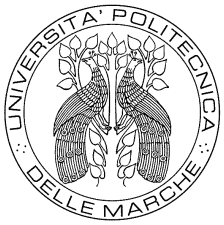

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RECIPROCITY IN THE LABOR MARKET: EXPERIMENTAL EVIDENCE

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Abstract

In this paper we focus on the impact of involuntary unemployment on wage formation using experimental evidence. We use the well-known *Gift Exchange Game* to analyze players' interaction in a simplified job market. The aim of this paper is twofold: on the one hand, we are interested in analyzing the relation between involuntary unemployment and wages; on the other hand, we aim at understanding whether the interaction between employers and employees could be affected by reciprocity. Our results show that unemployment has a negative impact on wages. Moreover, there is a positive correlation between wage and effort.

JEL Class.: C91, E24, J28, J30
Keywords: Reciprocity, Gift Exchange, Unemployment

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Reciprocity in the labor market: experimental evidence*

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1 Introduction

In this paper we analyze the labor market using experimental evidence in order to understand the relation between unemployment and wages. In particular, we focus on the impact of *exogenous* excess of labor supply on both wage and effort. The aim of this paper is twofold: on the one hand, we check if involuntary unemployment has a negative impact on wages; on the other hand, we are interested in understanding if the interaction between employers and employees could be affected by reciprocity [1].

We gathered experimental evidence using the well known *Bilateral Gift Exchange Game* developed by Fehr *et al.* (1993). In this game participants play in the role of employer or employee and they interact in a simplified job market. In the baseline form of the Bilateral Gift Exchange Game players are randomly assigned to the role of employers or employees. Interaction between the two parties can be summarized by a two stage game. Usually, in the first stage, employers propose a single contract consisting in a wage w and a desired effort e. Workers observe all the feasible contracts and they can accept one of these offers or not. In the second step, workers who subscribe a contract must choose their effective level of effort $\tilde{e}$. Each employee can choose a level of effort lower than the required one ($\tilde{e} < e$), fulfill the contract ($\tilde{e} = e$) or an effort level greater than the proposed one ($\tilde{e} > e$). In the standard game there is no punishment or reward for any level of effort different from the required level.

Using a similar setting, we try to validate our hypotheses, which is that firms are willing to pay low wages in a market with a high unemployment

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[1] As in Falk and Fischbacher (2006), reciprocity is a behavioral response to perceived kindness.

rate and that players are strongly influenced by the counterpart's behavior. Moreover, we take into account the impact of risk aversion on individual choices. In fact, we assign players with high risk aversion to the role of employee and we try to measure the impact of the risk aversion on final gains.

Under the hypothesis of perfect rationality, the best strategy for employees is to choose the minimum level of effort, while the best employers' strategy is to pay the lower wage. The growing experimental evidence suggests that individual behavior differs from the perfect rationality prediction. For an exhaustive review see Fehr and Falk (2008). The main results show that:

- the average proposed wage is greater than the minimum (Casoria and Riedl (2013), Brown *et al.* (2004);

- there is a positive correlation between wage and real effort (Fahr and Irlenbusch (2000), Fehr *et al.* (1998);

- it seems that there is a downward wage rigidity, that is employers are reluctant to pay very low wages (Fehr and Falk (1999), Campbell and Kamlani (1997)).

These results should be explained according to different theories:

- **Shirking theory** (Shapiro and Stiglitz (1984)). This theory is based on the premise that employers have partial information about employees' work performance, so workers can decide whether to shirk or work. Another fundamental assumption of this theory is that unemployment acts as an incentive device. Fehr *et al.* (1993) use for the first time the Gift Exchange Game in order to test the fair wage-efficiency hypothesis, that is if fairness induces firms to pay a high wage. They find a positive correlation between effort and wage. Moreover, they find that fairness[2] plays a crucial role in preventing wages from going down to the market clearing level. Another important contribution that tests the no shirking theory is Fehr *et al.* (1996). In this experiment they consider markets with an excess supply of workers and the employees' effort is verifiable with a given probability $0 < s < 1$. The results show that shirking is a persistent phenomenon but high wages reduce the probability of shirking.

- **Gift Exchange** (Ackerlof (1982)). This theory suggests that wage formation is influenced by social norms. On the one hand, workers

[2]As in Rabin (1993), an action is perceived as *fair* if the intention that is behind that action is kind.

are willing to give a *gift* to their employers, choosing a level of effort greater than that specified in the contract. On the other hand, firms are willing to repay the gift with an high wage. Fehr *et al.* (1997) firstly investigate this hypothesis with a laboratory experiment. They find a positive relation between rent and effort, i.e. the higher the rent the lower the probability of shirking. Falk (2007) uses a field experiment to test the gift exchange hypothesis. He finds that the relative frequency of donation increases with the "size of the gift". In contrast, Gneezy and List (2006) compare the results from the "Gift" and "noGift" treatments[3] and they find that in the "Gift" treatment the level of effort is significantly higher than that in the "noGift" one only in the early hours of work.

- **Reciprocity** proposed by Rabin (1993) and then developed by Fehr and Gatcher (2000). They try to include the reciprocity motive as a determinant of equilibrium wage. This means that employees are willing to choose a high level of effort if they receive a "kind wage". Pereira *et al.* (2006) test for positive and negative reciprocity. They consider an asymmetric marginal cost so that it is convenient to behave selfishly rather than reciprocally. They find that half of the participants behave reciprocally. Charness (2004) proposes a different approach to test reciprocity. He analyzes the impact of the intention reciprocity, that is he compares treatments in which wages are chosen by employers or by an external process. Results show that there is evidence for positive and negative reciprocity only in the treatment in which wages are proposed by the employer.

2 Experimental Setting

We conduct an experiment with three different treatments using a Bilateral Gift Exchange Game (BGE), in which our control variable is the unemployment rate. In the control treatment, there is no involuntary unemployment, in the second and in the third treatments the unemployment rates are, respectively, equal to 12% and 20%. We consider a one-shot game with 15 repetitions. This means that workers and firms play in each period a one shot game in which any firm can employ at most one worker and each worker can accept one contract. We conducted the experiment in the lab of the Faculty of Economics of Polytechnic University of Marche in October 2013. The

[3]In the "Gift" treatment participants are paid while in the "noGift" treatment they receive no compensation.

experiment was conducted using the software *z-tree* (Fischbacher (2007)).

We randomly drawn 95 students (50 female) in Economics from a population of 280 registered participants sending an invitation email. They were invited to show-up in the Laboratory of Faculty of Economics to participate to the experiment. Each session lasted about 45 minutes and participants were paid by cash at the the end of each session. During the game, wages and costs were expressed in ECU (Experimental Monetary Currency). At the beginning of each session, we read aloud the general instruction and then players read on their screen the specific instructions. The final payment depends on the final gains earned in the game. The mean earning per player was equal to 10 Euro (the exchange rate is 1 Euro=500 ECU), including the show-up fee. In the Appendix we report the translated instruction.

The main innovations of our setting with respect to the baseline game proposed by Fehr *et al.* (1996), are:

- there is an excess of supply of worker in the experimental treatments;
- each unemployed person receives a subsidy $\gamma = 10$ ECU;
- workers who decide to shirk, i.e. those who choose $\tilde{e} < e$, must pay a fine with a fixed probability p.

This setting is very similar to those proposed by Fehr *et al.* (1997). The main novelty regards the initial assignment of players. In the standard setting players enter a room and are randomly assigned in that of employers or in the role of workers. In our experiment we elicit players' risk aversion and we assign the role according to this information. To take into account the cleverness and the risk aversion of players, we asked participants to fill out a questionnaire immediately after the registration phase in order to determine their initial endowment (d). The questionnaire included 10 general knowledge and logic questions. The amount d can be invested in a lottery with a positive expected value [4]. We assume that smartest people with a risk attitude are willing to invest in a risky activity, people with those characteristics are willing to become entrepreneurs.

After this preliminary stage, we compute the *risk coefficient*, that is a linear combination of the initial endowment and the invested amount:

$$\delta = \alpha d + (1 - \alpha)x.$$

[4]We asked to invest a share of their endowment ($0 \leq x \leq$ *endowment*) in a lottery in which they win half of their investment with probability $p = 0.52$ or win 0 with probability $p = 0.48$.

According to the value of this coefficient we assign a rank and players with the highest rank play in the role of employers. The amount of the initial endowment is only useful for participation to this stage and does not influence the final profit of players[5].

We test three hypotheses:

H1 Unemployment has a negative impact on wage formation. We expect that in a context with high inequality workers are willing to accept any offer.[6]

H2 If employers are risk lovers then we expect them to offer low wages. This means that they are willing to accept the risk that a contract with very low wages is not accepted.

H3 Players behave reciprocally, that is we expect to observe a positive correlation between wage and effort, regardless of the different unemployment rate.

We implement the standard BGE procedure. In the first stage employers simultaneously propose a contract which contains wage and required effort (w, e) . In the second stage workers observe all the contracts and they can choose only one offer. Workers who accepted a contract choose the real effort $(\tilde{e})$. The cost associated $(c(e))$ to any level of effort is shown in Table 1. In our case, as in the Weak Reciprocity Treatment treatment in Fehr *et al.* (1997), if workers decide to shirk, a random mechanism determines whether the penalty f should be paid or not.

We consider a payoff function for employers that rules out losses, that is

$$\pi_f = (v - w)\tilde{e}$$

in which $v = 120$ is the redemption value, $\tilde{e}$ is the real effort chosen by employees and the wage is such that

$$11 \leq w \leq 120$$

where the lower bound means that the minimum wage is greater than the subsidy to unemployed, while the upper bound is a specification in order to avoid employers' losses.

[5]Notice that we know the endowment earned thanks to the questionnaire and we have all treatments with the same mean distribution of the endowment ($\mu_1 = 100.33$, $\mu_2 = 99.7$ and $\mu_3 = 106.6$). We check these values running an ANOVA and the result $F = 0.32 (p - value = 0.72)$ confirms that there are no significant differences in the distribution of the endowment.

[6]We fixed $w_{min} > \gamma$ and so a rational worker has always an incentive to accept a contract even if the wage is the lowest.

Table 1: Cost function

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

The expected payoff function of workers depends on the decision to shirk, that is:

$$\pi_w = \begin{cases} w - c(\tilde{e}) & \text{if } \tilde{e} \geq e \\ (1-p)(w - c(\tilde{e})) + p(w - c(\tilde{e}) - f) & \text{if } \tilde{e} < e \end{cases}$$

The fine is a function of the difference between required and real effort. Workers know that the greater the difference, the greater the fine, but they are able to see the penalty only after their choice.

The theoretical solution of standard Game Theory is based upon the hypothesis of perfect rationality. Under this hypothesis and using backward induction, the best strategy for the employee is to choose the minimum effort level, i.e. the level corresponding to zero cost. Employers, knowing the employees choice, are willing to pay the minimum wage. The Nash Equilibrium for the baseline game is given by the following strategies:

$$\begin{cases} \tilde{e}^* = min(\tilde{e}) = 1 & \text{for workers} \\ w^* = min(w) = 11 & \text{for firms} \end{cases}$$

In our setting, as in the work by Fehr *et al.* (1997), if workers decide to shirk with a probability $s = 0.3$ they must pay a fine. The fine is increasing function of the difference in effort, that is

$$f = (e - \tilde{e})^{(1.5)} \qquad \text{if } \tilde{e} < e$$

According to this approach the best rational choice is to shirk if

$$f < \frac{c(e) - c(\tilde{e})}{s}$$

Table 2: Descriptive statistics: wage

	Wage				
	Mean	St.Dev	Min	Max	Obs.
Treatment 1	67.63	27.20	20	119	398
Treatment 2	38.63	25.46	12	113	404
Treatment 3	46.26	28.24	11	110	360

in which $c(e)$ is the cost related to the proposed effort and $c(\tilde{e})$ is the cost of the real effort. The difference between these costs is positive if $\tilde{e} < e$ and we set $f = 0$ if $\tilde{e} > e$. This solution suggests that the best rational choice is to shirk if the fine is less than the difference in costs divided by the probability to be controlled. We check that this condition holds for each level of effort.

3 Experimental results: descriptive statistics and graphical analysis

In this section we report the main results of the experiment. We analyze the mean and the shape of wages and effort between treatment in order to validate our initial hypotheses. Moreover, we are interested in the analysis of agents' behavior to test if they behave reciprocally.

We start our analysis with the observation of employers behavior. In Table 2 we report the main descriptive statistics of the proposed wage. The highest average wage was proposed in the control treatment, where at least one employer proposed the highest possible wage. Contrary to our expectation, the lowest mean is in the second treatment.

Figure 1 shows the average wage for each period. The horizontal line is the minimum wage, i.e. $w = 11$. It is easy to see tha in all treatments the mean wages are significantly higher than the minimum, i.e. the Nash equilibrium. In the second treatment, also in the first period the average wage is lower than that in other treatments. The wage gap between treatments becomes larger during the first five periods.

This result confirms our hypothesis (H1), that a positive involuntary unemployment rate reduces the proposed wage. Indeed, treatment with the highest unemployment rate is the only one that shows a decline over repe-

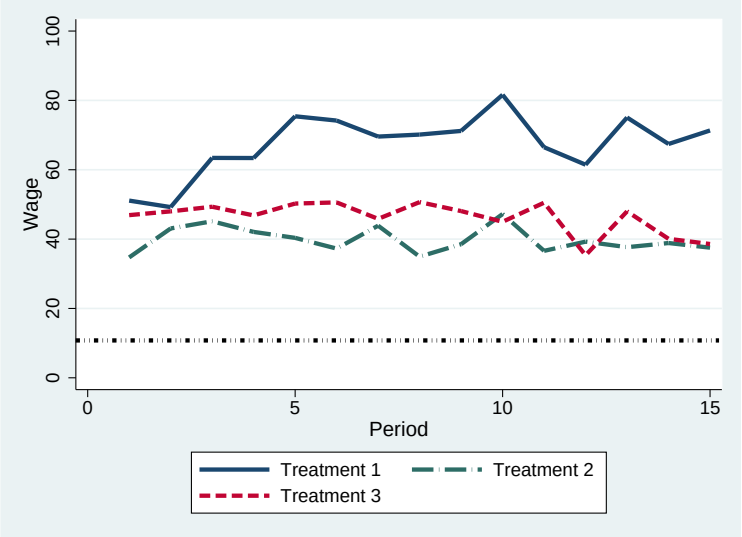

Figure 1: Average wage by treatment

tition. We run a parametric and non parametric test to confirm graphical results and, as we can see in Table 3, both of them reject the null hypothesis ($p - value$ in parenthesis). The difference in mean of the wage in the experimental and control treatments is significant.

The main tool to analyze workers' behavior is the analysis of the chosen effort. Table 4 reports the main descriptive statistics for this variable. In this case the highest mean is in the third treatment.

Employees choose the level of effort taking into account the related costs and the contract, i.e. wage and effort. As Table 4 shows, the highest mean is in the third treatment while the lowest is in the first. On the one hand,

Table 3: Statistics test : wage

	Statistics test	
	Treatment 2	Treatment 3
t-test	t= 15.040	t= 10.619
	(0.0000)	(0.000)
Wilcoxon	z= 13.991	z= 10.240
	(0.0000)	(0.000)

Table 4: Descriptive statistics: Real effort

	Real Effort				
	Mean	St.Dev	Min	Max	Obs.
Treatment 1	5.00	2.60	1	10	200
Treatment 2	5.55	2.76	1	10	203
Treatment 3	6.10	2.56	1	10	180

Table 5: Descriptive statistics: Proposed effort

	Proposed Effort				
	Mean	St.Dev	Min	Max	Obs.
Treatment 1	5.695	0.16	5	6	200
Treatment 2	7.20	0.13	6	7	203
Treatment 3	6.95	0.15	6	7	180

Table 6: Statistics test: effort

	Statistics test	
	Treatment 2	Treatment 3
t-test	t= -2.98	t= -4.11
	(0.038)	(0.000)
Wilcoxon	z= -2.079	z= -3.910
	(0.0376)	(0.0001)

according to the Shirking Theory, the higher the unemployment, the higher is the workers' willingness to exert more effort. On the other hand, according with the reciprocity hypothesis, we expect to observe the highest average effort in the control treatment in response to the highest mean wage. It is interesting to see also the average proposed effort which is shown in Table 5. In the first and in the third treatments there is no significant difference between the desired and the real effort. In the second treatment the difference between these value is huge. Thanks to this comparison we should assert that reciprocity plays an important role in the workers' choice. Indeed, in the second treatment the gap between proposed and real effort depends on the low wage paid by employers.

We have shown that involuntary unemployment has a significant effect on the wage. We also test if there are significant differences among average real effort using t-test and Wilcoxon test. Results are shown in Table 6.

Both tests are not able to accept the null hypothesis. This means that unemployment affects also the real effort. Unemployment has a negative impact on wage and a positive effect on effort. Employers are willing to pay a lower wage in a market with high unemployment because employees are willing to accept also a low offer. On the other hand, in a market with a high unemployment rate, workers choose a high level of effort and try to give a positive signal to their employers.

As we have already said, we want to analyze the relation between effort and wage to test if there is evidence for reciprocal behavior. We use rent as a proxy of employers' reciprocity. Rent is the difference between the proposed wage and the minimum wage ($r = w - w_{min}$). As in Rabin (1993), players behave reciprocally if they take into account the intentions signaled by opponents' actions. In the field of labor market, we can say that employers behave reciprocally if they are willing to pay a higher wage in response to

Table 7: Correlation

	Treatment 1	Treatment 2	Treatment 3	Overall
Spearman corr.	0.204	0.130	0.236	0.119
p-value	(0.003)	(0.05)	(0.001)	(0.004)

a high effort level and vice versa. According to this theory, we must check if employees are willing to choose a high level of effort in response to a high wage. We consider the Spearman correlation, that is a non parametric test in which the null hypothesis is the independence of variables. The correlation between wage and effort is shown in Table 7. In all treatments there is a positive and significant correlation. This result confirms our starting hypothesis. We test this conjecture with a regression hereafter.

We can assert that in our setting there is a "gift exchange" between employers who always offer a wage such that $w > \bar{w}$ and employees that guarantee a positive effort, i.e. $\tilde{e} > e_{min}$. The main difference between the gift exchange and the reciprocity approach is that in the former workers are willing to choose greater real effort than that in the contract. In our analysis there is a positive correlation between rent and wage, but only 9% of workers choose a level of effort greater than the proposed one. Hereafter we analyze this relation using OLS estimation.

As we have already said, we fix the minimum wage so that rational workers always have an incentive to accept a contract. In the previous section we have seen that according to the standard Game Theory the best rational choice for employees is to shirk despite the fact that they should pay a fine. In Figure 2, we show the percentage of shirking in each treatment. We identify the shirking behavior as a dummy variable that is equal to 1 if $\tilde{e} < e$ and 0 otherwise.

It is easy to see that the second treatment registers the highest percentage of shirking, i.e. 50%, while in the other two treatments the percentage is about 30%. The high percentage of shirking in the second treatment is useful to explain why the mean wage is the lowest. Indeed, employers are able to observe unkind employees' behavior and, as a consequence, they are willing to offer a low wage. In turn, employees who receive low wages punish their employers by choosing a low level of effort. According to this theory, a high involuntary unemployment rate is a deterrent for shirking. In the first treatment there is no excess of labor supply, so employees are willing to respect the contract to reciprocate the high wage paid by employers. This

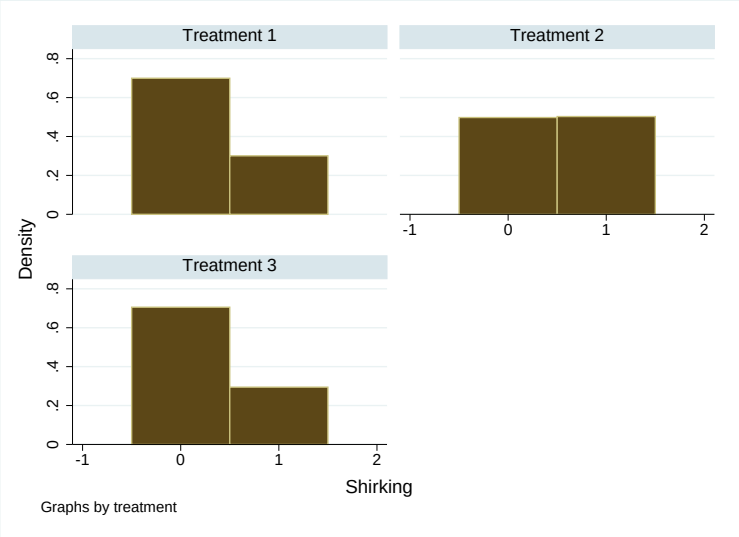

Figure 2: Percentage of Shirking

means that, in this case, positive reciprocity plays a crucial role. Finally, it is interesting to analyze the shape of unemployment. In our setting we consider involuntary and voluntary unemployment, that is we give employees the possibility of accepting no contract if the proposed wage is lower than their reservation wage. In Figure 3 we show the unemployment rate in each period and we add, as a reference point, the initial unemployment rate. It is interesting to highlight that in treatment 1 there is a high unemployment rate and that this is only voluntary.

This means that workers are willing to not accept offers in order to signal their reservation wage. Also in the second treatment there is voluntary unemployment but this is joined with high shirking rate. In the last treatment there is no voluntary unemployment because the induced rate is very high and workers are willing to accept any offer.

Finally, we want to analyze the impact of risk aversion. As we have said, we assign to the role of employers those who show the highest risk coefficient, that is a linear combination of the initial endowment and the investment in the lottery. We consider this combination in order to take into account both the smartness and the propensity to risk. In Figure 4, we show the relation between the total profit, that is the cumulative gains during the game, and the risk coefficient. In this graph we consider both the employees and employers gains. As we can see, the relation between these variables is positive. This is also confirmed by the Spearman correlation test $(\rho = 0.19, p - value = 0.06)$. This suggests that, on average, employers'

Figure 3: Unemployment rate

profits are greater than employees' ones.

Remember that payoff functions are such that:

$$\frac{\partial \pi_f}{\partial w} < 0 \qquad \frac{\partial \pi_f}{\partial \tilde{e}} > 0$$
$$\frac{\partial \pi_e}{\partial w} > 0 \qquad \frac{\partial \pi_e}{\partial \tilde{e}} < 0$$

In Figure 5 we see the average payoff per period of employers and employees divided by treatment. The first treatment is the only one in which the profit share is lower than the wage share. This is the result of two main aspects that we have already analyzed. The first treatment is that with the highest mean wage and, at the same time, the lowest mean effort. This means that with no exogenous excess of labor supply, workers use voluntary unemployment as a tool to increase their bargaining power. The result is that in this treatment the wage share is always greater than the profit share. In the second and third treatment profits are greater than wage. The presence of involuntary unemployment reduces the employees' bargaining power. According with the Shirking Theory of Shapiro and Stiglitz (1984), an excess of labor supply is an incentive for workers to exert a high level of effort. This is true especially in the third treatment in which there is an unemployment rate of 20%. Remember that in this treatment the level of effort is the highest. Moreover, in this treatment wages are, on average, less than those in the

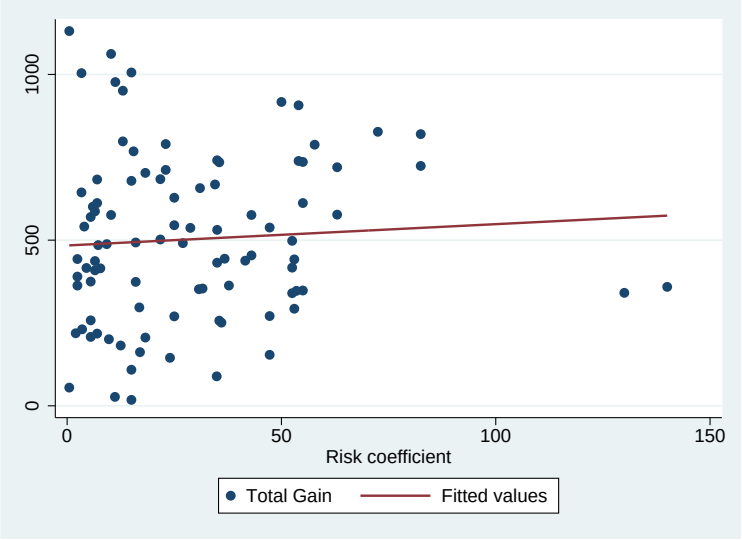

Figure 4: Aggregate final profit

Table 8: Correlation

	Treatment 1	Treatment 2	Treatment 3
Spearman corr.	-0.183	-0.041	-0.396
p-value	(0.515)	(0.884)	(0.202)

first treatment . This means that the presence of involuntary unemployment acts as a *contract enforcement device*.

Finally, we compute the correlation between risk coefficient and proposed wage in order to test the **H2** hypothesis. Results are shown in table 8.

There is a negative but not significant correlation between wages and risk coefficient. This means that, on average, players with the highest rank are willing to pay low wages.

4 Estimation results

In this section we try to validate if players' choices depend also on reciprocity. Thanks to the graphical analysis we have seen that both employers and employees choose wage and effort greater than the minimum level. We start with the analysis of employers behavior. Under the reciprocity hypothesis

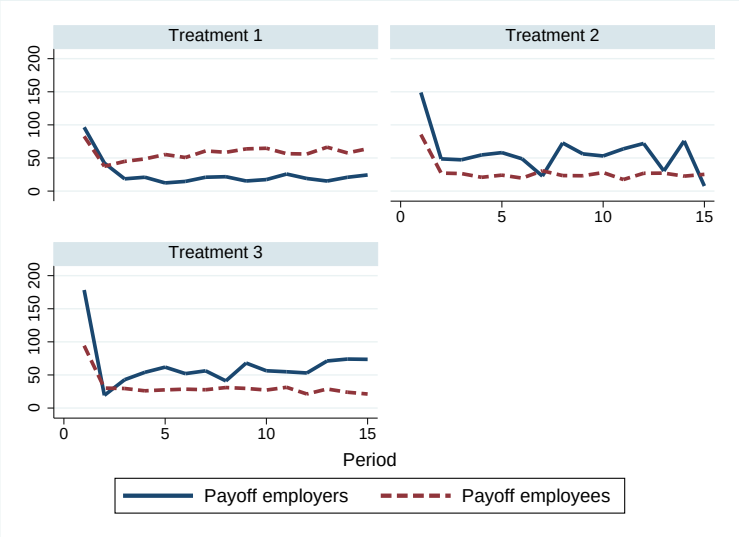

Figure 5: Wage share and Profit share

employers are willing to pay a higher wage if employees choose a positive effort. We run the following estimation

$$r_{it} = \alpha + \beta_0 \tilde{e_{it}} + \beta_1 s_{it} + \beta_2 u_t + \beta_3 \delta_i + \epsilon_{it}, \tag{1}$$

where r_{it}[7] is the proposed rent, $\tilde{e_{it}}$ is the real effort, s_{it} is a dummy variable for shirking equal to 1 if the worker chooses to shirk, u_t is the excess of labor supply and δ_i is the risk coefficient and $\epsilon_{it} = v_t + \mu_{it}$ is the error component which includes also individual specific characteristics. By estimating this equation we test the impact of both employees' behavior and the unemployment rate on rent.

We consider a panel regression with Random Effects. We choose Random Effects instead of Fixed Effects specification because we are interesting in estimating the impact of the risk coefficient on the proposed effort and this coefficient is time invariant.[8]

The main results are shown in Table 9. Real effort has a positive and significant effect on the rent. The shirking dummy has a negative and significant impact: if employees shirk, employers offer a low wage in the next

[7]The subscript i is for individual observation and the subscript$t$ is the time series dimension.

[8]We consider robust standard errors and we test for the serial correlation using the Wooldridge test. The test accepts the null hypothesis of absence of auto correlation ($F = 0.005$, $p - value$=0.943 , $F = 0.012$, $p - value = 0.912$ are the statistics relative to first and second estimations, respectively).

Table 9: RE estimation of the rent equation

	(1) Rent β (SE)
Real Effort	1.883***
	(0.480)
Shirking	-8.509***
	(2.554)
Unemployed	-4.128***
	(0.765)
Risk Coefficient	-0.010
	(0.194)
Constant	49.285***
	(4.757)
Observations	542
R-overall	0.161

Dependent Variable: Rent

period. This means that employees' behavior strongly influences the employers' willingness to pay high rent. The number of the unemployed has also a negative impact while the risk coefficient has no significant impact on rent. This means that rents are strongly influenced by the "market condition", especially by the number of voluntary unemployed in each period.

Regarding the employees' behavior we want to analyze if real effort is influenced by the proposed contract. As we have already seen in the graphical analysis, the highest percentage of shirking is in the second treatment and that the mean wage in the second treatment is the lowest. Taking into account this information, the high percentage of shirking can be seen as negative reciprocity. Employees prefer to accept low wages rather than be unemployed, but they consider low wages as an unfair offer. Their response to unkind behavior is to accept a contract but choose a lower level of effort than the required one.

In order to test the reciprocity hypothesis we estimate the following effort equation:

$$\tilde{e_{it}} = \alpha + \beta_0 w_{it} + \beta_1 e_{it} + \beta_2 u_{it-1} + \varepsilon_{it},$$

where the dependent variable is the real effort, w_{it} is the wage of each period, e_{it} is the desired effort and u_i is a dummy variable which is equal to one if the worker was unemployed in the previous period. We consider a panel estimation with Fixed Effect specification with robust standard errors. [9] Table 10 shows the result of our regression. The first and the second variables measure the impact of the contract conditions on the real effort. Both coefficients are positive and significant. It is interesting to highlight that the wage has a lower marginal effect than the proposed effort. This means that employees care about the request of their employer and their choices are less sensitive to changes in wage. In the previous section we show that workers always have an incentive to choose the lowest effort, i.e $\tilde{e} = 1$. So, the strong impact of the proposed effort on the real choice can be explained as an anchoring effect. This means that their choice is strongly influenced by the number of hours that employers propose. We consider also the worker's condition in the previous period. As we can see, this variable has a positive and significant coefficient. This means that if worker did not subscribe any contract in the previous period then she/he is willing to choose a higher effort in the next period. A possible explanation is related to the idea that workers try to construct a sort of reputation choosing a high level of effort in order to avoid being unemployed in the next period.

Finally, we are interested in understanding the determinants of the probability of no-shirking. As we have seen, real effort is influenced by the contract, i.e. the wage and proposed effort. We run the following Probit estimation with Random Effects:

$$\text{Prob}(\vartheta_{it} = 1|X) = \alpha + \beta_0 w_{it} + \beta_1 f_{it-1} + \beta_2 u + \beta_3 w_{it-1} + \varepsilon_{it}$$

ϑ is the probability of non shirking, i.e. $\vartheta = 1$ if worker does not shirk. w_{it} is the wage, f_{it-1} is a dummy variable equal to 1 if the employee paid a fine in the previous period. This dummy is a measure of the level of monitoring. u is the exogenous excess of labor supply, w_{it-1} is the wage in the previous period.

The analysis of the probability of no shirking is useful to evaluate the assumption of Shirking Theory. Our starting hypothesis is that both employers and employees make their choice taking into account the strategy of their opponent, that is they behave reciprocally. Under the assumption of the Shirking Theory we should observe that employees behavior is influenced not only by the wage but also by involuntary unemployment and the level of

[9] We check the absence of autocorrelation. The test accepts the null hypothesis (F=0.621, $p-value$ =0.435). We estimate also the model with Random Effect and we use the Hausman test. The test rejects the null hypothesis ($\chi^2 = 11.891, p - value = 0.007$).

Table 10: FE estimation of the effort equation

	(1) Real Effort β (SE)
Wage	0.017***
	(0.003)
Required Effort	0.577 ***
	(0.041)
Unemployed$_{t-1}$	0.308 **
	(0.124)
Constant	0.606
	(0.390)
Observations	525
R-overall	0.235

Dependent Variable: Real effort

Table 11: Output Regression: Probability of no-shirking

	ϑ β (SE)
Wage$_t$	0.023***
	(0.005)
Wage$_{t-1}$	-0.005
	(0.005)
Fine$_{t-1}$	-0.013
	(0.017)
Unemployment rate	4.696*
	(2.466)
Constant	-1.492***
	(0.534)
Observations	185

Dependent Variable: Probability of no-shirking

monitoring. Output regression is shown in Table 11. It is easy to see that the only significant coefficient in the Probit regression is the wage. In particular, the higher the wages paid by employers, the higher the probability of no shirking. All the other coefficients are not significant. Unemployment has a positive coefficient as we expect. In fact, workers try to behave "correctly" in order to decrease the probability of being unemployed. Involuntary unemployment affects the chosen effort but only the wage has a significant effect on employees behavior. This result confirms that employees and employers are mainly driven by the behavior of their counterpart.

5 Conclusion and future analysis

In this chapter we analyzed the dynamic in the job market using experimental evidence. We are interested in the study of the impact of unemployment on the wage and on the behavior of both employers and employees. We use the *Gift Exchange Game* in order to test our hypothesis. The main novelty that we introduce with respect to the literature is the assignment of players in their role according to a measure of risk aversion. We assigned participants with the higher risk aversion to the role of workers. We consider a one shot game with 15 repetitions. Our results show that involuntary unemployment has a negative impact on wages, that is, in absence of unemployment we observed the highest mean wage. Moreover, we observed a high voluntary unemployment rate only in the control treatment.

Unemployment has a negative effect on the trust relation between the two parties. According to the Shirking Theory, an excess of labor effort is an effective device to incentive workers to exert a higher level of effort. In the third treatment, in which the unemployment rate is equal to 20%, results are in line with the theoretical predictions. Indeed, the wage is greater than the lower bound and the percentage of shirking is very low. In the other treatment there are very different results. In the treatment in which the unemployment rate is equal to 12%, there is evidence for negative reciprocity. The result of this behavior is a very low mean wage and very high percentage of workers who decide to shirk.

Finally, we showed that the the level of monitoring, measured with the probability of paying a fine, has no significant impact on the probability of shirking. This implies that paying a higher wage, or in general offering a good contract, has a greater impact on the kind behavior of the employee rather than increasing the level of monitoring.

Currently in our country, as in the other OECD countries, we observe a very high unemployment rate. This is particularly true if we consider youth

unemployment rate. In Italy we have reached the peak of 43% in the first quarter of 2014. According to the Neoclassical theory, firms should cut wages in order to hire more workers. We have shown, using a very simplified environment, that the labor market does not work as other markets, that is wages do not follow the best demand-supply rule. In contrast, our results show that workers are willing to reciprocate employers behavior both in positive and negative way. If employers are willing to pay very low wages, employees accept a contract because of the very high unemployment rate, but they are willing to reciprocate choosing to shirk. This means that cutting wages results in a reduction in the labor productivity which, in turn, should reduce also firms' profit.

In our opinion, the main tool to reduce unemployment is to propose a short-term contract with "kind conditions", that is paying high wages. The short-term condition is favorable for firms which should increase or decrease labor demand according to the real demand for goods and services. Both employers and employees would benefit from the "kindness" condition. On the one hand, high wages improve the workers' standard of living and act as an incentive to increase productivity. On the other hand, high wages are costly for firms but are able to increase productivity per employers and so the final profit. It is important to remark that the flexibility in the job market should be associated with a good welfare system to safeguard workers' position.

Our aim is to investigate with further experimental analysis the impact of reciprocity, using a setting in which a firm hires more than one worker. The focus of this kind of experiment is to test if the reciprocity motive is as strong in multi-players interaction as in the two players context.

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A Experiments using *z-tree*: Gift Exchange Game

In this section we show the screen shoots of the second experiment, that is the *Gift Exchange Game*. The general instructions are read aloud before the beginning of the game. In this experiment the allocation of players is not in a random order but we assign a seat according to the initial endowment. Remember that players earn the initial endowment according to the number of right answers about logic and general culture.

Before starting, players use their own endowment to play in a lottery. They read the instructions to participate and then they enter the amount they are willing to bet, as shown in Figure 6. Thanks to this choice we are able to assign each player in the role of employer or employee.

At the beginning of the game players read on their own screen the specific instruction for their type. A summary is reported in Figures 7 and 8.

Figure 9 shows the next step. Players in the role of employers make their offer. they must insert the wage and the proposed effort. We impose the upper and lower bounds for both variables in order to respect the limits $11 \leq w \leq 120$ and $1 \leq e \leq 10$.

After all the employers have made their offer, players in the role of employees choose one of the feasible contracts. As in Figure 10, each employer should select one of the contracts or simply press the button **CONTINUA** and accept no contract. Each employer has a number in order to avoid the exact identification of the proposer.

Employees who have subscribed a contract must choose the level of effort. As shown in Figure 11, we pick a bullet in correspondence of the required effort. They should choose any level between 1 and 10 taking into account the cost function in their screen.

Thanks to the real effort we are able to calculate the profit for employers and employees. In the final screen, in each period they see only their personal payoff.

Table 12 shows the descriptive statistics of the final payment in each treatment. In the first treatment we register the higher average final profit. In Table 13 we can see that employers' final profit is higher than employees'one.

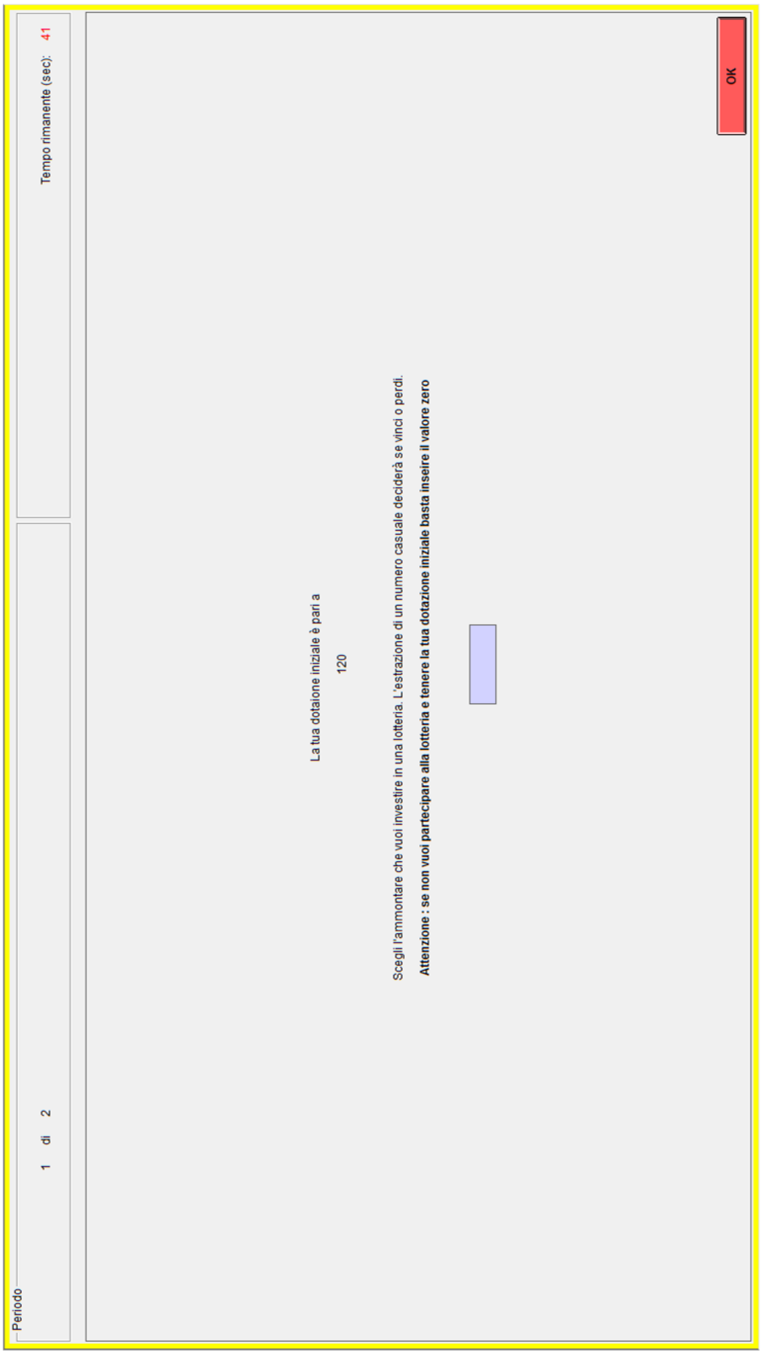

Figure 6: Lottery

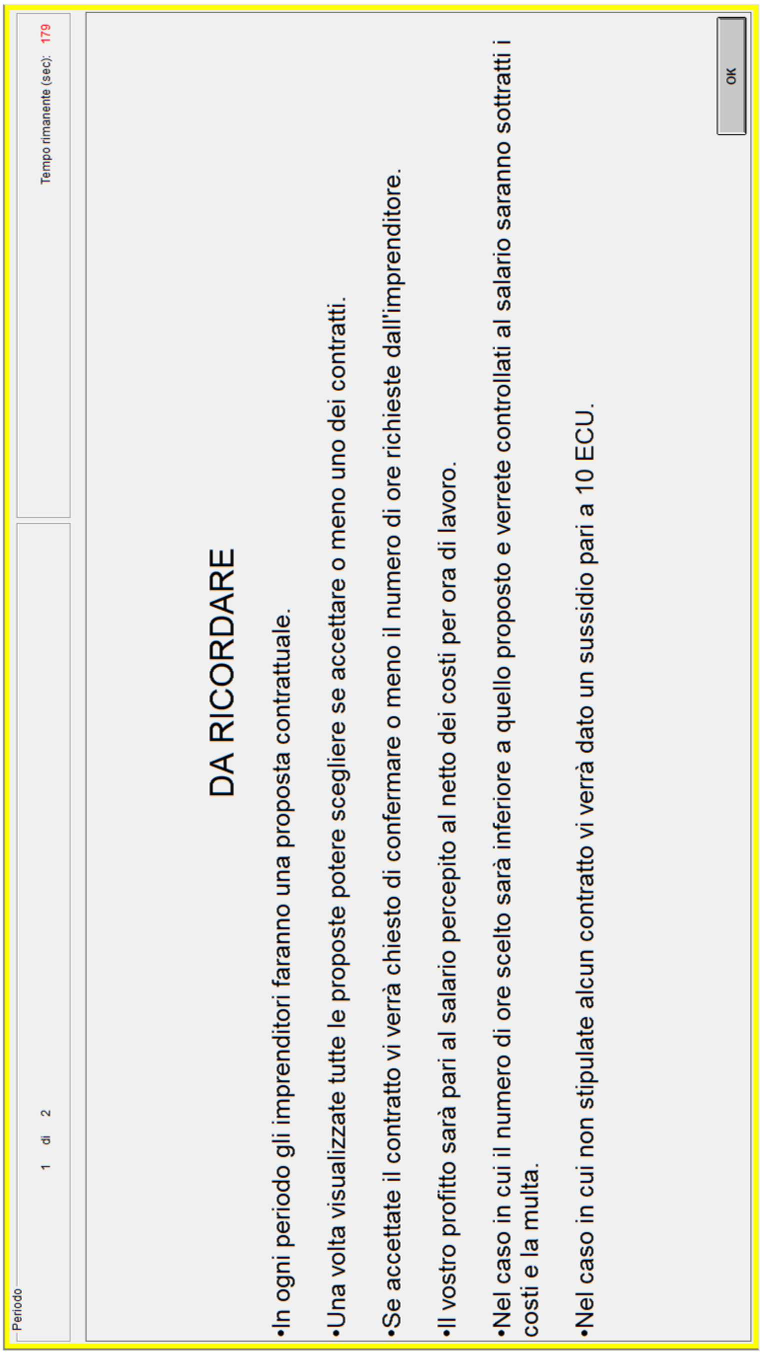

Figure 7: Instructions for employees

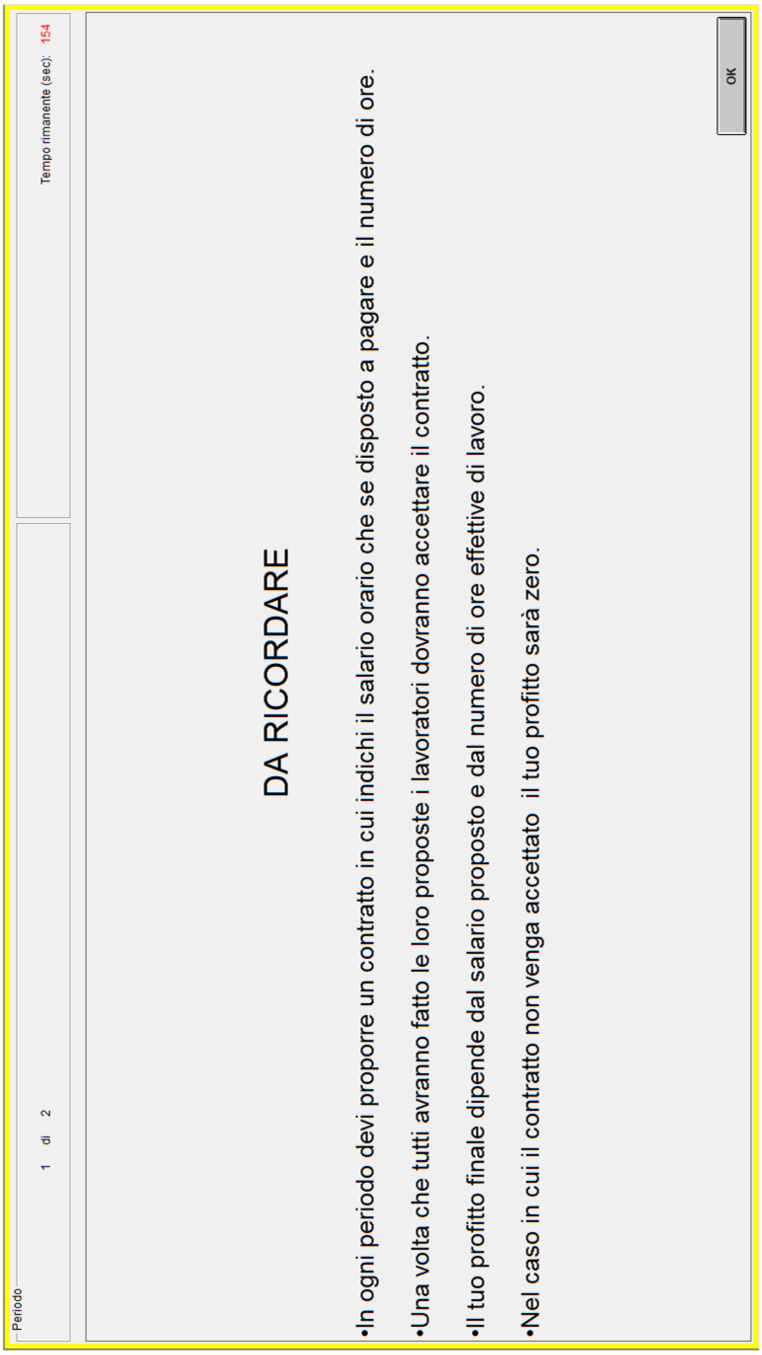

Figure 8: Instructions for employers

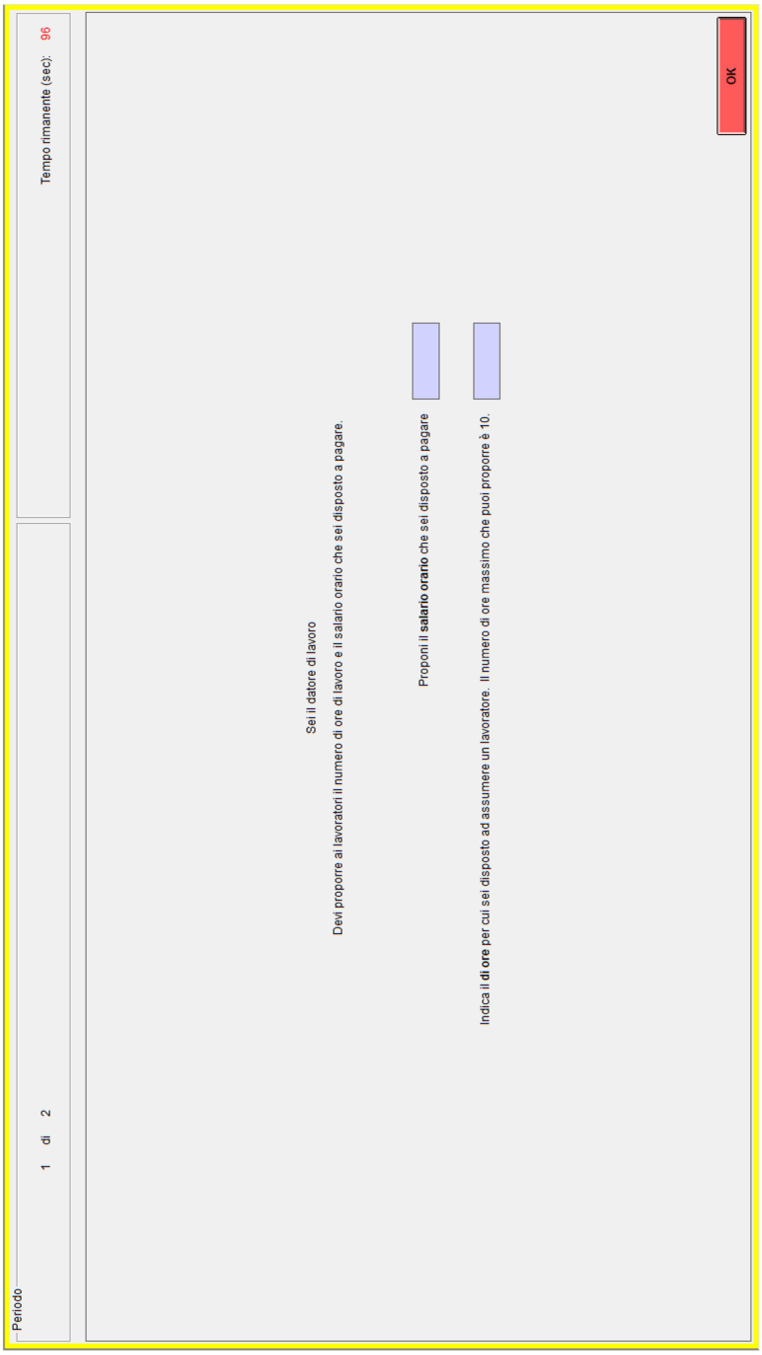

Figure 9: Contract

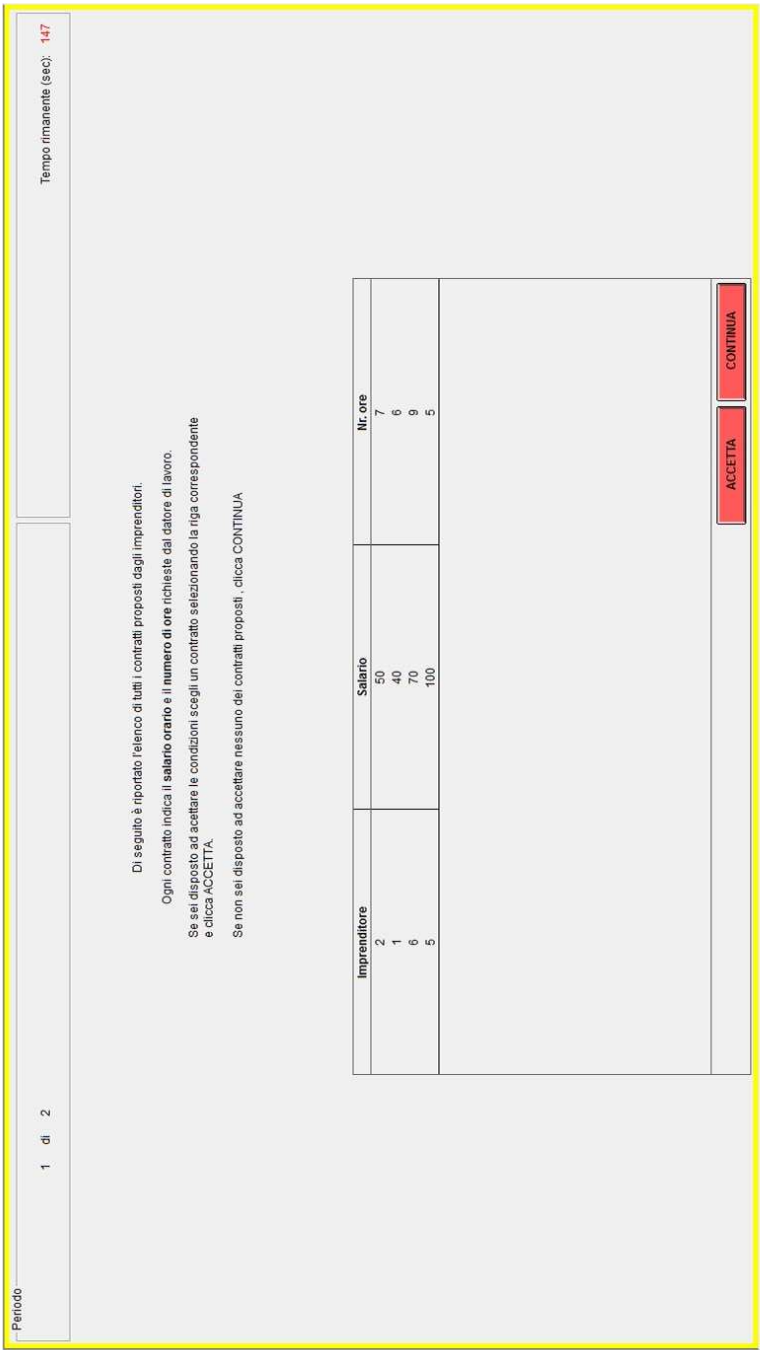

Figure 10: List of contracts

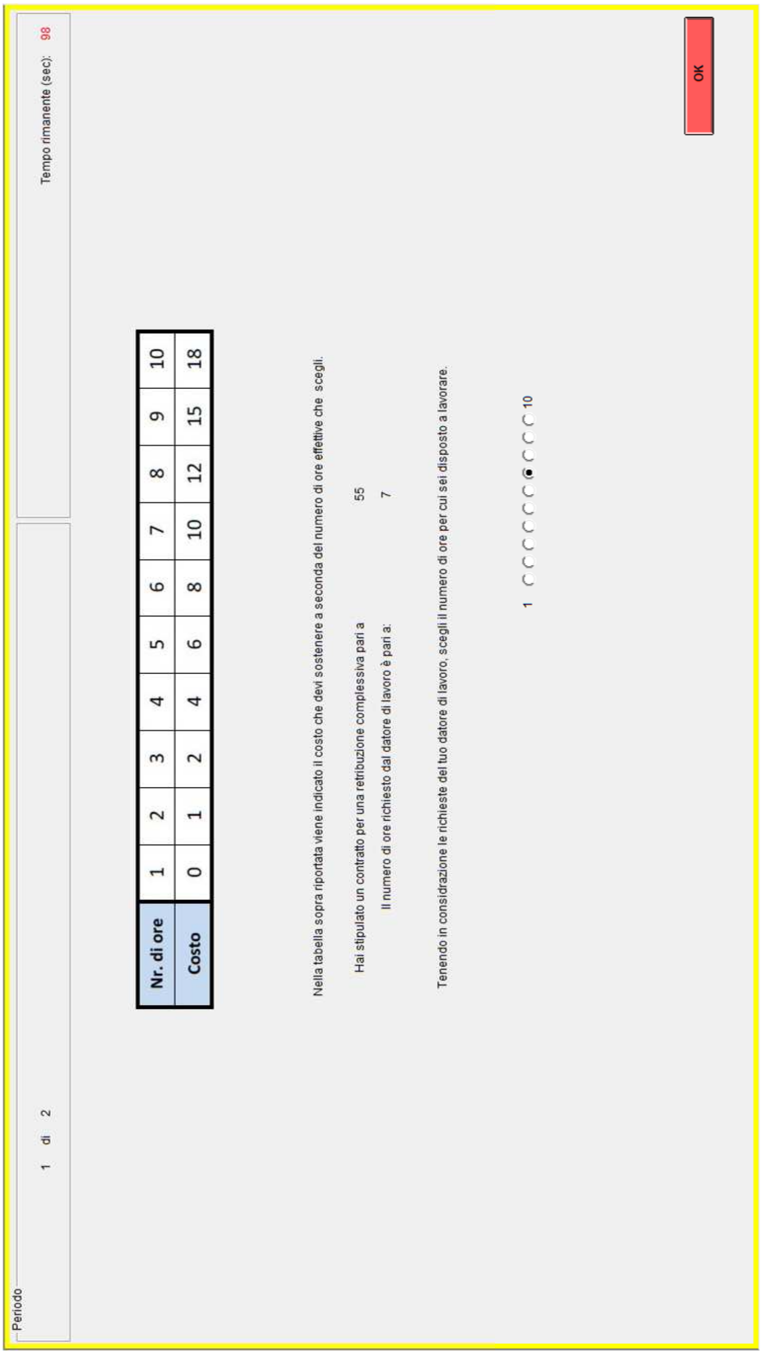

Figure 11: Real effort choice

Table 12: Descriptive statistics: Final payment

	Payment			
	Mean	St.Dev	Min	Max
Treatment 1	13	0.89	11	14
Treatment 2	11.78	0.77	10	13
Treatment 3	10.1	0.82	8	11

Table 13: Descriptive statistics: Final payment by type

	Payment			
	Mean	St.Dev	Min	Max
Type 1	12.83	0.63	11	14
Type 2	10.64	0.70	9	12