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Social exchange in the labor market: Reciprocity and trust versus egoistic money maximization

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Abstract

This paper presents results from a series of experimental labor markets. The implications of standard economic theory are contrasted with social exchange predictions. According to standard economic theory, workers and employers are rational egoistic individuals who strive to maximize profit. In markets, as well as in bilateral interactions, employers should offer the lowest wages which workers will accept and workers should provide the effort level which maximizes their utility (i.e. the minimum permitted).

According to social exchange principles, wage negotiations between employers and workers are not only determined by egoistic profit maximization but also by social norms. Interacting partners stick to the norm of reciprocity and reciprocate favors. Employers are supposed to trust reciprocation norms and offer higher than reservation wages, expecting workers to provide higher effort in response. Consequently, workers' effort choices are expected to be positively correlated to employers' wage offers.

Four experimental conditions were realized to test hypotheses deriving from standard economic theory and social exchange theory. In general, standard economic theory was poorly supported. Reciprocation norms were found to be important and, on average, cooperation was considerably higher than predicted by economic theory. There were, however, significant differences between participants: some workers cooperated over a series of bilateral trading periods and in market situations, whereas others did not. It is argued that economic theory needs to take into account

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both social norms and also personality differences as well as nonstandard motives which underlie human behavior.

PsycINFO classification: 2260; 3020; 3600

JEL classification: C91; C92; J30; J41

Keywords: Labor market; Experimental economics; Social exchange; Rational choice; Reciprocity

School Regulations

1. Piety, cleanliness and punctuality are the prerequisites of orderly instruction.
2. Teaching staff are now required to be present on weekdays between 6 a.m. and 6 p.m. only. Sundays shall be devoted to church attendance and Sunday school. Prayers shall be read each morning in the headmaster's office.
3. Plain clothing shall be the rule. Members of the teaching staff shall not sport bright or shiny colors, and shall wear plain stockings only. Galoshes and coats shall not be worn in the classroom as a stove is provided in every room. Moreover, it is recommended that 4 pounds of coal be brought along in winter by each member of the teaching staff.
4. There shall be no talking during class intervals. Any member of the teaching staff indulging in smoking tobacco, taking alcohol in any form whatsoever, frequenting billiard halls or political venues, shall give cause for his honor, character, probity and honesty to be called into question.
5. Food may be consumed between the hours of 1.30 p.m. and 2 p.m. However, work shall not be interrupted during that time.
6. Each member of the teaching staff shall be expected to work unpaid overtime if so deemed necessary by the curriculum.
7. The form teacher shall keep the classroom premises clean. Junior teachers shall report to him forty minutes before prayers and shall remain on hand after teaching hours to clean the school premises.
8. Each member of the teaching staff shall be obliged to ensure that he keeps good health. In the event of illness payment of his salary shall be suspended.
9. All due respect and modesty shall be shown to officials of the district school council and the regional school council.
10. In conclusion, the munificence of these new school regulations is to be emphasized. A considerable increase in personal attainment and performance is expected in return.

JOKO Lebensmittelanstalt (Establishment for Teaching Aids), 2630 Ternits (Austria), Established 1898.

1. Introduction

1.1. Rational behavior in labor markets

In labor markets employers demand labor and people willing to work offer their labor supply. At first glance the situation seems clear. Both employers and workers are rational humans seeking to maximize what they desire. They strive to maximize their egoistic interests without considering the other's outcome. Each party will compute his or her net profit independently of the profit of the other and choose the most advantageous alternative. For example, a worker who is offered a job which renders him or her marginally better off than any alternative will accept that offer. He or she will take the job offer independently of the employer's profit. Comparisons between one's own and the other's outcome are not supposed to influence the partner's choices.

Economic theory predicts that, in perfectly competitive markets, wages are solely determined by labor demand and labor supply. The market equilibrates at the intersection of the labor demand and labor supply curves. At this equilibrium all firms can satisfy their labor demand and all workers who are willing to work at the prevailing wage can find a job. Moreover, in equilibrium, each employed worker is better off than in his or her next best opportunity. This means that, in a perfectly competitive labor market, each employee gets paid exactly his or her opportunity costs or reservation wage. Employers have no reason to pay workers more than their reservation wages because this only reduces profits. Workers, on the other hand, will of course never accept less than their reservation wages.

In Fig. 1 we have depicted an experimental labor market in which each of seven employers is willing to pay at most a wage of 120 money units while there are 10 workers with a reservation wage of 20. Each employer has only one

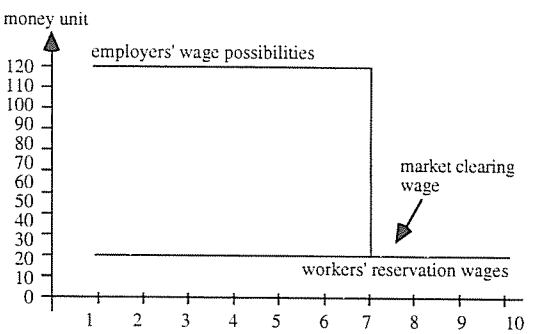

Fig. 1. Wage determination in a labor market with seven employers having the possibility to pay up to 120 money units for a worker and ten workers with a reservation wage of 20 money units.

job available. If this market works according to the rules of a perfectly competitive market, the wage must equilibrate at a level of 20, that is, workers get paid only their reservation wages.

The empirical evidence regarding the validity of the competitive model seems to be ambiguous. On the one hand there are numerous experimental studies which show that competitive markets converge very quickly to the competitive equilibrium (Smith, 1982). This result is generated irrespective of whether trade takes place in one-sided or in double-sided competitive auctions. On the other hand there exist field data which can be interpreted as evidence against the competitive model. It has been shown, for example, by Krueger and Summers (1987, 1988) that workers with the same observable characteristics who work under the same (observable) working conditions receive significantly different wages in different industries. Similar results have been found in many other studies. On the assumption that workers' characteristics and working conditions are objectively measured, these results cast serious doubt on the validity of the competitive model for the labor market. They indicate that workers in at least some industries are paid above their reservation wage.

However, it has been argued by Murphy and Topel (1987) and others that the studies mentioned above are seriously plagued by measurement error. These authors argue that more productive workers sort themselves into the high wage industries but that their higher skill level does not show up in the statistics available to the econometrician. And indeed, it seems to be extremely difficult to determine on the basis of field data for example, how energetically a worker works, how loyal workers are, the extent of their initiative, their readiness to perform extra-work if required and so on. There are many characteristics of a worker which determine their 'skill' level but which escape the usual statistics. Therefore, the interpretation of interindustry wage differentials as evidence against the competitive model is, in practice, contentious.

1.2. Social exchange in labor markets

A major alternative to the standard competitive model is the gift exchange view of labor relations. This view has been put forward by Akerlof (1982), Akerlof and Yellen (1990) and Fehr (1991). It is based on the notion of a fair reference wage. If workers are underpaid relative to the reference wage they are assumed to reduce their effort while if they are overpaid their effort does not change. If it is the case that workers' effort choices are driven by their perceptions of what constitutes a fair wage, it may be a profit maximizing strategy for firms to pay workers approximately the fair wage. Thus, if the wage

which is perceived to be fair by the workers is above their reservation wage, firms may voluntarily pay high noncompetitive wages in order to prevent a reduction in effort.

The argument outlined above relies on theories developed in social psychology and sociology, notably equity theory and social exchange theory. Equity theory stipulates that a wage decrease which creates underpayment reduces effort, while a wage increase that generates overpayment increases effort. Several social psychological studies confirm this prediction (Adams, 1963; De Dreu et al., 1994; Goodman and Friedman, 1971; Greenberg, 1988; Mikula, 1991). However, as the survey by Mowday (1991, p. 120) indicates, the prediction for the overpayment situation is frequently not met.

Social Exchange theory (Blau, 1964; Homans, 1961) emphasizes the norm of reciprocation which seems to be a strong social rule universally applied in social interactions. The rule stipulates that those who offer a favor expect a favor in return and that those who receive a favor feel obliged to reciprocate. Although there is no certainty that an interaction partner may return a favor, social exchange theory claims that, on average, the norm of reciprocation is reliably strong.

Standard economic theory and the gift exchange approach thus make competing predictions with respect to the labor market. So far the field evidence does not allow a convincing conclusion regarding the validity of these two approaches to be drawn. In this paper we report the results of a series of experiments which were designed to discriminate between these two approaches. At the heart of our experimental conditions is the possibility for subjects to do each other a favor. Giving a gift and reciprocating a favor was, however, costly. Therefore, if subjects in our experiments are selfish and rational as, economic theory assumes, neither gifts nor the reciprocation of gifts should be observed. However, if the norm of reciprocity is as strong as social exchange theory assumes, then we should observe stable gift giving and reciprocation in our experiments.

2. Experimental design

This study was designed to test whether employers' wage offers and workers' efforts are higher than predicted by standard economic theory in four experimental conditions: (a) one-shot bilateral interactions, (b) repeated bilateral interactions between the same partners, (c) gift exchange market situations designed as one-sided oral bid auctions with an excess supply of labor, and (d) pure market

situations with employers offering a wage and workers choosing between taking or rejecting it, but with no possibility for reciprocation. The purpose of conditions (a) and (b) was to see whether the phenomenon of gift giving (i.e. wages above workers' reservation wages) and reciprocation (i.e. high effort in response to high wages) can be observed in a bilateral relation. In condition (c) we can test whether the norm of reciprocation is strong enough to survive the competitive pressures of an experimental market while condition (d) serves a control purpose. If wages in the pure market are significantly below wages in the gift exchange market we can conclude that the norm of reciprocity is indeed responsible for high wages in the gift exchange market.

(a) *One-shot bilateral interaction:* In the first experimental condition a specific, randomly selected employer interacted with a single, randomly chosen worker. Employers and workers were sitting in different rooms, had no direct contact with each other and did not know which person had been selected as their partner. After each interaction period, the partners changed, and this was known to all participants. Overall, there were ten trading periods. As in all other conditions, the employer was able to make a wage offer to the worker and the worker could accept or reject it. The labor contract was incomplete because it did not specify workers' effort levels. There was an exogenously specified minimum effort level which was enforceable by the employers. All higher effort levels were not enforceable, neither by reputation effects nor by any other means. Employers could only offer high wages in the hope that workers would feel obliged to reciprocate the favor by choosing higher effort levels. After having accepted a wage offer, workers had to choose an effort level and employers were informed about the chosen level.

(b) *Repeated bilateral interaction:* Whereas in the first experimental condition partners were changed after every interaction period, the second condition paired a randomly chosen employer with a specific, randomly chosen worker for all ten interaction periods. Again, employers and workers were in different rooms and no participant knew who their selected partner was, but all participants were completely aware that their partner never changed. The contract conditions were the same as in the one-shot dyadic interaction.

(c) *Gift exchange market:* In this condition a competitive experimental labor market was implemented. Trading took place according to the rules of a one-sided oral bid auction. Six to eight employers, sitting in one room, could make wage offers to nine to twelve workers, who were sitting in another room. As in all the other treatments, employers were allowed to conclude only one contract per trading period and any worker who had accepted a wage offer, was not allowed to conclude any additional contracts in that interaction period. When

all employers had succeeded in hiring a worker in an interaction period (i.e. as many contracts were made as there were employers present), there were always some workers who had no contract. Again, after accepting a wage offer, workers chose an effort level.

(d) *Pure market:* The last condition served as control condition. As in the Gift Exchange Market, there was an excess supply of workers. In general there were 50% more workers than employers. Employers could make wage offers in a one-sided oral bid auction which workers could either accept or refuse. Once an offer was accepted, the worker did not have to choose an effort level since this was exogenously specified. Labor contracts were, therefore, complete in this condition.

Whereas in dyadic conditions (a) and (b) ten employers traded over ten periods with ten workers, in the market conditions (c) and (d) six to eight employers traded with nine to twelve workers. [1] In dyadic conditions every participant could secure a job contract, whereas in the market conditions our design ensured that three to four workers were always without a contract. According to competitive economic theory this excess supply of labor should exert a strong downwards pressure on wages. In the repeated bilateral interactions the partners were always the same; a given employer was never rematched with the same worker in the one-shot bilateral condition. In market conditions, the probability of trading with a former partner was positive but low.

At the beginning of each interaction period, each employer had 120 experimental money units, the exogenously given redemption value v, at his disposal to make a wage offer w. In dyadic interactions, the randomly selected worker could either accept the offer or reject it. If an offer was rejected, neither the employer nor the worker earned anything during that trading period. In the market conditions, a wage offer was written on a blackboard in the workers' room and each worker could either accept it or not. If it was not accepted by any of the workers, the employers were allowed to make new offers which had to be higher than the non accepted offers on the blackboard. Once a worker had accepted an offer, the respective employer and worker had completed a contract and, depending on the experimental condition, the worker choose the effort level. Neither the employer nor the worker were allowed to make an additional contract with another partner in that period. Each market period was limited to four minutes and all participants were aware of the limited time.

[1] It should be noted that the varying number of employers and workers across the market conditions was due to absenteeism among participants.

If a worker accepted a job offer, he had to bear opportunity costs c_o of 20 money units, which were described to the participants as 'travel costs'. In addition, workers who had to choose an effort level, had to take effort costs c_e. Workers could choose among ten different effort levels which ranged from 0.1, 0.2, 0.3, ... to 1.0. With increasing effort levels the costs for the workers increased from 0 monetary units over 1, 2, 4, 6, 8, 10, 12, 15 to 18. The higher the effort level, the better for the employer because their profit increased with increasing effort. The payoff function in terms of experimental money of an employer was given by

$$p = (v - w)e; \tag{1}$$

in other words, the employer received the difference between the $v = 120$ money units provided by the experimenter and the wage offer, multiplied by the worker's effort level.

The payoff function for workers was defined as

$$U = w - c_e - c_o; \tag{2}$$

in other words, the worker received the difference between his wage, the opportunity costs of 20 money units and his chosen effort costs.

To exclude the possibility of losses, wage offers above $v = 120$ and below $c_0 = 20$ were not allowed. All participants knew the redemption values $v = 120$, opportunity costs $c_0 = 20$, and the effort costs c_e before beginning to trade and were able to calculate the payoffs of both employers and workers. A summary of the four conditions is presented in Table 1.

3. Hypotheses

The gift exchange approach makes predictions that differ from those of standard economic theory. For the market conditions, standard competitive theory predicts wages of $w = 20$ and, if effort was endogenously determined, an effort level of $e = 0.1$. For the pure market the prediction is obvious because supply and demand curves are as depicted in Fig. 1, that is, they intersect at a wage of 20. In the gift exchange market, a rational money maximizing worker will always choose $e = 0.1$ because any other choice is more costly for him and, thus, reduces his money income. Rational firms will, of course, anticipate the behavior of workers. Therefore, if it is common knowledge that workers are rational money maximizers firms know that workers will always choose $e = 0.1$ irrespective of the wage they get paid. This means that firms have no benefit

Table 1
Summary description of experimental conditions

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Description of experimental conditions	One-shot bilateral interaction	Repeated bilateral interaction	Gift exchange market	Pure market
Matching process of employer and worker	Random selection; change after each period	Random selection; no changes	Via acceptance of wage offers	Via acceptance of wage offers
Probability of more than one interaction with the same partner over ten periods	$p = 0$	$p = 1$	$1 \geq p \geq 0$	$1 \geq p \geq 0$
Employer/worker relation	10:10	10:10	Exogenous excess of labor	Exogenous excess of labor
Parameters	$r = 120$ $c_0 = 20$	$r = 120$ $c_0 = 20$	$r = 120$ $c_0 = 20$	$r = 120$ $c_0 = 20$
Feasible wages	$r \geq w \geq c_0$	$r \geq w \geq c_0$	$r \geq w \geq c_0$	$r \geq w \geq c_0$
Wage determination	Offer of employer	Offer of employer	One-sided oral auction; employers set wages	One-sided oral auction; employers set wages
Feasible effort levels	e ranging from ((0.1, ..., 1.0)	e ranging from ((0.1, ..., 1.0)	e ranging from ((0.1, ..., 1.0)	e fixed at (1.0)
Participants' payoff in Austrian Shillings at the end of the experiment	Experimental money unit = AS 0.50	Experimental money unit = AS 0.33	Experimental money unit = AS 0.50	Experimental money unit = AS 0.33

Table 2
Hypotheses concerning employers' average wages and workers' efforts in four experimental conditions

Experimental condition	Predictions by social exchange theories	Predictions by standard economic theory and game theory
(a) One-shot bilateral interaction	Due to reciprocity rules, employers will offer significantly higher wages than the reservation wage. In response, workers will choose higher than minimum effort.	Observed wages will be at workers' reservation wage level, i.e., $w = 20$, because workers will always choose the effort level which maximizes their monetary income, i.e., $e = 0.1$.
(b) Repeated bilateral interaction	Due to reciprocity rules, employers will offer significantly higher wages than the reservation wage. In response, workers will choose higher than minimum effort.	Observed wages will be at workers' reservation wage level, i.e., $w = 20$, because workers will always choose the effort level which maximizes their monetary income, i.e., $e = 0.1$.
(c) Gift-exchange market	Due to reciprocity rules, employers will offer significantly higher wages than predicted by competitive market theory. Workers will choose higher than minimum effort.	Observed wages will be at the level predicted by competitive market theory, i.e., $w = 20$, because workers will always choose the effort level which maximizes their monetary income, i.e., $e = 0.1$.
(d) Pure market	Employers are in a powerful position both because of the excess supply of labor and independence of their profit from workers' reactions; wages will be significantly lower than in other conditions	Observed wages will be at the level predicted by competitive market theory, i.e., $w = 20$.

from paying wages above $w = 20$. Moreover, they know that rational money maximizing workers will accept any $w > 20$. Therefore, according to standard economic theory, we should expect a wage of 20 or 21 in the gift exchange market, too.

In the one-shot bilateral interaction standard game theory predicts an outcome of $w = 20$ and $e = 0.1$ as well. The reasoning that leads to this prediction is identical to the argument used for the gift exchange market: Since a rational worker will always choose $e = 0.1$ and accept any wage $w > 20$, a rational money maximizing firm will offer 20 or 21.

The game theoretic prediction for the case of finitely repeated bilateral interactions is also $w = 20$ and $e = 0.1$. If the rational money maximizing behavior of the worker and the employer is common knowledge, then the outcome in the tenth (final) period will be $w = 20$ and $e = 0.1$. This follows simply from the fact that the strategic situation in the tenth period is the same as in a bilateral one-shot interaction. This means that subjects' actions in the ninth period cannot affect the future behavior of their interaction partners. Therefore, from a strategic point of view the ninth period is identical to the tenth period, thus, $w = 20$ and $e = 0.1$ is to be expected. By repeating this argument to each preceding period we arrive at the prediction of $w = 20$ and $e = 0.1$ for any period.

In social exchange theory subjects are not assumed to be pure money maximizers. Instead, it is hypothesized that human behavior is also governed by the norm of reciprocity. Therefore, if reciprocation is possible in labor relations, employers can induce non-minimal effort choices by paying workers more than their reservation wages both in bilateral interactions as well as in market situations with an excess supply of workers. Wages should be higher than predicted by standard economic theory especially, in repeated bilateral interactions between employers and workers. The workers' effort should be positively correlated with wage offers, and thus, higher than the minimum allowed. Table 2 summarizes the hypotheses on the basis of standard economic theory (game theory) and social exchange theories, respectively. The experimental conditions are described in detail in the following.

4. Method

4.1. Participants

The subjects were 152 males between 18 and 29 years doing compulsory military service in the Austrian army. Overall, 41 held university degrees, 41

had college qualifications; the remaining 70 had all completed compulsory schooling.

4.2. Material

Experimental instructions: Each participant was provided with written instructions about the experiment. Instructions were different for employers and workers. An example, taken from the gift exchange market condition, is presented in Appendix A.

Questionnaire: After the experiment, each participant filled out three questionnaires. The first questionnaire was designed to check experimental manipulations. Participants indicated the difficulty they had understanding the experimental instructions and were asked whether they thought the trading partner changed after each period or not. The second questionnaire consisted of 16 statements concerning subjective motives leading to high wage offers, as well as motives to accept or reject them and to choose low or high effort levels. The third questionnaire was a brief version of the 16 Personality Factors test developed by Brandstätter (1988) that allows personality traits to be estimated. Motives and personality were assessed to control for individual differences. Finally, demographic characteristics were registered.

4.3. Procedure

The experiments were conducted in military barracks in Linz and in Vienna, Austria. All four conditions were conducted twice, giving eight experimental trials overall. Each group of 17 to 20 subjects was greeted and told that they were going to participate in a labor market experiment. The group was then divided randomly into two subgroups, the employers and workers, and given all necessary information about the interaction procedure. They were also informed how to compute their personal profits after each of the ten interaction rounds.

The experiment started when all participants had read the instructions and correctly computed their own and their partner's profit in a hypothetical trial period. At the end the questionnaires were filled out.

Overall, each experimental trial lasted about two hours and, at the end, each participant was paid the sum of his profits in cash. Participants received payments of up to 350 Austrian Shillings, which is a considerable amount given that the monthly income of recruits was about AS 1200 (approximately US$ 110 at the time).

5. Results and discussion

5.1. Manipulation check

It was important to check whether or not participants had fully understood experimental instructions. In addition to working through an example illustrating the computation of payoffs for employers and workers, and completing a trial period of trading at the beginning of the trial, participants were asked at the end of the experiment to indicate how complex they found the instructions. On a five-point scale ranging from 1 = not at all complex to 5 = highly complex, the participants, on average, found that the experimental instructions were not complex ($M = 1.38$).

In one-shot bilateral interactions, 90% of participants believed that their interaction partner had changed after each period, 10% were not sure. In the repeated bilateral condition 92.5% were sure that they had interacted always with the same partner; the remaining 7.5% were not sure. It can be concluded that experimental manipulations were successful.

5.2. Variation of wages over ten trading periods

According to predictions based on standard economic theory, average wages in all four experimental conditions should converge towards $w = 20$. In the first step of analysis the averages of offered and accepted wages in the four treatments were calculated. As Fig. 2 shows, the predictions of standard economic theory were not confirmed in any condition. Average wages are higher than 20 and, in all conditions with workers having the possibility to choose an effort level, no decrease of wages across the ten trading periods is observable. Only in the pure market condition did wages decrease over time. Regression analyses with wages as the dependent variable and the reciprocal time index ($1/t$; t = number of trading period) as a measure of adjustment, yield the results summarized in Table 3. It should be mentioned that the constant in the regression estimates the value to which the wage converges in the long run. The results show that in pure market situations wages decreased significantly from the first to the last trading period. Employers started with wage offers around 50 to 55 money units, reduced their offers soon drastically in order to approach a value of approximately 38 in the long run. In the three other conditions no decrease of wages over time was observable. To the contrary, in the repeated bilateral interaction condition wages increased significantly over time from 55 to 60 money units at the beginning to 66 in the long run. These

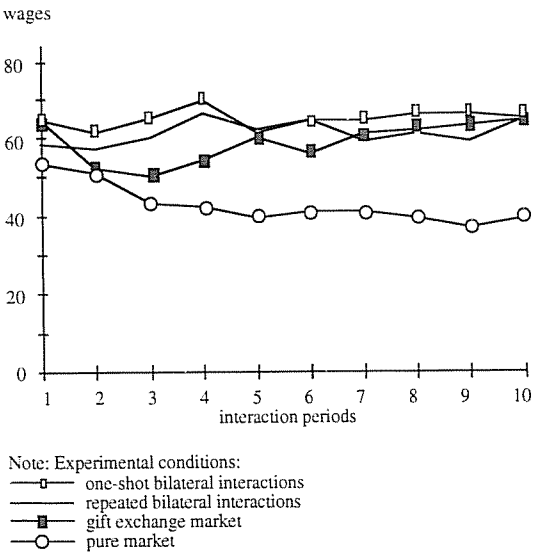

Fig. 2. Development of average wages during ten trading periods by four experimental conditions.

results support predictions derived from social exchange theory but go against the predictions of standard economic theory which is based exclusively on the assumption of rational and selfish behavior.

Effort levels were also higher than the minimum of 0.1 across all trading periods. On average, effort levels were between 0.3 and 0.4 with no statistically significant decreases across the trading periods. Regressions with effort level as the dependent variable and reciprocal index of trading period as adjustment showed no significant betas (for one-shot bilateral interactions $e = 0.28 + 0.10\ 1/t$; $p > 0.05$; for repeated bilateral interactions $e = 0.56 - 0.25\ 1/t$; $p > 0.05$; for gift exchange markets $e = 0.31 + 0.03\ 1/t$; $p > 0.05$).

Table 3
Results of regression analyses with wage as dependent variable and the reciprocal time index $(1/t)$ as an adjustment

Experimental condition	Regression: wage $= a + b\ (1/t)$	Significance of b
One-shot bilateral interaction	$w = 62.36 + 01.68\ 1/t$	$p > 0.05$
Repeated bilateral interaction	$w = 66.25 - 10.63\ 1/t$	$p < 0.05$
Gift-exchange market	$w = 58.32 - 01.05\ 1/t$	$p > 0.05$
Pure market	$w = 37.47 + 17.60\ 1/t$	$p < 0.01$

5.3. Reciprocity: Correlation of wages and effort levels

On the basis of social exchange theories, it was argued that wages would not decrease to reservation wages because of reciprocity and fairness norms. Reciprocity was tested by computing correlations between the employers' wage offers and the workers' chosen effort levels. First, average wages accepted over the ten trading rounds and average efforts chosen by the workers after having accepted a wage offer were computed. Then correlations between average wages and efforts were computed for the total sample and separately for each sample of the three experimental conditions where reciprocation was possible. The correlation for the total sample of 53 workers was $r = 0.46$; $p < 0.01$. For the one-shot bilateral interaction, repeated bilateral interaction and gift exchange market conditions, the correlations were $r(20) = 0.59$; $p < 0.01$; $r(20) = 0.49$; $p < 0.05$, and $r(13) = 0.79$; $p < 0.01$, respectively.

Second, correlations between wage offers and effort levels were computed for each worker separately over the interaction periods. The median correlation in the sample of 20 workers in the one-shot bilateral interaction condition was 0.20 (median correlation of 20 correlations); the correlation for the repeated bilateral interaction condition was 0.64 (20 correlations), and the median correlation for the gift exchange markets was $r = 0.61$ (18 correlations). Under all conditions effort was positively correlated with wages. The differences between correlations across the three experimental conditions were not found to be statistically significant ($\chi^2 = 3.83$; $p = 0.147$). Since effort levels were chosen after a wage offer was made, it can be concluded that, with increasing wages, effort levels also increased. In other words, workers reciprocated high offers with high effort.

5.4. Individual differences: Cooperators and defectors

The wage–effort correlations show that reciprocity was highest in the longitudinal dyadic interaction condition. Partners cooperated and were able to establish trust in each other's cooperative behavior. However, there was considerable variation in individual wage–effort correlations. Over all experimental conditions with reciprocity, individual correlations ranged from $r = -0.68$ to 0.88. Some workers reciprocated high wage offers with high effort whereas others did not.

This was especially clear in the last round, where some workers chose low efforts despite high wage offers. This leads to the conjecture that egoistic choices and reciprocity tendencies, respectively, vary among individuals. To test individual differences in defection, an index of 'last-round-defection' or 'egois-

tic behavior' was computed. This index was computed by calculating the average effort e from trading period 1 to 9 relative to the average wage in these periods, divided by effort in period 10 relative to the wage in period 10. The respective formula is as follows:

$$\text{Egoistic behavior of workers} = E = \left(\frac{1}{9} \sum_{i=1}^{9} \frac{e_i}{w_i} \right) \Big/ \frac{e_{10}}{w_{10}}.$$

It makes no sense to compute a similar index of egoism for employers since, in bilateral one-shot interactions and in the gift exchange market, their wage offers were not a response to workers' behavior.

A value of E greater than 1 indicates that the respective worker offered a lower effort relative to the wage in the last round as compared to previous rounds, thus, behaved egoistically. A result lower than 1 indicates a higher relative effort in the last round and therefore cooperation. The higher the value of E, the higher the egoism of a worker. Average egoism indexes amounted to 1.55, 2.99, and 1.40 in the bilateral one-shot, repeated interactions and markets with gift exchange conditions, respectively.

Surprisingly, egoism of workers was found highest in the repeated bilateral condition. This result represents a challenge to social psychological ideas which suggest that partners develop trust in repeated and longitudinal interactions. At least some people violate trust and exploit the possibilities for their own profit maximization.

In order to explain the egoistic last-round-defection behavior, personality traits and motives as measured in the motives questionnaire were analyzed. Factor analysis of the motives questionnaire yielded three main factors: altruism (the following two items loaded negatively on that factor: "Above all, I tried to make a high profit"; "I chose low effort levels in order to maximize my profit"); reciprocation (the following three items loaded highly on that factor: "If I was offered a high wage I chose a high effort level"; "I always tried to be fair to my partner"; "During the trading periods I was trying to be cooperative"); and competition ("I perceived the employers as opponents"). It should be mentioned that the wording of items changed for the employers and workers, respectively, and that in the pure market conditions no items relating to reciprocation were included. From the 16 PA test (Brandstätter, 1988) the two dimensions introversion versus extroversion and emotional stability versus lability were taken and analyzed. According to the theory by Brandstätter and Kirchler (1986), extrovert and emotionally unstable persons are exchange oriented, i.e., interested in social interaction and motivated to reciprocate favors but

they are angry if their partner defects. Introvert and unstable persons are, to the contrary, reinforcement oriented, i.e., competitive in task situations and not oriented toward social exchange. If, however, partners behave in an unfriendly way, introvert and unstable persons do not react with anger but with fear and become less competitive. It can be expected that exchange-oriented persons are motivated to be altruistic in order to establish a mutually satisfying interaction. Reinforcement-oriented persons should perceive the interaction as a task, be competitive and motivated to win. The more a participant is motivated to be altruistic the less likely they are to defect in the last round. If however, the employer does not cooperate during the previous trading rounds, then exchange-oriented workers might be angry and defect as a consequence in the last period. Reinforcement-oriented workers, who are competitive during the trading rounds, and are therefore also likely to defect in the last round, may also feel some fear which inhibits them from defection. In sum, motives and emotions may push reinforcement-oriented workers and exchange-oriented workers into different behavior directions.

A path analysis was computed for the samples of workers only with egoism indexes, the three motives factors competition, reciprocity and altruism, and reinforcement versus exchange orientation as personality characteristics. The results are summarized in Fig. 3.

The results of path analysis show that defection in the last round or egoistic behavior depends on altruistic interaction motives. The more a person is motivated to behave altruistically the less that person will defect. Reinforcement-oriented persons seem to be motivated to compete with their partners and to be less altruistic in order to win more. Consequently, they maximize their outcomes and defect in the last round. Exchange-oriented persons do not perceive the interaction process as a competitive task, they want to establish a mutually satisfying interaction situation, are, thus, motivated to behave altruistically and to cooperate also in the last round.

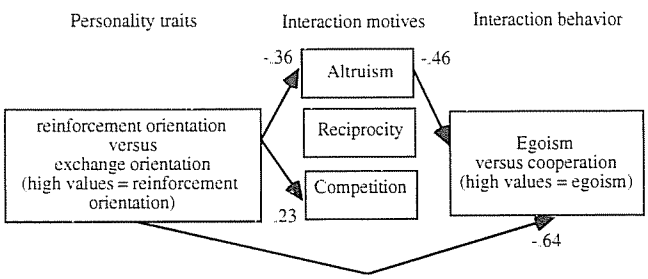

Fig. 3. Construction of a path from personality traits over interaction motives to interaction behavior.

Since reinforcement-oriented persons are fearful whereas exchange-oriented persons feel angry in unfriendly social situations, it is understandable that reinforcement-oriented workers did often not dare to defect in the last round despite other motives and aims. Exchange-oriented workers, on the other hand, defected due to their anger. This explains the direct negative path from personality to egoism in the last round and the indirect positive path from personality over motives to defection (Fig. 3).

Effects of reciprocity motives were suppressed in the path analysis. Single correlations between reciprocity motives and defection in the last round show, however, that reciprocity motives are likely to inhibit defection. The correlation between reciprocity motives and egoism in the last trading period amounted to -0.22 ($p < 0.05$).

In sum the results support both tendencies for rational choices and social exchange. Additionally, it became clear that social interaction depends on personality characteristics and on individuals' motive structure.

6. Conclusion

This study was designed to test competing theories of the labor market. For this reason the principal variables which economic theory and social exchange theory use to determine labor market behavior were isolated and manipulated in a laboratory setting. Applied psychologists and economists might make the criticism that the labor market is much too complex to be reduced to a simple laboratory environment. However, it should be noted that this is not just a critique of our experiments; it is also a critique of the two competing approaches to the labor market. Our experiments are as simple or as complicated as the environment that is stipulated in the two approaches. If one thinks that our experiments are too simple to do justice to the complexity of the real world one must also conclude that the two approaches are too simple. We do not want to claim that the factors that affect behavior in our experiments are the only factors that play a role in reality. There is, however, no reason to assume that they play no role in reality, if the behavioral environment is similar to our experiment. Thus, if the incompleteness of the labor contract is a relevant feature of naturally occurring labor markets, our results suggest that (unless there are countervailing factors) the reciprocity norm is likely to affect effort and wage setting behavior in a similar way as in our experiments.

The results of this study lend support to the hypothesis that in labor markets employers will offer higher than reservation wages to workers. If a partner,

termed employer, presents a gift or behaves cooperatively (i.e. offers more money than the rational minimum) then the other, termed worker, feels more or less obliged to reciprocate the favor. In our experiments, the norm of reciprocity proved to be stronger than rational egoistic money maximization. This was true at the beginning of interactions as well as over time, when subjects had already traded several times and had had the opportunity to learn about the different payoffs from cooperation and defection. Motives of reciprocal behavior partially offset motives of pure money maximization if interaction partners did not change over time as well as in market situations and in one-shot dyadic interactions with the partner changing after each trading period. These results are a challenge to standard economic theory and emphasize the importance of the "moral dimension", as Etzioni (1988) calls it.

These results are a serious challenge to economic assumptions and predictions for several reasons: Firstly, workers could make a significant amount of money by behaving egoistically and defecting. Relative to the monthly income of military recruits, the maximum reachable payoff in Austrian Shillings was more than a two weeks salary. Secondly, the participants in the role of workers chose their effort levels in completely anonymous situations. Nobody could develop an individual reputation and nor could they be personally blamed for defecting. Nobody knew his partner personally and everybody knew that no opponent would ever know the identity of the cooperating or defecting other. Nevertheless, workers chose effort levels significantly higher than 0.1 in all experimental conditions, in longitudinal dyadic interactions, in one-shot interactions and in the market settings. In addition, employers showed themselves to be highly cooperative by trusting in the workers' cooperation.

While workers were able to punish their employers in three experimental conditions, employers had no chance for revenge if their workers defected by choosing a low effort level. All workers were aware of their advantage, nevertheless some cooperated in all trading periods whereas others defected, especially in the last round in longitudinal interactions. Defection of more than one third of the workers in the last round goes against social exchange theory and reciprocity assumptions and supports the relevance of egoistic profit maximization. It seems as if both the variables identified by economic theory and those identified by social exchange theory are important under certain circumstances. Depending on situational possibilities and personality characteristics, as well as motives of interaction partners, an opponent may reciprocate favors or egoistically maximize his profit. These results underline the importance of considering differential effects in economic settings (see Brandstätter, 1993). It should be mentioned at this point that in the present study only male conscripts

participated and only some motivational and personality characteristics were assessed. The influence of gender and other situational and personal variables which may influence the observed behavior needs to be tested in future studies.

In conclusion, the results of our experiments suggest that economic theory needs to recognize that human motivation cannot be reduced to the rational pursuit of self-interest. The fact that many people tend to follow the norm of reciprocity is likely to have a non-negligible impact on wage formation. In addition, this study emphasizes the importance of differential personality characteristics in social interactions.

7. For further reading

Akerlof and Yellen (1990), Fehr et al. (1993), Fehr et al. (1994), Gouldner (1960), Loewenstein et al. (1989), Murphy and Topel (1989), Thibaut and Kelley (1959).

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Appendix A. Material used in the gift exchange market

YOU ARE A WORKER

General information for workers

You will be taking part in a study of the labor market, financed by the Creditanstalt Bankverein and the Giro Kredit AG. If you read these instructions

carefully you may earn a considerable amount of money. During the experiment your income will be calculated in Guilders. At the end of the experiment Guilders will be converted into Austrian Shillings at the rate of:

1 Guilder = 50 Groschen

At the end of the experiment your income will be paid to you in cash.

The labor market has two stages.

- *Stage 1:* Each of the 20 participants will be randomly assigned to one of two groups: 12 will be 'workers' and 8 'employers'. This is known by each participant. Whether you are an employer or a worker is noted at the top right hand corner of this page. At the first stage employers offer workers wages. Workers may accept or not accept a wage offer. After 4 minutes the second stage begins.
- *Stage 2:* At the second stage, those workers who accepted an offer have to make a decision. According to the procedure described below, they determine how much they work (quantity of work or amount of work, respectively [2]).

Attached to these instructions you will find decision sheets on which you must record the wage you have accepted. Furthermore, you will record the amount of work which you have chosen. After this you will calculate the income you have earned. At this point the first period of the labor market will be over. Overall, there will be ten periods. Your total income for the participation in this market will be the sum of your earnings in each of the ten periods.

How the labor market works

1. At the beginning of each period we will open the labor market.
2. In the first stage of the labor market the employers *may* offer wages to the workers, and the workers may either accept or reject these offers. The wages offered will be written on the blackboard in both the employers' and workers' rooms. In total, employers and workers have exactly 4 minutes for trading. Every employer can make more than one wage offer, but each new offer must be higher than the largest offer not yet accepted.
3. If a worker accepts a wage offer, then he has concluded a labor contract with the employer who offered this wage. A worker who wishes to accept a wage

[2] Since we tried to avoid value loaded terms we did not use such terms as 'effort' or 'work-performance' but the German term 'Arbeitsmenge' which can be translated as 'quantity of work' or 'amount of work'.

offer should raise his hand and say

His Worker Number and

the Wage he has Accepted.

For example, if Worker Number 14 accepts a wage offer of 50 Guilders, then he will say:

Worker 14 accepts 50.

No worker is obliged to accept a wage offer. Any worker may conclude a labor contract with any of the employers, and any employer may hire any worker. However, if an employer and worker have concluded a labor contract these two partners are not allowed to conclude any further contracts in that period.

4. If you accept a wage offer then you must immediately record the wage on the decision sheet for that period.
5. If you accept a wage offer you have to bear travel costs of 20 Guilders.
6. No worker will know with which employer he has concluded a contract, and no employer will know the worker.
7. After 4 minutes the second stage begins. Those workers who accepted wage offers must now choose their quantity of work. We will then relay the worker's chosen quantity of work to 'his' employer. Please do not tell anyone what quantity of work you chose. No other worker and no other employer will be informed about your chosen quantity of work.
8. Those workers who did not accept any offer receive nothing in the current period.

How do you calculate your income in each period?

1. If you do not accept any of the wages offered by the employers, you will receive nothing.
2. If you accept a wage offer, you will receive the wage you have accepted. From this wage you must then subtract the travel costs and the costs of your amount of work.
3. 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 a slightly higher amount, and so on up to 1.0, the highest amount.
4. The higher the quantity of work you choose the better it is for your employer. The higher the number you choose, that is, the higher the quantity of work, the higher 'your' employer's income.
5. The higher the amount of work you choose the higher your work-related costs will be. You can find out how your costs are related to quantity of work by looking in the schedule below.

6. If you accept a wage offer your income in Guilders will be determined by the following formula:

   Income (4) = Wage (1) − Costs of Quantity of Work (2) − Travel Costs (3).

Schedule of feasible amounts of work (AW) and corresponding work-related costs to workers (COST):

AW	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
COST	0	1	2	4	6	8	10	12	15	18

How do you calculate the income of your employer in each period?

1. Each employer receives from the experimenter 120 coupons which he may use to pay for wages. If he offers you a wage of 120 Guilders, then he will have no income coupons left. If he offers you a wage of 20 Guilders then he will have 100 income coupons left. In general, your employer will have
   120 coupons − wage
   income coupons left.
2. How are the remaining income coupons converted into Guilders? The number of coupons retained by the employer, whose wage offer you accepted, is multiplied by the quantity of work you choose. This result is the income of your employer in Guilders. Thus:

   Employer's Income in Guilders = Coupons Retained × Quantity of Work.

3. If no worker accepts the wages offered by an employer, then this employer will earn nothing during that period.

Please Note: The income of all workers and employers will be computed according to the same rules. Every employer has 120 Coupons and the work-related cost-schedule as well as the travel costs are the same for every worker. Every employer is able to compute the income of 'his' worker, and every worker is able to compute the income of 'his' employer.

Let's have an exercise

1. Let's assume that an employer, who has 120 Coupons, offers a wage of 110 Guilders which you accept. At the second stage of this period you choose a quantity of work of 0.5.
   What will your income and the income of your employer be?
   My Income = ... Guilders
   Employer's Income = ... Guilders

2. Let's assume that an employer, who has 120 Coupons, offers a wage of 28 Guilders which you accept. At the second stage of this period you choose a quantity of work of 0.6.
   What will your income and the income of your employer be?
   My Income = ... Guilders
   Employer's Income = ... Guilders
3. Assume that you do not accept any of the wages offered by employers.
   What will your income be?
   My Income = ... Guilders
4. Assume that no wage offers of an employer are accepted by the workers.
   What will the income of this employer be?
   Employer's Income = ... Guilders

Schedule of feasible amounts of work (AW) and corresponding work-related costs to workers (COST):

AW	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
COST	0	1	2	4	6	8	10	12	15	18

Period number:

Wage (1) 20 Guilders
Amount of Work Chosen
Cost of Amount of Work Chosen (2)
Travel Costs (3)
Your Income in Guilders (4) ... Guilders
(4) = (1) − (2) − (3)

Employer's Income = (120 Coupons − Wage)
× Amount of Work Chosen in Guilders

Workers will choose one of the feasible amounts of work (AW) from the first row. The higher the number the higher the amount of work.

The second row of the schedule shows the cost of each amount of work (COST) for the worker. The higher the amount of work the higher the costs to the worker.

AW	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
COST	0	1	2	4	6	8	10	12	15	18

YOU ARE AN EMPLOYER

General information for employers

You will be taking part in a study of the labor market, financed by the Creditanstalt Bankverein and the Giro Kredit AG. If you read these instructions carefully you may earn a considerable amount of money. During the experiment your income will be calculated in Guilders. At the end of the experiment Guilders will be converted into Austrian Shillings at the rate of:

1 Guilder = 50 GroschenAt the end of the experiment your income will be paid to you in cash.

The labor market has two stages.

- *Stage 1:* Each of the 20 participants will be randomly assigned to one of two groups: 12 will be 'workers' and 8 'employers'. This is known by each participant. Whether you are an employer or a worker is noted at the top right hand corner of this page. At the first stage employers offer workers wages. Workers may accept or not accept a wage offer. After 4 minutes the second stage begins.
- *Stage 2:* At the second stage, those workers who accepted an offer have to make a decision. According to the procedure described below, they determine how much they work (quantity of work or amount of work, respectively [3]).

Attached to these instructions you will find decision sheets on which you must record all wages you have offered to the workers. Furthermore, you will record the wage offer which has been accepted by a worker and the amount of work which that worker has chosen. After this you will calculate the income you have earned. At this point the first period of the labor market will be over. Overall, there will be ten periods. Your total income for the participation in this market will be the sum of your earnings in each of the ten periods.

How the labor market works

1. At the beginning of each period we will open the labor market.
2. In the first stage of the labor market the employers *may* offer wages to the workers, and the workers may either accept or reject these offers. Wage offers must be no less than 20 Guilders and no more than 120 Guilders. The wages offered will be written on the blackboard in both the employers' and

[3] Since we tried to avoid value loaded terms we did not use such terms as 'effort' or 'work-performance' but the German term 'Arbeitsmenge' which can be translated as 'quantity of work' or 'amount of work'.

workers' rooms. In total, employers and workers have exactly 4 minutes for trading. Every employer can make more than one wage offer, but each new offer must be higher than the largest offer not yet accepted.

3. How can you, as an employer, make a wage offer? You raise your hand and then you state:
   Your Employer Number and
   the Wage you are Offering.
   For example, if Employer Number 14 offers a wage of 50 Guilders, then he should say:
   Employer 14 offers 50.
4. If a worker accepts a wage offer then he has concluded a labor contract with the employer who made this offer. No worker is obliged to accept a wage offer. Any worker may make a contract with any employer, and any employer may hire any worker. However, if an employer and worker have concluded a labor contract these two partners are not allowed to conclude any further contracts in that period.
5. If a worker accepts a wage offer he has to bear travel costs of 20 Guilders.
6. If a worker accepts your wage offer then you must immediately record this wage on the decision sheet for that period.
7. No employer will know with which worker he has made a contract, and no worker will know the employer.
8. After 4 minutes the second stage begins. Now those workers who accepted wage offers must choose their quantity of work. We will then relay 'your' worker's chosen quantity of work to you. Please do not tell anyone what quantity of work he chose. No other worker and no other employer will be informed about the quantity of work 'your' worker has chosen.
9. Those workers who did not accept a wage offer earn nothing in the current period. Employers whose offers are not accepted will also earn nothing for this session.

How do you calculate your worker's income in each period?

1. If a worker does not accept any of the wages offered, he will receive nothing.
2. If a worker accepts a wage offer, he will receive the wage which he has accepted. From this wage he must, however, subtract the travel costs of 20 Guilders and the costs of the quantity of work he has chosen.
3. Workers determine their quantity of work by choosing a number between 0.1 and 1.0 from the schedule below. The lowest amount of work is 0.1, 0.2 is a slightly bigger amount, and so on up to 1.0, the highest amount.

4. The higher the quantity of work he chooses the better for you. The higher the number he chooses, that is, the higher the quantity of work, the higher your income.
5. The higher the quantity of work he chooses the higher his work-related costs. You can find out a worker's work-related costs from the schedule below.
6. If a worker accepts your wage offer, his income, in Guilders, will be determined by the following formula:

Income of the Worker = Wage − Costs of his Amount of Work − Travel Costs.

Schedule of feasible amounts of work (AW) and corresponding work-related costs to workers (COST):

AW	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
COST	0	1	2	4	6	8	10	12	15	18

How do you calculate your income in each period?

1. You will receive from us 120 Coupons, which you may use to pay wages. If you offer a wage of 120 Guilders, then you will have no income coupons left. If you offer a wage of 20 Guilders then you will have 100 income coupons left. In general, you will have
   120 Coupons − Wage
   income coupons left.
2. How are the remaining income coupons converted into Guilders? The number of coupons retained by you is multiplied by the quantity of work your worker has chosen. The result is your income in Guilders. Thus:

Your Income in Guilders (4) = {Number of Coupons (1) − Wage (2)} × Quantity of Work (3)

3. If no worker accepts the wages you offer, then you will earn nothing during that period.

Please Note: The income of all workers and employers will be computed according to the same rules. Every employer has 120 Coupons and the work-related cost schedule as well as the travel costs are the same for every worker. Every employer is able to compute the income of 'his' worker, and every worker is able to compute the income of 'his' employer.

Let's have an exercise

1. Let's assume that you used your 120 Coupons to offer a wage of 110 Guilders which is accepted by a worker. At the second stage of this period this worker chooses a quantity of work of 0.5.
   What will your income and the income of 'your' worker be?
   My Income = ... Guilders
   Worker's Income = ... Guilders
2. Let's assume that you used your 120 Coupons to offer a wage of 28 Guilders which is accepted by a worker. At the second stage of this period this worker chooses a quantity of work of 0.6.
   What will your income and the income of your worker be?
   My Income = ... Guilders
   Worker's Income = ... Guilders
3. Assume that a worker does not accept any of the wages offered.
   What will his income be?
   Worker's Income = ... Guilders
4. Assume that none of your wage offers has been accepted by a worker.
   What will your income be?
   My Income = ... Guilders

Schedule of feasible amounts of work (AW) and corresponding work-related costs to workers (COST):

AW	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
COST	0	1	2	4	6	8	10	12	15	18

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