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on Effort Behavior

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THE IMPACT OF PAY COMPARISONS ON EFFORT BEHAVIOR

Daniele Nosenzo

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04 March 2010

Abstract:

This study uses a three-person gift-exchange game experiment to examine the impact of pay comparisons on effort behavior. We compare effort choices made in a treatment where co-workers' wages are secret with effort choices made in two 'public wages' treatments. The two 'public wages' treatments differ in whether co-workers' wages are chosen by an employer, or are fixed exogenously by the experimenter. We find that pay comparison information has an overall detrimental impact on effort choices: employees respond less favorably to the wage offers made by the employer when they receive information about the wage paid to the co-worker as compared to the case where co-workers' wages are secret. These effects are particularly pronounced in the treatment where the level of the co-worker's wage is fixed exogenously.

Keywords: social comparisons; wage comparisons; gift exchange; experiments.

JEL: C91, C92, J31.

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1. Introduction

Naturally occurring interactions between individuals take place in complex social environments which typically contain considerable amounts of social comparison information about referent others (i.e. information about how similar others behave or are treated in similar circumstances). The availability of information about others' treatment and behavior can affect the way individuals evaluate their own treatment and behavior, and this may ultimately influence their actions.¹ These effects may be particularly prominent in workplaces, where employees are often aware of co-workers' pay and may use this information to evaluate the fairness of their own pay. Employees may feel treated unfairly if they discover to be paid less than co-workers who are in comparable positions within the firm. This may in turn affect their work morale and performance negatively. This type of argument is often invoked to justify firms' preference for wage secrecy norms. Moreover, it constitutes a central component in a number of theoretical approaches to labor market relations (e.g. Akerlof and Yellen, 1990), and to social relations more generally (e.g., Adams, 1965). Surprisingly, empirical studies have produced weak evidence that pay comparisons have a systematic influence on work behavior.²

This paper uses laboratory experiments to study pay comparison effects in a multilateral version of the gift-exchange game (Fehr et al., 1993). In the standard bilateral gift-exchange game a first-mover (the 'employer') decides on the size of the gift ('wage') she sends to a second-mover (the 'employee'), who can in turn reciprocate by choosing costly actions ('effort') that reward the first-mover. A typical result of bilateral gift-exchange game experiments is that employees are often willing to incur costs in order to reward employers who have treated them favorably (see Fehr et al., 2009 for a recent review of the experimental literature). In the multilateral version of the game used in this study the employer interacts with two employees at the same time, and has to pay a wage to each of them. Employees receive their wage and then independently choose an effort level. We observe effort choices in three different conditions. In a first condition employees only learn their own wage while co-workers' wages remain secret. We use this benchmark condition to assess how employees respond to given levels of their own wage in the absence of pay comparison information. In two other treatments employees have full information about co-workers' wages at the time

¹ For example, Fliessbach et al. (2007) show that reward-related brain processes are significantly influenced by information about the treatment of comparison others in a neuroimaging experiment.

² Survey and case-based studies have instead found some support for the importance of pay comparison effects at workplaces (see, e.g., Campbell III and Kamlani, 1997; Bewley, 1999).

they choose effort. We use these treatments to study how information about co-workers' wages affects employees' willingness to expend effort in response to own wage offers. The two 'public wages' treatments differ in how co-workers' wages are determined. In one treatment the employer can choose which wage to pay to the co-worker, while in the other treatment co-workers' wages are mandated exogenously. We use the former treatment to study pay comparison effects in settings where the employer has full discretion on the firm's wage structure, while the latter treatment allows us to study employees' reactions to pay comparison information in settings where an employer's wage policy is partly constrained by exogenous labor market regulations. Such exogenous constraints to firms' wage policies are commonplace in natural workplaces (e.g. minimum wage laws; centralized pay regulations; etc.), and previous experimental research has shown that they can affect workers' pay fairness considerations and effort behavior in important ways.³ Differently from previous studies, which either focused on bilateral labor relations or studied multilateral relations where workers received no information about the treatment of co-workers, in our experiment we can observe how employees' effort is affected by labor market regulations that affect the wage of their co-workers, and we can thus study how these effects extend to horizontal pay fairness considerations.

The three main results from our study are as follows. 1) As in many other related gift-exchange game experiments, in all treatments we observe a strong positive own wage-effort relation: employees in our experiment reciprocate high wages with higher effort. 2) Pay comparisons have an overall detrimental effect on the own wage-effort relation: employers trigger higher effort from employees when they cannot observe what the co-worker earns than when co-workers' wages are public. 3) The negative effects of pay comparisons are amplified in the treatment where co-workers' wages are fixed exogenously. Here employees respond negatively to pay comparison information regardless of whether they learn that the co-worker is paid an exogenously low or high wage, while in the treatment where employers can choose the level of the co-worker's wage marked responses are only detected when the employer chooses a high wage for the co-worker.

This paper is related to a small but growing literature that uses experiments to study how effort behavior is affected by information about others' pay relative to situations where

³ For example, Falk et al. (2006) show that introducing a nonbinding wage guideline in a previously unregulated experimental labor market shifts employees' perceptions of what constitutes a fair wage and increases their reservation wages considerably. The effect is even stronger if the same wage level chosen for the wage guideline is set as a (binding) 'minimum wage'. On the impact of minimum wages on effort in gift-exchange games see also Brandts and Charness (2004) and Owens and Kagel (*forthcoming*).

co-workers pay is secret. Güth et al. (2001) study a setting where a principal has to design separate contracts for two agents who differ in productivity. They compare a treatment where agents only learn their own contract with a treatment where agents also learn the contract offered to the other agent. While principals in their experiment anticipate the existence of pay comparison effects and offer less asymmetric contracts in the treatment where contracts are public information, there is only weak evidence that pay comparisons actually affect agents' behavior. Charness and Kuhn (2007) use a multilateral version of the gift-exchange game where one employer interacts with two differently productive employees. They compare effort choices across treatments that vary in whether co-workers' wages are public or secret and find that pay comparisons have negligible effects on effort behavior.⁴ Differently from these studies, employees in our experiment do not differ in their productivity: thus, in our setting unequal pay decidedly implies unfair treatment on the part of the employer.

A few other experimental studies investigate pay comparison effects by examining how employees' effort decisions change across situations that differ in the wage the employer pays to the co-worker. These studies do not include explicit comparisons of treatments differing in whether co-workers' wages are secret or public. Results from these experiments are mixed: in some cases information about co-workers' wages systematically affects employees' effort decisions (Gächter and Thöni, 2009; Abeler et al., *forthcoming*), while in other cases such effects are weak or absent (Gächter et al., 2009).

The remainder of the paper is organized as follows. In the next Section we discuss our experimental design and procedures. Section 3 presents our results. We offer concluding comments in Section 4.

2. Experimental Design & Methods

2.1. The constituent game

Our experiment is based on the following three-person game. At the outset of the game an Employer is endowed with £22 from which she pays a wage to two Employees, labeled RED and BLUE. The wages w_{RED} and w_{BLUE} can take three values: £1, £4 or £7.

⁴ Pay comparison effects are also absent in the real effort experiment by Hennig-Schmidt et al. (*forthcoming*). However, employees in their experiment are also unwilling to provide high effort in return for high own wages. Subsequent laboratory experiments (where no pay comparisons were possible) revealed that this was due to the lack of surplus information, which limited the scope for employees to develop adequate fairness attributions. Clark et al. (*forthcoming*) use standard bilateral gift-exchange games that vary in whether employees receive information about the wages offered in four other firms present in the market (i.e. they study inter-firm pay comparison effects as compared to the intra-firm comparison effects studied here). They find that effort choices are significantly affected by how the own wage is ranked relative to others' wages.

Employees are paid their wage and then select simultaneously an effort level. Each Employee $i \in \{RED, BLUE\}$ can choose an effort e_i among three possible levels: low (-1), medium (0) or high (+1). The effort technology is adapted from Charness and Levine (2007). Low effort costs an employee £1 and reduces the Employer's earnings by £4. Medium effort is costless and does not affect the Employer's earnings. High effort costs an employee £1 and increases the Employer's earnings by £4. Note that, differently from the usual setup where employees can only decide whether to reward or not to reward the Employer, the effort technology used in our study allows both rewarding (when employees choose high effort) and punishments (when employees choose low effort) of fair/unfair wage offers. Also note that employees are *ex ante* symmetric as they do not differ in their productivity at the time the Employer sets wages. After employees have chosen their efforts the game ends and earnings (in British Pounds) are computed as:

$$\pi_{ER} = 22 + 4 \cdot (e_{RED} + e_{BLUE}) - w_{RED} - w_{BLUE}$$

for the Employer, and

$$\pi_i = w_i - (e_i)^2$$

for Employee $i \in \{RED, BLUE\}$.

In our experiment subjects played a one-shot version of the game, which was described to them using the same labor market frame that we use throughout the text. The implementation of the game used the strategy method (Selten, 1967), i.e. subjects had to specify complete strategies in the game-theoretic sense.

2.2. The experimental treatments

Our constituent game was implemented in three different treatments which vary along two dimensions. The first dimension is whether wages are public (both employees learn both wages before making an effort choice) or private (each employee learns only her own wage). The second dimension is whether the Employer can choose *both* the wages she pays to the employees, or whether she can instead choose only *one* wage, while the other wage is fixed exogenously. Table 1 provides an overview of the treatments used in the experiment.

Table 1. Overview of treatments

Wages	both determined by the Employer	one determined exogenously
public	<i>PUBLIC</i>	$\left\{ \begin{array}{l} \textit{PUBLIC / EXO } \pounds 1 \\ \textit{PUBLIC / EXO } \pounds 7 \end{array} \right.$
private	<i>SECRET</i>	-

In our SECRET treatment the Employer chooses a wage for the RED Employee and a wage for the BLUE Employee. Each employee then learns her own wage but is not informed of the wage that the Employer chose for the co-worker: thus, co-workers' wages are *secret*.

In our PUBLIC treatment wages are also determined by the Employer, but they are *public* information as employees are informed of both wages before they choose effort.

In our PUBLIC/EXO treatment wages are also *public* information, but the Employer chooses only one of the two wages she pays to the employees, namely the wage for the BLUE Employee. The wage for the RED Employee is instead determined *exogenously* by the experimenter. We conducted two versions of the PUBLIC/EXO treatment where the RED Employee's wage was either fixed equal to £1 (PUBLIC/EXO £1) or equal to £7 (PUBLIC/EXO £7). The level of the RED wage was mandated using a neutral language: in the instructions (reproduced in Appendix A) subjects were simply told that "*the Employer must pay a £1 [£7 in PUBLIC/EXO £7] wage to the Red Employee, while he/she can decide on what wage (£1, £4 or £7) to pay to the Blue Employee.*" (emphasis in original).

2.3. Discussion of the design

The aim of our experiment is to assess the impact of pay comparison information on effort behavior. We study a setup where employees are *ex ante* symmetric such that any pay differential between employees has a straightforward interpretation in terms of pay fairness. We compare effort choices made in a treatment where co-workers' wages are not observable (the SECRET treatment) with choices made in two different 'public wages' treatments where co-workers' wages are observable. In the PUBLIC treatment co-workers' wages are freely chosen by the employer. This is the type of environment that has also been studied in previous experiments on pay comparison effects. In the PUBLIC/EXO treatment co-workers' wages are mandated exogenously, and we can thus study pay comparison effects in environments where the employer is constrained by external regulations to pay a given wage to a portion of the workforce.

It is not clear *a priori* whether the presence of exogenous constraints on a firm's wage structure may strengthen or weaken pay comparison effects. On the one hand, the fact that co-workers' wages are not determined by the employer in PUBLIC/EXO may actually *reduce* the scope for effective pay comparisons, as only wages actively chosen by employers may be considered as relevant for pay fairness attributions. Indeed, Gächter and Thöni (2009) find reduced pay comparison effects in their '*Non-intentional*' treatment where a random device chooses employees' wages on behalf of the employer. Nevertheless, we note that, differently

from Gächter and Thöni (2009), employers in our PUBLIC/EXO treatment do have some discretion over wages as they can set the level of the BLUE wage: hence in our game the Employer *is* responsible for any wage inequality within the firm, as she can always treat employees symmetrically if she wishes to do so. Moreover, the RED wages in PUBLIC/EXO are *not* determined by a random mechanism: they are fixed exogenously by the rules of the experiment, and workers may view the realization of a random process differently from an exogenous wage mandated by the experimenter. In fact, similarly to how the introduction of an exogenous minimum wage shifted workers' perceptions of what is a fair wage in previous experimental studies (e.g., Falk et al., 2006), our exogenous intervention on RED wages in PUBLIC/EXO may end up increasing the prominence of co-workers' wages as a reference point for what constitute a fair wage in an experimental firm, and thus *promote* the use of horizontal pay comparisons in pay fairness evaluations.⁵

Pay comparison effects in PUBLIC/EXO are studied focusing on two 'extreme' levels of the co-worker's wage, £1 and £7. These seem the most attractive cases to isolate pay comparison effects: it appears in fact unlikely that we would observe any effect of moderate amounts of wage inequality had we failed to observe reactions to larger amounts.

We collected employees' effort decisions using the strategy method. We believe that the use of the strategy method in our experiment is necessary because it allows us to observe effort behavior across all possible paths of play without either using deception or resorting to repeated play, which does not guarantee the collection of a sufficient number of observations for all information sets in the game and can introduce strategic confounds in the design. With the strategy method we can observe how each employee in our experiment chooses his or her effort for *all* possible combinations of the own wage and the co-worker's wage, and we can thus measure the impact of pay comparisons on effort at the individual level.⁶

Note that the number of effort decisions that employees have to submit with the strategy method depends on the treatment they are playing, as they control a different number of information sets in different treatments. In the PUBLIC treatment employees control nine information sets, one for each wage combination that could possibly be chosen by the

⁵ This may be particularly true for settings where the exogenous constraints contain value-laden elements that may speak to workers' feelings of entitlement. On this respect, it should be noted that we opted for a conservative approach to mandate the levels of the RED wage in PUBLIC/EXO rather than for more value-laden interventions, e.g. one where the experimenter somehow justifies the choice of the RED wage level.

⁶ The use of the strategy method in economics experiments has undergone a methodological debate about whether behavioral responses differ when they are elicited in a "hot" version of the game (i.e., when subjects directly respond to decisions made by other players) rather than in a "cold" version (i.e., when the game is played with the strategy method). The issue has been addressed in a number of experimental studies suggesting that the use of the strategy method is unlikely to distort behavior in experiments (see Brandts and Charness, 2009 for a review).

Employer: thus, we collect nine effort choices from RED and BLUE Employees in the PUBLIC treatment. In the PUBLIC/EXO treatment the RED Employee's wage is exogenously fixed at either £1 or £7 depending on which version of the treatment is implemented. Thus, only three wage combinations are actually feasible, and vary in the wage the Employer chooses for the BLUE Employee. Thus, we collect three effort choices from BLUE and RED Employees in our two versions of the PUBLIC/EXO treatment. Lastly, because in the SECRET treatment employees only learn their own wage and not the co-worker's wage, they control three information sets corresponding to the three wage levels that could possibly be paid to them by the Employer. Thus, we collect three effort choices from employees in the SECRET treatment.

2.4. Experimental procedures

The experiment was conducted at the University of Nottingham using subjects recruited from a university-wide pool of students who had previously indicated their willingness to be paid volunteers in decision-making experiments.⁷ Twelve sessions with a total of 180 participants were conducted: we had 30 subjects participate in two sessions of the PUBLIC treatment, 30 subjects participate in two sessions of the SECRET treatment, and 120 subjects participate in eight sessions of the PUBLIC/EXO treatment, equally divided between its two versions PUBLIC/EXO £1 and PUBLIC/EXO £7. No subject took part in more than one session. The average age of participants was 20.7 years, and 52% of them were male.

All sessions used an identical protocol. Upon arrival, subjects were welcomed and randomly seated at visually separated computer terminals. Subjects were then given a written set of instructions that the experimenter read aloud. Subjects were also given a set of Earnings Distributions tables (reproduced in Appendix B for the PUBLIC treatment), showing Employer's and Employees' earnings for all combinations of efforts and wages. Subjects were then randomly assigned to a group and a role (Employer, RED Employee or BLUE Employee), and were asked to solve a set of control questions to corroborate their understanding of the experimental game. Subjects had to answer all questions correctly before the experiment could continue. The decision-making phase of the session consisted of a one-shot play of the relevant experimental game. All decisions were made anonymously: neither during nor after the experiment were subjects informed about the identity of the other people in the room they were matched with.

⁷ The experiment was programmed and conducted with the software z-Tree (Fischbacher, 2007). Subjects were recruited through the online recruitment system ORSEE (Greiner, 2004).

At the end of the experiment subjects completed a short post-experimental questionnaire. Subjects were then privately paid a £3 show-up fee plus their earnings from the experimental game. Subject earnings, inclusive of the show-up fee, ranged from £3 to £27, with an average of £10.12 and a standard deviation of £6.95. Sessions lasted about 50 minutes on average.

3. Results

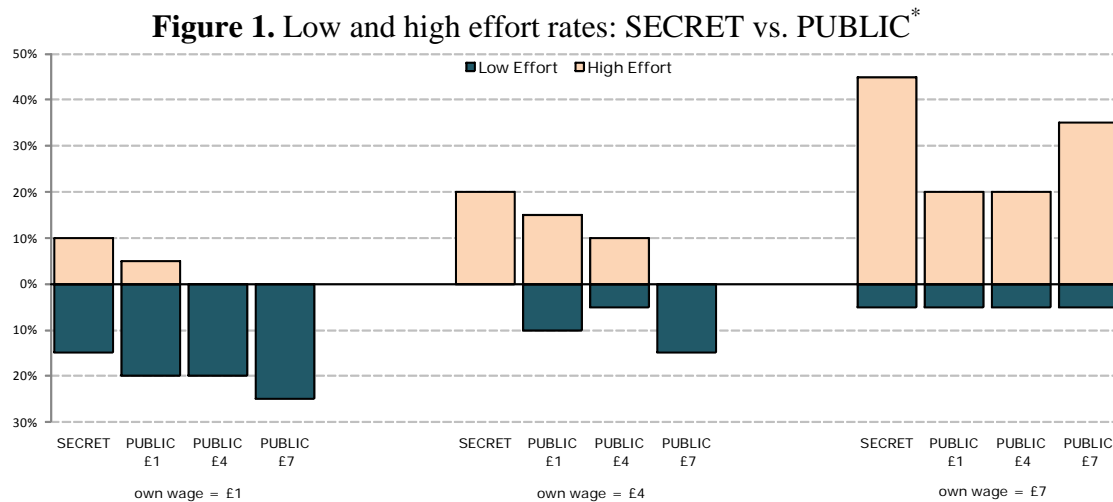
Our data analysis will be focused on employees' effort behavior across the three treatments used in the experiment. We start by comparing effort behavior across our SECRET and PUBLIC treatments. We then turn to a comparison of effort choices made in SECRET and PUBLIC/EXO. Because the focus of our study is on the impact of pay comparisons on own wage-effort reciprocal relations, only the effort decisions made by BLUE Employees are relevant to the analysis of effort choices made in PUBLIC/EXO: since RED Employees' wage was exogenously mandated by the experimenter their effort responses cannot be interpreted as a form of reciprocation towards the employer. Though not the focus of the experiment, we will briefly discuss the effort chosen by RED Employees in PUBLIC/EXO at the end of this section. Employers' wage decisions will also be briefly presented there.

3.1. SECRET vs. PUBLIC

Figure 1 reports the proportions of low effort choices (punishments) and high effort choices (rewards) made by employees in SECRET and PUBLIC for different levels of the own wage. In PUBLIC, for any given level of the own wage, we also differentiate the effort choices made when the co-worker's wage was low (PUBLIC £1), medium (PUBLIC £4) or high (PUBLIC £7). Effort rates for SECRET are not disaggregated according to the co-worker's wage as this was not known to employees at the time they made an effort choice.

A first evident feature of Figure 1 is that, in both treatments, employees expend higher effort when they are paid a high wage. Employees rarely reward the employer with high effort when the own wage is £1, but the proportion of high effort choices when the own wage is £7 varies from 20% to 45% depending on the treatment and the relative pay conditions. Conversely, there are virtually no low effort choices when the own wage is £7, while a £1 wage triggers punishment between 15% and 25% of the times. Thus, in these two treatments, as in many other related gift-exchange game experiments, a positive own wage-effort relation

emerges whereby employees are willing to expend more effort to reciprocate generous wage offers made by the employer.



* Medium effort is the omitted category, thus % low effort + % high effort + % medium effort = 100%. Bars are based on choices made by 20 employees in each treatment.

A second noticeable feature of Figure 1 is that, irrespective of the own wage level, employees respond more favorably to the employer’s wage offers in SECRET than in PUBLIC. For any given level of the own wage, and irrespective of the level of the co-worker’s wage, reward rates are highest in SECRET. Punishment rates are generally lower in SECRET than in PUBLIC. This detrimental impact of pay comparison information in PUBLIC appears to be sensitive to relative pay conditions: when the own wage is low or medium employees generally respond less favorably to the employer’s wage offers the higher is the wage paid to the co-worker. Thus, pay comparisons are mostly detrimental when a worker is paired with a co-worker who receives a £7 wage. The pattern is somewhat reversed when the own wage is high: here employees tend to act less favorably towards the employer when the latter discriminate against the co-worker.

We corroborate these observations by performing a regression analysis of effort behavior in the two treatments. In a first model (Model I) we regress effort on a variable measuring the different levels of the own wage (*Own wage*) and on dummy variables measuring the different levels of the co-worker’s wage: *PUBLIC £1*, *PUBLIC £4* and *PUBLIC £7*. These dummies assume value 1 for effort choices made in wage combinations where the co-worker earns respectively £1, £4 or £7, and 0 otherwise. Notice that the baseline category is represented by effort choices made in the SECRET treatment. Dummy variables controlling for individual characteristics (gender and field of study) are added as regressors in Model II, while Model III expands Model II by including interaction terms between the *Own*

wage’ variable and the co-worker’s wage dummies. Ordered probit estimations of the three regression models are reported in Table 2.

Starting with Model I, the coefficient on the ‘*Own wage*’ variable is positive and highly significant, confirming the existence of a positive own wage-effort relation in our experiment: own wages are a powerful determinant of effort. Consistent with our second observation, the coefficients on the three dummies for the PUBLIC treatment are all negative: employees expend more effort when co-workers’ wages are secret. The effect is significant at the 5% level for medium and high levels of the co-worker’s wage ($p = 0.048$ for *PUBLIC £4*; $p = 0.018$ for *PUBLIC £7*).

Table 2. Effort behavior in SECRET and PUBLIC

	I	II	III
Own wage	0.186 ^{***} (0.050)	0.195 ^{***} (0.052)	0.205 ^{**} (0.088)
PUBLIC £1	-0.436 (0.290)	-0.301 (0.305)	-0.064 (.510)
Own wage * PUBLIC £1	-	-	-0.059 (0.102)
PUBLIC £4	-0.486 ^{**} (0.245)	-0.352 (0.261)	-0.219 (0.463)
Own wage * PUBLIC £4	-	-	-0.033 (0.103)
PUBLIC £7	-0.584 ^{**} (0.247)	-0.460 [*] (0.262)	-0.683 (0.434)
Own wage * PUBLIC £7	-	-	0.055 (0.096)
1 if Male	-	-0.710 ^{***} (0.274)	-0.712 ^{***} (0.277)
1 if studies Social Sciences (incl. Economics)	-	0.109 (0.271)	0.110 (0.272)
<i>N.</i>	240	240	240
<i>Pseudo R</i> ² :	0.100	0.147	0.152

Ordered probit regressions. Dependent variable is effort. Robust standard errors in parentheses adjusted for intragroup correlation (individuals are used as independent clustering units).

* .05 < p ≤ .10; ** .01 < p ≤ .05; *** p ≤ .01.

In Model II we add controls for gender and field of study. The coefficient on the ‘*Own wage*’ variable remains positive and highly significant. The coefficients on the three dummies for PUBLIC remain negative, but only the coefficient on the dummy controlling for the highest co-worker’s wage (*PUBLIC £7*) is now significantly different from zero ($p = 0.079$). The coefficients on the two other co-worker’s wage dummies fall instead short of conventional significance levels ($p = 0.323$ for *PUBLIC £1*; $p = 0.178$ for *PUBLIC £4*).

The gender dummy enters significantly in the regression: men expend lower effort than women and the difference is significant at the 1% level. This result compares with findings on second-mover’s behavior in related trust and sequential prisoner’s dilemma games, where

men are sometimes found to act more selfishly than women (e.g., Croson and Buchan, 1999), although the effect is not always significant (e.g. Clark and Sefton, 2001).⁸

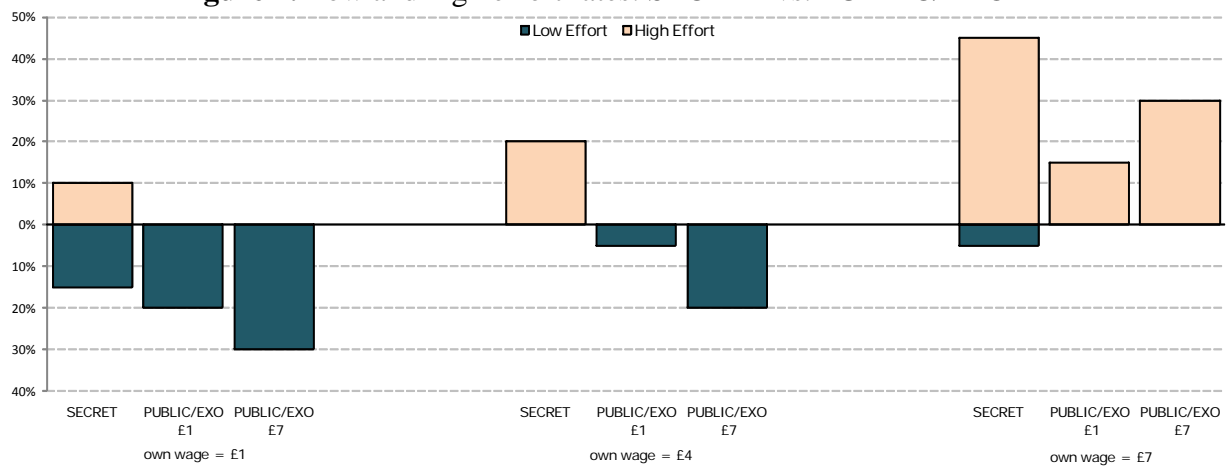
Model III extends Model II by introducing interactions between the ‘Own wage’ variable and the co-worker’s wage dummies. None of the coefficients on the interaction terms differ significantly from zero. Thus, pay comparisons do not alter the shape of the own wage-effort relationships, but do induce lower effort levels irrespective of own wage.

Overall these findings show that the availability of pay comparison information does generally depress employees’ willingness to provide costly effort relative to the case where no pay comparison information is available, and that the effect is particularly marked for high levels of the co-worker’s wage.

3.2. SECRET vs. PUBLIC/EXO

We now turn to effort choices made in PUBLIC/EXO. Figure 2 reports the proportions of low and high effort choices made by BLUE employees in PUBLIC/EXO for different levels of the own wage. We distinguish between effort choices made in sessions where the co-worker’s wage was low (PUBLIC/EXO £1) and sessions where the co-worker’s wage was high (PUBLIC/EXO £7). For comparison, effort choices made in SECRET are also included. As in Figure 1 we do not disaggregate effort choices in SECRET according to the co-worker’s wage.

Figure 2. Low and high effort rates: SECRET vs. PUBLIC/EXO*



* Medium effort is the omitted category, thus % low effort + % high effort + % medium effort = 100%. Bars are based on choices made by 20 employees in SECRET and by 20 BLUE Employees in each version of the PUBLIC/EXO treatment.

As in PUBLIC and SECRET, also in PUBLIC/EXO a positive own wage-effort relation emerges from the data: irrespectively of the wage of the co-worker, higher own wage levels decrease the frequency of low effort and increase the frequency of high effort (in fact, high

⁸ For a review of gender effects in experiments see Croson and Gneezy (2009).

effort is only chosen when the own wage is £7). A second important feature of Figure 2 is that also in PUBLIC/EXO the availability of pay comparison information appears to have a marked negative impact on effort choices. While in SECRET employees choose high effort in response to low or medium own wages between 10% and 20% of the times, the same level of the own wage only triggers medium or low effort in PUBLIC/EXO. High own wage offers also trigger less generous responses from employees in PUBLIC/EXO than in SECRET.

Table 3 reports a regression analysis of effort behavior in PUBLIC/EXO and in SECRET. Similarly to the analysis performed in the previous sub-section, in a first model (Model I) we regress effort on a variable for the own wage (*'Own wage'*) and on dummies for different levels of the co-worker's wage, *PUBLIC/EXO £1* and *PUBLIC/EXO £7*, assuming value 1 for effort choices made in sessions where the co-worker earns £1 and £7 respectively, and 0 otherwise. In Model II we add controls for individual characteristics, while in Model III we add interaction terms between the *'Own wage'* variable and the co-worker's wage dummies.

Table 3. Effort behavior in SECRET and PUBLIC/EXO

	I	II	III
Own wage	0.246*** (0.052)	0.248*** (0.052)	0.222** (0.096)
PUBLIC/EXO £1	-0.654*** (0.227)	-0.611*** (0.214)	-0.559 (0.518)
Own wage * PUBLIC/EXO £1	-	-	-0.016 (0.115)
PUBLIC/EXO £7	-0.761*** (0.254)	-0.745*** (0.262)	-1.169** (0.535)
Own wage * PUBLIC/EXO £7	-	-	0.103 (0.111)
1 if Male	-	0.137 (0.208)	0.140 (0.209)
1 if studies Social Sciences (incl. Economics)	-	0.186 (0.207)	0.196 (0.206)
<i>N.</i>	180	180	180
<i>Pseudo R</i> ² :	0.164	0.169	0.176

Ordered probit regressions. Dependent variable is effort. Robust standard errors in parentheses adjusted for intragroup correlation (individuals are used as independent clustering units).

* .05 < p ≤ .10; ** .01 < p ≤ .05; *** p ≤ .01.

The coefficient on the *'Own wage'* variable in Model I and to III is positive and significant and the interaction terms added in Model III are all insignificant: this confirms that the level of the own wage is an important determinant of effort choices also in PUBLIC/EXO. The dummies controlling for pay comparison effects in PUBLIC/EXO are negative and highly significant both in Model I and in Model II: the availability of information about the co-worker's wage is detrimental for effort behavior, regardless of the level of the co-worker's wage. Contrary to the results reported in Table 2, the coefficient on the gender dummy is positive and insignificant in both models presented in Table 3, showing

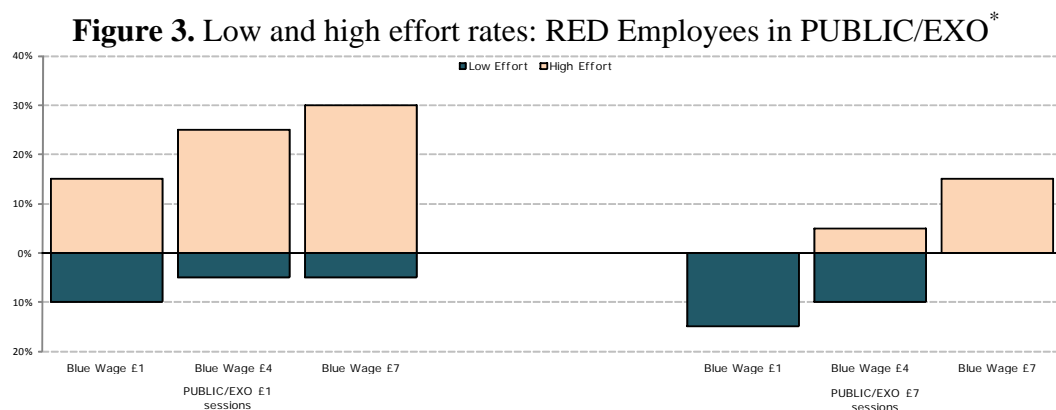
that overall we do not observe a clear gender effect in our experiment. The dummy for field of study also falls short of statistical significance in both models where they are included.

Overall, these results confirm that pay comparisons have a detrimental impact on effort. In fact, the negative effects of pay comparisons appear even more marked in PUBLIC/EXO: here employees are less willing to act favorably towards the employer regardless of relative pay conditions, while in PUBLIC the detrimental impact of pay comparisons was only detected for high levels of the co-worker’s wage. Hence, the presence of exogenous constraints to a firm’s wage structure seems to amplify the importance of relative wages for pay fairness considerations.

3.3. RED Employees’ effort in PUBLIC/EXO and Employers’ wage choices

Though not the focus of the experiment, our design also delivers data on wage choices by Employers across the three treatments, and on effort responses to fixed wages by RED Employees in PUBLIC/EXO. Here we briefly present these data for completeness.

In PUBLIC/EXO, RED Employees knew that their wage had been fixed exogenously by the experimenter at either £1 (PUBLIC/EXO £1 sessions) or £7 (PUBLIC/EXO £7 sessions), and were asked to make an effort choice for each possible level of the BLUE wage chosen by the Employer. Figure 3 shows the proportions of low and high effort choices made by RED employees in the PUBLIC/EXO sessions for different levels of the BLUE wage.



Medium effort is the omitted category, thus % low effort + % high effort + % medium effort = 100%. Bars are based on choices made by 20 RED Employees in each version of PUBLIC/EXO.

It is interesting to note how RED Employees’ willingness to punish the Employer decreases and their willingness to reward the Employer increases as the Employer pays higher wages to the BLUE Employee. Thus, while as outlined in the previous sub-sections co-workers’ wages have an overall negative impact on the effort decisions of those employees whose wage was *actively* chosen by the Employer, the same wage inequalities seem to have a positive impact on the effort of RED employees, whose wage was *not* chosen

by the Employer. A second interesting pattern emerging from Figure 3 is that RED Employees seem to expend higher effort when paid a £1 wage than a £7 wage. Thus, a *negative* relation between own wage and effort seems to exist when own wages are not chosen by the Employer.⁹

Turning to Employers' wage choices, Table 4 shows the combinations of wages paid by Employers across the three treatments of our experiment. The most noticeable feature of the Table is the high frequency of unequal wages choices made by Employers across the three treatments (55% of the cases). Unequal wages were chosen more often in PUBLIC/EXO (about 72% of the cases) than in the two other treatments (20% of the cases).

Table 4. Frequencies of Employers' wage choices across treatments
(SECRET / PUBLIC / PUBLIC/EXO)

	BLUE wage = £1	BLUE wage = £4	BLUE wage = £7
RED wage = £1	6 / 5 / 8	0 / 1 / 11	0 / 0 / 1
RED wage = £4	2 / 1 / -	2 / 2 / -	0 / 0 / -
RED wage = £7	0 / 0 / 11	0 / 0 / 6	0 / 1 / 3

4. Discussion & Conclusions

This study reports an experiment designed to examine the impact of pay comparison information on effort behavior in a multilateral version of the gift-exchange game. We compare effort choices made by employees in a treatment where they receive no information about the wage paid to their co-worker, with effort choices made in two treatments where co-workers' wages are public information. The two 'public wages' treatments vary in whether co-workers' wages are chosen by the employer, or fixed exogenously by the experimenter.

In all treatments of our experiment employees reciprocate high wages with high effort: a strong positive own wage-effort relationship exists in our setting, as it has been observed in many other gift-exchange game experiments (e.g., Fehr et al., 1993; Fehr et al., 1997; Gächter and Falk, 2002; Charness, 2004). Pay comparison information is found to be detrimental for the own wage-effort relation. In the treatment where co-workers' wages are chosen by the employer we find that learning that the co-worker is paid the highest wage reduces an employee's willingness to expend high effort relative to the treatment where co-workers' wages

⁹ To explore these patterns we ran an ordered probit regression (clustering on individuals) of RED Employees' effort on a dummy variable assuming value 1 for the sessions where the RED wage was £7, and on two co-worker's wage dummies assuming value 1 when the BLUE wage was either £4 or £7 respectively. The co-worker's wage dummies were both significant (the £4 dummy at the 10% level, the £7 dummy at the 1% level), revealing that RED Employees expended more effort when the Employer paid a medium or high wage to the co-worker relative to the case where the co-worker was paid a £1 wage. The own wage dummy was negative and significant at the 10% level.

are secret. Pay comparison effects are instead weaker for medium or low co-workers' wage levels. These findings compare with those by Gächter and Thöni (2009), who also observe stronger pay comparisons effects when employees are paired with a highly-paid co-worker. Pay comparison effects are amplified in the treatment where the employer is forced to pay an exogenously fixed wage to a portion of the workforce. Here the detrimental effects of pay comparisons are found regardless of the level of the co-worker's wage. These findings suggest that the presence of exogenous constraints to a firm's wage policy may increase the prominence of relative pay comparisons as a useful source of information about what constitutes a fair wage, thus strengthening the importance of horizontal fairness concerns for pay fairness evaluations.

Overall, our results show that the presence of information about others' well-being and the resulting ability to discover interpersonal inequalities can do substantial harm to reciprocal relations and to pro-social behaviors more in general: for any given level of the own wage, employees in our experiment are less willing to reward the employer and more willing to incur costs to reduce her earnings when co-workers' wages are public than when they remain undisclosed. That the ability to contemplate income inequalities can be detrimental for social behaviors has also been found in a variety of experimental settings. For example, it has been found that having subjects start the experiment with unequal distributions of endowments can reduce cooperativeness in public goods experiments (e.g., Anderson et al., 2008) and harm trust and trustworthiness in investment and trust games (e.g., Greiner et al., 2007; Hargreaves-Heap et al., 2009), although the effects are not always marked (see e.g., Anderson et al., 2006). Overall, these findings lend support to the argument (sometimes invoked to explain firms' preferences for wage secrecy) that the confidentiality of earnings within groups of individuals can effectively minimize the losses that arise due to negative reactions to observed inequalities and, more generally, to the dampening of their pro-social inclinations.

Appendices

Appendix A – Instructions

In the following we report the instructions used in the PUBLIC/EXO £7 sessions. Instructions used in the PUBLIC/EXO £1 sessions are identical with the exception that RED Employees' wage was fixed at £1. Any difference between the instructions used in the PUBLIC/EXO sessions and those used in the SECRET and PUBLIC sessions is italicized and reported in square brackets.

Instructions

Welcome!

You are about to take part in an experiment in the economics of decision making. This experiment is run by the "Centre for Decision Research and Experimental Economics" and has been financed by various foundations for research promotion.

There are other people in this room, who are also participating in this experiment. All participants are reading the same instructions as you are and have been recruited in the same fashion. Likewise, all participants are participating in this experiment for the first time, as you are.

It is important that you do not talk, or in any way try to communicate with the other participants during the experiment. If you have a question, raise your hand and a monitor will come over to where you are sitting and answer your question in private.

The experiment will take no more than 60 minutes, and at the end you will be paid in private and in cash. You will be paid a £3 show-up fee, plus an additional amount that will depend on the decisions that you and the other participants make. It is therefore very important to read these instructions with care.

1. Introduction

In this experiment you will be randomly paired with two other participants to form a group of three people. We will refer to each group as a "firm", and to the three group members as "**the Employer**", "**the Blue Employee**" and "**the Red Employee**".

The computer will randomly determine whether you are the Employer, the Blue Employee or the Red Employee just at the beginning of the experiment.

You will *not* be informed about who of the other participants are in your firm, either during or after the experiment. Therefore, all decisions are made anonymously.

In this experiment you will be asked to perform the following decision task and you will do it only once.

At the end of the experiment you will be paid a £3 show-up fee plus your earnings from this task.

2. The decision task

The structure of the decision-making within each firm is as follows.

- **The Employer** is initially endowed with £22 from which he/she pays a wage to the two employees with whom he/she is paired.

Wages can take three values: £1, £4 or £7.

The Employer **must** pay a £7 wage to the Red Employee, while he/she can decide on what wage (£1, £4 or £7) to pay to the Blue Employee. [*SECRET and PUBLIC: The Employer can decide on what wage (£1, £4 or £7) to pay to the Red Employee and on what wage (£1, £4 or £7) to pay to the Blue Employee.*]

The wage the Employer chooses for the Blue Employee and the wage he/she must pay to the Red Employee will be subtracted from his/her £22 endowment. [*SECRET and PUBLIC: The*

wages the Employer chooses for the Blue Employee and the Red Employee will be subtracted from his/her £22 endowment.]

- Each **Employee** is then informed of the wages paid by the Employer, i.e. employees learn their own wage and the wage that the Employer pays to the other employee. [SECRET: Each **Employee** is then informed of the wage the Employer pays to him/her, i.e. employees learn their own wage but not the wage that the Employer pays to the other employee.]

Each employee chooses then independently and in private an effort level: low, medium or high.

Low effort costs the employee £1 and reduces the Employer's earnings by £4.

Medium effort costs the employee nothing and leaves the Employer's earnings unchanged.

High effort costs the employee £1 and increases the Employer's earnings by £4.

On the next pages you will find a couple of hypothetical examples which will illustrate how to calculate the earnings of each member in the firm.

HYPOTHETICAL EXAMPLE FOR DEMONSTRATION PURPOSES, #1

The Employer must pay the £7 wage to the Red Employee. Suppose the Employer chooses to pay a £4 wage to the Blue Employee. [SECRET and PUBLIC: Suppose the Employer chooses to pay a £1 wage to the Red Employee and a £4 wage to the Blue Employee.]

Suppose that the Red Employee chooses LOW effort and the Blue Employee chooses HIGH effort.

This situation results in the following earnings:

==> EMPLOYER'S EARNINGS:

The Employer pays a total of £11 [SECRET and PUBLIC: £5] to the employees: £7 [SECRET and PUBLIC: £1] to the Red Employee and £4 to the Blue Employee.

The Employer receives a £4 revenue from the HIGH effort of the Blue Employee, but the Red Employee's LOW effort choice decreases his/her earnings by £4.

Therefore the Employer's earnings are: £22 - £11 [SECRET and PUBLIC: £5] + £4 - £4 = **£11** [SECRET and PUBLIC: £17].

==> RED EMPLOYEE'S EARNINGS:

The Red Employee is paid a £7 [SECRET and PUBLIC: £1] wage. LOW effort costs £1 to the employee.

Therefore the Red Employee's earnings are: £7 [SECRET and PUBLIC: £1] - £1 = **£6** [SECRET and PUBLIC: £0].

==> BLUE EMPLOYEE'S EARNINGS:

The Blue Employee receives a £4 wage. HIGH effort costs £1 to the employee.

Therefore the Blue Employee's earnings are: £4 - £1 = **£3**.

HYPOTHETICAL EXAMPLE FOR DEMONSTRATION PURPOSES, #2

The Employer must pay the £7 wage to the Red Employee. Suppose the Employer chooses to pay a £1 wage to the Blue Employee. [SECRET and PUBLIC: Suppose the Employer chooses to pay a £7 wage to the Red Employee and a £4 wage to the Blue Employee.]

Suppose that the Red Employee chooses MEDIUM effort and the Blue Employee chooses MEDIUM effort.

This situation results in the following earnings:

==> EMPLOYER'S EARNINGS:

The Employer pays a total of £8 to the employees: £7 to the Red Employee and £1 to the Blue Employee.

Employees' effort choices do not produce any revenue for the Employer, as MEDIUM effort leaves the Employer's earnings unchanged.

Therefore the Employer's earnings are: $\text{£}22 - \text{£}8 + \text{£}0 + \text{£}0 = \text{£}14$.

==> RED EMPLOYEE'S EARNINGS:

The Red Employee is paid a $\text{£}7$ wage. MEDIUM effort costs nothing to the employee.

Therefore the Red Employee's earnings are: $\text{£}7 - \text{£}0 = \text{£}7$.

==> BLUE EMPLOYEE'S EARNINGS:

The Blue Employee receives a $\text{£}1$ wage. MEDIUM effort costs nothing to the employee.

Therefore the Blue Employee's earnings are: $\text{£}1 - \text{£}0 = \text{£}1$.

Although the structure of the decision-making within each firm is the one we have just described, in this experiment employees make their decisions before learning the wage that the Employer has actually chosen for the Blue Employee.

Employees know however that **the Employer must pay a $\text{£}7$ wage to the Red Employee.**

If you are an employee, you will then be asked to indicate what you would do in each of the following **THREE SITUATIONS:**

- I. The Employer chooses to pay a **$\text{£}1$ wage** to the Blue Employee.
- II. The Employer chooses to pay a **$\text{£}4$ wage** to the Blue Employee.
- III. The Employer chooses to pay a **$\text{£}7$ wage** to the Blue Employee.

[SECRET: Although the structure of the decision-making within each firm is the one we have just described, in this experiment employees make their decisions before learning the wages that the Employer has actually chosen for them.

*If you are an employee, you will then be asked to indicate what you would do in each of the following **THREE SITUATIONS:***

- I. *The Employer chooses to pay a **$\text{£}1$ wage** to you.*
- II. *The Employer chooses to pay a **$\text{£}4$ wage** to you*
- III. *The Employer chooses to pay a **$\text{£}7$ wage** to you.]*

[PUBLIC: Although the structure of the decision-making within each firm is the one we have just described, in this experiment employees make their decisions before learning the wages that the Employer has actually chosen.

*If you are an employee, you will then be asked to indicate what you would do in each of the following **NINE SITUATIONS:***

- I. *The Employer chooses to pay a **$\text{£}1$ wage** to you and a **$\text{£}1$ wage** to the other Employee.*
- II. *The Employer chooses to pay a **$\text{£}1$ wage** to you and a **$\text{£}4$ wage** to the other Employee.*
- III. *The Employer chooses to pay a **$\text{£}1$ wage** to you and a **$\text{£}7$ wage** to the other Employee.*
- IV. *The Employer chooses to pay a **$\text{£}4$ wage** to you and a **$\text{£}1$ wage** to the other Employee.*
- V. *The Employer chooses to pay a **$\text{£}4$ wage** to you and a **$\text{£}4$ wage** to the other Employee.*
- VI. *The Employer chooses to pay a **$\text{£}4$ wage** to you and a **$\text{£}7$ wage** to the other Employee.*
- VII. *The Employer chooses to pay a **$\text{£}7$ wage** to you and a **$\text{£}1$ wage** to the other Employee.*
- VIII. *The Employer chooses to pay a **$\text{£}7$ wage** to you and a **$\text{£}4$ wage** to the other Employee.*
- IX. *The Employer chooses to pay a **$\text{£}7$ wage** to you and a **$\text{£}7$ wage** to the other Employee.]*

Please note that one of these situations will actually count for determining your and the other firm members' earnings, so make your choices carefully.

You will be informed of which situation is actually relevant at the end of the experiment, once everyone in the firm has taken his/her decision. The wage the Employer has actually chosen for the Blue Employee will determine which of the three situations above (I, II or III) counts for the computation of earnings. *[SECRET: The wages the Employer has actually chosen will determine, for each employee, which of the three situations above (I, II or III) counts for the computation of earnings.] [PUBLIC: The wages the Employer has actually chosen will determine, for each employee, which of the nine*

situations above (I to IX) counts for the computation of earnings.] Employees' choices in that situation will determine the final outcome for each firm member.

A complete list of all the possible earnings distributions resulting from the employees' effort choices in each of these three situations is provided in a separate sheet. *[SECRET and PUBLIC: A complete list of all the possible earnings distributions resulting from the employees' effort choices in each of these three [nine in PUBLIC] situations is provided separately. Two sets of Tables are provided. The two sets contain exactly the same information, just organised differently for your convenience. If you are a Red Employee you should refer to the set labelled "USE IF YOU ARE A RED EMPLOYEE". If you are a Blue Employee you should refer to the set labelled "USE IF YOU ARE A BLUE EMPLOYEE". If you are an Employer you can refer to either one.]*

3. What happens next?

- When the experiment starts, the computer will randomly assign you to a firm and randomly determine whether you are the Employer, the Blue Employee or the Red Employee.
- You will then access a couple of screens where you will be asked to answer a few questions. You will also have to calculate the earnings of all members of your firm for six hypothetical scenarios, with the help of the attached Tables. Press the "Check answers" button on the screen once you have answered all the questions. The computer will let you know whether your answers are correct.
- Once everyone has answered all the questions correctly, you will access the "Decision task" screen. Depending on whether you are an employer or an employee you will have to choose wage or effort levels, as described above in Section 2.

At the end of the experiment, you will be paid a £3 show-up fee plus your earnings from the decision task.

Please, raise your hand if you have any questions.

Appendix B – Earnings Distributions Tables

In the following we report the Earnings Distributions tables used by BLUE Employees in the PUBLIC sessions. In order to treat the two employee types symmetrically, columns and rows were inverted in the tables used by Red Employees and the order in which wage combinations were presented was modified accordingly. The tables used in the SECRET treatment were identical, but had different captions to account for the fact that only three ‘situations’ could occur in SECRET, depending on the level of the own wage. Tables with the same own wage and different levels of the co-worker’s wage were referred to as different ‘cases’ of the same ‘situation’. In the PUBLIC/EXO treatment only the tables where the co-worker’s wage was equal to £1 (in PUBLIC/EXO £1) or £7 (in PUBLIC/EXO £7) were used.

EARNINGS DISTRIBUTIONS

TABLE I : Earnings distributions resulting from the employees’ effort choices in **SITUATION I**, i.e. when the Employer chooses a **£1 wage** for the Blue Employee and a **£1 wage** for the Red Employee.

	Red Employee chooses LOW effort			Red Employee chooses MEDIUM effort			Red Employee chooses HIGH effort		
	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee
Blue Employee chooses LOW effort	£12	£0	£0	£16	£0	£1	£20	£0	£0
Blue Employee chooses MEDIUM effort	£16	£1	£0	£20	£1	£1	£24	£1	£0
Blue Employee chooses HIGH effort	£20	£0	£0	£24	£0	£1	£28	£0	£0

TABLE II : Earnings distributions resulting from the employees’ effort choices in **SITUATION II**, i.e. when the Employer chooses a **£1 wage** for the Blue Employee and a **£4 wage** for the Red Employee.

	Red Employee chooses LOW effort			Red Employee chooses MEDIUM effort			Red Employee chooses HIGH effort		
	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee
Blue Employee chooses LOW effort	£9	£0	£3	£13	£0	£4	£17	£0	£3
Blue Employee chooses MEDIUM effort	£13	£1	£3	£17	£1	£4	£21	£1	£3
Blue Employee chooses HIGH effort	£17	£0	£3	£21	£0	£4	£25	£0	£3

TABLE III : Earnings distributions resulting from the employees' effort choices in SITUATION III, i.e. when the Employer chooses a £1 wage for the Blue Employee and a £7 wage for the Red Employee.

	Red Employee chooses LOW effort			Red Employee chooses MEDIUM effort			Red Employee chooses HIGH effort		
	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee
Blue Employee chooses LOW effort	£6	£0	£6	£10	£0	£7	£14	£0	£6
Blue Employee chooses MEDIUM effort	£10	£1	£6	£14	£1	£7	£18	£1	£6
Blue Employee chooses HIGH effort	£14	£0	£6	£18	£0	£7	£22	£0	£6

TABLE IV : Earnings distributions resulting from the employees' effort choices in SITUATION IV, i.e. when the Employer chooses a £4 wage for the Blue Employee and a £1 wage for the Red Employee.

	Red Employee chooses LOW effort			Red Employee chooses MEDIUM effort			Red Employee chooses HIGH effort		
	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee
Blue Employee chooses LOW effort	£9	£3	£0	£13	£3	£1	£17	£3	£0
Blue Employee chooses MEDIUM effort	£13	£4	£0	£17	£4	£1	£21	£4	£0
Blue Employee chooses HIGH effort	£17	£3	£0	£21	£3	£1	£25	£3	£0

TABLE V : Earnings distributions resulting from the employees' effort choices in SITUATION V, i.e. when the Employer chooses a £4 wage for the Blue Employee and a £4 wage for the Red Employee.

	Red Employee chooses LOW effort			Red Employee chooses MEDIUM effort			Red Employee chooses HIGH effort		
	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee
Blue Employee chooses LOW effort	£6	£3	£3	£10	£3	£4	£14	£3	£3
Blue Employee chooses MEDIUM effort	£10	£4	£3	£14	£4	£4	£18	£4	£3
Blue Employee chooses HIGH effort	£14	£3	£3	£18	£3	£4	£22	£3	£3

TABLE VI: Earnings distributions resulting from the employees' effort choices in SITUATION VI, i.e. when the Employer chooses a £4 wage for the Blue Employee and a £7 wage for the Red Employee.

	Red Employee chooses LOW effort			Red Employee chooses MEDIUM effort			Red Employee chooses HIGH effort		
	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee
Blue Employee chooses LOW effort	£3	£3	£6	£7	£3	£7	£11	£3	£6
Blue Employee chooses MEDIUM effort	£7	£4	£6	£11	£4	£7	£15	£4	£6
Blue Employee chooses HIGH effort	£11	£3	£6	£15	£3	£7	£19	£3	£6

TABLE VII : Earnings distributions resulting from the employees' effort choices in **SITUATION VII**, i.e. when the Employer chooses a **£7 wage** for the Blue Employee and a **£1 wage** for the Red Employee.

	Red Employee chooses LOW effort			Red Employee chooses MEDIUM effort			Red Employee chooses HIGH effort		
	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee
Blue Employee chooses LOW effort	£6	£6	£0	£10	£6	£1	£14	£6	£0
Blue Employee chooses MEDIUM effort	£10	£7	£0	£14	£7	£1	£18	£7	£0
Blue Employee chooses HIGH effort	£14	£6	£0	£18	£6	£1	£22	£6	£0

TABLE VIII : Earnings distributions resulting from the employees' effort choices in **SITUATION VIII**, i.e. when the Employer chooses a **£7 wage** for the Blue Employee and a **£4 wage** for the Red Employee.

	Red Employee chooses LOW effort			Red Employee chooses MEDIUM effort			Red Employee chooses HIGH effort		
	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee
Blue Employee chooses LOW effort	£3	£6	£3	£7	£6	£4	£11	£6	£3
Blue Employee chooses MEDIUM effort	£7	£7	£3	£11	£7	£4	£15	£7	£3
Blue Employee chooses HIGH effort	£11	£6	£3	£15	£6	£4	£19	£6	£3

TABLE IX : Earnings distributions resulting from the employees' effort choices in **SITUATION IX**, i.e. when the Employer chooses a **£7 wage** for the Blue Employee and a **£7 wage** for the Red Employee.

	Red Employee chooses LOW effort			Red Employee chooses MEDIUM effort			Red Employee chooses HIGH effort		
	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee	Employer	Blue Employee	Red Employee
Blue Employee chooses LOW effort	£0	£6	£6	£4	£6	£7	£8	£6	£6
Blue Employee chooses MEDIUM effort	£4	£7	£6	£8	£7	£7	£12	£7	£6
Blue Employee chooses HIGH effort	£8	£6	£6	£12	£6	£7	£16	£6	£6

References

- Abeler, J., S. Altmann, S. Kube, and M. Wibral. Reciprocity and Payment Schemes: When Equality Is Unfair. *Journal of the European Economic Association* (forthcoming).
- Adams, J.S. 1965. Inequity in Social Exchange. In *Berkowitz, L. (ed.) "Advances in Experimental Psychology"*, Vol. 2:267-299. New York: Academic Press.
- Akerlof, G.A., and J.L. Yellen. 1990. The Fair Wage-Effort Hypothesis and Unemployment. *Quarterly Journal of Economics* 105(2), 255-283.
- Anderson, L., J. Mellor, and J. Milyo. 2006. Induced heterogeneity in trust experiments. *Experimental Economics* 9(3), 223-235.
- Anderson, L., J. Mellor, and J. Milyo. 2008. Inequality and public good provision: An experimental analysis. *Journal of Socio-Economics* 37(3) (June), 1010-1028.
- Bewley, T. 1999. *Why wages don't fall in a recession*. Cambridge: Harvard University Press.
- Brandts, J., and G. Charness. 2004. Do labour market conditions affect gift exchange? Some experimental evidence. *Economic Journal* 114(497), 684-708.
- Brandts, J., and G. Charness. 2009. The Strategy versus the Direct-response Method: A Survey of Experimental Comparisons. Mimeo. Department of Business Economics U. Autònoma de Barcelona and Department of Economics, UC Santa Barbara.
- Campbell III, C.M., and K.S. Kamlani. 1997. The Reasons for Wage Rigidity: Evidence from a Survey of Firms. *The Quarterly Journal of Economics* 112(3), 759-789.
- Charness, G. 2004. Attribution and reciprocity in an experimental labor market. *J Labor Econ J Labor Econ* 22(3), 665-688.
- Charness, G., and P. Kuhn. 2007. Does pay inequality affect worker effort? Experimental evidence. *Journal of Labor Economics* 25(4), 693-723.
- Charness, G., and D.I. Levine. 2007. Intention and stochastic outcomes: An experimental study. *Economic Journal* 117(522), 1051-1072.
- Clark, A., D. Masclet, and M.C. Villeval. Effort and Comparison Income. *Industrial and Labor Relations Review* (forthcoming).
- Clark, K., and M. Sefton. 2001. The sequential prisoner's dilemma: evidence on reciprocation. *Economic Journal* 111(468), 51-68.
- Crosan, R., and N. Buchan. 1999. Gender and culture: international experimental evidence from trust games. *American Economic Review* 89(2), 386-391.
- Crosan, R., and U. Gneezy. 2009. Gender Differences in Preferences. *Journal of Economic Literature* 47(2), 448-474.
- Falk, A., E. Fehr, and C. Zehnder. 2006. Fairness perceptions and reservation wages - The behavioral effects of minimum wage laws. *Quarterly Journal of Economics* 121(4), 1347-1381.
- Fehr, E., G. Kirchsteiger, and A. Riedl. 1993. Does Fairness Prevent Market Clearing - an Experimental Investigation. *Quarterly Journal of Economics* 108(2), 437-459.
- Fehr, E., S. Gächter, and G. Kirchsteiger. 1997. Reciprocity as a contract enforcement device: Experimental evidence. *Econometrica* 65(4), 833-860.
- Fehr, E., L. Goette, and C. Zehnder. 2009. A Behavioral Account of the Labor Market: The Role of Fairness Concerns. *Annual Review of Economics* 1(1), 355-384.
- Fischbacher, U. 2007. z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics* 10(2), 171-178.
- Fliessbach, K., B. Weber, P. Trautner, T. Dohmen, U. Sunde, C.E. Elger, and A. Falk. 2007. Social Comparison Affects Reward-Related Brain Activity in the Human Ventral Striatum. *Science* 318(5854), 1305-1308.
- Gächter, S., and A. Falk. 2002. Reputation and reciprocity: Consequences for the labour relation. *Scandinavian Journal of Economics* 104(1), 1-26.
- Gächter, S., D. Nosenzo, and M. Sefton. 2009. The Impact of Social Comparisons on

- Reciprocity. Mimeo. Department of Economics, University of Nottingham.
- Gächter, S., and C. Thöni. 2009. Social Comparison and Performance: Experimental Evidence on the Fair Wage-Effort Hypothesis. CeDEx Discussion Paper 2009-23.
- Greiner, B. 2004. The Online Recruitment System ORSEE 2.0 - A Guide for the Organization of Experiments in Economics. University of Cologne, Working Paper Series in Economics No. 10.
- Greiner, B., A. Ockenfels, and P. Werner. 2007. The Dynamic Interplay of Inequality and Trust: An Experimental Study. Harvard Business School WP 08-026.
- Güth, W., M. Königstein, J. Kovács, and E. Zala-Mező. 2001. Fairness within Firms: The Case of One Principal and Many Agents. *Schmalenbach Business Review* 53, 82-101.
- Hargreaves Heap, S.P., J.H. Tan, and D.J. Zizzo. 2009. Trust, Inequality and the Market. Unpublished manuscript available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1374844.
- Hennig-Schmidt, H., B. Rockenbach, and A. Sadrieh. In Search of Workers' Real Effort Reciprocity - A Field and a Laboratory Experiment. *Journal of the European Economic Association* (forthcoming).
- Owens, M.F., and J.H. Kagel. Minimum Wage Restrictions and Employee Effort in Incomplete Labor Markets: An Experimental Investigation. *Journal of Economic Behavior & Organization* (forthcoming).
- Selten, R. 1967. Die Strategiemethode zur Erforschung des eingeschränkt rationalen Verhaltens im Rahmen eines Oligopolexperimentes. In *Beiträge zur experimentellen Wirtschaftsforschung*, 136-168. Tübingen: J.C.B. Mohr (Paul Siebeck).