Investigating Reciprocal Motivation in Experimental Labor Markets with Cumulated Job Tenure and Unemployment Pool

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Abstract

This paper proposes an experimental design that replicates and extends the main idea in Charness (1998). In addition to the original setup, we consider the unemployment alternative and the possibility of consecutive contract renewal implying eventual accumulation of job seniority. The random learning framework of Jovanovic (1979) is used as benchmark theoretical model. We expect to be able to compare individual reciprocal motivation in this framework p where workers are strategically interested in longer work relationships, to existing literature on mutual reciprocity concerns in wage-setting schemes. This project offers at the same time an opportunity to test Jovanovic's (1979) predictions in terms of tenure distribution and separation rates. Some further ideas to the initial design scheme are put forward in the last section, e.g. job specific training costs to be incurred by the firms; public knowledge of the size of the unemployment.

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1. Introduction

A usual assumption in standard economic models is that people maximize their own financial interest, disregarding social norms and issues such as fairness and reciprocity. Although this hypothesis greatly facilitates analysis and is often innocuous, it leads to unrealistic predictions of behavior in many economic situations. A considerable number of laboratory experiments implementing ultimatum or dictator games have demonstrated that one cannot adequately explain individual choice behavior on basis of pecuniary maximization alone. These experiments show that social forces can have substantial effects on the economic decisions made by individuals. Unfortunately the underlying composition and specific determinants of these forces are often left unconsidered in the literature.

One of the important mechanisms accounting for the way markets function is *reciprocal motivation*, as described for instance in Dufwenberg and Kirchsteiger (2000). People desire to be kind to anyone they think of as being kind and they wish to hurt anyone who is unkind to them; in other words they want to reward or punish on a reciprocal basis. In the labor market context this would translate as follows: a worker who receives a high wage thinks of his employer as gentle, and he will be considerate in return by exerting more effort even if failing to maximize his payoff by doing this; at the same time employers avoid hiring people at very low wages, foreseeing that this can be seen as unkind behavior that might be met with shirking. Research in various economics fields supports these facts. From interview studies conducted with managers and business leaders (e.g. Blinder and Choi (1990); Campbell and Kamlani (1997); Bewley (1998)) to studies of individual decision making e.g. Akerlof (1982), Akerlof & Yellen (1988; 1990) or to studies of organization theory (e.g. Steers and Porter (1991)), the results are all consistent with the fact that forces such as reciprocity are at work in labor markets. Moreover, previous labor market experiments, e.g. Fehr & Falk (1998), Fehr, Kirchsteiger & Riedl (1993) or Falk & Gaechter (2002), add to the evidence.

While treating reciprocity motives, in-depth attention has been given to both negative and positive considerations. Fehr and Falk (1998) give instances where negative or respectively positive reciprocity is the predominant motive. In ultimatum game bargaining many people are willing to punish behavior that they view as hostile or unfair even if this punishment is costly for them; this behavior can be labeled negative reciprocity, relying on hostile actions that trigger hostile responses. Trust games, on the other hand, indicate the presence of a behavior that can be termed positive reciprocity. Positive reciprocal behavior is based on willingness to reward actions that are perceived as generous, kind or fair. Generous actions trigger cooperative responses even if they are costly for the responder. In our project we shall be able to test both for negative and for positive reciprocity motives.

Charness (1998) attempted to generalize previous distributive-effects models[1] so that they include reciprocal altruism. This study has as aim extending Charness's design

[1] In distributive effects models decision makers can be motivated not only by their payoff but also by the final distribution of payoffs of all agents. The most cited models that have been applied to wage setting games incorporate a desire for a fair allocation, which in other words would mean that a

by allowing for longer job duration (cumulative tenure on the job) and for unemployment as alternative to being employed, with all implications thereof. The background theory we shall use is imported from the standard learning model of Jovanovic (1979). Essentially, the idea is that workers are randomly offered a job and a contract is concluded if they accept the offer. The quality of this match is unknown apriori, being revealed only after a subsequent period of the game. After this period both the employer and the worker can decide to separate or to continue their work relationship for another period and so on.

As we will see in more detail later, we have three categories of agents participating in the market: firms, workers and unemployed individuals. They are assigned to their categories randomly at the beginning of the experiment. There is a flow into unemployment and respectively a flow from unemployment to employment; hence any worker and unemployed persons can theoretically change categories, as we shall see later. Each period of the game consists of two stages: in the first stage the employer proposes a wage[2] and in the second stage the worker selects, on basis of a given scale, an effort level. The wage determines the payoff of the worker, while the combination between the wage and the effort chosen by the worker will determine the payoff of the firm; the unemployed receive an unemployment benefit equal to the minimum wage that can be offered.

2. Theoretical background

We shall use as theoretical basis the learning model developed in Jovanovic (1979). Jovanovic treats a job match (i.e. match between a worker and a firm) as a "pure experience good", a terminology introduced by Nelson (1970). This means that the only way to determine the quality of a particular match is to form the match and to "experience it". Jovanovic's objective was to construct and to interpret a model of permanent job separations. In this case, turnover might occur only as a result of the arrival of information about the current job match, i.e. the parties "learn" about the quality of the match with time and may decide to separate or to continue accordingly.

In the initial model of Jovanovic the firm has a production function exhibiting constant returns to scale with labor as the only factor of production. If we denote by X(t) the contribution by a worker to the output of the firm over a period of length t, we have

$$X(t)=\mu t+\sigma z(t) \text{ (for each } t>0), \qquad (1)$$

where μ and σ are constants and $\sigma>0$, and where $z(t)$ is a standard normal variable with mean zero and variance t. Then $X(t)$ is normally distributed with mean μt and with variance $\sigma^2 t$. Jovanovic assumes further that σ is the same across each firm-worker match, while in general μ differs across matches. μ is not capturing worker's

person's utility is decreasing in the difference between the own payoff and that of the partner. The precedent in this respect is set for instance in Bolton and Ockenfels (1999), Fehr et al (1998), Fehr and Schmidt (1999)

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ability but measures the quality of the match. When the match is formed, μ is unknown, further information (according to the equation (1) above) being generated as time passes. In this respect a "good match" is characterized by a large μ. Jovanovic also assumes in his paper that μ is normally distributed across matches with mean m and with variance s. Job change involves thus a new draw of μ from this distribution having independent successive drawings. This latter assumption guarantees that the worker's prior history is of no relevance in assessing the value of his μ parameter on a newly formed match (perfectly in accordance with the set-up in our experimental design in this respect). The one and only way to learn about μ is to observe the worker on the job for a period of time. As Jovanovic notes, this independence assumption also means that the informational capital thus generated is completely match specific and is analogous to the concept of firm-specific human capital. In other words, general human capital does not play a role in this model.

In Jovanovic (1979) wages are a function of the output and the time spent on the job and all job separations are at the worker's initiative[3]. It is also assumed that all firms are risk-neutral and maximize the mathematical expectation of revenues; all firms face the same product price, normalized at unity, so that demand conditions are stationary. The firm's wage policy is a function

$$w[X(t), t], \quad (2)$$

where $X(t)$ and t are the same as in expression (1) above.

The workers are assumed to live forever, this assumption justifying the exclusion of age as an explicit argument in the wage function. As long as he remains with the same firm, the worker receives payment according to the wage function in (2). He has the option of quitting at any time (after each period in our experimental design, given the discrete setting).

If we let Q be the present value of quitting a job, the infinite horizon, constant discount rate and the independence of the successive drawings of μ will imply that Q is a constant. The constancy of Q over time means that the worker never returns to a job from which he once separated (this is consistent with the set-up of our model: we preclude the possibility of recall). Let us denote by

$$\alpha(Q, [w]) \quad (3)$$

the present value to the worker of obtaining a job with a firm that offers $w(.)$ as its wage contract when the value of quitting is Q. Then if c is the direct and the foregone earnings costs of job changing (it is assumed that this constant is parametrically given for each worker) we have

$$Q=\alpha(Q, [w])-c \quad (4)$$

We will not insist on further derivations in this model (the interested reader can consult Jovanovic (1979) for details in this regard) but will rather get directly to the equilibrium of this model.

[3] Some of these quits can nonetheless be counted as disguised layoffs since the employer can offer for instance a wage low enough to be refused by the worker and induce him to quit. For the purpose of our experimental design, this assumption is consistent with our setup.

Denote by B the set of equilibrium wage contracts and for any $w(.)$ let $Q([w])$ denote the unique solution for Q from equation (4) above. For $w(.) \in B$ we have

(i) each worker follows his optimal quitting policy in response to $w(.)$ and to $Q([w])$

(ii) $\pi\{Q([w]),[w]\} \geq \pi\{Q([w]),[w']\}$ for all $w'(.) \neq w(.)$ so that $w(.)$ maximizes expected profits;

(iii) $\pi\{Q([w]), [w]\}=0$, the zero expected profit constraint (certainly we won't impose this in our experimental design).

Let us now define

$$w^*(x,t)=E_{xt}(\mu) \text{ for all } (x,t) \quad (5)$$

The wage contract in (5) states that the worker will be paid his expected (marginal) product at each moment in time.

Jovanovic's predictions are consistent with the available empirical evidence on tenure distribution and exit rates. The model predicts that workers remain on jobs in which their productivity is revealed to be relatively high and they select themselves out of jobs in which their productivity is revealed to be low. Furthermore, given that in the model wages always equal expected marginal products for all workers, the model generates (on average) wage growth as tenure increases. Hence Jovanovic's model finds a tenure profiles in wages. In terms of optimal separation, Jovanovic predicts that each worker's separation probability is a decreasing function of his job tenure. This is due, loosely speaking, to the fact that a mismatch between a worker and his employer is likely to be detected early on and discontinued.

One essential assumption of the theoretical framework that we will successfully meet in our experimental design is that employers can contract with workers only on individual basis. This allows for instance for an employer to reward a worker with whom he matches well by paying the worker relatively more than in the initial period. Certainly the essential difference is that in our model the wage is ex-ante agreed upon and thus the worker's subsequent productivity level might be correlated to this wage level (in other words we would also have the wage entering in equation (1) displayed in the beginning of this section). This is one of the major aspects we would in fact want to focus in our experiment: to what extent does reciprocity matter (particularly negative reciprocity, where for instance the wage was low in the first stage) in the worker's decision of investing effort knowing that he might get a contract renewal and he won't be faced with the unemployment alternative.

One obvious shortcoming is the fact that Jovanovic (1979) does not explicitly model unemployment as alternative. This means that we might not be able to rely directly on the predictions of his initial model to compare the experimental results. We argue however that unemployment can herein be modeled as "the worst" job and that there is some randomization involved so that workers in unemployment do not immediately receive better job offers and might stay longer in this "job". This should be possible given that unemployment benefits are constant per each period and given also the way

the quitting value is modeled in equation 4). For our purpose we ought therefore not lose generality and be able to still use Jovanovic's model as benchmark.

3. Experimental Design

As mentioned already in the previous sections, this proposal is rooted in Charness (1998). At his turn Charness used ideas implemented in Blount (1995) and Fehr et al (1998).

We assume that there are enough participants so that they can be divided in employers, employees and unemployed, with equal number of employers and workers and a positive number of unemployed individuals. All participants receive a sum of money for showing up in time. The subjects receive complete instructions in the beginning of the game, thus determining them to pay attention to all the roles, even if they might be eventually stuck with one role following the randomized assignment. Next, the participants will be randomly assigned to be workers, employers and unemployed for instance by letting them choose cards, using a bingo cage or making use of pre-designed computer program.

All participants are in the same room, but no contact between them is allowed, all communication being realized using the organizers as intermediary. Any direct interaction is thus controlled for. Only the two parties involved in setting up a match (firm and prospective employee) will know the wage bid and the effort chosen at a certain time. This information will flow by way of the intermediary; the parties will not know any detail of who is the contractor or other details related to his history in the game. The ideal setting will be that everybody has a computer workstation and communication is done by sending messages to a dispatcher (from the organizing team) which further sends them to the party involved, randomizing if necessary (a computer program can do the randomization in this case). None of the parties will actually come in direct contact, nor will they give their names, all these records being taken care of by the dispatcher. The persons will also not know what is the size of the unemployment or of the employment (as we will see this is subject of another type of treatment which we will discuss as an extension to this study).

Each period of the game consists of two stages: in the first stage each employer proposes a wage[4] while in the second stage the corresponding worker selects, on basis of a given scale, an effort level. The wage offered determines the payoff of the worker, while the combination between the wage and the effort chosen by the worker will determine the payoff of the firm. The unemployed people receive an unemployment benefit each period, equal to the minimum wage that can be offered. Based on the chosen effort level and on possible strategic considerations, the firm can at the end of a period propose a new contract to the same worker and can of course increase or decrease his wage as part of the new deal. The firm can also decide to give up the services of the previous worker (which will enter the unemployment pool) and

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ask for a new candidate in which case the organizers will randomly select one person from the unemployment pool that would receive a wage offer from that firm. A wage offer can at the same time be rejected by the recipient of the proposal, which means that this person will choose to be unemployed until she gets another offer. There is no possibility of recall; in other words re-hiring the same individual later is precluded. In practice this will be arranged in the sense that neither the worker nor the firm will not know if they had a previous work relationship, if this has not been continuous at the moment of the proposal. Thus memory is "deleted" at the moment of separation. A firm can make wage offers as long as there still are people available to confront them in the unemployment pool. At the moment the firm has been repeatedly refused and there is nobody else to be offered the wage, the firm will be "idle" and will gain 0 profits for that period. One important remark to be made here is that firms propose wage offers in an order randomly chosen every period; then the first offer refused will be the first one to be referred to the an unemployed person and so on. The game takes place for a finite number of 10 periods.

Let us see more concretely how this game works. Suppose we have 2N+K subjects, where for the moment we do not have any other constraints on N or K, than N>0, K>0, with N, K natural numbers. When the game starts, the "potential" employees are randomly matched to the employers, with one employer matched to one potential employee; in our example we will have N firms and N potential employees which might in principle have exchanges with the K unemployed individuals (N and K will not be known by the participants). In each period the employers receive a capital of 120 tokens. The employer starts each period by proposing a wage between 20 and 120 tokens that he will pay to the potential employee. We will not have the worker pay 20 tokens from his wage for transport costs to the experimenter as in Charness (1998) but this amount will be here the minimum wage, which is also equal to the outside option, that is, with the unemployment benefits that the unemployed persons receive. The worker matched to the employer can refuse the wage offer in which case he will go into unemployment and somebody else from the unemployment pool will be randomly "matched" to the employer who proposes him a wage (same wage or a different one). A worker who just refused an offer will not be matched again for a possible offer with the same employer in the same period (this can happen in a future period, but as previously stated, without keeping memory on previous rounds). If an employer has been refused sufficiently before the start of a certain period so that there is nobody else left in the unemployment pool not to have received an offer, that employer is going to be left unmatched and will receive 0 payoff for that period (he will lose his capital of 120 tokens for that period)[5]. In the second stage of each period a worker who accepted the wage proposal, chooses an effort level according to a scale of effort and cost of effort. Choosing a higher effort means higher profit for the employer but lower gain for the worker for that period since the cost of investing that effort will be higher. It is thus clear that if there are no idle firms in a period, there will be N work matches (so N workers and N firms operating) and K unemployed persons, while if there are X idle firms, with X<N, it means that there are N-X work matches and K+X unemployed persons for that respective period.

[5] Using for instance a specialized computer program to handle all this cases would eliminate all the worries about too much time consumption, dead time and other inefficiencies throughout the process of the experiment.

As a general point to this experiment, it seems reasonable to assume that firms and workers know very well the range of possible wages. Hence, we presuppose that workers can easily assess the firm's "kindness" when paying a specific wage and there is no error in this perception. Similarly, the range of possible effort levels and thus the kindness of the employee is assumed to be easily assessed by the employers. The basic experimental design assumptions appear therefore clear-cut.

Monetary payoffs are formally calculated according to:

$$P_E=(120-w)*e \quad \text{(E1)}$$

and

$$P_W=w-c(e) \quad \text{(E2)}$$

where E is the Employer and W the Worker, w the wage level and e the effort, $c(e)$ the cost of effort for which the same scale as in Charness (1998) is provided:

e	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
c(e)	0	1	2	4	6	8	10	12	15	18

We thus notice that the minimum wage per period gained by the workers is 20 and this will be equal to the unemployment benefits. The minimum profit of an employer per period, provided somebody accepts his offer, will be 10. An unemployed person will gain 20 per period. An "idle" firm will have 0 profit per period of inactivity.

As far as the scene-setting of the experiment is concerned, clear rules will be written down and handed to the subjects before their assignment into different categories. An overview of these instructions is given in the appendix to this paper. Furthermore a pilot session with examples will take place before each experimental session so as to ensure that all participants perfectly understand what they have to do, the effort-cost table, all the instructions and rules and so on. Charness (1998) reports that this strategy is very beneficial and pays off considerably for the progress of the game.

4. Data analysis and predictions

The data collected after the experiment will be analyzed as follows. For each period we will have the number of contracts accepted with the value of the wage bid and the effort chosen, respectively. At the same time, for each period we will have the number of contracts refused with the values of the wage offered. The latter would be considered for our purpose as having as wage the level of the unemployment benefits (so equal to the minimum wage) and as effort, 0. We would thus find an estimate of the coefficient b for the wage in the following regression:

$$e=a+b*w+\varepsilon \quad \text{(E3)}$$

where e is the effort, w is the wage and ε is white noise. Charness (1998) and several other studies investigating this relationship find a significant $b>0$. It would be interesting to test for this hypothesis here, having the modified setup. A simple OLS regression would in general be sufficient for the analysis, however if we believe in a

nonlinear relationship between the effort and the wage and we also worry about the fact that in fact the effort takes only values in a given range (between 0.1 and 1 as in the table previously displayed), we could also test (E3) using a two-sided censored Tobit regression. In this case E3 would read:

$$e=a+b*w+\varepsilon \text{ if } 0.1<a+b*w+\varepsilon<1$$
$$e=0.1 \text{ if } a+b*w+\varepsilon\leq 0.1$$
$$e=1 \text{ if } a+b*w+\varepsilon\geq 1 \qquad (E3b)$$

A second investigation interesting for us is whether the effort induced modifies with time, controlling for wages. Thus, (E3) would also contain a dummy for each period (labeled Dperiod):

$$e=m+n*w+p_1*Dperiod_1+\ldots+p_{10}*Dperiod_{10}+\delta \quad \text{(E4)}$$

Of course (E3b) applies here as well, more correct than the simple least squares would be to perform a 2-side censored Tobit regression.

We would also be interested in the acceptance vs. rejection behavior of the wage offers. We could in this sense run for instance a logit model of the following genre:

$$Reject=f(k+l*w/wmax) \quad \text{(E5)}$$

In (E5) above *f(.)* is the logit function, *wmax* is the maximum wage that can be offered (120) , w is the wage offered. Thus *w/wmax* measures the fraction of the total wage that could be offered and was actually offered. Accept is 1 if the offer was accepted and 0 otherwise. We can test also whether rejection changes over time which means that we would include in (E5) a dummy for all periods.

Having seen an outline of the analysis to be carried out subsequent to the experiment, we shall in what follows put forward some predictions. Given that we have introduced the possibility of contract renewal, a comparison with the Charness experiment should yield less negative reciprocity considerations in the first periods (we expect behavior to change in the last periods, especially the very last one), while positive reciprocity should be considerably enhanced, given that a work relationship is prone to be built. In other words a relatively low wage offer in the first periods should not be met with refusal or with a very low effort. Employers might start off with a low wage offer but they are going to reward workers that put considerable effort by renewing their contract and increasing eventually their wage which would also confirm the theoretical learning model of Jovanovic in which the wage paid depends on the tenure and of course the productivity: *w[X(t), t]*. At the same time the worker will appreciate the "kindness" of his employer and might raise the effort even further in a future period, hoping to be further rewarded and to increase his tenure in the firm. We should also notice another prediction of Jovanovic's theory, namely that bad matches are to ended very soon, that is an employer will not renew the contract of a worker who did not put enough effort, nor will a worker accept to work with an employer that paid him a rather low wage for which he feels he put a lot of effort but further the employer does not consider raising his wage to reward him for the extra effort. In other words, the turnover rate is expected to be negatively correlated with the job tenure of the individual.

Particular importance is attached to the analysis of the agent's behavior in the last rounds. If we believe that reciprocal motivation is in general far less important than selfish, homo-economicus type of behavior, then the last rounds should not contain at all reciprocity considerations, but pure efficiency maximization behavior.

4. Discussion and extensions

The dilemma with this project proposal is that it will be considerably difficult to disentangle the different effects involved. Even if parameters such as size of unemployment are varied (see some of the extension points below), there will still be things such as reciprocity vs. rationality and self-preservation considerations, cumbersome to set apart. A fine methodology is eventually required to be able to separate and emphasize different considerations that the individuals in both sides of the market may take into consideration when they make a decision. Next to this, a major shortcoming would be that even if we were able to separate reciprocity considerations from rationality motives for instance, this experiment would not always make a difference between "pure reciprocity" considerations and reciprocity & fairness concerns. But for the start, we would be satisfied with this second-best solution; once it works, one could obviously think of re-shaping some of its assumptions in order to improve it.

In what follows we consider a few ideas for further research. Some of these can be implemented as treatment variations in the same design as above. Firstly, we could let the size of the unemployment and employment known to all the participants (the N and the K in the previous sections). In this sense, we could experiment with the differences in behavior when varying the size of the unemployment pool from zero to a large positive number. We know from practice, that workers' incentives to keep a contract are very different when the market is tight than when the market is very loose and it goes similarly for the employers, but in the other way around. To take just one example, if K/N were very big, the workers would be much more careful in refusing any offer since they would earn more with the lowest possible wage than being in the unemployment where, most importantly, the chances of receiving a new offer are quite low given the large number of unemployed persons. The negative and positive reciprocal concerns might thus well vary with the size of the unemployment.

Another treatment would be to vary the difference between the minimum wage and the unemployment benefits by varying either one of those two levels. In particular a 0 payoff as minimum wage would bring us back to the Charness (1998) case. Again, we expect the agent's behavior to vary when the option of losing the minimum wage would be insignificant and so on.

Finally, one other extension that in fact was part of a previous draft setup of this experiment would be to introduce specific training costs that ought to be paid by a) the firm; b) the worker; for each new match they would undertake Again, we seek to reveal differences in strategic behavior.

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Appendix: Overview of the experimental instructions[6]

Instructions for all parties

You will be taking part in a study of the labor market. If you read these instructions carefully, you may earn a significant sum of money. During the experiment your income will be calculated in Tokens. At the end of the experiment, Tokens will be converted into Euros at the rate of:

20 tokens=2 euros

You will also receive a 5-euro payment for showing up in time. At the end of the experiment your income will be paid to you in cash.

In the beginning of the experiment you will randomly assigned to one of three groups: employees, unemployed and employers. This will be known by each participant. There will be 10 periods for this game.

Stage 1 of each period: if you are an unemployed you will receive the unemployment benefits of 20 tokens for that period or you will be randomly selected for a job offer if there is a place- in which case you become an employee. If you are an employee an employer whom you will not know directly will offer you a wage. The wage will be at least 20 euros. You have to decide whether you accept or not. If you do not accept you will move to unemployment for the given period and somebody else from there will be randomly selected for the match with that employer.

Stage 2 of each period: you make a decision on an effort level as described below. Following this decision the same employer can offer you a contract renewal or you move out to unemployment (Stage 1's rules apply further in the next period).

Attached to these general instructions you will find decision-sheets on which you must record whether you are an employer or respectively an employee or unemployed and the wage offered and accepted or refused (respectively the unemployment benefits) at the beginning of each stage. Furthermore you will record the effort chosen. After this you will calculate the income you have earned. You will not know with whom you have been matched in any of the periods other than it is the same firm proposing a renewal as in the precious period or a different one. Your total earnings will be the cumulated earnings over the maxim 10 periods.

For employees/unemployed persons

Labor market process:

1. At the beginning of each period we will open the labor market. In the first stage of the labor market each employer will offer a wage to an employee. This Employee accepts the wage or not.
2. You must immediately record the wage offer, whether it is from the same firm (it will be told to you) and whether you accept it or not or your decision-sheet paper.
3. If you are unemployed or became unemployed by refusing a wage offer, record an earning of 20 tokens (unemployment benefits) for that period
4. If you accepted a wage offer, you must in the second stage choose a quantity of work. We will then relay your chosen quantity of work to your employer. The employer might decide to offer you a contract for the next period as well. You must calculate your income as below and write it down (unemployed have 20 tokens income).
5. No employer will know with which employee s/he has concluded a contract and no employee will know the employer. You may not let anybody know on your wage offer and decision, respectively effort offer.

[6] The general wording is reproduced almost unchanged from Charness (1998)

Income computation

1. You will receive the wage you have accepted. From this wage you must then substract the costs of your amount of work. If you are unemployed you receive 20 tokens unemployment benefits and you don't substract other costs.
2. You determine your quantity of work by choosing a number between 0.1 and 1.0 from the schedule below. The lowest amount of work you can choose is 0.1, 0.2 is slightly higher amount, and so on up to 1.0, the highest amount.

e	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
c(e)	0	1	2	4	6	8	10	12	15	18

3. The higher the quantity of work you choose, the better it is for your employer. The higher the number you choose, that is, the quantity of work, the higher "your" employer's income.
4. The higher the amount of work you choose the higher your work related costs would be. You can find out how these costs are related to quantity of work by again looking at the schedule above.
5. Your income in tokens will be determined as follows:

Income=wage-costs of quantity of work

Computation of your employer's profit

1. Each employer receives from the experimenter 120 tokens that he may use to pay for wages. If s/he offers you a wage of 120 tokens then s/he will have no income tokens left. The initial income of your employer is:

Initial income=120 tokens-wage

2. How is the income over a period calculated for your employer? The number of tokens remaining is multiplied by the quantity of work you choose in the second stage. This is the income of the employer.

Income=Initial income* Quantity of Work

Please note: The income of all employees, employers and unemployed persons will be computed according to the same rules. Every employer is able to compute the income of his/her employee and every employee is able to compute the income of his/her employer.

<u>For employers</u>

Labor market process

1. At the beginning of each period we will open the labor market. In the first stage of the labor market each employer will offer a wage to an employee. This employee accepts the wage or not. Wage offers must be no less than 20 tokens and no more than 120 tokens.
2. You must immediately record the wage offer you made, whether it is for the same employee and whether it is rejected/accepted.
3. If the employee matched to you accepted a wage offer, he will in the second stage choose a quantity of work. We will then relay his chosen quantity of work to you. You might decide to offer you a contract for the next period as well. You must calculate your income as below and write it down (unemployed have 20 tokens income).
4. No employer will know with which employee s/he has concluded a contract and no employee will know the employer. You may not let anybody know on your wage offer and decision, respectively effort offer.

Employee's income computation

1. An employee will receive the wage he/she has accepted. From this wage s/he must then substract the costs of the amount of work. An unemployed individual receives 20 tokens unemployment benefits.
2. Employees determine the quantity of their work by choosing a number between 0.1 and 1.0 from the schedule below. The lowest amount of work they can choose is 0.1, 0.2 is slightly higher amount, and so on up to 1.0, the highest amount.

e	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
c(e)	0	1	2	4	6	8	10	12	15	18

3. The higher the quantity of work he/she chooses, the better it is for you. The higher the number s/he chooses, that is, the quantity of work, the higher "your" income.
4. The higher the amount of work s/he chooses, the higher his/her work related costs will be. You can find out how these costs are related to quantity of work by again looking at the schedule above.
5. The income of your employee in tokens will be determined as follows:

Income=wage-costs of quantity of work

Computation of your income

1. You will receive from the experimenter 120 tokens, which you may use to pay wages. If you offer a wage of 120 tokens then you will have no income tokens left. Your initial income will be:

Initial income=120 tokens-wage

2. How is your income over a period calculated? The number of tokens remaining is multiplied by the quantity of work your employee choose sin the second stage. This is your final income per period:

Income=Initial income* Quantity of Work

Please note: The income of all employees, employers and unemployed persons will be computed according to the same rules. Every employer is able to compute the income of his/her employee and every employee is able to compute the income of his/her employer.