

TCER Working Paper Series

Endogenous Social Preferences in Bargaining and Contract Enforcement

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May 2019

Working Paper E-134

<http://tcer.or.jp/wp/pdf/e134.pdf>



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## Abstract

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# Endogenous Social Preferences in Bargaining and Contract Enforcement\*

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May 10, 2019

## *Abstract*

In this study, we explore the impact of the endogenous nature of *social* preferences in bargaining on contract enforcement. For this purpose, we conduct laboratory experiments based on a one-shot gift exchange game in the context of firm–worker relationships. Our design admits two types of worker proposals on the contracts to his/her firm, defined as cheap talk. One contains only the desirable wage of the worker, while the other additionally contains his/her future effort. We find that worker preferences become biased in a more self-serving direction by making proposals in bargaining. That is, both types of worker cheap talk undermine reciprocity, thus deteriorating efficiency in an incomplete contract. Additional experiments show that the negative effect of cheap talk in bargaining is robust even for repeated interactions.

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\* This research was financially supported by JSPS KAKENHI, grant number 24730169. The authors are grateful to Hirokazu Takizawa for conducting some of the experiments at Chuo University.

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**JEL Classification:** C92, J3, J42

**Keywords:** bargaining, cheap talk, social preference, self-serving bias, incomplete contract, gift exchange game, economic experiment

## 1. Introduction

Bargaining is a fundamental and ubiquitous activity in a market economy where any party has the power to veto any trade. As a result, considerable attention has been paid to predicting the consequences of bargaining on various conflicts of interests. One main issue in this field concerns inefficiency in bargaining, such as disagreements and costly delays, with studies aiming to understand why parties frequently fail to reach immediate agreements even if they seem to be mutually beneficial (i.e., Pareto superior to disagreement). Classical game-theoretic bargaining models typically attribute such inefficiencies to incomplete information, under the assumption that the parties have stable and well-defined preferences (e.g., Myerson and Satterthwaite 1983).

Empirical research on bargaining, however, suggests that the diversity and instability of preferences are frequently behind such inefficiencies. For example, since individuals are deeply concerned about fairness in bargaining, they tend to rely on their perceptions of what is fair when evaluating offers and outcomes. However, fairness perceptions differ because of the self-serving bias, that is, individuals conflate what is fair with own self-interests. Thus, the self-serving bias is known to be an

important factor of the bargaining impasse (e.g., Babcock and Loewenstein 1997). Furthermore, individual evaluations of outcomes are relative to their reference points, which may be affected by the offers exchanged during the bargaining process (e.g., Kristensen and Gärling 1997); that is, the preferred outcomes of bargainers would form endogenously in the bargaining process, which could be another cause of bargaining inefficiency (e.g., Compte and Jehiel 2007; Li 2007).

In this study, we focus on bargaining in incomplete contracts. We argue that the preferences of bargainers become more self-serving based on their own proposals in bargaining, and this bias may overshadow the benefits of contract enforcement. In reality, many contracts are incomplete in that third parties, such as a court, are unable to enforce a contract. For example, in an employment contract, worker performance would be observable but not enforceable, thus causing incentive problems (e.g., Milgrom and Roberts 1992, Chapter 5). However, social norms such as fairness and reciprocity serve as contract enforcement devices (e.g., Fehr, Gächter, and Kirchsteiger 1997): a firm and its worker can agree on a wage above the market-clearing level, which induces the worker to provide a higher effort level than the incentive-compatible level. This is called the “gift exchange hypothesis” in efficiency wage theory (Akerlof 1982; Akerlof and Yellen 1990). Therefore, examining how bargainer preferences for fairness or reciprocity (i.e., social preferences) change during the bargaining process is essential for understanding the contract enforcement problem.

Our argument is thus based on the self-serving and endogenous nature of preferences. Specifically, the empirical study on bargaining by Curhan, Neale, and Ross (2004) is a starting point, as they show that making a proposal to a counterpart

enhances the attractiveness of such a proposal to the individuals who offered it. Since any offers bargainers make to their counterparts rely on the social preferences of the former and are possibly biased in the direction of their own self-interests in the first place, the empirical result above implies that making a proposal during bargaining enhances the bargainers' self-serving tendencies. As a result, it would be difficult for bargainers to agree on a contract and, even if they sign one, contract enforcement would be challenging.

As such, the main empirical questions to be addressed are concerned with how the social preferences of bargainers are affected by their own proposals during bargaining, and whether these are sufficiently strong to affect contracts. To examine these questions, we conduct laboratory experiments on a gift exchange game in the context of firm–worker relationships. In the game, a firm makes a wage offer to its worker and the worker has the option to reject it. If the worker rejects the firm's wage offer, both the firm and worker earn nothing. If the worker accepts the wage offer, he/she is free to choose his/her effort level. A higher effort level imposes higher costs on the worker and yields a higher total welfare by increasing firm payoff. A series of laboratory experiments on gift exchange games (e.g., Fehr, Kirchsteiger, and Riedl 1993; Fehr, Kirchler, Weichbold, and Gächter 1998; Fehr and Falk 1999; Brown, Falk, and Fehr 2004) support the “gift exchange hypothesis,” that is, workers reciprocally choose a higher effort in response to the firm's higher wage offer, although there is no explicit incentive to make a costly effort in response to wages.

Our experimental design consists of three treatments: the baseline is represented by the gift exchange game just described (denoted as GE) and the others are determined

by costless and non-binding proposals (i.e., cheap talk) about the contracts.<sup>3</sup> During the intention treatment (denoted as IT), before the firm makes a wage offer, the worker communicates to the firm the wage he/she is willing to receive and the effort level he/she will choose if he/she receives it (henceforth, “communicating intention”). The request treatment (denoted as RT) is the same as IT, except that the worker only communicates to the firm the wage he/she is willing to receive (henceforth, “communicating desirable wage”). Such proposals by workers are now common in the workplace because of the changes in worker–management relations in the past few decades. These changes have included frequent job shifts (e.g., Neale and Bazerman 1991), decentralization of wage bargaining, declining union densities (e.g., Dahl, Maire, and Munch 2013), and increasing use of grievance systems for employees (e.g., Feuille and Delaney 1992). Therefore, examining the effects of such proposals on preferences can address concerns of management and business researchers as well as economists.

Regardless of treatment, we adopt a *strategy method* to elicit the worker’s minimum acceptable wage (i.e., reservation wage) and effort schedule according to the firm’s wage offer, both reflecting his/her social preference. Each treatment consists of 10 periods, in which the probability of meeting the same subject more than once is zero (i.e., one-shot game setting).

Our data provide evidence that by making proposals for contracts, the social preferences of workers become biased in a self-serving direction. First, their

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<sup>3</sup> In this paper, we use “non-binding” when a message does not bind the future actions of the sender and receiver. Some authors, such as Charness and Dufwenberg (2006) use the same term when the sender may talk freely.

reservation wages in the IT and RT are higher than those in the GE (however, the difference between the RT and GE is not statistically significant). This finding implies that the wage offer level that the worker perceives as fair increases. Second, the slopes of the effort schedules in the IT and RT are lower than in the GE, although the effort schedules are upward-sloping in all treatments, as suggested by the gift exchange hypothesis. That is, cheap talk (communicating intention and desirable wage) in bargaining undermines the reciprocity of workers. Third, the strengthening of worker self-serving tendencies is also confirmed by the estimation of a utility function based on the inequality aversion model (Fehr and Schmidt 1999): cheap talk in bargaining increases (decreases) subject disutility from disadvantage (advantage) inequality. Finally, if we assume that worker disutilities from disadvantage and advantage inequalities are invariant, we find worker perceptions about what is fair deviate in a self-serving direction from the egalitarian outcome in the IT and RT by estimating a simple model of reference-dependent inequality aversion.

Therefore, the question is: what impact will the economic consequences of the negative effect of cheap talk on social preferences have on the contract enforcement problem? Increasing the reservation wage of a worker makes it difficult to agree on a contract and undermining reciprocity makes the worker choose a lower effort level—even if he/she accepts firm's wage offer. Both situations should therefore explain deteriorating efficiency in gift exchange games. However, owing to the reciprocity of workers, coordination aspect might be inherent in gift exchange games, which cheap talk could help address as a coordination device (e.g., Cooper, DeJong, Forsythe, and Ross 1992). For example, if the worker communicates to the firm he/she intends to provide a high level of effort and the firm trusts his/her message (in



the IT), or the firm interprets the request for a high wage by the worker as his/her signal to choose a high effort level (in the RT), the firm would offer a high wage. Since effort schedules are upward-sloping even in the IT and RT, higher wage offers increase effort levels, which in turn increase total welfare. In short, coordination success would outweigh the negative effect of cheap talk on social preferences. However, this does not hold in our experiment: the firm's wage offers in the IT and RT are no higher than those in the GE. As a result, the contract rates in the IT and RT setting are lower than that in the GE. Moreover, actual worker efforts in agreed contracts in the IT and RT are lower than that in the GE. Therefore, worker cheap talk in bargaining reduces total welfare in the gift exchange game.

We conduct further experiments to verify whether the long-term interaction between the same partners successfully allows cheap talk to work as a coordination device. We compare the three treatments in a repeated situation in which the same pair interacts in all periods. Additional data indicate that worker cheap talk (both the communicating intention and desirable wage) in bargaining undermines reciprocal behavior even in the repeated situation. Moreover, communicating the desirable wage cannot alleviate the coordination problem between the firm and the worker. However, communicating the intention leads to a higher wage offer, which in turn induces higher actual effort levels and an increase in total welfare: the success of coordination outweighs the negative effects of cheap talk on social preferences.

The remainder of the paper is organized as follows. The next section develops our main hypothesis based on studies on the endogenous nature of preferences and explains the experimental design and procedure. In Section 3, we discuss related research and provide the theoretical predictions for our experiment. Section 4 presents

the experimental results, including the estimation results for a utility function based on the inequality aversion model. Section 5 presents the main results of additional experiments. Finally, Section 6 provides concluding remarks, including the implications of our results for the effectiveness of a grievance mechanism.

## **2. Hypothesis development and experimental design**

### **2.1. Endogenous nature of preferences and main hypothesis**

Classical economic, or game-theoretic, models of bargaining assume the parties enter the bargaining process with stable and well-defined preferences. However, previous research on the behavioral science of negotiation has provided empirical evidence that the preferred outcomes of negotiators are endogenously formed during negotiations, owing to their various cognitive biases (e.g., Neale and Bazerman 1991). Some theoretical studies have attempted to explain the endogenous nature of preferences in bargaining, based on models with reference-dependent preferences where bargainers evaluate offers and agreements relative to their reference points (e.g., Kahneman 1992). In turn, these reference points are affected by the offers exchanged during bargaining (e.g., Compte and Jehiel 2007; Li 2007).

While most of these theoretical studies assume that bargainer preferences are only affected by the offers of the opponents, the empirical results of Curhan, Neale, and Ross (2004) imply that they also change by the offering party's own offers to opponents as follows. In their role-play experiment, subjects are divided into two roles (student and financial aid officer), and they bargain face-to-face regarding a student loan contract under the following procedure. In each round, the student and the officer exchange written proposals simultaneously. Thereafter, according to their

preferences, they privately rate all possible loans, including the one they offered. Finally, they engage in a brief discussion. Each round is repeated until they exchange the same proposal in that round or the time limit elapses. The experimental results indicate that making proposals for a loan contract enhances its attractiveness to the subjects who offer them to their counterparts.<sup>4</sup> That is, individuals will feel more positively about their offers than before, as suggested by cognitive dissonance theory in social psychology (Festinger 1957; Festinger and Aronson 1960).

Although the studies above on the endogenous nature of preferences do not explicitly address preferences for fairness (i.e., social preferences), there is considerable empirical evidence that individuals are concerned about fairness in bargaining (e.g., Güth, Schmittberger, and Schwarze 1982). Therefore, social preferences could also change endogenously during the bargaining process. However, the mechanisms behind this change remain yet unclear.

The self-serving bias is a clue to understanding this question, as the social preferences of bargainers depend on their perception of what the fair outcomes in bargaining are, and these are in turn prone to self-serving bias (Loewenstein, Issacharoff, Camerer, and Babcock 1993; Babcock, Loewenstein, Issacharoff, and Camerer 1995; Babcock and Loewenstein 1997). Therefore, the conditions bargainers offer to their counterparts are biased toward the direction of their own self-interest in the first place, since they may rely on their own preferences. Therefore, according to Curhan, Neale, and Ross (2004), the social preferences of bargainers would be biased

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<sup>4</sup> Based on these experimental results, Gimpel (2007) develops a model of the attachment effect, in which reference points are changed not only by the opponent's offers, but also by the party's own offers to the opponent.

toward a more self-serving direction when making contract proposals. This leads to the main hypothesis of our study:

**Main hypothesis:** By making a proposal during bargaining, a bargainer's social preferences become biased toward a more self-serving direction.

The implications of this hypothesis on bargaining problems are the following. First, disagreements will occur more frequently in complicated bargaining contexts (i.e., in which the interested parties make mutual offers) than in simple ultimatum ones.<sup>5</sup> Enhancing the self-serving tendency of parties would make reaching an agreement more difficult. Second, for incomplete contracts, enforcement would be challenging even if the parties sign a contract. For example, a worker's social preference serves as a contract enforcement device in an incomplete employment contract, as suggested by the "gift exchange hypothesis" (Akerlof 1982; Akerlof and Yellen 1990). However, making a wage offer or renegotiating contracts with his/her company would enhance his/her self-serving tendency, which would in turn reduce his/her labor motivation at a given wage level.

## 2.2. Experimental design

To verify the role of social preferences in contract enforcement, numerous experiments rely on the gift exchange game introduced by Fehr, Kirchsteiger, and Riedl (1993). To examine the main hypothesis and its implications for incomplete

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<sup>5</sup> In reality, individuals can usually decide whether to buy a commodity by looking at its price in a supermarket or consider whether to apply for a job advertised in a magazine by looking at its starting salary. These are ultimatum bargaining situations.

contracts, our experiment is based on a version of this game in the context of firm–worker relationships. The firm makes wage offer  $w \in \{21, 36, 51, 66, 81, 96\}$  to its worker, who can accept or reject it. If the worker rejects wage offer  $w$ , the payoff for both the firm and the worker are 0 *tokens* (experimental currency unit). If the worker accepts the wage offer, he/she chooses effort level  $e$ , which ranges from 0.1 to 1 in increments of 0.1. In this case, the payoff functions of the firm and the worker in terms of *tokens* are respectively given by

$$\pi(w, e) = (120 - w) \times e \times 10,$$

$$u(w, e) = (w - c(e) - 20) \times 10,$$

where  $c(e)$  reflects the increasing effort costs shown in Table I. Their payoffs are multiplied by 10, making the firm payoff an integer.

Table I. Effort levels and costs

$e$	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
$c(e)$	0	1	2	4	6	8	10	12	15	18

This game is similar to the one-shot bilateral gift exchange game of Gächter and Falk (2002), except that the payoffs are multiplied by 10 and the wage offer domain is restricted to six types.<sup>6</sup> By restricting the wage domain, we can easily adopt the strategy method (explained below) and represent firm and worker payoff as a matrix (Table II). The payoff matrix is not a strategic form of the game but rather shows both payoffs for any combination of firm wage offer  $w$  and worker effort level  $e$ ,

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<sup>6</sup> In Gächter and Falk (2002), the firm’s wage offer is an integer, taking any values from 20 to 120.

assuming that the worker accepts  $w$ .

Table II. Payoff matrix for the firm and the worker

Wage \ Effort	21	36	51	66	81	96
0.1	99 (10)	84 (160)	69 (310)	54 (460)	39 (610)	24 (760)
0.2	198 (0)	168 (150)	138 (300)	108 (450)	78 (600)	48 (750)
0.3	297 (-10)	252 (140)	207 (290)	162 (440)	117 (590)	72 (740)
0.4	396 (-30)	336 (120)	276 (270)	216 (420)	156 (570)	96 (720)
0.5	495 (-50)	420 (100)	345 (250)	270 (400)	195 (550)	120 (700)
0.6	594 (-70)	504 (80)	414 (230)	324 (380)	234 (530)	144 (680)
0.7	693 (-90)	588 (60)	483 (210)	378 (360)	273 (510)	168 (660)
0.8	792 (-110)	672 (40)	552 (190)	432 (340)	312 (490)	192 (640)
0.9	891 (-140)	756 (10)	621 (160)	486 (310)	351 (460)	216 (610)
1	990 (-170)	840 (-20)	690 (130)	540 (280)	390 (430)	240 (580)

N.B.: Worker payoffs are in parentheses.

To test the main hypothesis, our experimental design consists of three treatments: the baseline gift exchange game (GE) and two cases with costless and non-binding proposals (i.e., cheap talk) from the worker.<sup>7</sup> In the first of these, namely, the IT, before the firm makes a wage offer to its worker, the worker communicates the pair  $(W, E)$  to the firm, where  $W \in \{21, 36, 51, 66, 81, 96\}$  is the wage level he/she is willing to receive and  $E$  is the effort level he/she intends to choose if he/she

<sup>7</sup> In the experiment of Curhan, Neale, and Ross (2004), bargainer proposals are not exactly cheap talk, even in the first round, since an agreement is reached if the exchanged proposals coincidentally match in the same round. However, it is unlikely that subjects expect the agreement to be reached in the first round, since this rarely happens. Indeed, they reported that the percentage of agreements reached by the end of the second round was only 6% (one among 17 pairs) under their baseline condition. Therefore, we assume that bargainer proposals would have a similar effect on their preferences, even if they cannot bind future actions.

receives  $W$  (communicating intention). The final design treatment is the RT, which is essentially the same as the IT, except that only the wage level he/she is willing to receive,  $W$ , is communicated (communicating desirable wage). Hence, worker cheap talk  $(W, E)$  fully identifies the outcome that he/she pursues, whereas  $W$  does not.

Regardless of treatment, we adopt a strategy method to elicit the worker's minimum acceptable wage (i.e., reservation wage) and effort schedule according to the firm's wage offer, both of which reflect his/her social preference in a one-shot gift exchange game. Before the worker receives the firm's wage offer (and after cheap talking in the IT and RT), he/she decides the reservation wage  $\underline{w} \in \{21, 36, 51, 66, 81, 96\}$  and effort level  $e(w)$  for every  $w \geq \underline{w}$ . If the actual wage offer is below  $\underline{w}$ , the offer is automatically rejected. Otherwise, it is accepted, and firm and worker payoffs are automatically calculated as the actual offer  $w$  and worker effort level  $e(w)$ .

### 2.3. Experimental procedure<sup>8</sup>

We conducted two experimental sessions for each treatment, between May 2014 and December 2015 at Chuo University, Japan. We recruited the subjects using an electronic mailing list, posters, and fliers. The 140 participants were undergraduates in several departments who had not participated in any prior experiment using a gift exchange game. Each subject could participate in only one session. The total number of subjects for the GE was 44 (24 subjects in one session and 20 in the other), while for the IT and RT was 48 (24 per session in both treatments). For all sessions, we used the z-tree software package by Fischbacher (2007).

Each session was conducted in a computer room, with computer terminals

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<sup>8</sup> Instructions for the IT and practice problems are available upon request.

separated into two groups (i.e., firms and workers) by a physical partition. Before the experiment, subjects were randomly assigned their roles (firms or workers). After assignment, workers (firms) were seated randomly in front of a computer terminal at the front (back) of the laboratory. Each desk had an envelope containing all experimental materials, including the instructions, a record sheet, practice problems, and an identification number card. To avoid potential experimenter effects, assistants other than the researcher acted as instructors. The instructor read the instructions aloud, so that the rules of the game would be common knowledge for all subjects. Before the experiment began, subjects were instructed to solve practice problems to check their understanding of the experimental instructions. The experiment began only after all subjects answered these correctly. During the experiment, subjects could always observe the payoff matrix on their computer screens.

To increase the number of observations in the empirical analysis, each session comprised 10 periods. The probability of meeting subjects more than once was zero, as, for each period, each firm was exogenously matched with a new worker (i.e., a one-shot game setting). The role of each subject remained fixed during the session and all transactions were anonymous (i.e., subjects did not know the identities of their trading partners). The reward was a fixed participation fee of 800 yen plus the *tokens* earned in the 10 periods. One *token* was converted into one yen and the reward paid in cash to each subject after the session. The session lasted approximately two hours and subjects earned an average of 2,819 yen.

### **3. Theoretical Predictions**

#### **3.1. Reciprocity in the gift exchange game**



If we assume common knowledge of rationality and selfishness, the GE game results are straightforward. The selfish worker will always choose the reservation wage  $\underline{w} = 21$  and minimum effort  $e(w) = 0.1$  for every  $w \geq 21$ . Therefore, the firm has no incentive to offer more than  $w = 21$ .

**Prediction 1 (*selfishness*):** In the GE, (a) the worker reservation wage is 21, (b) the effort level is 0.1 regardless of the wage offers by the firm, and (c) the wage offered by the firm is 21.

Contrary to this prediction, experiments on gift exchange games (e.g., Fehr, Kirchsteiger, and Riedl 1993; Fehr, Kirchler, Weichbold, and Gächter 1998; Fehr and Falk 1999; Brown, Falk, and Fehr 2004) have qualitatively supported the “gift exchange hypothesis,”<sup>9</sup> that is, firm wage offers and worker chosen effort levels are positively correlated.

Several theoretical models of social (or other-regarding) preferences have been developed to explain such unselfish behaviors.<sup>10</sup> These models may be loosely categorized into two types. First, in outcome-based (henceforth, OB) models, individuals care about both their own and others’ payoffs but pay attention to only those payoff distributions realized as a consequence of their actions (e.g., Fehr and Schmidt 1999; Bolton and Ockenfels 2001; Andreoni and Miller 2002). Second, in intention-based reciprocity (henceforth, IBR) models, individuals pay attention not only to the realized payoff distribution but also to the opponents’ intentions behind the

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<sup>9</sup> See Gächter and Fehr (2002) for a survey.

<sup>10</sup> For more details, see the survey by Camerer (2003).

process inducing these outcomes (e.g., Rabin 1993; Dufwenberg and Kirchsteinger 2004; Falk and Fischbacher 2006).<sup>11</sup> Both OB and IBR models can explain the qualitative regularities of worker behavior in experiments on gift exchange games. For example, according to the OB model of inequality aversion of Fehr and Schmidt (1999), the worker dislikes having either a lower or a higher payoff than the firm. Hence, an inequality-averse worker will reject the minimum wage offer because of disadvantageous inequality and will respond with a higher effort to higher wages since the higher the wage, the greater the advantageous inequality if he/she chose the same level of effort.<sup>12</sup> In view of these theoretical considerations, we formulate the “gift exchange hypothesis” as follows.

**Prediction 2 (*gift exchange hypothesis*):** In the GE, (a) the worker’s reservation wage is higher than 21, (b) the effort schedules are upward-sloping: the higher the wage offer, the higher the effort level is, and (c) the firm’s wage offer is higher than 21.

### 3.2. Effects of worker cheap talk on the wage offer

The worker’s proposals are defined as cheap talk in our experiment. Economists have focused on cheap talk as a means to solve coordination problems by disclosing one’s private information or signaling one’s intentions regarding future decisions, both of

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<sup>11</sup> These models rely on the psychological game theory developed by Geanakoplos, Pearce, and Stacchetti (1989), in which preferences depend directly on beliefs.

<sup>12</sup> To understand how such reciprocal behaviors can be explained by the inequality aversion model, see also Fehr and Schmidt (1999) and Fehr and Gächter (2002). To understand these behaviors based on an IBR model, see Falk and Fischbacher (2006) for example.

which affect the beliefs and, consequently, the actions of the opponents (in this case, the firm's belief and its offer). As shown by Crawford and Sobel (1982), in games with asymmetric information, cheap talk can convey private information if player interests are aligned. Further, Farrell and Gibbons (1989) and Matthews and Postlewaite (1989) show that pre-play communication matters in bargaining. For complete information, signaling intentions have been shown to be effective at coordinating player actions. For example, Farrell (1987) studied a game of Battle of the Sexes with one or more stages of pre-play communication, in which each player makes a non-binding announcement (cheap talk) about his/her future play. He found an equilibrium in which the expected payoffs of the players increase with the number of communication stages. These theoretical findings are supported by laboratory experiments (e.g., Cooper, DeJong, Forsythe, and Ross 1989, 1992).<sup>13</sup>

However, in gift exchange games, the firm and the worker have no private information and there is no room to coordinate their actions, since the worker has the dominant strategy (assuming selfishness).<sup>14</sup> Therefore, conventional economic models of communication predict no impact of worker cheap talk on the firm's wage offer. This prediction is summarized as follows.

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<sup>13</sup> See Crawford (1998) and Farrell and Rabin (1996) for a review.

<sup>14</sup> We can also model a gift exchange game as a game with asymmetric information about the players' social preferences. Then, the question is whether a worker's cheap talk can transmit a signal about his/her private information (e.g., high reservation wage) and induce a firm to offer a generous wage. However, if cheap talk leads to a high wage offer, a rational and selfish worker will also communicate the same content (i.e., there is no separate equilibrium in such a game with asymmetric information).

**Prediction 3 (*no impact on firm's offer*):** In the IT and RT, the firm's wage offers are the same as under the GE.

In contrast to this prediction, previous experiments have shown that cheap talk matters in bargaining situations with no private information and no coordination problems related to (at least) monetary payoffs. Roth (1995) reported that face-to-face communication before an ultimatum bargaining game yields higher offers and fewer disagreements compared with normal ultimatum bargaining. Moreover, Charness and Dufwenberg (2006) conducted a laboratory experiment on a simple trust game that models an incomplete employment contract with hidden actions, and showed that the option to send a message with unrestricted contents from the worker to the firm is effective: firms are more likely to enter into contracts with workers, who in turn choose a higher effort level. Yamamori, Kato, Kawagoe, and Matsui (2008) conducted a dictator game experiment, in which the recipient states a request for the minimum offer he/she is willing to receive before the dictator dictates his/her offer, finding that the dictator's offer increases as the recipient's request increases to half of the share.

These empirical findings imply that coordination arises in these conflict situations because individuals have social preferences. However, it is difficult to draw clear implications from these findings. Roth (1995) also reports that face-to-face communication does not have a significant incremental value over mutual identification. Unlike his experiment, we maintain the anonymity of subjects to isolate the pure effects of cheap talk. Conversely, Charness and Dufwenberg (2006) maintain the anonymity of subjects similarly to our study. However, we focus only on a bargaining situation in which communication is restricted to the contents related to

the contracts. Yamamori, Kato, Kawagoe, and Matsui (2008) focus on anonymous bargaining, in which messages are restricted to “requests” similar to the RT. They also show that dictators reduced their offers to greedy recipients who required more than half the share. Therefore, in a gift exchange game, whether the firm agrees to the worker’s request may depend on the firm’s beliefs about his/her effort levels after the contract is entered into.

### **3.3. Effects of worker cheap talk on his/her own preference**

Our main concern is examining how the worker’s proposal (cheap talk) affects his/her social preference. Therefore, we compare the reservation wages and effort schedules between the GE and IT and between the GE and RT.

We first make a prediction from the main hypothesis. There is considerable evidence from ultimatum bargaining games that the responder is willing to reject and therefore sacrifice monetary payoffs to punish unfair offers (e.g., Güth, Schmittberger, and Schwarze 1982). Therefore, minimum acceptable offers depend on the perceptions of fairness across subjects. Since the self-serving bias implies that individuals believe that what is beneficial for them is also fair, strengthening the self-serving bias means that minimum acceptable offer will increase. Furthermore, if the gift exchange hypothesis (Prediction 2) holds, the extent to which a gift should be returned for generous wage offers also depends on these fairness perceptions. Therefore, strengthening the self-serving bias would undermine the reciprocal behavior of workers. This prediction is summarized as follows.

**Prediction 4 (*main hypothesis*):** In the IT and RT, (a) the worker’s reservation wage is higher than in the GE, and (b) the slopes of the worker’s effort schedules in the IT

and RT are lower than in the GE.

This prediction means that, in gift exchange games, workers making proposals during bargaining has a negative effect on efficiency. Increasing the reservation wage of a worker makes it difficult to agree on a contract while undermining reciprocity makes a worker choose a lower effort level—even if he/she accepts the firm’s wage offer, leading to deteriorating efficiency in gift exchange games.

Contrary to the prediction above, traditional economic and OB models predict that worker cheap talk has no effect on their own preferences. In these models, an individual’s preference depends only on his/her own payoff or on the payoff distribution. Cheap talk cannot affect payoff distributions and, hence, distributional preferences.

IBR models also predict that worker cheap talk does not affect his/her (revealed) preferences. According to these models, a worker judges whether a firm intends to be kind or unkind to him/her based on his/her beliefs about the firm’s strategies and (higher-order) beliefs about the firm’s beliefs about his/her strategies. If the worker perceives the firm’s behaviors to be kind (hostile) toward him/her, he/she responds to them in a kind (hostile) manner. Beliefs are not arbitrary but match actual behavior (i.e., people have rational expectations) at equilibrium.

Conversely, assume that the worker’s cheap talk alters his/her own strategy, especially the reservation wage. That is, there is a firm’s wage offer  $w$  that the worker rejects or accepts (or the worker’s rejection probability), depending on his/her own cheap talk. However, this is only the case when the worker’s cheap talk alters his/her beliefs on the firm’s beliefs about the worker’s effort level after accepting

offer  $w$ . Therefore, we assume that, depending on the worker's cheap talk, he/she responds to  $w$  with different effort levels, such as  $e$  and  $e'$  with  $e > e'$ , if he/she accepts  $w$ . If the worker think that the firm (correctly) believes that the worker will choose higher effort level  $e$  after he/she accepts  $w$ , then the worker would perceive this wage level as less kind to him/her compared with when the firm believes that the worker responds to this offer with a lower effort level  $e'$  after he/she accepts  $w$  (given wage offer  $w$ , the higher the effort level, the lower the worker's payoffs and the higher the firm's payoffs). Therefore, the worker will have fewer reasons to choose the high (low) effort level  $e$  ( $e'$ ) than when his/her cheap talk induces lower (higher) effort  $e'$  ( $e$ ) after accepting  $w$ . This argument implies that the worker's cheap talk has no effect on the worker's reservation wage and the effort schedule.

**Prediction 5 (*OB and IBR models*):** In the IT and RT, the worker's (a) reservation wage and (b) effort schedules are the same as in the GE.

Contrary to predictions 4 and 5, Charness and Dufwenberg (2006) empirically observe that cheap talk seems to have a *positive* effect on the sender's social preferences. As previously mentioned, if there is an option to send unrestricted messages from the worker to the firm, then more workers will commit to the costly effort in the simple trust game. To explain this communication effect, they build a model of guilt aversion. A guilt-averse player dislikes guilt that depends on "the extent he/she believes he/she hurts others relative to what they believe they will get." They argue that, by making a promise to undertake the costlier effort (communicating the intention to make a higher effort), the worker strengthens his/her beliefs about the

firm's belief that he/she will make the costlier effort. Then, the worker respects the promise to avoid the guilt caused by disappointing the firm. Similar to IBR models, their model is based on equilibrium concepts relying on rational expectations.<sup>15</sup>

In our gift exchange game, a guilt-averse worker rejects the firm's offer only when he/she can avoid guilt by rejecting the offer. However, he/she cannot disappoint the firm more than by rejecting its offer, since the firm's payoff cannot be negative. Therefore, the reservation wage of a guilt-averse worker is always 21 and his/her cheap talk cannot affect his/her reservation wage.

**Prediction 6 (*guilt aversion*):** In all treatments, the worker's reservation wage is equal to 21.

It is difficult to make predictions regarding the effect of cheap talk on the worker's effort schedule based on the model of guilt aversion, partly because we cannot identify the initial beliefs of the worker in our experiments.<sup>16</sup> Furthermore, this model is limited in determining how communicating an intention changes the receiver's beliefs about what he/she has not been told. For example, if the firm receives  $(W, E)$

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<sup>15</sup> See also Battigalli and Dufwenberg (2007) for the formal model of guilt aversion.

<sup>16</sup> The guilt aversion model can also explain the reciprocal behavior of a worker in a gift exchange game if he/she believes that the firm believes he/she behaves reciprocally. However, even if the worker's sensitivity to guilt is the same, when he/she believes that the firm believes he/she never chooses the costlier effort, the worker actually chooses the minimum effort since he/she will not hurt the firm. Therefore, the predictions of the model depend on the worker's initial beliefs.



in the IT, it is uncertain how its beliefs about the worker's effort level in response to  $w \neq W$  will change.

## 4. Experimental results

### 4.1. Overview

Table III shows the means of the experimental outcomes by treatment. The total number of observations is 700 (= (12 pairs  $\times$  5 sessions + 10 pairs  $\times$  1 session)  $\times$  10 periods). For analyzing workers' stated preference data from the strategy method, the number of observations can potentially increase to 4,200 because each worker is required to choose effort levels corresponding to six wage types. If the contracts between workers and firms fail, the worker's actual effort cannot be reported. Therefore, the total number of observations for the actual effort is reduced to 609.

Table III. Means of experimental outcomes by treatment

	Total	GE	RT	IT
Total profit	403.80 (230.80)	454.92 (204.99)	366.82 (239.79)	393.93 (236.46)
Worker's profit	278.01 (180.09)	287.73 (144.31)	261.79 (194.66)	285.33 (193.59)
Firm's profit	125.79 (118.60)	167.20 (130.31)	105.03 (103.29)	108.60 (112.26)
Firm's offer	51.28 (17.68)	52.50 (15.16)	49.06 (19.23)	52.38 (18.05)
Worker's reservation wage	35.81 (12.72)	34.43 (11.49)	35.06 (12.04)	37.81 (14.18)
Contract agreement dummy	0.87 (0.34)	0.95 (0.23)	0.83 (0.38)	0.84 (0.37)
Worker's actual effort <sup>1)</sup> (omit samples if contracts failed)	0.24 (0.23)	0.29 (0.25)	0.21 (0.21)	0.22 (0.22)
Worker's stated effort <sup>2)</sup>	0.30 (0.30)	0.37 (0.33)	0.27 (0.27)	0.26 (0.27)
Worker's desirable wage	-	-	76.06 (15.37)	71.38 (15.92)
Number of observations	700	220	240	240

Note: Values in parentheses are standard deviations. 1) The sample sizes for GE, RT, and IT are 208, 199, and 202, respectively. 2) The sample sizes for GE, RT, and IT are 1,123, 1,215, and 1,171, respectively.

**Result 1:** Regardless of treatment, the firm's offer and worker's reservation wage are

higher than 21 and the worker's actual effort is above 0.1. Therefore, Prediction 1 (*selfishness*) and Prediction 6 (*guilt aversion*) are rejected.

Result 1 is supported by Table III and a simple t-test ( $p < 0.01$  for each), which is consistent with (a) and (c) in Prediction 2 (*gift exchange hypothesis*). Furthermore, Table III shows that the total profit in the GE is higher than in the RT and IT. This implies that the effect of the worker's cheap talk (communicating both intention and desirable wage) on efficiency may be negative.

There are two sources of inefficiency in the gift exchange game: disagreement and low worker effort. As previously mentioned, whether a contract is entered into depends on the wage offer of the firm and the reservation wage of the worker. The actual effort level of the worker after signing a contract depends on his/her effort schedule and the firm's wage offer. Whereas the firm's offer is around 50 in all treatments, the contract agreement rate and worker's actual effort are highest in the GE. Therefore, these mean comparisons suggest that the effect of the worker's cheap talk on his/her preference is consistent with Prediction 4 (*main hypothesis*). Indeed, the worker's reservation wages (actual and stated efforts) in the RT and IT are higher (lower) than in the GE. To analyze these observations in more detail, we rely on econometric analysis in the following subsections.

#### **4.2. Profit comparison**

Figure 1 illustrates the total profit as well as worker and firm profits by treatment. Overall, the total and the firm's profit in the GE are higher than in the RT and IT. Conversely, worker profits do not seem to differ across treatments, except for period 6 in the RT.

Figure 1. Transitions of means for the three profit types



Table IV shows the regression results, where the dependent variables are the three profit types. The coefficients of the RT and IT dummies for total profit are significant and negative, implying that the total profits of the pairs in the RT and IT are smaller than in the GE setting. In contrast to the results on total profit, the RT and IT dummies do not have a statistically strong influence on worker profit. Conversely, both dummies significantly and negatively affect the firm's profit. These results are summarized as follows.

Table IV. Estimation results for the profit types

	Total profit	Worker's profit	Firm's profit
RT dummy	-88.11*** (20.65)	-25.94 (15.88)	-62.17*** (10.97)
IT dummy	-60.99*** (20.59)	-2.394 (15.87)	-58.60*** (11.36)
Period	-7.237** (2.888)	-4.146* (2.286)	-3.091* (1.582)
Constant	494.7*** (20.94)	310.5*** (15.60)	184.2*** (12.95)
F-value	8.66***	2.12*	13.03***
Adj. R-squared	0.03	0.00	0.06
Observations	700	700	700

Note: Robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively.

**Result 2:** Total profit and the firm profit in the GE are higher than those in the RT and IT. Therefore, worker cheap talk (communicating both intention and desirable wage) in bargaining reduces total welfare in a gift exchange game.

### 4.3. Comparison of contract agreement rates

In the previous subsection, worker cheap talk in bargaining was found to reduce total welfare. One of the sources of such inefficiency is disagreement, which depends on the wage offer of the firm and the reservation wage of the worker. Table V presents the estimation results, where the dependent variables are the firm's offer, the worker's reservation wage, and the contract agreement rate. We employ a probit model only for the contract agreement dummy.

Table V. Estimation results for the firm's offer, the worker's reservation wage, and the contract agreement rate

	Firm's offer	Worker's reservation wage	Contract agreement
RT dummy	-3.437** (1.604)	0.631 (1.097)	-0.650*** (0.168)
IT dummy	-0.125 (1.552)	3.381*** (1.194)	-0.601*** (0.170)
Period	-0.568** (0.226)	-0.440*** (0.168)	-0.0108 (0.0200)
Constant	55.62*** (1.584)	36.85*** (1.199)	1.662*** (0.182)
F-/Wald-value	3.95***	4.76**	16.62***
Adj./Pseudo R-squared	0.01	0.02	0.03
Observations	700	700	700

Note: Robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively.

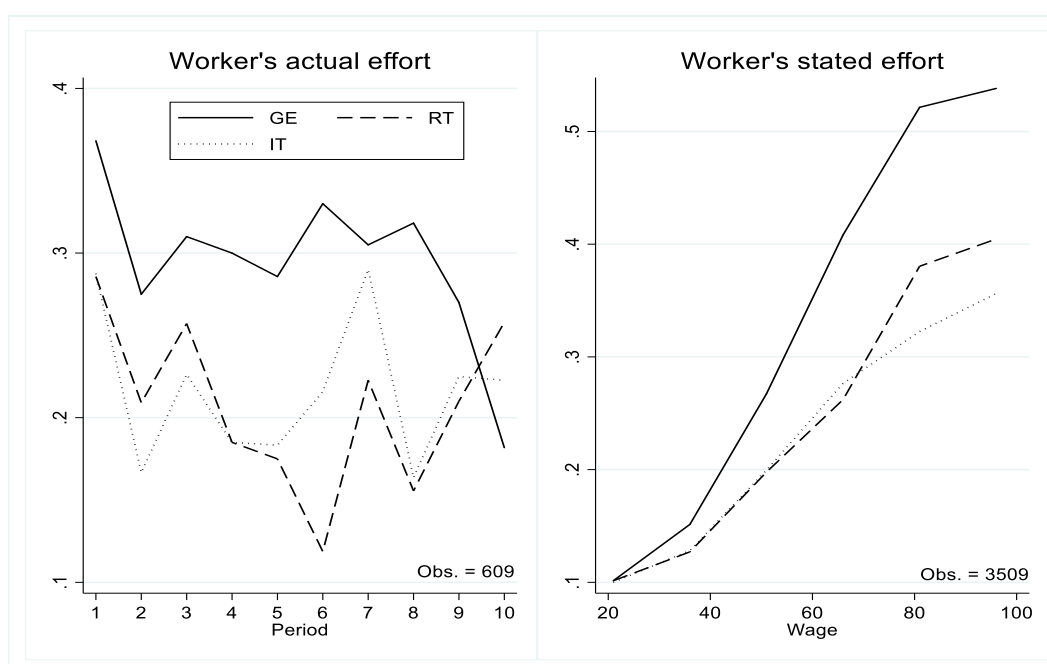
Although the communication of the desirable wage in the RT has significant negative effects on the firm's offer, the communication of the intention in the IT does not. The worker's reservation wage is significantly and positively affected by his/her cheap talk in the IT, which is consistent with part (a) of Prediction 4 (*main hypothesis*). On the other hand, cheap talk in the RT has no influence on the worker's reservation wage. Consequently, the changes generated by the RT and IT reduce the probability of contracting success (column 3 in Table V). These results are summarized as follows.

**Result 3:** The contact agreement rate in the GE is higher than in the RT or IT setting because the firm's offer (worker's reservation wage) in GE is higher (lower) than that in the RT (IT). Therefore, Prediction 3 (*no impact on firm's offer*) and part (a) of Prediction 5 (*OB and IBR models*) are rejected in the RT and IT, respectively.

#### 4.4. Comparison of worker efforts

Another potential source of inefficiency is that the worker's cheap talk may induce low effort levels even when a contract is agreed upon, as suggested by part (b) of Prediction 4 (*main hypothesis*). We present the worker's actual effort level by period in the left-hand figure of Figure 2. Except for period 10, the actual effort level in GE is higher than that in the other treatments.

Figure 2. Worker's actual effort and stated effort schedule



From the worker's stated effort in the strategy method, the right-hand figure of Figure 2 shows the means of the efforts according to the corresponding wage offer. Since workers are not required to state their effort schedule if the corresponding wage is below their reservation wage, the number of observations decreases from 4,200 to 3,509. Comparing the three treatments, the wage-to-effort gradients in the RT and IT are lower than that in the GE.

The estimation results in Table VI show that worker cheap talk (communicating both intention and desirable wage) significantly decrease actual effort levels. From the

F-test, the magnitudes of the reduction effects are not significantly different ( $p = 0.69$ ). The second column presents the estimation results using the worker's stated effort schedule to capture the effects of the RT and IT settings by incorporating two interaction terms with wages instead of dummies. The coefficient on wages is significant and positive, suggesting that the gift exchange hypothesis holds in the GE. However, the coefficients of the interaction terms for the RT and IT are significant and negative. This result implies that cheap talk weakens worker reciprocity. We thus find the following results, which are consistent with part (b) of Prediction 2 (*gift exchange hypothesis*) and part (b) of Prediction 4 (*main hypothesis*).

Table VI. Estimation results for the worker's actual effort and stated effort schedule

	Worker's actual effort	Worker's stated effort
RT dummy	-0.0844*** (0.0226)	
IT dummy	-0.0758*** (0.0232)	
Wage		0.00620*** (0.000237)
RT dummy×Wage		-0.00159*** (0.000199)
IT dummy×Wage		-0.00194*** (0.000200)
Period	-0.00543* (0.00326)	-0.00285* (0.00160)
Constant	0.324*** (0.0258)	-0.0106 (0.0136)
F-value	5.89***	184.37***
Adj. R-squared	0.03	0.19
Observations	609	3509

Note: Robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively.

**Result 4:** Regardless of treatment, worker effort schedules are upward-sloping. However, the slopes of the effort schedules in the RT and IT are lower than that in the

GE. Therefore, part (b) of Prediction 5 (*OB and IBR models*) is rejected.

#### 4.5. Estimation for social preferences based on inequality aversion

Until now, we have examined the impact of worker cheap talk in bargaining on their own strategies, which in turn reflect their preferences. Here, we capture this impact in the form of changes in the parameters of a particular social preference model. As mentioned in Section 3.1, theoretical models of social preferences—OB and IBR—can explain the gift exchange hypothesis. Among these models, we focus on the inequality aversion model by Fehr and Schmidt (1999), which is one of the simplest OB models and is widely applied to explain unselfish behaviors observed in laboratory experiments. Let  $\pi$  and  $u$  be the monetary payoffs of the firm and worker, respectively. Then, the utility of an inequity-averse worker for allocation  $(\pi, u)$  is given by

$$u - \alpha \times \max\{\pi - u, 0\} - \beta \times \max\{u - \pi, 0\},$$

where  $\alpha$  is the worker's disutility of having less than the firm (disadvantageous inequality) and  $\beta$  is his/her disutility of having more than the firm (advantageous inequality). Fehr and Schmidt (1999) assume  $0 \leq \beta < 1$  and  $\beta \leq \alpha$ . We estimate these parameters for each treatment and examine how worker disutility for disadvantageous and advantageous inequality is changed by his/her cheap talk.<sup>17</sup>

Before the estimation, we rephrase the worker's payoff  $u$  as *SELF*, whose parameter is standardized to 1. The second and third terms in the utility function are *FSD* and *FSA*, respectively. Under the strategy method, subjects choose one effort

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<sup>17</sup> Our estimation follows the method described in Chapter 16 of Moffatt (2016).



level from among 11 choices (i.e.,  $e \in \{0, 0.1, \dots, 0.9, 1\}$ ) corresponding to six wage levels (we assume  $e = 0$  if the corresponding wage is below their reservation wage). Therefore, using 46,200 observations ( $= 70$  workers  $\times$  10 periods  $\times$  11 effort levels  $\times$  6 wage levels) and after rearranging the dataset, we estimate the utility function with an error component by a conditional logit model.

The estimation results for each treatment are shown in the columns of Table VII. Every coefficient of *FSD* and *FSA* is significantly positive, although the assumption of Fehr and Schmidt (1999) that  $\beta \leq \alpha$  is not satisfied. The effect of the disadvantage inequality, *FSD*, is lowest in the GE, followed by the RT and IT, whereas the effect of advantage equality, *FSA*, is the opposite, meaning that the effect is lowest in the IT, followed by the RT and GE. The difference in effects between the GE and RT and between the GE and IT are found to be significant by the Wald test ( $p < 0.01$  for each). Therefore, cheap talk (communicating both intention and desirable wage) in bargaining increases (decreases) subject disutility for disadvantage (advantage) inequality, both of which indicate that the self-serving tendency of subjects has been strengthened.

Table VII. Estimation results for the inequality-averse utility function

	GE	RT	IT
<i>FSD</i>	0.102*** (0.00565)	0.118*** (0.00295)	0.119*** (0.00257)
<i>FSA</i>	0.293*** (0.0114)	0.242*** (0.00754)	0.233*** (0.00929)
<i>SELF</i>	1 (0)	1 (0)	1 (0)
Wald-value	1011.5***	2396.1***	2721.2***
Loglikelihood	-27923	-27228	-33456
Observations	14,520	15,840	15,840

Note: Robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively.

The model of inequity aversion above assumes that a player's reference point in social comparison is the egalitarian outcome ( $\pi = u$ ). Fehr and Gächter (2002) state that it seems natural to assume that egalitarian outcome is a salient reference point in laboratory experiments, where subjects are randomly assigned to different roles and anonymously matched. However, as mentioned in Section 2.1, some theoretical studies have attempted to explain the endogenous nature of preferences in bargaining based on a model of reference-dependent preferences. Therefore, we examine the hypothesis that worker cheap talk changes their reference points in social comparisons and, in turn, their social preferences. To do this, we develop a simple model of reference-dependent social preference based on inequality aversion, and estimate how worker perceptions about fairness deviate from the egalitarian outcome, assuming that their disutilities for both disadvantage and advantage inequality are invariant.<sup>18</sup> If the utility of an inequity-averse worker for allocation  $(\pi, u)$  is given by

$$u - \alpha \times \max\{\pi - (u - r), 0\} - \beta \times \max\{(u - r) - \pi, 0\},$$

the difference from the previous model is the additional parameter  $r$ , which represents the worker's perception about fairness. He/she perceives the outcome in which  $u - \pi = r$  (i.e., his/her payoff is only  $r$  more than the firm's payoff) as a fair outcome. In this model,  $r = 0$  indicates that the reference point in social comparison is the egalitarian outcome, as in the previous model, whereas  $r > 0$  implies that

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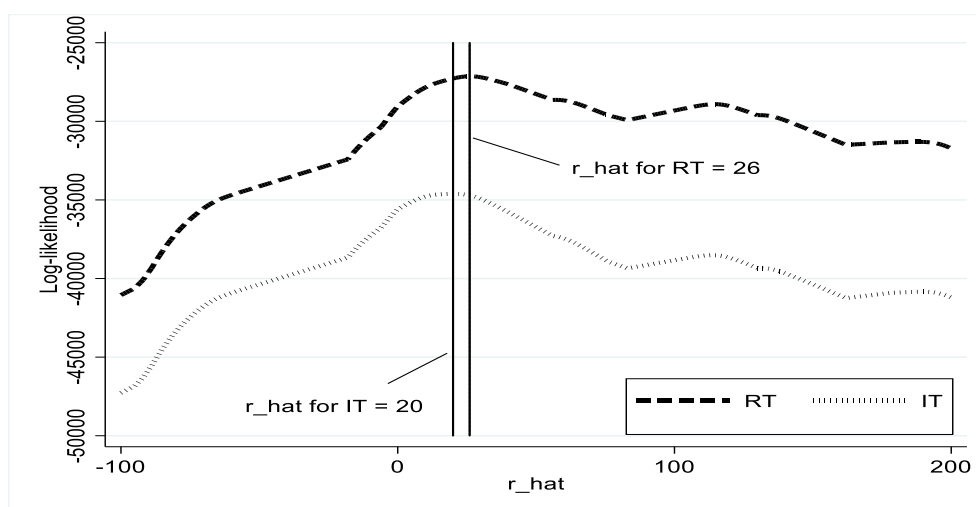
<sup>18</sup> See, for example, Breitmoser and Tan (2013) for more sophisticated models on reference-dependent social preferences.

he/she estimates what is fair in a self-serving way.

In the estimation, we assume that parameters  $\alpha$  and  $\beta$  are the same across treatments and the reference point  $r$  is set to 0 in the GE. Instead, we let  $r$  vary across treatments, that is, we attempt to capture the effect of cheap talk as the change in  $r$ . Therefore, the following procedure is adopted for the estimation. First, using data on the GE, we estimate the previous utility function and obtain the coefficients, which are same as the first column of Table VII. Second, using the estimated coefficients in the RT and IT, we search for  $\hat{r}$  maximizing the log likelihood in the two treatments (i.e., calibration). To take computational feasibility into account, a grid search is employed because  $r$  is, theoretically, an integer variable.

The calibration results for  $\hat{r}$  are illustrated in Figure 3, where the x- and y-axis denote  $\hat{r}$  and the log likelihood, respectively. The best reference points maximizing the corresponding log likelihoods for  $\hat{r}_{RT}$  and  $\hat{r}_{IT}$  are 26 and 20, respectively. Since both points are positive, cheap talk works as a driver for enhancing the self-serving tendency and its effects compared to the GE (where  $r_{GE} = 0$ ).

Figure 3. Relationship between the log likelihood and  $\hat{r}$



## 5. Repeated interactions

In the previous section, worker social preferences were found to be biased in a more self-serving direction by cheap talk (communicating both intention and desirable wage) in bargaining. However, this negative effect of cheap talk on social preferences does not directly mean inefficiency in a gift exchange game. Owing to the reciprocity of workers, a coordination aspect might be inherent in the gift exchange game, which cheap talk could help address as a coordination device (see Section 3.2): if the worker tells the firm that he/she intended to provide a high effort level and the firm trusts his/her message (in the IT setting) or if the firm interprets the request for a high wage as the worker's signal of choosing a high level of effort (in the RT setting), the firm would offer a high wage. Since effort schedules are upward-sloping, the offer of a higher wage increases effort levels, which in turn increase total welfare. In short, coordination success would outweigh the negative effect of cheap talk on social preferences.

However, in the IT, cheap talk has no impact on the firm's offer, which is consistent with Prediction 3 (*no impact on firm's offer*). One possible explanation is that firms ignore worker messages since workers are strongly tempted to misrepresent their intentions by cheap talk due to the one-shot game setting: they are never matched with the same partners twice. Indeed, some experimental studies show that individuals often use their cheap talk as a tool for deception (e.g., Wilson and Sell 1997; Croson, Boles, and Murnighan 2003).

Conversely, in the RT, Prediction 3 is rejected as it decreases the firm's offer. Since the desirable wages are rather high (around 76 on average), firms may not interpret

the request for a high wage as a signal of a high effort level, but rather as evidence of greedy and unreliable workers, leading them to punish these workers by offering a low wage. This is consistent with the results of the dictator game by Yamamori, Kato, Kawagoe, and Matsui (2008), in which the dictators reduce their offers to greedy recipients.

These arguments naturally turn our attention to long-term interactions, in which the same partner repeatedly plays a gift exchange game. In an IT setting, the worker would hesitate to misrepresent his/her intention since the firm can punish an insincere worker by offering him/her the lowest wage in the next period. Therefore, the repeated interaction between the same partners will increase the credibility of the message. Furthermore, in an RT setting, the worker would hesitate to request a high wage in the next period if the firm punished greedy requests by offering a low wage. A modest wage request could thus discourage the firm to offer a low wage.

To examine whether cheap talk successfully works as a coordination device in repeated interactions, we conducted additional experimental sessions for the three treatments.<sup>19</sup> The total numbers of subjects in the additional sessions for the GE, IT, and RT were 92, 64, and 64, respectively. The experimental designs and procedures for each session are similar to the one in the previous section (i.e., one-shot situation with the same partner), except for the matching mechanism: in these sessions,

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<sup>19</sup> Some experimental studies on gift exchange games show that repeated interactions improve efficiency relative to the one-shot situation through the so-called “repeated game effect” (Falk, Gächter, and Kovács 1999; Gächter and Falk 2002). We do not focus on this repeated game effect to address inefficiency, but rather because of its ability to make messages credible.

matching pairs are predetermined and fixed. We only state the main results here, focusing on the robustness of the negative effects of cheap talk on worker's reciprocal behaviors<sup>20</sup> and the effect of repeated interactions on coordination success.

First, similar to the one-shot setting, the slopes of the effort schedules in the IT and RT are lower than that in the GE, whereas worker effort schedules are upward-sloping in all treatments. Figure 4 shows the relationship between stated efforts and wages, as derived from the strategy method. The figure indicates that a worker's reciprocity is still negatively affected by his/her cheap talk because the GE line is above the other two lines. However, compared to the one-shot setting (see Figure 2), the impact of cheap talk on the worker's reciprocity seems more modest. This would be because the worker's effort schedule reflects not only his/her social preferences but also his/her strategic considerations when repeatedly playing with the same firm. For example, the worker might consider the possibility that returning a high effort for high wages induces a high wage in the next period.

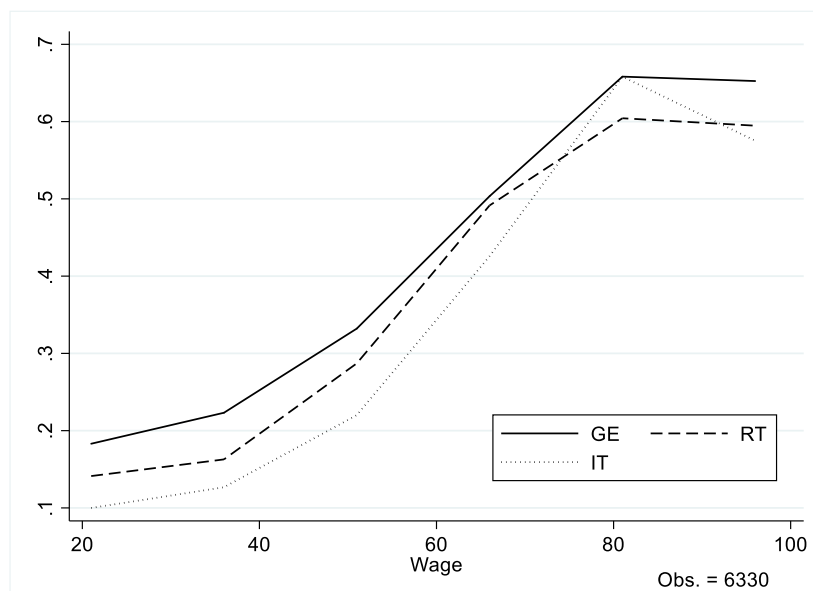
Second, the negative effect of cheap talk on the firm's offer is also robust in the RT case. Therefore, communicating the desirable wage cannot alleviate the coordination problem. Third, unlike in the one-shot setting, communicating the intention leads to a higher wage offer, which, in turn, induces a higher actual effort and total profit level than in the GE. Finally, for the worker's reservation wage (which also reflects his/her strategic considerations) and the contract agreement rate, there are no significant differences between treatments (the significance level of each difference is above

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<sup>20</sup> Note that reservation wages and effort schedules are no longer proxies for their preferences in the repeated situation, since strategic considerations would influence them.

5%).

Figure 4. Worker's stated effort schedule in long-term interactions



## 6. Concluding remarks

To explore how the social preferences of bargainers are affected by their own proposals during bargaining and whether these changes are sufficiently strong to affect the consequences of contract enforcement problem, we conduct laboratory experiments on a gift exchange game with costless and non-binding proposals by workers (i.e., cheap talk) in a one-shot game setting. We consider two types of proposals as experimental treatments: one contains the worker's intention, including his/her desirable wage and intended effort when he/she receives the wage, and the other contains only his/her desirable wage. Although worker reciprocity is crucial for addressing contract enforcement, we predict that the social preferences of workers are rather biased in a self-serving direction by making such proposals for bargaining, thus resulting in a reduced economic surplus.

Our data support this prediction. While the worker reciprocally chooses a higher

effort in response to the firm's generous wage, his/her judgment for the extent to which the effort should be returned for a generous wage becomes biased in a more self-serving direction if he/she made a proposal during the bargaining. That is, such a worker's cheap talk during bargaining undermines his/her reciprocity. The worker's reservation wage also increases by strengthening the self-serving bias when his/her cheap talk is his/her intention. Moreover, the worker's cheap talk has no effect on increasing the firm's wage offer. As a result, worker's cheap talk in bargaining reduces total welfare in a gift exchange game by increasing the disagreement rate and reducing the actual efforts of workers in the agreed contracts.

We also find that the difference in effects between the two types of cheap talk appear in repeated interactions. While both types of cheap talk undermine worker reciprocal behavior even in this setting, a worker's cheap talk about his/her intention leads to a higher wage offer by the firm, which in turn induces higher actual effort levels and increases total welfare: the success of coordination outweighs the negative effects of cheap talk. Conversely, worker's messages about his/her desirable wage cannot improve coordination, even in repeated interactions.

Our study has implications for the effectiveness of opportunities for workers to file complaints about wages or work environments (e.g., grievance procedures and suggestion boxes), which has hitherto been controversial in management science. While Freeman and Medoff (1984) argue that it makes sense for both employers and employees to have a grievance mechanism based on the exit voice model (Hirschman, 1970), field research on the grievance activities of employees has found that grievance filers have lower promotion rates, attendance rates, and performance ratings, and higher turnover rates than non-filers after grievance settlement (e.g., Lewin and



Peterson 1988). Although these authors relied on a subjective performance rating, the role-play experiment of Olson-Buchanon (1996) showed that grievance filers have a lower objective job performance than non-filers although they are involved in the same wage-related disputes. However, Olson-Buchanon (1996) could not conclude that the low performance of employees was due to the presence of grievance systems, since filing a grievance was at the subject's discretion (i.e., grievance filing was not manipulated in their experiment). Conversely, the workers in our experiment had to request their desirable wage (especially in the RT). Therefore, our results imply that grievance filers in Olson-Buchanon's (1996) experiment have lower objective job performance because their social preferences are biased in a more self-serving direction by grievance activities.

In this paper, worker proposals in the bargaining process are defined as cheap talk. Over the past decades, there has been considerable empirical research on the role of communication by cheap talk in various social dilemmas, including a coordination failure, prisoner's dilemma, free rides in public goods provision, and moral hazard in incomplete contracts (e.g., Dawes, McTavish, and Shaklee 1977; Ostrom, Gardner, and Walker 1994; Crawford 1998; Charness and Dufwenberg 2006). Whereas most of these studies have focused on cheap talk as a means to facilitate coordination or foster mutual trust, thus improving efficiency, some researchers have focused on the shortcomings of cheap talk, such as being a tool for deception and reducing efficiency in a social dilemma (e.g., Wilson and Sell 1997). In this paper, we discover another pathway for cheap talk to cause inefficiencies (i.e., biasing the sender's social preferences in a more self-serving direction) by conducting an anonymous bargaining experiment on incomplete contracts in which the worker communicates one-way to

the firm about contracts. Of course, social preferences could be affected by the opponent's offer, a history of offers during bargaining, or social distance (such as gender, race, and social class) among bargainers. A systematic analysis of the effects of cheap talk on social preferences in more complicated bargaining situations or in other social dilemmas is thus an important topic for future research.

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