

The power of delegation: Allowing workers to choose their wage

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Abstract

This paper analyzes the effect of delegation on the employees' performance in an experimental gift exchange game where employers may allow workers to choose their own wage. Our results show that workers reciprocate positively towards companies that delegate the decision of the wage, obtaining that higher effort levels are displayed when workers are free to choose their wage, even when wages chosen by employees are similar to those assigned by employers. In addition, we find that this enhancement in workers' behavior is mainly due to the positive effect of delegation per se rather than to the "responsibility-alleviation".

JEL Classification: J41, J3, C9, D01.

Keywords: labor market, gift exchange-game, delegation, responsibility-alleviation, experiments.

1. Introduction

Many employment relationships are characterized by long-term durations and incomplete labor contracts in which the employees' performance is not always enforceable.¹ Employers' profits depend (in part) on workers' behavior. Thus, employers often need to use incentive devices to get the best workers' performance.

¹ See for instance Neumark (2000) or Farber (2006).

In some real-life labor relationships, when the employer is satisfied with an employee's performance, she allows the employee to choose her own wage increase.

This paper analyzes how employers and employees change their behavior when the option of delegating the wage decision is present. We conducted an experiment in which an employer can decide either to choose the employee's wage or to let her decide on it.

In this experiment, each pair of subjects remain matched for fifteen periods playing a modified version of the gift exchange game proposed by Fehr, Kirchsteiger and Riedl (1993).² In each period, the employer first may decide on the wage level or delegate this decision to the worker. In this first stage, the employer also announces a desired effort level. After observing the employer's decision and the desired effort level, the worker subsequently decides how much effort to supply (and her own wage level, in the appropriate case). As usual, worker's profits are increasing in wages, but those are also (increasingly) costly to the employer; and effort levels increase employer's profits, but those are also (increasingly) costly to the worker.

According to standard economic theory, in repeated interactions with a finite time horizon, backward induction implies that –similar to one-shot interactions– employees' effort collapses to the minimum. Thus the employer has no incentives to pay above-minimum wage. Nevertheless, previous experimental works by Gächter and Falk (2002) and Brown et al. (2004) in similar settings with fixed partners, show that both reciprocity and reputation effects are empirically relevant leading to a significantly positive wage-effort relationship.³

The novel feature of our experiment is the employer's decision. Standard economic theory predicts the employer would never delegate the wage decision to the employee since the employer anticipates that the worker would choose the highest wage jointly with the lowest level of effort resulting in the worst scenario for the employer.

Nevertheless, we hypothesize that if the employer allows worker to choose her own wage, the performance of workers will be even better than if they received a

² Recently, the gift-exchange game has been widely analyzed in the experimental literature. For instance, Abeler et al. (2006) study the interaction of different payment modes with reciprocity; Kocher and Sutter (2007) analyze how groups behave in the gift exchange game and the role of communication; Charness et al. (2004) examine the role of different levels of information; in Maximiano et al. (2006) the gift exchange game is extended to a situation in which the employer employs several workers.

³ The positive relationship between wage and effort has also been found in a very large number of one-shot gift exchange experiments. See, for instance, Fehr et al. (1993), Fehr and Gächter (1998), Hannan et al. (2002), Charness (2004) or Charness et al. (2004).

high wage. Two main behavioral patterns might drive this improvement. On one hand, the employee may enhance her performance reacting to a higher level of trust showed by the employer when delegating. On the other hand, we claim that the improvement in the employees' performance could be triggered by some kind of *responsibility-alleviation* effect.

Regarding the first reason, our experimental design adds an extra component of trust (whenever the employer delegates) to the standard gift-exchange game.⁴ While a high wage only pursues a payoff-driven "reciprocity", by delegating the wage decision the employer trusts that the employee is also capable of choosing a suitable wage level.⁵ Thus, we argue that most employees may perceive the decision of delegating as a signal of trust, which increases the employees' willingness to act in the employer's interest.

This first behavioral pattern would be closely related to that of Falk and Kosfeld (2006). They analyze the consequences of control on motivation in an experiment where the employer can control the agent by implementing a minimum performance requirement before the agent chooses a productive activity. They find that control entails hidden costs since most agents reduce their performance as a response to the employer's controlling decision. In this sense, delegating could entail *hidden advantages*.⁶

The second pattern is based on an adjustment to our setting of the *responsibility-alleviation* effect. Charness (2000) suggests that an agent who bears the responsibility for an outcome will behave in a more 'pro-social' manner. In other words, the *responsibility-alleviation* effect states that an increase of responsibility augments internal impulses towards honesty, loyalty, or generosity. According to the principle of responsibility alleviation, we should expect impulses toward generosity to be increased if the employee assigns her own wage. A wage assigned by the employer may enable the employee to rationalize shifting some of the responsibility for the final outcome onto the shoulders of the employer. Conversely, if the employer delegates, it is more difficult for the employee to avoid accepting full responsibility for the final allocations.

Our data support the hypothesis that wage delegation significantly increases the employees' performance. We find that a majority of employees choose higher levels of effort when the employer delegates rather than when she assigns the

⁴ There are a few studies regarding delegation in different settings (see, for example, Coffman, 2009 or Bartling and Fischbacher, 2008) but, to the best of our knowledge, no paper has analyzed delegation in the context of a gift exchange game.

⁵ See Fehr et al. (1997), Charness (2004) or Kube et al. (2008) for the experimental analysis of the "reciprocity" effect in a labor market context.

⁶ This paper is also in line with the recent literature on psychological and economic incentives (e.g., Frey, 1997; Gneezy and Rustichini, 2000a, b; Frey and Jegen, 2001; Gneezy, 2004).

wage, even controlling for the wage effect. Results also show that “reciprocity” per se will play a more relevant role than *responsibility alleviation* in explaining workers’ behavior.

In the two examples previously explained about companies that allow CEOs to assign their own wage, this *permission* firms give to workers to establish their salaries is implicitly bounded. Both employees and CEOs know that they cannot make a decision that threatens the company's profits. We conducted two different treatments to capture this possibility. While in the first treatment the employee choosing her wage could not grab employer’s entire profits, in the second one this possibility was allowed.

While we find evidence for higher levels of effort when the wage determination rested on the employees themselves in both treatments, the net effect of delegating on employer’s profits is conditioned to the treatment. When the wage decision is not bounded, delegation does not generate higher profits for the employers in spite of eliciting higher levels of effort. Additionally, we conducted a control treatment removing the possibility of delegation. We did not find significant differences in the effort levels compared with those where employers did not use the delegating option. The latter implies that we did not find evidence for “negative reciprocity” toward the employers for not delegating.

The rest of the paper is organized as follows. Section 2 explains in detail the main hypothesis that will be tested. Section 3 describes the experimental design and procedures. Section 4 reports the experimental results, while Section 5 contains some final remarks and guidelines for future research.

2. Behavioral Predictions and Hypothesis

In the Gift Exchange Game, although employers and employees interact repeatedly and employees’ current effort may influence employers’ future decisions, under the assumption of common knowledge of rationality and selfishness, and with finite repetition, backward induction implies that employees will choose the minimum effort level. As a consequence, the employer would never delegate the wage decision and would assign the lowest possible wage. Thus, the only strict subgame-perfect equilibrium outcome is the following: the employer will assign the minimum wage and the employee will choose the minimum effort level, in every period.

Nevertheless, as mentioned above, the accumulated experimental evidence suggests that many people are reciprocally motivated. Moreover, it has also been shown that in repeated games with fixed matching, “reciprocity” is strengthened. Reputation amplifies the positive effects of social preferences since some subjects

imitate “reciprocity”.⁷

Additionally, some employees might perceive the delegation as a stronger signal of trust and react by choosing higher efforts than they would have chosen if the employer had not delegated and she had assigned a similar level of wage.

Another potential reason that might explain a better performance is the aforementioned *responsibility-alleviation* effect. According to this principle of responsibility alleviation, we should expect a higher performance if the employee assigns her own wage. If the wage delegation causes an employee to feel more responsible for the employer’s payoff, we should expect that employees will provide higher effort levels when a wage has been determined by her than when this same wage is determined by the employer.

If those behavioral patterns arise, the optimal strategy for the employers would be to delegate the wage decision. According to this, we state our main hypothesis:

Hypothesis 1 (main): Controlling for the wage, employees’ effort will be higher when employers delegate than when they do not.⁸

Following the intuition behind Hypothesis 1, we could think that delegating the wage decision will make workers to choose an effort level closer to the one desired by managers, specifically,

Hypothesis 2: The gap between employees’ actual effort and the managers’ desired effort will be lower when employers delegate than when they do not.

In a situation in which managers do not use the delegation option, standard theory predicts no differences in workers’ behavior between the case in which the manager has not the opportunity to delegate and when she decides not to do it despite having the chance. However, if employees feel distrust and react negatively when employers do not delegate, then effort levels should be higher when the delegation option is not present. Thus, we state the following hypothesis.

Hypothesis 3: Controlling for the wage, employees’ effort levels will be lower when managers do not use the delegation option (although having the opportunity) than when the delegation option is not present.

The following hypothesis accounts for the motives behind the enhancement of workers’ performance under delegation. In a case in which an external “agent” (the computer) randomly decides the delegation, we expect to find no positive reaction to delegation.

⁷ See for instance Gächter and Falk (2002).

⁸ Also, Hypothesis 1 implies that employers’ profits are higher when the delegation option is used.

Hypothesis 4: For a given wage, employees' effort levels will be independent of whom (the employee or the employer) establishes the wage when an external "agent" does determine the delegation option.

Finally, the last hypothesis is established to verify that we obtain the usual relationship between wages and effort levels found in the previous experimental literature on labor markets.

3. Experimental design and procedures.

The experiment was run at the University of Granada with 264 participants. Subjects were recruited via posters in the Faculty of Economics. All sessions were conducted in the lab, using Z-Tree software (Fischbacher, 2007). In all treatments subjects were anonymously paired and remained with the same partner for 15 periods.

Subjects were randomly allocated a role as employer or as employee upon arrival at the lab. The role was fixed throughout the whole session. No subject participated in more than one treatment or session. A total of 110 subjects participated in the main treatments; 96 subjects in the control treatments; and, finally, 48 subjects in an additional treatment to explore the reasons of the enhancement of workers' behavior under delegation (the Random treatment). On average, each person received around 15.29€ for a one-hour session.

Principal Treatment

In the main treatment we implement a modified version of the two-stage principal-agent game, introduced by Fehr et al. (1993). In our experimental design the crucial feature is the employer's decision. In the first stage, the "employer" may either assign her "employee" a wage, w , or allow her to do it by herself. In this stage, the employer also asks for a non-binding effort, \hat{e} . The second stage depends on the decision in the previous one. If the employer has decided the wage, then the worker must only choose her effort level, e . If the employer has delegated, then the worker will choose both her own wage and the effort level.

The combination of wage and effort determined outcomes and monetary payoffs for both employer and employee in each period. The monetary payoff functions are given by:

$$\Pi_F = (v-w)*e \quad (1)$$

$$\Pi_E = w-c(e)-20 \quad (2)$$

where F denotes the employer, E the employee, v is an exogenously given redemption value, e represents the employee's effort level, w is the wage and $c(e)$ is the cost of effort, a function increasing in e . Wages have to be integers between 20 and 120. The feasible effort level and costs of effort are as described in Table 1.⁹

Table 1. Effort levels and costs of effort

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

We conjecture that the wage delegation will occur mainly in long-term employment relations. For this reason, in our design subjects play a repeated game with the same partner. The reason for using fixed instead of random matching is that given the nature of our experiment, if employers are matched with a different employee in each round, it would be very difficult to find firms delegating the decision of the wage. The idea is that in real life, if a company decides to delegate the wage decision to the workers, this may happen after a long period of relationship, that is, companies usually do not allow workers to choose their own wage if they are going to be hired for a short period of time.¹⁰ Hence, in order to provide a more realistic environment, we decided to have fixed matching in the experiment.

Additionally, as aforementioned, we consider that this wage delegation is implicitly bounded. Both employers and employees know that employees cannot make a decision that threatens the firm's profits. Thus, in the first treatment (Prin240 hereafter), the firm's redemption value is $v = 240$. In this case, the employee choosing the maximum wage ($w = 120$) cannot grab employer's entire profits. Nevertheless, the impact of delegating crucially depends on the feasibility of the workers of threatening the employer's profits with her wage decision. To measure this impact, we consider another treatment (Prin120 hereafter) in which the redemption value is reduced to $v = 120$.¹¹

Control Treatment

In the control treatment the possibility of delegation is eliminated. Thus, participants play the standard version of the gift-exchange game in which the

⁹ This cost of effort function was introduced by Fehr et al. (1998) and has been widely used in this literature. See, among others, Charness (2004) or Maximiano et al. (2006).

¹⁰ One exception to this example could be the case of very high skilled workers. As we do not control for the ability in the experiment, we focus on the case of workers that are working for the same company for a long period of time.

¹¹ Remember that for both treatments ($v=240$ and $v=120$) wage $\in [20, 120]$.

employer decides the wage and a non-binding desired effort level and the employee chooses the effort level she will provide. We aimed to test whether in the Principal Treatment the option of delegating the wage decision affected both employers' and employees' behavior in the cases in which the employers did not delegate.

In the Principal treatment, differences in the levels of effort when employers delegate, compared with those when they do not, might come from three reasons: i) workers react positively to the delegation; ii) workers react negatively to the *non*-delegation; or iii) a combination of the two previous.

By comparing efforts in the control treatment with those where the employers do not delegate in the main treatments we will be able to analyze the importance of reason ii).

In this treatment we have also considered the two redemption values 120 and 240 although our main focus in the analysis of results will be on 240 because it seems more realistic a setting in which workers do not have the power to appropriate the entire profits of the firm.

Random treatment

In this treatment, the delegation decision is not made by the "employer". In this case the computer randomly decides whether the wage will be chosen by the "employer" or by the "employee". Thus, the gift-exchange game is composed of three stages. In the first stage, the "nature" decides who is going to establish the wage. In the second stage and if the computer has selected the employer to choose the wage, then she decides the wage and also she asks for a non-binding effort, \hat{e} . Otherwise, the employer just asks for a non-binding effort level. In the third stage, the worker must choose her effort level, e . If the nature has decided that the employee will choose also the salary, then the worker chooses both her own wage and effort level.

As we have explained before, workers may increase their effort levels when they have the chance of fixing their own wage for two reasons: *i)* they reciprocate towards the manager and *ii)* they feel more responsible for the final outcome.

If Nature decides that the worker fixes the wage and the worker increases the effort level (respect to the case in which the firm establishes the wage), the reason may be because the worker feels responsible for the final outcome. Thus, we get rid of the reciprocity effect. Thereby, we can differentiate between which of the above two explanations is driving workers' behavior.

A simple way to implement the probability of delegation is to compute the frequency of delegation in the Principal treatment (which should be conducted before the Random one). Nevertheless, there is a potential problem which may

arise if the probability of delegation is constant, since the threat workers face in a case of misbehavior is reduced. In the Principal treatment, the worker knows that if she provides a very low effort, the manager has the opportunity of punishing her in the next period establishing the lowest possible wage. This is not possible in the Random Treatment in which the manager does not make the delegation decision. To solve this problem, the computer delegation decision should depend on the workers' behavior (effort level) in the previous period. That is, the computer will be programmed in order to adjust the probability of delegation in each period, so the computer will "react" to worker's efforts according to decisions previously taken by managers in the Principal Treatment.¹²

Participants were told that the delegation decision would be made by the computer in a random way with the probability changing according to workers' decision in the previous period.¹³ To be precise, we used the following sentences in the instructions "The computer is programmed in order to behave as an employer. That is, the behavior of the worker will affect the computer's decision".¹⁴

As our main focus is on $v = 240$ for the reasons already explained in the Principal treatment subsection, we consider this (random) treatment only for redemption value $v = 240$.

Information

Payoff functions for employees and employers were common information. Also was the conversion rate from experimental points to Euros (40:1). The existence of the delegation stage was also known by employees. In both Principal and Random treatments all subjects knew who will take the delegation decision. Participants were informed about the total number of periods and about the fact that the matching was fixed. After each period, the feedback provided to players included wage, actual effort, own and partner's profits.

¹² In period 1 the probability of delegation was 21% because this was the average frequency of delegation observed in the Main Treatment (Prin240) in the first period. From period 2 onwards, we conditioned the probability of delegation to the event of "delegating the wage decision to the workers in the previous period in the Main Treatment". For each value of the effort level and depending on whether the wage decision was delegated or not in the previous period, the probability of delegation was computed as the average frequency of delegation observed in the Main Treatment.

¹³ The complete instructions are available upon request.

¹⁴ It seems that the design was appropriate because we find a similar distribution of total observations between delegation (26% and 30%) and non-delegation (74% and 70%) in the Prin240 and Rand240, respectively.

4. Results

In this section, we present the main results obtained in this experiment. We first report results of the main treatments, Prin240 and Prin120. We then turn to the results of the Cont240 and Rand240 treatments and compare them with the main treatments. Finally, we conduct an econometric analysis to confirm previous results and also, we examine in detail the determinants of employers' delegating decision.

Prin240 treatment

In this treatment employers could either assign the wage or delegate the wage decision to the employee. Note that in the Prin240 treatment employees cannot grab the entire profits of the final outcome when choosing their own wages, since the redemption value, $v = 240$, is larger than the maximum wage allowed, $W_{max} = 120$.

Since we are mainly interested in the impact of delegating on employees' behavior, in the analysis of the data we distinguish between decisions made under delegation (employees choose both wage and effort, D hereafter) and under non-delegation (employers choose the wage and employees choose the effort, ND hereafter).

Figure 1 shows the evolution of average wages and effort levels in the Prin240 treatment differentiating between decisions in D and ND. In both cases, contrary to the predictions based on standard theory, the average effort of the employees over all possible wages is higher than the minimum effort level. Besides, a sharp drop in the last period is observed revealing some strategic behavior in previous periods both in D and in ND. Similar to previous literature, in Prin240 Hypothesis 5 (positive correlation between wage and effort level) is highly supported by a Spearman rank test ($\rho = 0.781$, $p = 0.000$).

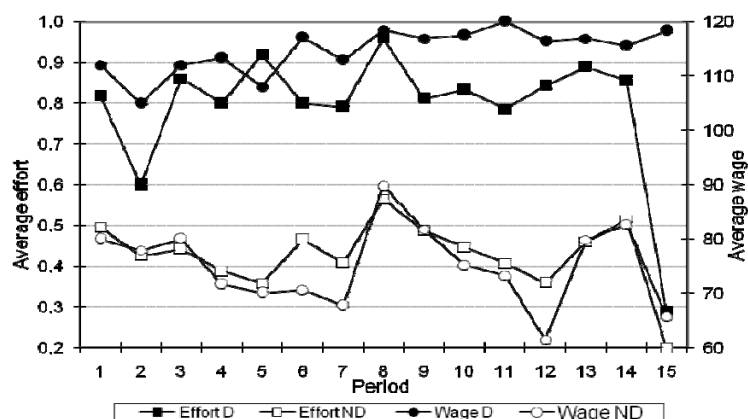


Figure 1. Average effort levels and wages in Delegation (D) and Non-Delegation (ND) in Prin240.

As Figure 1 illustrates, employees choose higher wages and supply higher effort levels when the employer delegates (D). In particular, the average wage and the average effort level in D are 114.35 and 0.732 respectively, while those in ND are 77.08 and 0.45, see Table 1.¹⁵ A Wilcoxon matched-pairs signed-rank test confirms that these differences are statistically significant for wages and effort levels respectively ($z = 3.883$, $p = 0.0001$; $z = 3.757$, $p = 0.0002$, one-tailed tests). Note that, each cell of Table 1 represents the average of each pair (firm and worker) for the corresponding variable in the first 14 periods. The reason is that as the matching was fixed during all periods, observations are not independent, so we run all the tests in this section taking into account just one observation for each pair.

Table 1. Summary of employers' and employees' behavior

	Prin240		Cont 240	Prin120		Cont 120	Rand240	
	ND	D	Cont	ND	D	Cont	ND	D
Av. wage	77.08	114.35	75.95	48.89	95.27	52.23	85.18	112.41
Av. desired effort	0.78	0.81	0.72	0.68	0.76	0.66	0.83	0.80
Av. effort	0.45	0.73	0.46	0.35	0.65	0.40	0.58	0.71
Av. profit employer	65.99	91.56	68.36	21.28	16.28	23.46	83.58	89.60
Av. profit employee	51.18	82.78	50.01	25.09	65.58	27.38	57.01	81.62
Total earnings	117.17	174.33	118.37	46.38	81.86	50.83	140.59	171.23
N	24	20	24	36	26	24	24	24

Prin240 (Prin120) refers to the Principal Treatment with $v = 240$ ($v = 120$); *Cont240 (Cont120)* refers to the Control Treatment with $v = 240$ ($v = 120$); and, *Rand240* refers to the Random treatment with $v = 240$. *ND* represents non-delegation and *D* represents delegation. Finally, *Av.* represents the average of the corresponding variable for each pair in the first 14 periods.

As a consequence, delegating pays both for the employer and for the employee. The employer's profit is 91.56 in D against 65.99 in ND and the employee's profit is 82.78 in D against 51.18 in ND. These differences are again statistically significant ($z = 3.621$, $p = 0.0002$; $z = 3.883$, $p = 0.0001$, one-tailed tests). Thus, the efficiency is considerably higher in D relative to ND. The following result summarizes these findings.

Result 1: *Delegating the wage decision enhances the employees' performance and raises both employers' and employees' profits.*

¹⁵ We are interested in the consequences of delegating in a repeated game setting. As participants knew the total number of periods, we removed the last period from our statistical analysis for all treatments in Table 1 in order to get rid of the well-known "end-time" effect.

Figure 2 displays desired and actual effort levels in both D and ND. We observe that there exists a significant gap between desired and performed effort level across periods (0.78 against 0.45 on average, see Table 1) in ND. This gap is statistically significant ($z = 4.272$, $p = 0.000$, one-tailed test). Nevertheless, as panel D of Figure 2 shows, this gap diminishes when we turn to the case in which employers delegate the wage decision to the employees (0.81 against 0.73 on average, see Table 1). A Wilcoxon matched-pairs signed-rank test confirms that this difference is not statistically significant ($z = 1.272$, $p = 0.203$, two-tailed test). Those results highly support Hypothesis 2.

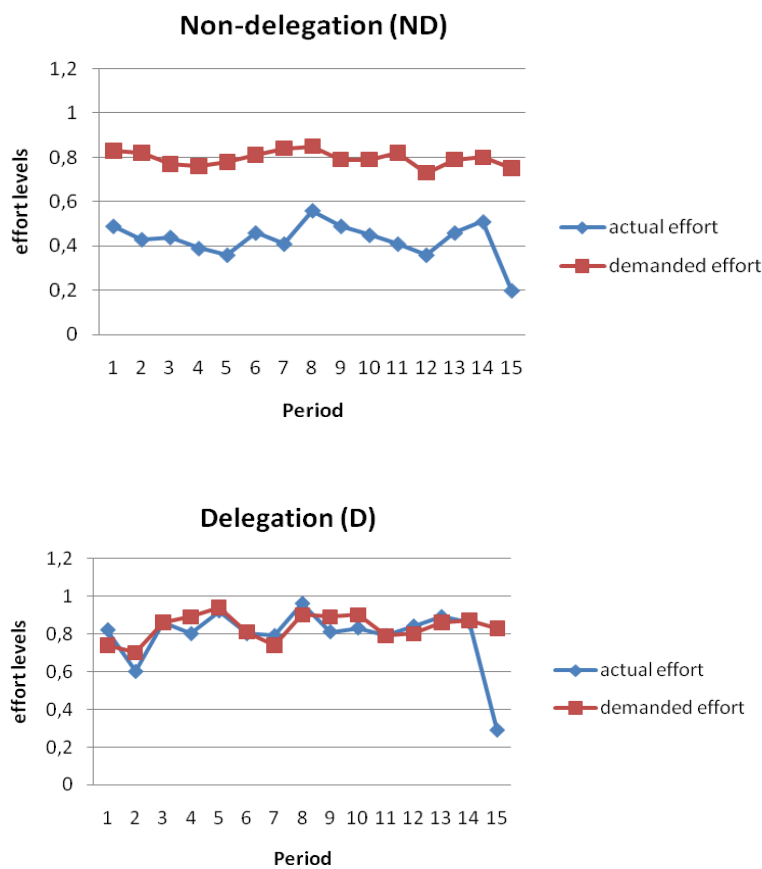


Figure 2. Differences between desired and actual effort over time in Delegation (D) and Non- delegation (ND) in the Prin240 treatment.

Previous findings are summarized in the next result.

Result 2: *The gap observed between desired and actual effort levels is greatly reduced when employers delegate the wage decision.*

Prin120 treatment

The Prin120 treatment equalizes the redemption value to the maximum wage allowed, $v = w_{max} = 120$. This treatment allows us to investigate what happens in situations in which the employee choosing her own wage might threaten the employer's entire profits.

Similar to Figure 1, Figure 3 shows the evolution of average wages and effort levels in the Prin120 treatment differentiating between decisions in D and ND.¹⁶ In both cases, as before, the average effort of the employees over all possible wages is higher than the minimum effort level. A positive correlation between wage and effort level is again observed ($\rho = 0.735$, $p = 0.000$). Besides, a similar pattern as in the Prin240 treatment in the last period is observed.

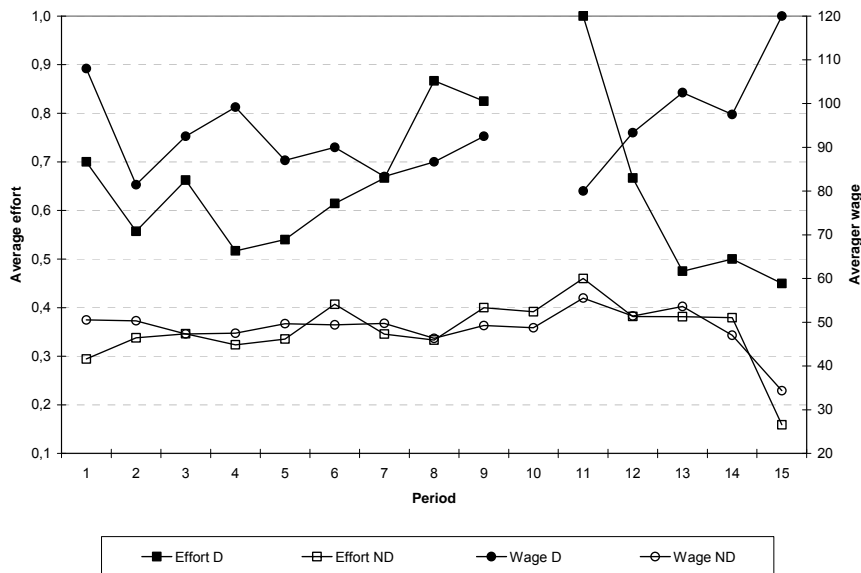


Figure 3. Average effort levels and wages in Prin120.

In this treatment, employees also chose higher wages and supplied higher effort levels when the employers delegated (the average wage and the average effort level in D are 95.27 and 0.65 respectively, while those in ND are 48.89 and 0.35, see Table 1). Using a Wilcoxon matched-pairs signed-rank test we obtain that the differences are statistically significant ($z = 4.457$, $p = 0.000$; $z = 3.568$, $p = 0.0002$, one-tailed tests for wage and effort level, respectively). Delegating was profitable

¹⁶ Observe that all “delegation” graphs in Figure 3 present a discontinuity in period 10 due to the fact that in this period no employer delegated the wage decision.

for employees (65.58 in D against 25.09 in ND).¹⁷ Besides, data suggest that employees did not exploit the delegation decision assigning high wages jointly with low effort. Nevertheless, contrary to the Prin240, since the feasible maximum wage could be equal to the redemption value, delegating no longer pays for the employer (16.28 in D against 21.28 in ND).¹⁸ As a consequence, the number of times that employers delegated the wage decision during all 15 periods was very low compared with the Prin240 treatment: 10% in the Prin120 treatment against 30% in the Prin240 treatment on average. In summary, due to the higher risk and the lower benefit, employers show a lower willingness to delegate the wage decision.¹⁹ The following result summarizes these findings.

Result 3: *If profits are not safe when delegating, the cost borne by the employers due to the high wages outweighs the benefit of a better performance by the employees.*

Control treatment

In the analysis of the Principal treatments we observe higher effort levels under delegation. This could be due to a negative reaction of employees when employers do not delegate or to a positive response to delegation. To isolate the effect of “delegation” on the employees’ behavior, we compare the effort levels in the sub-game that follows the “non-delegation” in the Prin240 treatment with employees’ choices in a control treatment where the option of delegation is removed. Now, in the first stage of the control treatment, employers only assign the wage and demand a non-binding effort, and in the second stage the worker only choose her effort level. Parameters are equal to those of the Prin240 treatment.

The comparison will be made to analyze whether the fact that firms do not delegate the decision of the wage in workers when they have the opportunity, will generate some kind of negative effect on effort levels.

We compare the effort levels of the control treatment with those of the sub-game following “non-delegation”. We have that effort levels are 0.45 and 0.46 for “non-delegation” and the control, respectively. Differences are not statistically significant ($z = 0.186$, $p = 0.427$, two-tailed Mann-Whitney test). Moreover, differences in wages (77.08 vs. 75.95) are not statistically significant either ($z=0.093$, $p=$

¹⁷ Wilcoxon matched-pairs signed-rank test: $z = 4.457$, $p = 0.000$, one-tailed.

¹⁸ Wilcoxon matched-pairs signed-rank test: $z = -1.892$, $p = 0.029$, one-tailed.

¹⁹ As a result, we had to conduct an additional session of Prin120 in order to observe a sufficient number of delegations. The latter explains why in Table 1 there are 36 observations in Prin120 in contrast to 24 in the other treatments.

0.926). This implies that there is not wage effect which can influence the effort level provided by workers. These results show that negative reciprocity does not play a relevant role when workers provide their efforts, controlling for the wage effect. Therefore, there is evidence against Hypothesis 3.

From previous results we may conclude that the increment in the effort level between D and ND in the main treatments is not due to negative reciprocity, but to the positive effect of delegation per se.

One possible explanation for this result could be that even having some level of “negative reciprocity”, as the game is played for 15 periods with fixed matching, workers may not decrease their effort because they are trying to be allowed to choose their own wage in subsequent periods. Therefore, this effect may be stronger than the “negative reciprocity”. Moreover, if they provide a low effort as a response of non-delegation, employers can punish them in the next round by establishing a low wage.

The following result summarizes previous findings.

Result 4: *For similar wages, there is not a significant negative effect when employers decide not to delegate the wage decision.*

For the case in which $v = 120$ (Cont120) results are very similar to those obtained for Cont240. In the comparison between the subgame following non-delegation and the control treatment results show that neither the wages nor the efforts are statistically significant.²⁰

Econometric analysis

In the previous analysis we are not taking into account the fact that, while in D most wages are very high, ND aggregates both high and low wages.²¹ Therefore, previous results obtained about the increment in effort rates when delegating may be explained not only for the fact of delegating per se, but also for the effect of workers getting higher wages. In order to isolate the delegation effect and to confirm the robustness of our previous results we develop an econometric analysis controlling for the wage effect.

²⁰ $z = -0.981$, $p = 0.327$, $z = -0.868$, $p = 0.385$, W-M-W two-tailed test.

²¹ The reason for not controlling for the wage in the previous section is that given the structure of our data, if we conduct the test constrained to high wages, we will lose a considerable number of observations. Note that, given the non-independence of our data we run all tests not taking into account all observations, but only the average value for each pair in all periods except the last one.

The arrangement of this section is as follows. First, we will analyze if there is a positive effect of delegation in the Prin240 controlling for the wage. Subsequently, we will examine if this effect is due to a positive reaction to delegation or to a negative reaction to non-delegation, comparing Cont240 and Prin240 under both conditions (delegation and non-delegation). Finally and in order to explore possible motives for the enhancement of workers' behavior under delegation, we will make a comparison between delegation and non-delegation in Rand240.

First, we consider a GLS random effects model in which the dependent variable is the effort level in the Prin240 treatment.²² The explanatory variables are *wage*, *desired effort* and the *Delegation* dummy. We also control for the individual heterogeneity.²³ *Delegation* takes the value 1 when a firm used the delegation option and 0 otherwise.

Table 3. GLS Random effects regression on effort in Prin240

<i>Wage</i>	0.006*** (0.0004)
<i>Desired effort</i>	0.111* (0.065)
<i>Delegation</i>	0.082*** (0.032)
<i>Constant</i>	-0.075 (0.053)
Heterogeneity	Yes
R-squared	0.569
N	360

Delegation is a dummy which takes the value 1 when a firm delegated the wage decision and 0 otherwise. Robust errors are in parenthesis. *** and * represents significance at 1% and 10% level.

From Table 3, we may conclude that even controlling for the wage effect,

²² We use random effects because the most important variables we need to examine are dummies (*Delegation* and *Non-delegation*), which will be dropped in a fixed effect estimation.

²³ At the end of the experiment subjects answered a questionnaire which consisted of the following items: gender, altruism (dictator game), the Big Five Inventory (see John and Srivastava, 1999) and risk aversion (Holt and Laury, 1995). These variables were used to control for heterogeneity.

delegation has a significant positive effect. Thereby, Hypothesis 1 is supported.²⁴

Regarding the two possible effects leading workers decision on effort, on one side, we study the positive effect of delegation; and, on the other side, we focus on the negative effect that may arise when the manager decides not to delegate the wage decision.

We consider again a GLS random effects model in which the dependent variable is the effort level in the Prin240 and the Cont240. The explanatory variables are *wage*, *desired effort* and two dummies: *Delegation* and *non-delegation*. *Delegation* takes the value 1 when a firm used the delegation option and 0 when the firm didn't have the chance to delegate, that is, in the control treatment. In this way, we can analyze the positive effect of delegation. *Non-delegation* takes the value 1 when a firm didn't use the delegation option (although having the opportunity) and 0 in the baseline. This dummy is useful for examining the negative effect of non-delegation.

Table 4. GLS RE regression on effort in Prin240 and Cont240

	Delegation vs. Control		Non-deleg. vs. Control	
	(1)	(2)	(3)	(4)
<i>Wage</i>	0.005*** (0.0004)		0.006*** (0.0003)	
<i>Desired effort</i>	0.121** (0.051)		0.118*** (0.038)	
<i>Delegation</i>	0.028 (0.713)	0.243*** (0.077)		
<i>Non-delegat.</i>			-0.024 (0.036)	-0.024 (0.061)
<i>Constant</i>	-0.034 (0.041)	0.458*** (0.050)	-0.069** (0.029)	0.458*** (0.038)
R-squared	0.571	0.179	0.582	0.002
N	469	469	611	611

Delegation is a dummy which takes the value 1 when a firm delegated the decision of the wage and 0 in the baseline. *Non-delegat.* is 1 when a firm did not use the delegation option and 0 in the baseline. Robust errors are in parenthesis. *** and ** represents significance at 1% and 5% level, respectively.

²⁴ To test robustness of the model, we have also conducted all regressions in this section considering a tobit random effects model left and right-censored by 0.1 and 1, respectively. Results are very similar. Significance levels for the explanatory variables are the same and only coefficients are slightly different.

Table 4 confirms results obtained in the previous statistical analysis. First, observe that in the first column in regression (1), the delegation dummy is not significant. However, if we consider this dummy as the only covariate of the effort (see regression (2)), it turns to be significant. The reason is that the wage and the delegation dummy are highly correlated (58%), so they cannot be included in the same regression as explanatory variables. This may be a potential problem because in this section our aim is to control for the wage effect. Nevertheless, if we observe regression (3) in the last column of Table 4, the non-delegation dummy is not statistically significant controlling for the wage. Now, the problem of correlation between wage and the non-delegation dummy vanishes. Even if we consider the non-delegation dummy as the only covariate of the effort, it is still not statistically significant (see regression (4)). Hence, there is not a negative effect on worker's behavior when the manager didn't use the delegation option. Thus, Hypothesis 3 is not supported.

Since from Table 3, we concluded that there is a significant *positive* effect between delegation and non-delegation in the Prin240 treatment, this effect may only be due to the positive effect of delegation. In sum, controlling for the wage effect, the differences observed in the workers' performance come from the positive effect of delegation per se, rather than for worker's negative reaction to managers who didn't opt for delegation.

The last analysis we consider refers to the Random treatment. We have shown that delegation has a positive effect per se on workers' behavior.

The higher effort levels obtained under delegation in the Principal treatments, as we have pointed before, may be explained because workers react positively to the fact that managers delegate the decision about the wage or may be also explained because workers feel more responsible for the final outcome.

As the Random treatment was designed in order to eliminate the possibility of reciprocity, if we obtain that, controlling for the wage, under delegation effort levels are higher than under non-delegation, this fact will imply that the main force driving results is responsibility.

On the other side, if it is the reciprocity the reason for providing a higher effort level, we should observe no difference in effort between delegation and non-delegation (again controlling for the wage) in the Random Treatment.²⁵

In the analysis, we have again the same problem of correlation between the wage and the delegation dummy when we consider all observations of this treatment

²⁵ We do not report the previous analysis with descriptive statistics for the Random treatment because for studying this explanation, it is crucial to control for the wage and, as we have explained before, in the descriptive statistics analysis this was not possible.

(see first column of Table 5). To solve this problem we conduct two different regressions, the first one restricting the sample to observations under delegation, and the second one under non-delegation (see Table 5). Then, we run a Chow test to compare coefficients of the wage between the two regressions ($\chi^2 = 1.02$, $p = 0.599$). We reject the null hypothesis that all coefficients (wage and constant) in the regression are equal. This hypothesis may be rejected for two reasons. The first one is because only the constant is different, so the wage coefficient is the same under non-delegation and under delegation. The second one is because the wage coefficient is different (in this case, it is not important if the coefficient of the constant is the same or it is not), so the wage coefficient is significantly higher under non-delegation than under delegation (0.006 vs. 0.005, see second and third column in Table 5). The latter means that workers reaction to an increase in the wage is higher or equal under non-delegation than under delegation. This result supports Hypothesis 4. This is sensitive if we bear in mind that in the Rand240 treatment, the computer decided the delegation (not the manager), so under delegation the worker could not reciprocate (the worker also assigns the wage), whereas under non-delegation the worker could reciprocate if the manager has assigned a high wage. Therefore, it is reinforced the conclusion that the main driving force in worker's performance is reciprocity to the managers, rather than workers' feeling of responsibility for the final outcome.

Table 5. GLS RE regressions on effort in Rand240

	All		Deleg.	Non-deleg
<i>Wage</i>	0.005*** (0.0005)	<i>Wage</i>	0.005*** (0.002)	0.006*** (0.0005)
<i>Delegation</i>	-0.004 (0.028)			
<i>Constant</i>	0.126** (0.050)	<i>Constant</i>	0.118 (0.238)	0.029 (0.053)
R-squared	0.378	R-squared	0.029	0.420
N	360	N	95	265

Robust errors are in parenthesis. *** and ** represents significance at 1% and 5% level.

Analyzing the delegation of the wage decision

The aim of this section is twofold: On one hand, to explore why employers delegate the wage decision in their employees; and, on the other hand, to study how these decisions evolve over time.

For the analysis we run some probit regressions for each treatment (see Table 6), controlling for heterogeneity. Given that there could be problems of heterokedasticity in our sample, we have run regressions with robust errors allowing for a difference in variance between subjects. In addition, we consider a cluster in observations from the same group of subjects, that is, the 12 observations from different rounds. To control for time effects in the dependent variable we have considered dummies for all 15 rounds. There are no important changes in the coefficients or significance levels of the independent variables.

The dependent variable in all cases is a binary variable which takes value 1 if employer delegates the wage decision and 0 otherwise. As our first explanatory variable we use the profits obtained by the employers in the previous period, π_{t-1} . This allows us to check if profitable performances of employees are rewarded with the possibility of choosing their own wage in the next period. Our second covariate is the difference between the desired and the actual effort in the previous period, $\hat{e}_{t-1} - e_{t-1}$. This allows us to see if employers obtaining effort levels close to their demands reward this behavior delegating the wage decision in the next period.²⁶

Table 6. Probit regressions. Dependent variable: delegation

	Prin240		Prin120	
	(1)	(2)	(1)	(2)
π_{t-1}	0.003*** (0.001)		0.002*** (0.0007)	
$\hat{e}_{t-1} - e_{t-1}$		-0.402*** (0.218)		-0.202*** (0.046)
Heterogeneity	Yes	Yes	Yes	Yes
N	336	336	504	504

π_{t-1} represents the profit of the firm in the previous period and $\hat{e}_{t-1} - e_{t-1}$ denotes the difference between the desired effort and the actual effort in the previous period. Robust errors are in parenthesis. *** represents significance at 1% level.

Table 6 shows that the employers' profits in the previous period have a positive effect on the probability of delegating. In the same way, the closer the actual effort level to the desired effort, the more likely the employer allows the employee to

²⁶ We found that explanatory variables wage and desired or actual effort levels are correlated. Therefore, they cannot be included in the same regression. This is the reason why we chose the profit in last period as a proxy which accounts for the effect of the wage.

choose her wage in the next period. Results are robust for both treatments. These results suggest that employers use the delegation of the wage decision as a tool to reward *good* employees.²⁷

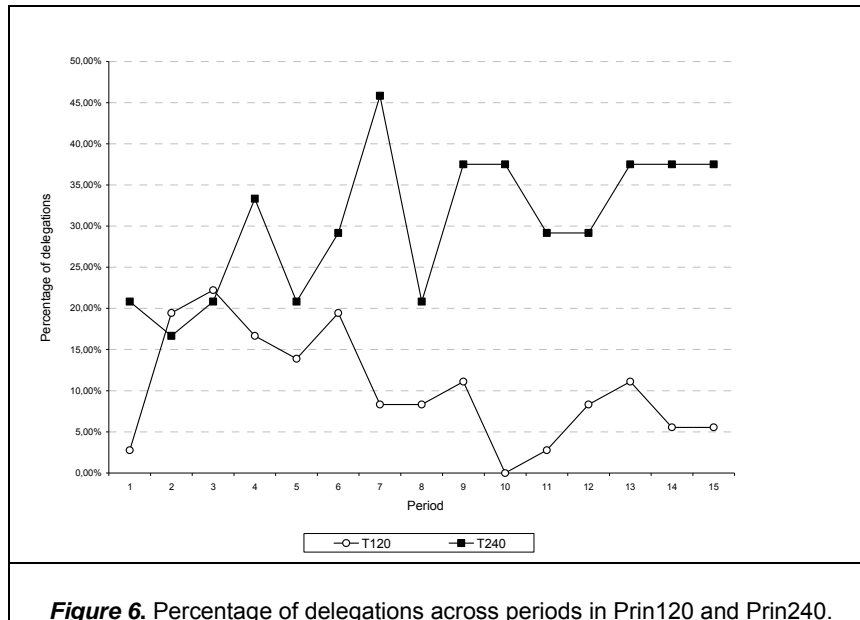


Figure 6. Percentage of delegations across periods in Prin120 and Prin240.

We now turn to the analysis of the evolution of the decision of delegation across periods. Figure 6 shows an opposite trend of the delegations depending on whether employees are able to appropriate the entire profits of the employers or not. A Cuzick test shows that there is a significant difference between trends of delegation percentages in Prin120 and Prin240 ($z = 4.38, p = 0.000$). Moreover, a Sperman test (between the percentage of delegations and time) confirms that there is a significant increasing trend in Prin240 ($\rho = 0.654, p = 0.008$), while in Prin120 the trend is statistically decreasing ($\rho = -0.487, p = 0.065$). In Prin240, the redemption value, $v = 240$, is larger than the maximum wage allowed, $w_{max} = 120$. This fact implies that the wage delegation is profitable for employers. Since, as showed above, the more profits employers get, the more likely they delegate in the next period, the number of delegations increases across periods.

On the contrary, the same intuition could be used to explain the opposite trend in the Prin120 treatment. Since employees can grab the entire profits of the final outcome when choosing their own wages, the delegation is both risky and no longer profitable and, thus, decreases across periods.

²⁷ We have also run some probit regressions with other two explanatory variables: wage and effort levels in the previous period. Similarly to the results reported above, both variables had a positive and significant effect in the probability of delegation in both treatments.

5. Conclusions

This paper investigates the consequences of delegating the wage decision in a principal-agent relationship using a modified version of the gift-exchange game where employers may allow employees to choose their own wage. Our results show that employees display higher effort levels when employers delegate than when they do not. This result holds even controlling for the wage effect. However, these higher effort levels do not always lead to larger profits for employers. This crucially depends on the employees' feasibility of threatening the company's profits with their wage decision. When this decision is *bounded*, delegation increases the employers' profits. In fact, in our experiment, when this case is analyzed, the number of delegations increases across periods.

We hypothesize two possible reasons that could explain this *power of delegating*. On one hand, delegation might be perceived as a signal of trust. Falk and Kosfeld (2006) analyze the potential impact of control in a principal-agent relationship. They find that their subjects perceive the controlling decision as a signal of distrust and a limitation of their choice autonomy. Consequently, subjects react negatively. In this paper, we observe a symmetric pattern in an opposite setting. Our subjects might have perceived the delegating decision as a signal of trust and an increase of their choice autonomy and, as a consequence, they were more motivated to perform well.

On the other hand, the issue of responsibility can also be an important determinant in an individual's choice of actions. Charness (2000) finds that subjects, in general, are more generous when they must assume full human responsibility for an allocation of payoffs. By delegating, employers are putting all the responsibility for the final outcome onto the shoulders of employees. Therefore, the wage delegation might have caused our subjects to feel more responsible for the employer's payoff and provided higher effort levels.

Our experimental design allows disentangling the behavioral force that plays a more important role in our setting. We obtain that reciprocity toward the employers prevails as a determinant of workers' behavior under delegation.

Results obtained might have important implications for the labor market. In some labor relationships, if managers are satisfied with one worker's performance, then they may incentivize the worker and, in some cases, even raise worker's salary. Our results show that, in this case, it is better for managers to allow good workers to choose their wage, increasing their performance and getting higher profits. In addition, delegating has not negative effect on worker's performance when managers decide not to use the delegation option.

6. References

1. Abeler, J., Altmann, S., Kube, S., and Wibral, M. (2006). Reciprocity and payment schemes: When equality is unfair. IZA discussion paper. No. 2500.
2. Bartling, B. and Fischbacher, U. (2008). Shifting the blame: on delegation and responsibility. Unpublished manuscript.
3. Brown, M., Falk, A. and Fehr, E. (2004), 'Relational contracts and the nature of market interactions', *Econometrica* 72(3), 747–780.
4. Charness, G. (2000), 'Responsibility and effort in an experimental labor market', *Journal of Economic Behavior and Organization* 42(3), 375-384.
5. Charness, G. (2004), 'Attribution and reciprocity in an experimental labor market', *Journal of Labor Economics* 22(3), 665–688.
6. Charness, G., Frechette, G. R. and Kagel, J. H. (2004), 'How robust is laboratory gift exchange?' *Experimental Economics* 7(2), 189–205.
7. Coffman, L. C. (2009). Intermediation reduces punishment and reward. Unpublished manuscript.
8. Farber, H. (2006) Labor Market Adjustment to Globalization: Long-term employment in the United States and Japan. Preliminary draft.
9. Fehr, E. and Gächter, S. (1998), How effective are trust- and reciprocity-based incentives, in A. Benner and L. Putterman, eds, 'Economics, Values, and Organization', Cambridge University Press, chapter 13, pp. 337–363.
10. Fehr, E., Kirchsteiger, G. and Riedl, A. (1993), 'Does fairness prevent market clearing? An experimental investigation', *The Quarterly Journal of Economics* 108(2), 437–460.
11. Fischbacher, U., (2007). Z-Tree: Zurich Toolbox for Ready-made Economic Experiments. *Experimental Economics*, 10, 171-178.
12. Frey, Bruno S. (1997). Not Just for the Money: An Economic Theory of Personal Motivation. Cheltenham: Edward Elgar Publishing.
13. Frey, Bruno S., and Reto Jegen. (2001). "Motivation Crowding Theory." *Journal of Economic Surveys*, 15(5): 589–611.
14. Gächter, S. and Falk, A. (2002), 'Reputation and reciprocity: Consequences for the labour relation', *Scandinavian Journal of Economics* 104(1), 1–27.
15. Gneezy, Uri. (2004). "The W Effect of Incentives." Unpublished.
16. Gneezy, Uri, and Aldo Rustichini. (2000a). "A Fine Is a Price." *Journal of Legal Studies*, 29(1):1–17.
17. Gneezy, Uri, and Aldo Rustichini. (2000b). "Pay Enough or Don't Pay at All." *Quarterly Journal of Economics*, 115(2): 791–810.
18. Hannan, R. L., Kagel, J. H. and Moser, D. V. (2002), 'Partial gift exchange in an experimental labor market: Impact of subject population differences, productivity differences, and effort requests on behavior', *Journal of Labor Economics* 20(4), 923–951.
19. Holt, C. and Laury, S. (2002) "Risk aversion and Incentive Effects". *American Economic Review*, 92(5): 1644-1655.
20. John, O. and Srivastava, S. (1999) "The big-five trait taxonomy: History, Measurement and Theoretical Perspectives" *Handbook of Personality: Theory and Research*. L. Pervin and O.P. John (Eds.), New York: Guilford.

21. Kocher, M. and M. Sutter. (2007). Individual versus group behavior and the role of the decision making process in gift-exchange experiments. *Empirica*, Vol. 34, No. 1, 2007, pp. 63-88.
22. Kube, S., Maréchal, M. A. and Puppe, C. (2006), Putting reciprocity to work—positive versus negative responses in the field. University of St. Gallen Discussion Paper no. 2006-27.
23. Maximiano, S., Sloof, R., and Sonnemans, J. (2007). Gift exchange in a multi-worker firm. *Economic Journal*, 117:1025-1050.
24. Neumark, (2000) "On the job: is long-term employment a thing of the past?" Russell Sage Foundation. New York