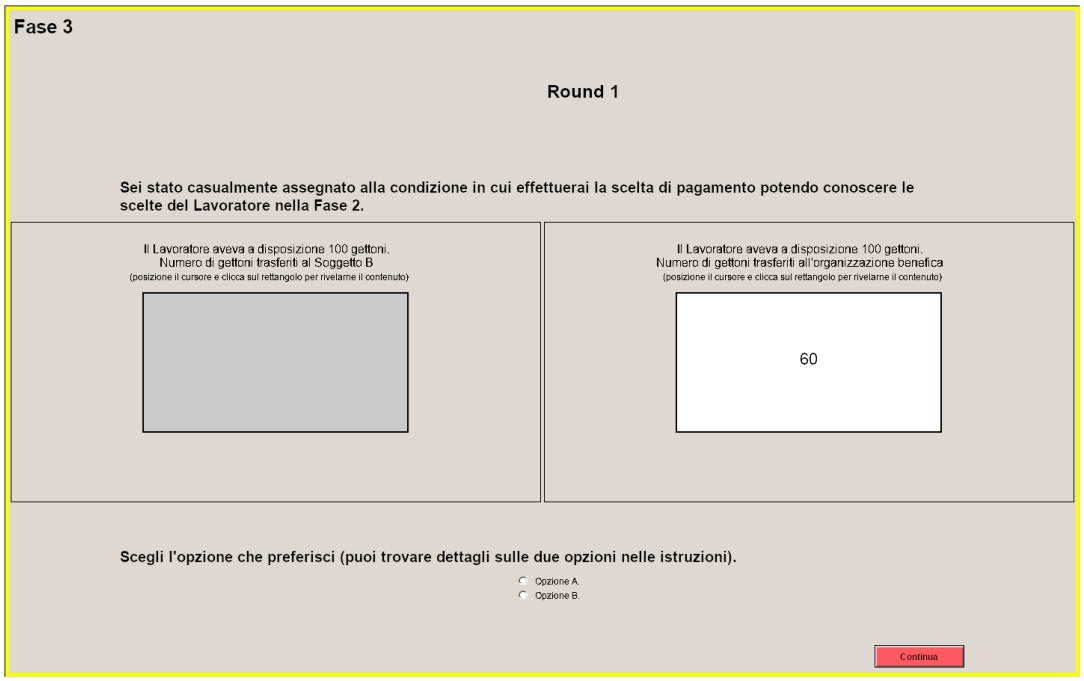


Figure 3.5: Information about worker's donation to charity in the CDG

SUMMARY AND CONCLUDING REMARKS

The experimentally-grounded approach on studying social preferences have so far overlooked on some important aspects which were placed within the scope of the present doctoral dissertation. Three experimental chapters center on how distributional preferences are identified and utilized by practitioners.

In Chapter 1, the identification methods of distributional preference types in experimental economics are discussed. The identification method using distributive choices can be divided into two main types: parametric and non-parametric. The parametric approach identifies types based on the assumption of a specific utility function while the non-parametric one uses the core features of preferences. Each identification approach has its own merits. The identification process of the non-parametric method is quick and simple while the parametric one offers a well-constructed theoretical framework for experimental design.

Aiming at investigating the categorical agreement of the two methods, I conduct an experiment in which subjects perform two allocation tasks: one designed by the parametric approach and one designed by the non-parametric approach. Accordingly, subjects' distributional preference types are identified. The experimental result shows that the non-parametric and parametric method categorize a subject into the same type only about 48% of the time. This fair categorical agreement is due to two main reasons: (1) as the order of allocation choices was randomized, the proportion of subjects unclassified by the non-parametric approach is relatively high; (2) the parametric approach produces much higher proportion of *selfish* type than the symmetric version of the task designed within the non-parametric realm. An all-rounded examination on all four criteria including validity, reliability, output resolution and efficiency of all available identification methods would be also a promising and valuable extension of this chapter.

In Chapter 2, social preferences are treated as a signaling device. The novelty of this study is the introduction of an allocation task with four distributive choices

indicating four common distributional preference types namely *selfish*, *inequality averse*, *efficiency seeking* and *competitive*. In the lab, subjects are classified into four types and then play a modified DG in which dictators might observe recipients' types before making decision on their offer. The treatments are whether recipients can revise or send the signal about their preferences. People turn out to strategically employ a type of social preferences: the *selfish* revises their preferred allocation choice so as to signal as either *inequality-averse* or *efficiency seeking*. The *selfish* and *competitive* are also less likely to reveal their types and hence, the majority of signalers are *inequality-averse* and *efficiency-seeking*. However, signal receivers only condition their decision on the signal if the signal is credible and salient: dictators only offer more to recipients signaling as *inequality-averse* but this condition vanishes if dictators know that the signal might be the revised choice.

Chapter 3 presented an experiment designed to examine how employers handle workers' pro-sociality. We use two DGs as proxies of one's pro-sociality towards another person and towards a deserving party (charity) and study employers' contract choice in a principal-agent setting in which employers may observe workers' pro-sociality before choosing a compensation scheme to offer workers. There are two contract choices: a standard piece-rate pay and a pro-social contract which allows for the substitutability of pro-sociality and the motivational power of material incentive. The experimental evidence shows that the main driver of workers' effort and employers' contract choice is the workers' pro-sociality towards another person. More importantly, a fixed-pay contract can be as profitable as a piece-rate pay one if it is offered to pro-socially motivated. This study is the first to demonstrate how not only non-profit but also for-profit organizations can rely on workers' intrinsic motivation and hence, has managerial implications for a better design of contracts.

Despite the abundant research on social preferences, studies conducted in this dissertation stand out as they open the door to several unsettled questions and methodological issues. First, the findings of our review in Chapter I offer a comprehensive overview of the existing instruments on identifying one's social preference types and more importantly, draws contrasts between the advantages and weaknesses of the available methods. In this way, the insights gained from the review as well as the experimental results on the different approaches' categorial agreement could be used to direct the type identification in research and practice. This study informs researchers about the latest developments in this research area and

uncovers gaps for subsequent investigations and development of a better social preference identification method.

Second, the past four decades have witnessed an overload of research related to social preferences. Many people have raised the "so what?" question: are the discovery of social preferences and all the associated interesting findings really valuable in any important field such as public economics, finance and development economics. This dissertation contributes to address this question both in a general setting (Chapter II) and with a particular reference to labor economics (Chapter III). Experimental results in the present dissertation have highlighted the importance of social preferences in attempt to better understand economic behavior and optimize economic decision. Extensions of our experiments, in other mechanisms and in the field with real employers and workers, would be an interesting direction for future research.

From what emerged from the present work, some considerations deserve to be remarked.

We know surprisingly little about the observability of social preference types and how people handle it. A plausible reason could be the difficulty in exposing subjects' information in the lab. In fact, there is no “clean" way to disclose one's genuine social preferences to other people. In our setting, we had to tell subjects in advance about the observability of their decisions or let them choose which information to be observed by others. On the one hand, that context actually brings the lab setting closer to the real-world situation in which people can choose and change how they want others to believe about them. For instance, workers might engage in some voluntary activities or work in low-paid non-profit jobs to make their CVs more attractive to employers. On the other hand, subjects whose information is disclosed will be driven by other factors such as strategic thinking or social image concern when making a decision while those who receive information about others' choices might doubt the credibility of that information. That being said, how people make use of their own and others' social preferences, as studied in this dissertation, is decisive in economic decision-making.

In particular, how social preferences may alter incentives claims further rigorous exploration. A list of potential research questions includes: whether it is possible to design a pro-social contract which totally outperforms the performance pay contract; whether the pro-social contract performs the same in two scenarios:

individual-based and group-based incentive; how pro-sociality operates if there is some degrees of conflict of interests between employers and workers. More experimental evidence on these dynamics would have far-reaching implications and enhance the role of social preferences in labor economics.

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