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CEEL Working Paper 1-18

Cognitive and Experimental Economics
Laboratory

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Abstract

Our paper reproduces the cash posters framework *à la* Homans (1953, 1954) in a laboratory setting with a twofold aim: first of all, it explores the gift-exchange between employers and employees, both in terms of wage-effort and in terms of effort-potential leniency in punishment; secondly, it investigates whether employees' behavior is driven also by solidarity concerns towards their unlucky peers. We propose a novel experimental design with a modified version of the gift-exchange game with real effort, punishment, and multiple rounds (Fehr et al., 1997): each employer is matched with two employees and she has the possibility to punish each of them if their individual production is lower than that asked. Each employee's production risks to be reduced by a random intervention and, in our treatment, each employee has the possibility to renounce to a part of his production to give it to his coworker in need. Our data support the well-known relation between wage and effort, but suggest that employers are not willing to overlook employees non-compliance, neither when employees exerted high effort in the past, nor when their coworkers exert high effort. In our treatment, employees not only exploit the possibility to help their needy peers, but they tend also to exert higher effort towards their employers. Consequently, the employers are those who earn more from employees' solidarity, and the gap in earnings between employers and employees becomes even greater in our treatment.

JEL Classification: C91; M52; D91; D81

Keywords: Solidarity, Gift-exchange, Reciprocity, Experiment.

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1. Introduction

In a famous study conducted at the Costumers Accounting Division of the Boston Edison Company, George Homans (1953, 1954) spent several months in observing the social relations among some clerical workers. His focus was mainly on a group of ten young cash posters whose job consisted in recording customers' payments: since their duties were rather repetitive and their performance easy to monitor, they represented the perfect target for a field study aimed at combining the measurement of individual effectiveness with the systematic observation of social behavior (Homans, 1954: p. 724).

Cash posters were required to pull at least 300 cards per hour and they were paid a flat wage. Beside that, they received no monetary incentive: neither a punishment for those who failed in reaching the quota, nor a prize for those who outperformed the requested minimum. Nevertheless, the average number of cards per hour recorded by Homans was more than 17 percent higher than the minimum quota required by the company; moreover, few subjects worked almost 50 percent more than the standard requested (Akerlof, 1982). From the observation of this data, at least one question arises: since there were not economic incentives, why did the cash posters work so hard?

Years later, George Akerlof (1982) interpreted cash posters' behavior by referring to the concept of *gift-exchange*: according to this interpretation, the excess of effort exerted by the cash posters was seen as a gift to the firm. Because of the essential reciprocal nature of gift-giving (Mauss, 1954), the gift given by the clerical workers was expected to be exchanged with appropriate gifts given by the firm: first of all, cash posters were remunerated with an above the minimum wage. Besides that monetary gift, the firm repaid cash posters' effort with a twofold *leniency* in the work rules. Firstly, potential leniency for future errors or slowdown: meaning that, by exerting higher effort in the present, each clerical worker could build a sort of self-insurance for her own future slackness. Secondly, the firm reciprocated to the high performance of *some* cash posters by reducing the pressure on *all* of them; therefore, the hard-workers could derive utility from the firm's generous treatment of other members of the group for whom the work rules were a binding constraint (Akerlof, 1982: 552).

Since among the cash posters it was rather simple to distinguish the hard-workers from the poor performers, we can presume that hard-workers' behavior was also

driven by *solidarity* with their slower coworkers. There is a profound difference between the driver of workers' behavior towards the firm (reciprocity) and the driver of workers' behavior towards their coworkers (solidarity): indeed, reciprocity implies the expectation of receiving something back, while solidarity is "a willingness to help people in need who are similar to oneself but victims of outside influences" (Selten and Ockenfels, 1998: 518). We suggest to incorporate also solidarity concerns among the drivers of cash posters' behavior, despite Akerlof (1982) never broached them in his analysis, by pointing out a probable relation between the "outside influences" mentioned by Selten and Ockenfels (1998) and the random distribution of ability at work between cash-posters; furthermore, we argue that those who were more able in cash-posting were willing to help the others because of their empathy with the coworkers in need.

The relation between firm and workers has been widely studied as a gift-exchange. The seminal paper by Fehr et al. (1993) was the first to introduce the gift-exchange game to mimic a labor relation in an experimental setting, and it confirmed the positive relation between wage and effort observed in Homans (1953). Starting from this influential study, several papers have expanded the basic setting proposed by Fehr and colleagues with the aim of exploring in which conditions reciprocity does survive. For example, some experimental works have investigated whether workers are still moved by reciprocal concerns when there are multiple employees working for the same employer (Falk and Ichino, 2006; Maximiano et al., 2007; Gächter et al., 2012); they showed that workers are very sensitive to peers' behavior, and that their reciprocity holds out and even increases if workers observe others behaving reciprocally. Another stream of literature has developed on settings in which the employer has the possibility to respond to workers' behavior through fines and/or rewards (Fehr et al., 1997; Fehr and Gächter, 2002; Fehr et al., 2007). Here the results are more mixed: when employers have the possibility of both punishing and rewarding after the observation of workers' effort, both employers and workers tend to behave more reciprocally (Fehr et al., 1997); moreover, when employers have decided *a priori* whether to punish or to reward workers' behavior, workers' reciprocity is much higher with a rewarding contract (Fehr et al., 2007); finally, when employers have no power in choosing the preferred contract (among a trust one and an incentive one), both employers and workers are less willing to reciprocate under the incentive contract (Fehr and Gächter, 2002). Moreover, other experimental studies have proved that reciprocity survives (at least in the short term) also in settings with real effort tasks (Gneezy and List, 2006; Bellemare and Shearer, 2009; 2011;

Carpenter, 2017).

Despite the large number of studies on reciprocity between employers and employees, to the best of our knowledge, no study has investigated the interaction between reciprocity and another factor that is likely to drive employees' behavior: solidarity. Solidarity concerns have been explored, separately, by a narrow stream of experimental literature starting with the pioneering study by Selten and Ockenfels (1998): they proposed a solidarity game in which participants were asked to play a one-shot three-players game, and they had the possibility either to win a certain amount of money or to receive anything. Before the random draw, each of them was asked how much he/she was willing to give to the loser(s) in the group in the case he/she won the amount of money; therefore, these transfers were conditional on being a winner. This game creates a situation in which "ex ante everybody is in the same situation but the ex post distribution of payoffs may be very uneven unless the inequality is mitigated by positive conditional gifts" (Selten and Ockenfels, 1998: 531), and it was found that these conditional gifts were actually substantial.

But the structure of the solidarity game, as presented by Selten and Ockenfels (1998), risks to be far from representing the complex workplace dynamics observed by Homans. First of all, the framework of the solidarity game is such that the players have all the same informations, make the same decisions simultaneously, and there is no conflict of interests nor interaction among them: therefore, it totally lacks the principal-agent nature which is typical of labor relations (Jensen and Meckling, 1976). Secondly, in the standard solidarity game subjects decide on how to split an amount of money which is given to them by the experimenter. It is very difficult to observe situations like this in reality. In addition, it has been largely proven that when subjects have to earn their endowment before deciding how to split it in a dictator game, they tend to become more selfish than when they receive money as a windfall (Cherry et al., 2002; Cherry and Shogren, 2008; Reinstein and Riener, 2009; Mittone and Ploner, 2012; Carlsson et al., 2013).

Our study falls between these two strands of experimental research, with the aim of filling the gap among them in representing a workplace framework in which the workers are moved also by solidarity concerns. We propose a novel design with a modified version of the gift-exchange game, in which workers are allowed to show their solidarity concerns. Players are assigned a role that can be either employer or employee, and each employer is matched with two employees: in the baseline

(Control Treatment, CT), people within each group play together for 10 rounds (partners matching). The structure of the game is as follows: in the first phase of each round, each employer proposes a contract (s, s_{min}, p^*) to both her employees¹; s represents a wage, s_{min} a minimum wage that is lower than s , and p^* is the asked level of effort. The employees have the possibility to see the proposed contract, then they are asked to exert an individual real effort by counting the exact number of 1 in tables composed by 0 and 1 for 90 seconds. Each player knows that after these 90 seconds, each of the following events has the same probability to occur: 1) the production of employee 1 is halved, 2) the production of employee 2 is halved, 3) nor the production of employee 1 nor the production of employee 2 is halved. We introduce this random device in order to let employees' final performance be determined not only by their effort, but also by an event that is independent from their behavior; this is aimed at mimicking those uncertain events that in real life can modify individuals productivity, despite of the effort produced (such as unforeseen inconveniences in workplace, familiar problems, machinery malfunctions, and so on). Before knowing which of these events will effectively happen, each employee decides how to allocate his production between himself and his employer: for each kept table he earns 0.4 tokens, for each table given to the employer, the latter earns 0.6 tokens.² The number of tables effectively given to the employer by one employee represents his effective effort p . If $p \geq p^*$ the employer is forced to pay him the higher wage s , while if $p < p^*$ the employer can choose either to pay him the wage s or the minimum wage s_{min} . After the payment of the wage, the round ends.

We compare this baseline with a Solidarity treatment (ST), in which each employee is allowed to allocate his production of tables between himself, his employer, and also his coworker in the three above mentioned hypothetical situations. If some tables are given to the coworker, these tables are directly passed from the coworker to the employer, and the employer perceive them as coming from the coworker. Indeed, the employer is not aware of the table exchange between her employees, but she is only able to see the final number of tables received by each of them.

We decided to implement such a complex design in order to mimic the cash posters framework as close as possible and to capture solidarity concerns: indeed, with this setting we are able to explore the gift-exchange observed by Homans (1953, 1954),

¹For simplicity, from now on we refer to employer as female, and to employee as male.

²These parameters are aimed at representing a situation in which the tables are profitable for the employee that decides to keep them for himself, but when they are given to the employer the amount of wealth generated is even higher.

both in terms of wage-effort relation and in terms of effort-potential leniency. Moreover, we can test whether lucky workers ³ are moved also by solidarity concerns towards unlucky coworkers.

We find that some behaviors are effectively moved by reciprocity concerns: for example, the minimum wage offered by the employers is higher than the minimum possible, and employees' effort is positively influenced by the offered wage. However, we do not find the relation between effort and potential leniency hypothesized by Akerlof (1982): indeed, employers are not willing to forgive employees' non-compliance, neither when the employees themselves exerted high effort in the past, nor when the employers receive high effort from the coworkers. Furthermore, our data show that when employees are allowed to show their solidarity towards their coworkers, they effectively exploit this possibility; this solidarity concern is found to be influenced also by a sort of reciprocity towards coworkers, meaning that employees are more supportive towards those coworkers who have helped them in the previous round. Moreover, in the solidarity treatment employees are unexpectedly willing to exert higher effort towards their employers. As a consequence, the employers become the greatest beneficiaries of the solidarity drivers, and the gap between employers' and employees' payoffs is even higher in the solidarity treatment.

The reminder of the paper is structured as follows: Section 2 illustrates our research hypotheses; Section 3 describes our experimental design and procedure; Section 4 illustrates our results and Section 5 concludes. The instructions of the experiment are presented in the Appendix.

2. Research Hypotheses:

If both the employer and the employees were perfectly rational and selfish agents, their aim should be the maximization of their own payoff and we can develop some predictions about their behavior. Starting the analysis from the last phase, the employer should never pay the higher wage if she is not forced to. Since the employee can predict this behavior, he should decide how many tables consign to the employer according to these simple considerations: first of all, he should check whether the offered wage is *appropriate* for the asked effort. Indeed, it is easy to suppose that an employee will exert the asked effort p^* as long as the offered wage is at least equal

³We define "lucky" those workers whose number of tables is not halved, and consequently those who know that their wage will be s for sure.

to $0.4p^*$; when this is not the case, the employee will maximize his payoff by keeping all the tables for himself. Secondly, the employee should compare his effective effort with the asked effort: if the number of tables completed is lower than p^* , there is no reason to give a positive amount of tables to the employer. Moreover, the employee should never give any tables to the coworker (in ST), because it would directly lower his own payoff; finally, assuming that the effort of completing tables is costly and that the cost of completing tables is increasing and convex, he would complete tables until the marginal cost of completing tables would become higher than the benefit he gets from each completed table (0.4 tokens).

To conclude the analysis, in the first phase the employer should propose a contract with these two properties: first of all, the asked effort and the offered wage should be related in such a way that $s \geq 0.4p^*$; secondly, the minimum wage should be equal to 0.

Nonetheless, as we have already mentioned, a huge body of literature has shown that people's behavior is driven by other forces besides the selfish concerns, such as the desire to reciprocate kindness or to punish unkind behaviors (Fehr et al., 1993; Fehr et al., 1997; Fehr et al., 2007; Fehr et al., 2009; Charness et al., 2012), but also empathy and solidarity with people in need (Selten and Ockenfels 1998; Eberlein and Przmeck, 2006; Buchner et al., 2007).

Therefore, we hypothesize that the employer's decision about the contract can be determined also by her desire to induce a reciprocal behavior into her employees: as a consequence, she can offer a wage which is higher than (or at least equal to) the minimum acceptable for the asked level of effort ($s \geq 0.4p^*$). And again, she can offer a minimum wage which is higher than zero and she can pay the higher wage even when she is not forced to, especially to an employee who has already given a number of tables higher than that asked.

H1: The employer offers a contract in such a way that the wage is, on average, higher or equal to the minimum acceptable for the asked level of effort.

H2: The offered minimum wage is, on average, greater than zero.

H3: The employer does not exploit the possibility to pay the minimum wage all the times that an employee gives her a number of tables $p < p^*$, and her decision in round t is related to the employee's behavior in round $t_{-1}, \dots, 0$

From the side of the employee, if also his behavior is effectively influenced by reciprocity considerations, we can expect that his effort is positively influenced by the wage proposed by his employer. Moreover, we can hypothesize that even if the employee is not able to give the asked level of effort, he is likely to consign to the employer a number of tables that is greater than zero, even just to show off his goodwill.

H4: The number of tables given by one employee to the employer is positively influenced by the wage proposed by the employer.

H5: Even if the employee is not able to give the asked level of effort, he is likely to consign to the employer a positive number of tables.

If we compare ST with CT, we can suppose that in the first one participants' behavior could be driven even by *horizontal solidarity* concerns. Given the before mentioned definition of solidarity (Selten and Ockenfels, 1998; Bierhoff and Fetchenhauer, 2001; Buchner et al., 2007), we hypothesize that in ST each employee is willing to help the coworker who finds himself in difficulty by consigning him some of his own completed tables. Moreover, since the essential basis of solidarity is to help someone in need, we can suppose that an employee should be more willing to help his coworker when his coworker finds himself in effectively unlucky circumstances (i.e., his tables are reduced). Finally, employees' behavior in ST should be influenced also by reciprocity concerns: indeed, because of the partner matching protocol, each employee could expect to be treated kindly by his coworker if he treats him kindly. That is, one employee could give some completed tables to his coworker not only because he is willing to help him, but also because he expects to induce his coworker to give him some tables in the successive rounds. But if an employee discovers that his coworker is not willing to give him some of his completed tables, it can destroy employee's reciprocity and, consequently, the number of exchanged tables is likely to drop down.

H6: The number of tables effectively given by an employee to his coworker is, on average, greater than 0.

H7: The number of tables given by an employee to his coworker should be the highest when the number of tables of the coworker is halved.

H8: The number of tables given by an employee to his coworker is influenced by the coworker's behavior in the previous rounds.

3. Experimental design and procedure

3.1 Procedure

In order to test these hypotheses, we ran a laboratory experiment in the CEEL Lab at the University of Trento. The experiment was completely computerized and it was programmed using oTree Software (Chen et al., 2016). We conducted 8 experimental sessions, and 156 subjects participated voluntarily: no subject participated in more than one treatment or session. All the participants were undergraduate students, 62.8% were female, they were on average 21.6 years old, they have already participated on average in 5.9 experiments, and 47.3% of them were enrolled to an economics major. All the experimental subjects received a show up fee of 3 euro, and they earned an average extra sum of 9.7 euro by participating in the experiment. Each session lasted about 1 hour and 30 minutes.

Before the beginning of each session, the participants were welcomed and they were asked to seat randomly in the lab; then the instructions were read aloud by one experimenter and the participants were asked to answer to some control question in order to verify their comprehension. During each session they were not allowed to chat nor to use their cellphones. In each period, each group was allowed to observe only the outcome of the group itself: the participants did not observe nor the behavior nor the outcome of the participants outside their own group.

3.2 Treatments

Our experimental design consists of two treatments: the Control treatment, and the Solidarity treatment. Each of them represents a modified version of the gift-exchange game with punishment, as that presented by Fehr et al. (1997).

Control treatment:

At the beginning of each session, participants are randomly divided in employers and employees; then, groups of three people (1 employer and 2 employees) are formed. Participants are randomly and anonymously grouped, therefore no one knows the other people he/she is playing with; they only know that the groups will remain unchanged until the end of the session.

Each session is made of 10 rounds, plus 2 preliminary rounds which are identical to the others except that in these rounds the subjects are not remunerated. At the beginning of each round, each employer is given an endowment of 20 tokens and each employee is given an endowment of 8 tokens. Each round is composed by three phases:

1. In the first phase, each employer chooses the contract to be offered to both her employees. The contract is composed by: an asked level of effort p^* , a wage s , and a minimum wage s_{min} that should be lower than the wage. The asked effort should be within the range $[0, 20]$, while both the wage and the minimum wage should be within $[0, 10]$.
2. In the second phase, each employee is told about the contract offered by his employer, and then he is asked to exert a real effort for 90 seconds: that is, he is asked to count the exact number of 1 in tables made by 0 and 1. After the completion of this task, each of these three events can happen with the same probability within each group: the number of tables completed by employee 1 is halved, the number of tables completed by employee 2 is halved, or none of these events.

Before knowing which of these events will effectively happen, each employee has to decide how to allocate his completed tables between himself and his employer in each of the three hypothetical situations: meaning that he has to decide how many tables keep for himself and how many tables give to the employer when 1) his tables are reduced 2) the tables completed by his coworker are reduced and 3) neither his tables nor the tables of his coworker are reduced. For each completed table he decides to keep for himself, he earns 0.4 tokens; for each completed table given to the matched employer, he does not earn anything and the employer earns 0.6 tokens.

After this choice, each employee discovers which event has happened and consequently which of his strategies has been implemented. The number of tables effectively given to the employer by one employee represents his effort (p).

3. The employer observes how many tables each employee has effectively sent her and the average number of tables completed by *all* the employees in the previous round; moreover, she is aware about the possibility that the number of tables completed by one of her employees is reduced, but she does not discover which of the three above mentioned events has effectively happened. After having observed the number of tables consigned by each employee, the employer has to decide their individual wages:
 - If the number of tables consigned by one employee is greater or equal to the asked level of effort, the employer is forced to pay the higher wage s to that employee.
 - If the number of tables consigned by one employee is lower than the asked level of effort, the employer has the possibility to choose between

the higher wage s and the minimum wage s_{min} .

The employer is then asked to guess the total number of tables that each of her employees wanted to keep. This elicitation of belief is incentivized, meaning that, if the employer guess the right number of kept tables, she is paid additional 1 token.

This is the end of phase three and the end of the round.

After 12 rounds, all the participants are asked to complete a questionnaire aimed at investigating their propensity to risk (BRET; Crosetto and Filippin, 2012) and they are asked few demographic questions; then their tokens are converted in money with a conversion rate of 1 token = 0.05 euro and they are paid privately in a separate room.

Solidarity treatment:

The only difference between the Solidarity treatment and the Control treatment is that in the Solidarity treatment, employees have the possibility to consign their completed tables not only to the employer but also to the employee they are working with. That is, each employee has to decide how to allocate his own tables between himself, the other employee, and the employer in the three possible situations (the number of tables completed by employee 1 is halved, the number of tables completed by employee 2 is halved, or none of these events). If the employee decides to give some of the completed tables to his coworker, these tables are automatically sent from the coworker to the employee: meaning that, the coworker can not decide to keep them for himself. In this way, both the tables directly given to the employer and those given to the coworker are substantially consigned to the employer: the only difference among them is that the employer perceive the first ones as given by the employee himself, and the second ones as given by his coworker. This is because the employer is not aware if a tables' exchange between her employees has taken place nor, eventually, to which extent: she only knows that each of her employees has the possibility to give some tables to his coworker, but she does not know if they effectively do exploit that possibility.

Payoff

In both treatments, participants' payoffs are determined in this way. Employers' payoff is given by

$$\Pi_{employer} = 20 - s_1(s_{min1}) - s_2(s_{min2}) + 0.6(p1 + p2)$$

where 20 is the initial endowment, s_1 (s_{min1}) and s_2 (s_{min2}) represent the wage (minimum wage) given to employee 1 and to employee 2, p_1 and p_2 represent the number of tables effectively received by employee 1 and by employee 2. On the other hand, employees' payoff is equal to:

$$\Pi_{employee} = 8 + s(s_{min}) + 0.4(kt)$$

where 8 is the initial endowment, s (s_{min}) represents the wage received and kt is the number of tables that the employee decides to keep for himself.

4. Results

4.1 Proposed contracts

In the first stage of each round, each employer decides the contract to be offered to her two employees: meaning that, she asks for a number of tables p^* , and she decides how to remunerate them by choosing the minimum wage s_{min} and the wage s . Table 1 shows that the difference between the three contract components in CT and in ST is almost irrelevant; however, we can see that in both treatments the proposed minimum wage is higher than the absolute minimum wage, 0 (p-value < 0.00 for both CT and ST, two-tailed Wilcoxon-Mann-Whitney test). Since s_{min} represents the minimum wage that the employer decides to pay to the employees no matter what is the number of tables that she receives, this evidence seems to suggest an attempt of inducing some kind of reciprocity in employees' behavior.

Result 1: *The minimum offered wage is greater than 0 both in CT and in ST.*

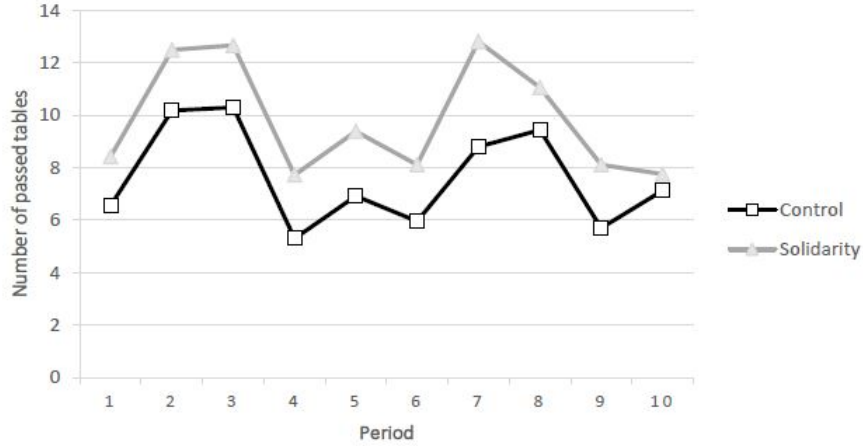
The other observation that we can draw from Table 1 is that the majority of contracts, both in CT and in ST, are proposed in such a way that the wage is appropriate

Table 1: Contract offers by treatment

	CT		ST	
	Mean	(SD)	Mean	(SD)
Wage	6.29	(1.55)	6.26	(2.01)
Minimum wage	0.52	(0.53)	0.68	(0.82)
Asked effort	15.24	(3.03)	16	(2.94)
Ratio of incentive-compatible p^*	0.67	(0.37)	0.58	(0.39)

Standard deviations are in parentheses.

Figure 1: Total number of tables passed across periods



for the asked number of tables: that is, $s \geq 0.4p^*$. Nevertheless, the ratio of the contracts in which p^* is incentive-compatible is significantly higher in CT than in ST ($p = 0.05$, two-tailed Wilcoxon-Mann-Whitney test): the interpretation of this results could be that, since employers are aware of employees' possibility of exchanging tables, they are likely to ask for more tables being equal the offered wage. Moreover, the amount of asked tables is found to increase over time: the average number of asked tables in the last five rounds is significantly higher than the number of tables asked in the first five rounds, both in CT and in ST ($p = 0.03$ both for CT and ST, two-tailed Wilcoxon-Mann-Whitney test). This result is probably driven by the fact that, for each round, each employer is allowed to observe the average number of tables completed by all the employees: since the average number of completed tables is much higher than the average number of tables given to the employers (as we will see in the next sub-sessions), employers ask few tables in the preliminary rounds,⁴ and then they are likely to update their requests according to employees' capabilities. On the other hand, the offered wages are stable across periods for both treatments.

Result 2: *Most of the offered contracts are such that $s \geq 0.4p^*$, but in CT the ratio of incentive-compatible p^* is higher.*

4.2 Effort levels

In our experimental design, the employee's level of effort is represented by the total

⁴The amount of tables asked in the preliminary rounds is significantly lower than that asked in the other rounds (p -value = 0.01 in CT and p -value < 0.01 in ST, two-tailed Wilcoxon-Mann-Whitney test)

Table 2: Number of passed tables by treatment

	CT		ST	
	Mean	(SD)	Mean	(SD)
Own tables halved (empl.)	3.18	(2.21)	4.36	(2.76)
Coworker’s tables halved (empl.)	9.49	(4.32)	11.25	(4.38)
Tables not halved (empl.)	9.41	(4.21)	11.43	(4.6)
Effectively passed (empl.)	7.62	(1.88)	9.2	(2.17)
Own tables halved (cow.)			0.38	(0.64)
Coworker’s tables halved (cow.)			1.06	(1.2)
Tables not halved (cow.)			0.65	(1.38)
Effectively passed (cow.)			0.64	(0.35)
Total passed (empl.)	7.62	(1.88)	9.85	(1.88)

Standard deviations are in parentheses.

number of tables that he effectively gives to the employer: Figure 1 depicts the average number of tables passed to the employer across periods in CT and in ST. Despite the time pattern is similar in the two treatments, we can clearly see that the effort exerted in ST is higher than the effort exerted in CT in all the periods: this remark is confirmed by a two-tailed Wilcoxon-Mann-Whitney test ($p = 0.04$).

Result 3: *The total number of tables effectively passed to the employer is always higher in ST than in CT.*

In both treatments, this number is determined by the number of tables that the employee would like to give to the employer, and by the effect of the intervention of the random device; moreover, in ST the number of tables given by one employee to the employer is determined also by the number of tables that his coworker decides to give him. Since the random device is made to hit employees with the same probability in CT and ST, our analysis will be focused on the other two components: the number of tables directly given to the employer, and the number of tables received by the coworker.

Table 2 shows, for both treatments, the average number of tables that the employees want to pass to the employer and to the coworker in the three hypothetical situations (their own tables are halved, the tables of the coworker are halved, or none

Table 3: Tables passed to the employer (no interactions among coworkers)

	(1)	(2)	(3)
(Intercept)	9.45*	4.50	4.78
	(3.84)	4.18	(5.18)
Solidarity	1.73 ⁺	1.78*	1.65 ⁺
	(0.98)	(0.88)	(0.9)
Proposed wage		0.87***	
		(0.12)	
Completed tables			0.15
			(0.09)
Incentive-compatible asked effort			2.85***
			(0.73)
Wage received in t-1			0.05
			(0.08)
Tables passed by the coworker in t-1			0.14***
			(0.03)
R.sq.overall	0.03	0.08	0.08
Wald Chi(2)	12.26	74.17	63.57
Num. obs.	1030	1030	927

Random effects GLS (Standard error adjusted for clusters in group in parentheses)

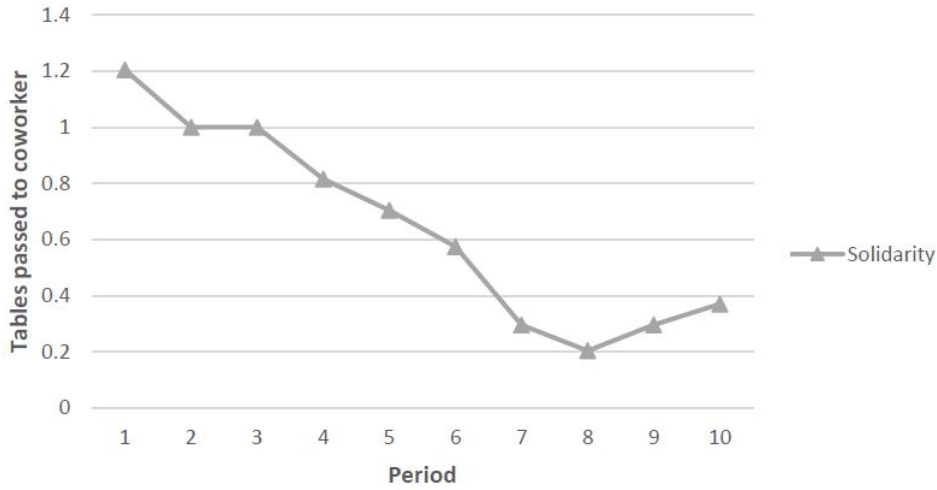
Controls: age, nationality, major, gender, number of past experiments, guess about average number of tables completed by the others. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

of these events), the average number of tables effectively passed to the employer ⁵ and to the coworker according to the effects of the random device, and the total number of tables passed to the employer. Since this last number is nothing but the sum of the tables effectively passed to the employer plus those effectively received by the coworker, in CT this number is equal to the number of tables effectively passed to the employer because employees are not allowed to exchange tables. By looking at this table it is easy to see that, when the employees are given the possibility to show their solidarity with the coworkers in need, they tend to be more generous even with their employers. Indeed, the number of tables effectively given to the employer is higher in ST than in CT (p-value = 0.07, two-tailed Wilcoxon-Mann-Whitney test), and this is the first component of Result 3.

Result 3.1: *When the employees are allowed to show their solidarity with their coworkers, they tend to be more generous even with their employers.*

⁵This number is calculated without considering the possible exchange of tables between coworkers in ST

Figure 2: Number of tables passed to the coworker across periods



The panel analysis presented in Table 3 confirms this result and provides some insights into the drivers of employees' decision on passing tables to the employer: indeed, all the regressions show that the employees in the Solidarity treatment pass around 1.7 more tables than those in the Control treatment. In column (2) we can observe the well-known and well-proved positive relation between wage and effort; moreover, the regression in column (3) shows that the number of passed tables is significantly higher when the employer asks for an effort that is incentive-compatible. The second evidence offered by column (3) is that employees' behavior is positively influenced by their peers', as other experimental studies have proven before (Falk and Ichino, 2006; Mas and Moretti, 2009): that is, the number of tables passed by one employee to the employer is slightly but positively influenced by the number of tables passed by his coworker to the employer in the previous round. The peer effect that we found is likely to be related to Result 3.1: that is, in ST employees pass more tables to the employer because they want to overcome the comparison with the coworkers, and they know that their coworkers' performance is increased by the tables that the employees themselves have passed them. Finally, employees' behavior in one round does not seem to be influenced by the wage received in the previous round.

The second component of Result 3, as we have already mentioned, is represented by the number of tables received by the coworker. Table 2 provides us some cues about employees' behavior towards coworkers: the first evidence is that they do exploit the possibility of helping coworker in all the hypothetical situations, and the

Table 4: Tables passed to the coworker

	Random effects GLS
(Intercept)	−2.42 (1.57)
Completed tables	0.00 (0.03)
Wage proposed	0.04* (0.02)
Asked tables	−0.06+ (0.03)
Tables received by the coworker in t-1	0.17*** (0.04)
R.sq.overall	0.21
Wald.Chi (2)	120.69
Num. obs.	486

Random effects GLS (Standard error adjusted for clusters in group in parentheses)

Controls: age, nationality, major, gender, number of past experiments, guess about average number of tables completed by the others. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

number of tables passed to the coworker is always higher than 0 (p-value<0.00 for all the hypothetical situations, two-tailed Wilcoxon-Mann-Whitney test).

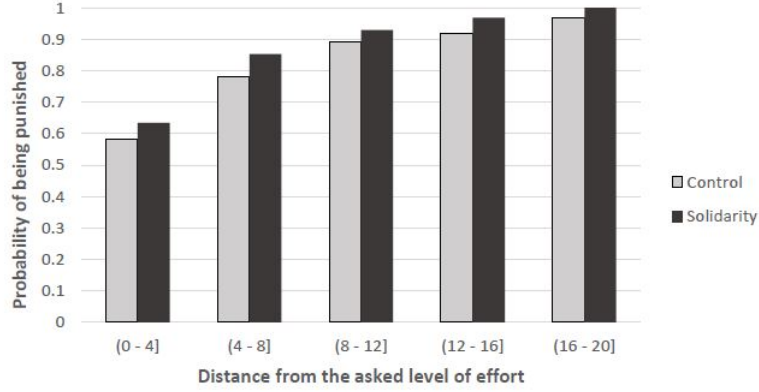
Result 3.2: *Employees do exploit the possibility of showing solidarity towards their coworkers.*

Moreover, employees' solidarity is not *tout court*: indeed, Table 2 shows that the number of tables given to the coworker when the tables of the coworker are halved is higher than that given in the other two hypothetical situations (p-value < 0.00 for both hypothetical situations, two-tailed Wilcoxon-Mann-Whitney test). It means that employees pass significantly more tables to their coworkers when they know that their coworkers are effectively in need; this situation resembles the classic solidarity game context in which only the player who wins the lottery (the lucky one) has the possibility to show his solidarity towards those who loose it (Selten and Ockenfels, 1998; Ockenfels and Weimann, 1999; Buchner et al., 2007).

Result 4: *Employees pass significantly more tables to their coworkers when they know that their coworkers are effectively in need.*

If we look at the trend of the number of tables effectively passed to the coworker

Figure 3: Probability of being punished as a function of the distance $p^* - p$



across periods in Figure 2 (therefore, considering the intervention of the random device), it is easy to identify a decreasing pattern⁶. One possible interpretation can be linked to conditional cooperation: an employee is willing to show solidarity towards the coworker as long as the coworker is reciprocating his help. Therefore, as time goes by, the initial solidarity of some employees tends to disappear because they meet some selfish coworkers that do not reciprocate the initial help. The negative reciprocity is confirmed also by the regression shown in Table 4: indeed, it is clear that the number of tables received by the coworker in $t-1$ strongly and positively influences the number of tables passed to the coworker in t . Moreover, and not surprisingly, it shows that employees tend to pass less table to their coworkers when they are asked to exert higher effort. Finally, the number of tables given to the coworker is positively influenced by the wage proposed by the employer: meaning that, when employees know that they have the possibility to earn an high wage, they are probably more willing to renounce to a part of their tables to help their coworkers.

Result 5: *Employees' solidarity is influenced by their reciprocity towards coworkers.*

4.3 Punishment behavior

The final move of each round is up to the employers: they have to decide how to remunerate their employees, and they are allowed to punish one of them only if they receive from that employee a number of tables lower than that asked. The first result that stands out is that employers punish non-compliant employees almost all

⁶This pattern can be easily linked to the decay in contribution that has been observed by several studies on public good games (Ledyard, 1995; Chaudhuri, 2011).

Table 5: Determinants of punishment

	(1)	(2)
(Intercept)	0.47** (0.15)	-2.13 (3.13)
Solidarity	0.02 (0.04)	0.02 (0.04)
(p* - p)	0.02*** (0.00)	0.02*** (0.00)
(p* - p) in t-1	-	-0.004* (0.00)
(p* - p) coworker	-	-0.006** (0.00)
R.sq.overall	0.14	0.19
Wald Chi(2)	40.25	46.09
Num. obs.	605	536

Random effects GLS (Standard error adjusted for clusters in group in parentheses).

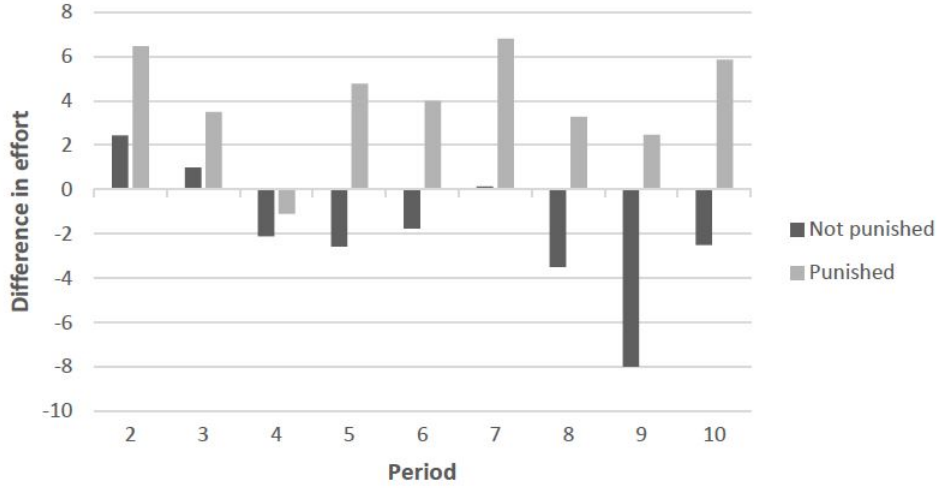
Controls: age, nationality, major, gender, number of past experiments, guess about average number of tables completed by the others.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

the times that they are allowed to (86% of the times for CT and 90% for ST, no statistical difference) and the probability of being punished is stable across rounds for both treatments (comparing the first five rounds and the last five rounds we do not find statistical differences). ⁷ However, not all the non-compliant employees have the same probability of being punished: indeed, Figure 3 shows that the probability of being punished is strictly linked to the distance between the asked number of tables and the number of tables effectively consigned. Table 5 confirms the causal link between the distance between the asked effort and the exerted one, and the probability of being punished. Furthermore, column (2) sheds some light on the other determinants of this probability: indeed, it shows that the probability of being punished decreases as long as the difference in effort (p* - p) provided by the coworker increases, and as long as the difference in effort (p* - p) provided by the employee in t-1 is high. It seems to suggest that employers consider coworkers' behavior and employees' behavior in the previous round as a reference point: for example, if employers are aware that also in t-1 the employee failed in reaching the

⁷It should be noticed that the probability of being punished is much lower in the preliminary rounds than in the other rounds (p-value <0.01 for both treatments, two-tailed Wilcoxon-Mann-Whitney test); this results is related to the fact that subjects receive no payment for the preliminary rounds, and those employers who renounce to their possibility to punish are probably attempting to induce their employees to reciprocate in the successive rounds.

Figure 4: Employees' reaction to punishment across periods

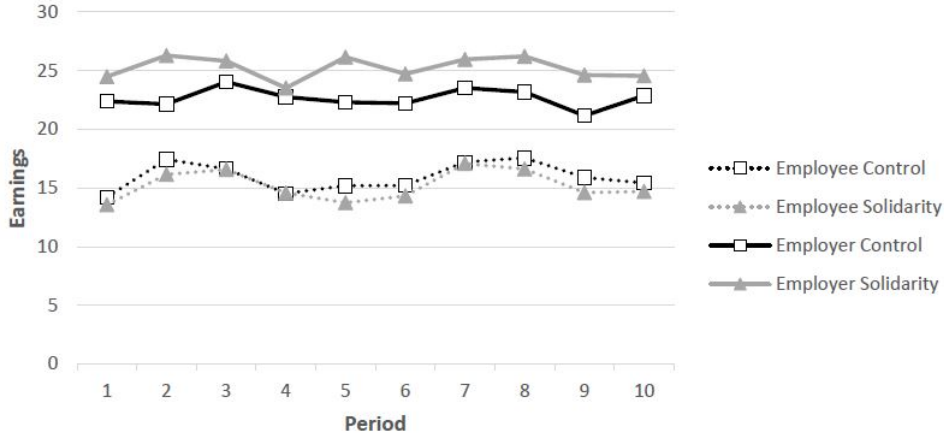


objective, or that neither the coworker was able to reach it, they can think that they asked too many tables and they are less willing to punish the non-compliance.

Result 6: *Employers exploit the possibility of punishing their non-compliant employees almost all the times, both in CT and in ST.*

One possible reason that lead employers to do not overlook employees' non-compliance can be guessed by looking at the reactions to punishment. The y-axis of Figure 4 represents the difference in number of tables consigned to the employer between $t-1$ and t of those employees whose effort in $t-1$ was lower than that asked; therefore, the bars shows the difference in effort of those who have been punished (light gray) and of those who have not been punished (dark gray). It is easy to see that in all the periods those employees who are punished for their non-compliance tend to increase more (or decrease less) their effort from $t-1$, the period in which they are punished, to t ; this difference in effort is significant both in CT and in ST ($p\text{-value} < 0.00$ for both treatments, two-tailed Wilcoxon-Mann-Whitney test). Therefore, by looking at the consequences of their behavior, employers *learn* that punishment is the best option to induce employees to exert higher effort (reinforcement learning, Sutton and Barto, 1998). To conclude, it becomes more efficient for the employers to punish non-compliant employees for two reasons: firstly, they save some money by paying them a lower wage; and secondly, employees tend to exert higher effort after being punished.

Figure 5: Employers' and employees' earnings across periods



4.4 Earnings

Finally, let us give a look at how employers' and employees' earnings differ across treatments. Figure 5 shows that employers' payoffs are much higher than employees' in all the periods in both treatments, and this difference becomes even stronger in ST with respect to CT. Indeed, employers' payoffs in ST are significantly higher than employers' payoff in CT (p-value < 0.00, two-tailed Wilcoxon-Mann-Whitney test) and employees' payoffs in ST are significantly lower than employees' payoff in CT (p-value < 0.00, two-tailed Wilcoxon-Mann-Whitney test). The determinants of this evidence are at least threefold: first of all, employees complete almost the same number of tables in CT and in ST (22.5 in CT and 22.7 in ST, p-value= 0.7 two-tailed Wilcoxon-Mann-Whitney test); despite this, in ST the number of tables directly given to the employer is higher than that given in CT; and finally, in ST employees give some tables even to their coworker, and these are indirectly passed to the employer.

5. Concluding remarks

The main goal of this study was to explore whether people are moved also by solidarity concerns when they interact with peers in need into a workplace context; moreover, by mimicking the cash posters' framework *à la* Homans, it tested the gift-exchange between employers and employees, both in terms of wage-effort and in terms of effort-potential leniency relation. In order to pursue these aims, we proposed a novel experimental design in which subjects are assigned either the role of employer or employee, and each employer is matched with two employees; they are asked to play a modified gift-exchange game with punishment, in which each

employer proposes a contract (composed by a minimum wage, a wage and an asked level of production), and each employee is asked to exert a real effort that is nothing but counting the number of zero in a series of tables. For each correctly counted table the employees are allowed to decide either to keep it for themselves, and receive a small payment, or to pass it to their employer; after this decision, the number of tables they decided to give to the employer risks to be reduced by a random device. If an employee's final effort⁸ is at least equal to that asked, the employer is forced to pay him the regular wage; if the effort is lower than that asked, the employer can choose to pay him the regular or the minimum wage. In our treatment, each employee has the possibility to help the coworker in need by renouncing to a part of his tables and giving it to the coworker, in order to prevent his needy peer receiving the minimum wage.

We did find some behaviors driven by that reciprocity that is widely-proved to characterize gift-exchange games (Fehr et al., 1993; Fehr et al., 1997; Fehr et al., 2007): indeed, employers offer a minimum wage that is significantly higher than the minimum possible and employees' effort is strongly influenced by the proposed wage. Nevertheless, employers do not seem to be willing to overlook employees' non-compliance, neither when the employee exerted a high effort in the past, nor when his coworker exerts a high effort; therefore, we did not find any evidence of the twofold leniency in the work rules that Akerlof (1982) ascribed to the firm's behavior in the cash poster framework. One possible reason of this result can be related to the artificial time compression that is typical of lab experiments, and that makes the link between punishment and employees' behavior much more salient than that observed in the Homans' framework. This unwillingness to forgive non-compliant employees can be also linked to the consequences of forgiveness: indeed, when employees are not punished for their non-compliance in one round, they tend to exert even less effort in the next round, while punishment is an effective tool for increasing employees' performance.

When employees are allowed to show their solidarity towards the coworker in need, they effectively exploit this possibility, and this result is in line with the previous evidence on people's behavior in the solidarity game (Selten and Ockenfels, 1998; Ockenfels and Weimann, 1999; de Oliveira et al., 2014); it means that, despite the workplace context and the fact that subjects have to work before deciding whether

⁸By *final effort* we mean the number of tables given by one employee to the employer after the intervention of the random device.

to provide help or not, solidarity concerns still hold. It is worthwhile to underline that the interactions among employees are shaped not only by solidarity concerns, but also by reciprocity: that is, one employee is willing to help his coworker as long as the coworker reciprocates this help. Further development of this research should be focused on disentangling reciprocity from solidarity concerns, in order to explore whether people still help peers in need without expecting anything back.

Another result of our treatment is that employees not just show their solidarity towards their peers, but they are also willing to exert higher effort towards their employers. This finding is undoubtedly counterintuitive: indeed, since employees complete approximately the same number of tables in both treatments and in the solidarity treatment they renounce to a part of them to help the coworker, by giving more tables to the employers in the solidarity treatment they end up with keeping less tables for themselves. One possible interpretation of this result could be related to the observed positive link between the number of tables given by one employee to the employer in one round, and the number of tables given by his coworker in the previous round: since employees' performance is influenced by a peer effect, and in solidarity treatment each employee knows that his coworker's performance is increased by the tables that the employee himself has passed him, in order to overcome the comparison with the coworker each employee should pass even more tables to the employer.

As a consequence, the gap between employers' and employees' payoffs became even greater in the solidarity treatment: indeed, employers' payoffs increase and employees' payoffs decrease with respect to the control treatment. This is due to the fact that employees take the opportunity to show their solidarity towards coworkers, and exert higher effort even towards their employers: on the other side, employers exploit this situation and ask for more effort without increasing the offered wage nor their willingness to forgive non-compliance. We can also hypothesize that solidarity among coworkers can be even increased by employers' exploiting behavior, and that employees tend to help one another to face together the "mean" employer; posit that the employer is able to predict this behavior, he is likely to become even more severe to induce more solidarity. To conclude, the main conclusion that we can draw from our results is that employees' behavior seems to be moved also by solidarity concerns, and that the employers are the major beneficiaries of this driver. Further investigation could certainly help in disentangling solidarity from reciprocity concerns, for example by using a strangers matching protocol instead a partners one;

moreover, it should be explored whether our main results hold when the number of employees is higher, and whether solidarity concerns might interact with some sort of intrinsic motivation.

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Appendix: experimental instructions

Since the experiment was conducted in Trento, the original instructions were in Italian. This is a translated version.

INSTRUCTIONS (CONTROL TREATMENT)

Good morning and thank you for your participation to this experiment!

You are going to take part in an experiment with scientific purposes. Please read carefully the instructions that we gave to you; an experimenter will read them aloud. May you have any doubts, don't hesitate to ask!

During the experiment, you will have the possibility to earn an amount of money according to a procedure that you will be told in a while. In addition, you will receive 3 euro for arriving on time. During the experiment, your payment will be calculated in tokens (UMS) with a conversion rate of:

$$1 \text{ UMS} = 0.05 \text{ euro}$$

The experiment is characterized by anonymity. During the experiment, you are not allowed to talk to other participants nor to use your phone; otherwise, you will be excluded from the experiment. At the end of the experiment, you will be asked to respond to a brief questionnaire; after that, you will be paid in cash in a private room.

General informations:

Participants will be randomly assigned the role of employer or employee. At the beginning of the experiment you will find out which will be your role, and you will maintain the same role throughout the entire experiment. Participants will be then randomly assigned to groups that consist of three people: two employees and one employer. You will not know the identity of the other components of your group, and they will not know yours.

Rounds:

The experiment consists of ten identical rounds. Before the proper experiment begins, there will be two trial rounds that will be absolutely identical to the experimental rounds, except that participants will not be paid for these two rounds. When the proper experiment begins, groups formed during the trial rounds will be separated and participants will be randomly rematched in new groups. The new groups will remain unchanged until the end of the experiment: it means that you will interact with the same people for all the rest of the experiment. Participants'

role will not change after the trial rounds: meaning that, those who are employees in the trial rounds keep on being employees also in the proper rounds, and those who are employers in the trial rounds keep on being employers also in the proper rounds.

After the trial rounds, your earnings for each round will depend on your decisions and on the decisions of the participants you will be grouped with. At the beginning of each round, each employer will receive an endowment of 20 UMS, while each employee will receive an endowment of 8 UMS. Each round consists of three stages.

Stage 1: the contract

Each employer will have the possibility to choose the contract to be proposed to both her employees. The contract is composed by: an asked level of effort p^* , a wage s , and a minimum wage s_{min} that should be lower than the wage. The asked effort should be within the range $[0, 20]$, while both the wage and the minimum wage should be within $[0, 10]$.

Stage 2: the production

Each employee will be told about the contract offered by his employer; then a sequence of tables made by 0 and 1 will appear on his screen, and he will be asked to count the exact number of 1 in each table. This task will last 90 seconds.

During these 90 seconds, employers will be given the possibility to play "snake", but their performance will not influence their earnings.

After 90 seconds, each of these three events can happen *with the same probability* within each group: the number of tables completed by employee 1 is halved, the number of tables completed by employee 2 is halved, or none of these events. It means that for example, if employee 1 has completed 6 tables during the production phase, there is a probability equal to $\frac{1}{3}$ that his production is halved and he has only 3 tables at his disposal.

BEFORE knowing which of these events will effectively happen, each employee has to decide how many tables keep for himself and how many tables give to the employer in each of the three possible situations, meaning 1) if his tables are reduced 2) if the tables completed by his coworker are reduced and 3) if neither his tables nor the tables of his coworker are reduced. For each completed table he decides to keep for himself, he will earn 0.4 tokens; for each completed table given to the matched employer, the employer will earn 0.6 tokens.

After this choice, each employee will discover which event has effectively happened and consequently which of his three potential strategies will be implemented. The number of tables effectively given to the employer by one employee represents the employee's level of production (p).

Stage 3: the payment of the wage

In this stage each employer will observe how many tables each employee has effectively sent her, but she will not discover which of the three events has effectively happened (whether the number of tables completed by employee 1 is halved, the number of tables completed by employee 2 is halved, or none of these events). Moreover, she will be told about the average number of tables completed by all the employees in the previous round.

If the number of tables consigned by one employee to the employer is greater or equal to the asked level of effort (p^*), the employer will be forced to pay the higher wage s to that employee; on the other hand, if the number of tables consigned by one employee to the employer is lower than the asked level of effort (p^*), the employer will have the possibility to choose whether to pay him the higher wage s or the minimum wage s_{min} . The employer will have the possibility to pay a different wage to her employees.

The employer will be then asked to guess the total number of tables that each of her employees wanted to keep; if the employer guess the right number of kept tables, she will be paid additional 1 UMS. This is the end of stage three and the end of the round.

At the end of each round, each participant will be told about everything happened in that round, the payment he obtained, and the cumulative payment that he has obtained up to that round. The rules used to calculate participant's earnings are summarized in the session *Earnings per round*. After 12 rounds, all the participants will be asked to complete a questionnaire; then their UMS will be converted in money, and they will be paid privately in a separate room.

Earnings per round

$$\text{Employee's earnings} = 8 + s(s_{min}) + 0.4(\text{number of kept tables})$$

$$\text{Employer's earnings} = 20 - s_1(s_{min1}) - s_2(s_{min2}) + 0.6(p1 + p2)$$

s_1 (s_{min1}) and s_2 (s_{min2}) represent the wage/minimum wage given to employee 1 and to employee 2; $p1$ and $p2$ represent the number of tables effectively received by employee 1 and by employee 2.

EXAMPLE:

The employer proposes a contract composed by $p^* = 10$, $s = 8$, $s_{min} = 0$.

Both employee 1 and employee 2 complete 20 tables.

The number of tables completed by employee 1 are halved, therefore employee 1 has only 10 tables. Employee 1 decides to give 10 tables to the employer and he does not keep anything for himself; employee 2 decides to give 5 tables to the employer and to keep 15 tables for himself.

The employer decides to pay the minimum wage $s_{min} = 0$ to employee 2, while employee 1 receives a wage equal to $s = 8$.

Earnings:

Employee 1 = $8 + 8 = 16$

Employee 2 = $8 + 0 + 0.4 \cdot 15 = 8 + 6 = 14$

Employer = $20 - 8 - 0 + 0.6 \cdot (10 + 5) = 12 + 9 = 21$

CONTROL QUESTION:

The employer proposes a contract composed by $p^* = 12$, $s = 8$, $s_{min} = 1$.

Employee 1 completes 16 tables, and employee 2 completes 13 tables. Neither the number of tables completed by employee 1 nor the number of tables completed by employee 2 is halved. Employee 1 decides to give 3 tables to the employer and to keep for himself 13 tables; employee 2 gives 13 tables to the employer and he does not keep anything for himself. The employer decides to pay the minimum wage $s_{min} = 1$ to employee 1, while employee 1 receives a wage equal to $s = 8$. Which are the participants' earnings?

INSTRUCTIONS (SOLIDARITY TREATMENT)

Good morning and thank you for your participation to this experiment!

You are going to take part in an experiment with scientific purposes. Please read carefully the instructions that we gave to you; an experimenter will read them aloud. May you have any doubts, don't hesitate to ask!

During the experiment, you will have the possibility to earn an amount of money according to a procedure that you will be told in a while. In addition, you will receive 3 euro for arriving on time. During the experiment, your payment will be calculated in tokens (UMS) with a conversion rate of:

$$1 \text{ UMS} = 0.05 \text{ euro}$$

The experiment is characterized by anonymity. During the experiment, you are not allowed to talk to other participants nor to use your phone; otherwise, you will be excluded from the experiment. At the end of the experiment, you will be asked to respond to a brief questionnaire; after that, you will be paid in cash in a private room.

General informations:

Participants will be randomly assigned the role of employer or employee. At the beginning of the experiment you will find out which will be your role, and you will maintain the same role throughout the entire experiment. Participants will be then randomly assigned to groups that consist of three people: two employees and one employer. You will not know the identity of the other components of your group, and they will not know yours.

Rounds:

The experiment consists of ten identical rounds. Before the proper experiment begins, there will be two trial rounds that will be absolutely identical to the experimental rounds, except that participants will not be paid for these two rounds. When the proper experiment begins, groups formed during the trial rounds will be separated and participants will be randomly rematched in new groups. The new groups will remain unchanged until the end of the experiment: it means that you will interact with the same people for all the rest of the experiment. Participants' role will not change after the trial rounds: meaning that, those who are employees in the trial rounds keep on being employees also in the proper rounds, and those who are employers in the trial rounds keep on being employers also in the proper

rounds.

After the trial rounds, your earnings for each round will depend on your decisions and on the decisions of the participants you will be grouped with. At the beginning of each round, each employer will receive an endowment of 20 UMS, while each employee will receive an endowment of 8 UMS. Each round consists of three stages.

Stage 1: the contract

Each employer will have the possibility to choose the contract to be proposed to both her employees. The contract is composed by: an asked level of effort p^* , a wage s , and a minimum wage s_{min} that should be lower than the wage. The asked effort should be within the range $[0, 20]$, while both the wage and the minimum wage should be within $[0, 10]$.

Stage 2: the production

Each employee will be told about the contract offered by his employer; then a sequence of tables made by 0 and 1 will appear on his screen, and he will be asked to count the exact number of 1 in each table. This task will last 90 seconds.

During these 90 seconds, employers will be given the possibility to play "snake", but their performance will not influence their earnings.

After 90 seconds, each of these three events can happen *with the same probability* within each group: the number of tables completed by employee 1 is halved, the number of tables completed by employee 2 is halved, or none of these events. It means that for example, if employee 1 has completed 6 tables during the production phase, there is a probability equal to $\frac{1}{3}$ that his production is halved and he has only 3 tables at his disposal.

BEFORE knowing whether his tables will be effectively halved or not, each employee has to decide how many tables keep for himself, how many tables give to the other employee, and how many tables give to the employer in each of the three possible situations: meaning that he has to decide how many tables to give and how many to keep 1) if his tables are reduced 2) if the tables completed by his coworker are reduced and 3) if neither his tables nor the tables of his coworker are reduced. If he decides to give one or more tables to his coworker, his coworker will not have the possibility to keep these tables for himself, but rather these tables will be automatically sent from the coworker to the employer. Consequently:

Tables received by the employer from emp1: tables consigned by emp1 +
tables consigned by emp2 to emp1

Tables received by the employer from emp2: tables consigned by emp2 +
tables consigned by emp1 to emp2

For each completed table the employee decides to keep for himself, he will earn 0.4 tokens; for each completed table given to the matched employer or to his coworker, the employer will earn 0.6 tokens.

After this choice, each employee will discover which event has effectively happened and consequently which of his three potential strategies will be implemented. The number of tables effectively given to the employer by one employee represents the employee's level of production (p), and it is composed by: the number of tables given by employee 1 to the employer + the number of tables given by employee 2 to employee 1.

Stage 3: the payment of the wage

In this stage each employer will observe how many tables each employee has effectively sent her, but she will not discover which of the three events has effectively happened (whether the number of tables completed by employee 1 is halved, the number of tables completed by employee 2 is halved, or none of these events). Each employer will have the possibility to see only the *total* number of tables that each employee has sent her, but she will not see whether there was a tables exchange among workers. Moreover, she will be told about the average number of tables completed by all the employees in the previous round.

If the number of tables consigned by one employee to the employer is greater or equal to the asked level of effort (p^*), the employer will be forced to pay the higher wage s to that employee; on the other hand, if the number of tables consigned by one employee to the employer is lower than the asked level of effort (p^*), the employer will have the possibility to choose whether to pay him the higher wage s or the minimum wage s_{min} . The employer will have the possibility to pay a different wage to her employees.

The employer will be then asked to guess the total number of tables that each of her employees wanted to keep; if the employer guess the right number of kept tables, she will be paid additional 1 UMS. This is the end of stage three and the end of the round.

At the end of each round, each participant will be told about everything happened in that round, the payment he obtained, and the cumulative payment that

he has obtained up to that round. The rules used to calculate participant's earnings are summarized in the session *Earnings per round*. After 12 rounds, all the participants will be asked to complete a questionnaire; then their UMS will be converted in money, and they will be paid privately in a separate room.

Earnings per round

$$\text{Employee's earnings} = 8 + s(s_{min}) + 0.4(\text{number of kept tables})$$

$$\text{Employer's earnings} = 20 - s_1(s_{min1}) - s_2(s_{min2}) + 0.6(p1 + p2)$$

$s_1(s_{min1})$ and $s_2(s_{min2})$ represent the wage/minimum wage given to employee 1 and to employee 2; $p1$ and $p2$ represent the number of tables effectively received by employee 1 and by employee 2.

EXAMPLE:

The employer proposes a contract composed by $p^* = 10$, $s = 8$, $s_{min} = 0$.

Both employee 1 and employee 2 complete 18 tables.

The number of tables completed by employee 1 are halved, therefore employee 1 has only 9 tables. Employee 1 decides to give 9 tables to the employer, 0 to employee 2, and he does not keep anything for himself; employee 2 decides to give 7 tables to the employer, 2 to employee 1, and to keep 9 tables for himself.

The employer decides to pay the minimum wage $s_{min} = 0$ to employee 2, while employee 1 receives a wage equal to $s = 8$.

Earnings:

$$\text{Employee 1} = 8 + 8 = 16$$

$$\text{Employee 2} = 8 + 0 + 0.4 \cdot 9 = 8 + 3.6 = 11.6$$

$$\text{Employer} = 20 - 8 - 0 + 0.6 \cdot ((9+2) + (7+0)) = 12 + 10.8 = 22.8$$

CONTROL QUESTION:

The employer proposes a contract composed by $p^* = 12$, $s = 8$, $s_{min} = 1$.

Employee 1 completes 16 tables, and employee 2 completes 13 tables. Neither the number of tables completed by employee 1 nor the number of tables completed by employee 2 is halved. Employee 1 decides to give 3 tables to the employer, 1 to employee 2, and to keep for himself 12 tables; employee 2 gives 11 tables to the employer, 2 to employee 1, and he does not keep anything for himself. The employer decides to pay the minimum wage $s_{min} = 1$ to employee 1, while employee 1 receives a wage equal to $s = 8$. Which are the participants' earnings?