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## Peer effects in pro-social behavior: social norms or social preferences?

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CENTRE FOR DECISION RESEARCH & EXPERIMENTAL ECONOMICS



The University of  
Nottingham

Discussion Paper No. 2010-23

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# PEER EFFECTS IN PRO-SOCIAL BEHAVIOR: SOCIAL NORMS OR SOCIAL PREFERENCES?

Simon Gächter<sup>\*+§</sup>, Daniele Nosenzo<sup>\*</sup> and Martin Sefton<sup>\*</sup>

24 December 2010

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## Abstract:

We compare social preference and social norm based explanations for peer effects in a three-person gift-exchange game experiment. In the experiment a principal pays a wage to each of two agents, who then make effort choices sequentially. We find that both agents supply more effort in response to a higher own wage, even though supplying minimal effort maximizes own-earnings. In our baseline treatment we observe that the second agent's effort is influenced by the effort choice of the first agent, even though there are no material spillovers between agents. This peer effect is consistent with inequity aversion and we also show, by conducting an experiment to measure social norms, that it is consistent with social norm compliance. We design a second treatment where social norm compliance, but not inequity aversion, predicts this peer effect. In this treatment we do not observe peer effects. Our results suggest that, in our context, inequity aversion provides a parsimonious explanation for observed peer effects.

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**Keywords:** peer effects, social influence, gift-exchange, experiment, social preferences, inequity aversion, measuring social norms.

**JEL:** A13, C92.

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## 1. Introduction

A large body of experimental evidence challenges the assumption that individuals act exclusively to maximize their narrowly-defined self-interest. In simple games such as the dictator game, the investment game and the gift-exchange game, individuals often choose to reduce their own earnings in order to increase the earnings of their opponent, even in non-repeated and anonymous interactions where there are no positive future consequences associated with behaving pro-socially (see, e.g., Camerer, 2003). More recently, several studies of peer effects show that the extent to which people behave pro-socially is sensitive to whether they observe others doing so.<sup>1</sup>

Previous studies have typically interpreted these peer effects by referring to one of two different behavioral mechanisms. One view is that pro-social behavior originates from pressures to comply with norms of ‘socially appropriate’ behavior in a given context (e.g., Bicchieri, 2006; Keizer et al., 2008). Here observing what others do can affect individuals’ actions by influencing what they perceive to constitute appropriate behavior in a given situation. The alternative view emphasizes the role of stable social preferences, which can also predict non-selfish behavior and, as we show below, peer effects. Our paper reports experiments designed to separate these two leading explanations of pro-social behavior and peer effects.

Our starting point is a three-person gift-exchange game described in Section 2. In the experiment subjects are grouped in experimental ‘firms’ composed of three members: ‘Employer’, ‘Employee 1’ and ‘Employee 2’. Employers choose wages for their employees, who choose costly effort in return. A key feature of the game is that, before making an effort choice, Employee 2 is informed of the co-worker’s effort choice. Previous studies with this type of experimental setting have found that the availability of information about others’ efforts has a systematic influence on Employee 2’s decisions: in particular, when the Employer pays high wages to both employees Employee 2 expends more effort when she observes her co-worker supplying more effort, despite the fact that there are no earnings interdependencies between the employees. The behavioral

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<sup>1</sup> See, e.g., Cason and Mui (1998); Bicchieri and Xiao (2009) and Krupka and Weber (2009) in the dictator game; Gächter et al. (2010) and Thöni and Gächter (2011) in the gift-exchange game; Mittone and Ploner (*forthcoming*) in the investment game. Related, in public goods game experiments many people are ‘conditional cooperators’ who are willing to contribute in proportion to what others contribute (see, e.g., Falk et al., 2010; Fischbacher and Gächter, 2010). The importance of conditional cooperation has also been documented in a number of recent field experiments (Chen et al., 2010; Shang and Croson, 2009; Alpizar et al., 2008; Croson and Shang, 2008; Martin and Randal, 2008; Frey and Meier, 2004).

mechanism underlying this peer effect is unclear. We show that a model of social preferences where individuals dislike inequitable distributions of earnings (Fehr and Schmidt, 1999) can explain this effect. However, social norm compliance can also explain the positive relation between employees' efforts: as we describe in Section 3, using a norms-elicitation procedure introduced by Krupka and Weber (2010) we find that the co-worker's effort decisions systematically affect the perception of what constitutes an appropriate effort response by Employee 2 to a high wage offer.

In this paper we disentangle these two possible explanations for peer effects in pro-social behavior. Our experiment, described in Section 4, consists of two main treatments. The BASELINE treatment uses the same game used in previous studies, and both the social preferences approach and the social norms approach are consistent with a positive relation between employees' efforts. Our RANDOM treatment modifies the game used in BASELINE as follows: after all firm members have made a decision one of the employees is randomly selected, and only the wage and effort decisions regarding the selected employee are implemented and have consequences for the computation of earnings. In such a setting models of social preferences predict no correlation between employees' efforts. However, our norms-elicitation procedure for RANDOM reveals that the co-worker's effort decisions still influence what is perceived to be an appropriate response by Employee 2 to a high wage offer. Thus, observing a positive relation between employees' efforts in RANDOM is consistent with social norms compliance.

We describe our results in Section 5. Our BASELINE treatment successfully reproduces the finding that Employees 2's effort decisions are significantly influenced by the co-worker's effort decisions. However, this effect vanishes in RANDOM where Employees 2's choices are not affected by the co-worker's choices. Thus peer effects in effort decisions are always evident in the elicited social norms, but not in the behavioral data. Peer effects are observed only when predicted by inequity aversion.

Peer effects are observed in our data when both employees are paid the same high wage. In Section 6 we address the question whether peer effects are robust to situations in which employees are treated generously but asymmetrically. We report an ASYMMETRIC treatment in which we introduce small wage asymmetries in the high wage combination. This has only minor effects on the predictions from inequity aversion relative to the BASELINE treatment, but might have more

noticeable effects on social norm compliance due to the existence of ‘moral wiggle’ opportunities. In fact we again find clear peer effects in the elicited social norms as well as in the behavioral data.

The patterns of behavior observed in each treatment are consistent with inequity aversion. The patterns are not consistent with elicited social norms when social norms and inequity aversion make differing predictions. This suggests that an approach that emphasizes the role of stable social preferences can parsimoniously explain peer effects in pro-social behavior in our context. However, we also observe differences across treatments in the proportion of individuals who are willing to engage in pro-social behavior, and this is more difficult to reconcile with inequity aversion. In Section 7 we discuss this result and related studies that have examined the predictive power of social norms and social preference approaches in experimental games.

## **2. Peer Effects in Trilateral Gift-Exchange Games**

We examine peer effects in pro-social behavior using a three-person version of the standard gift-exchange game (Fehr et al., 1993). In the trilateral gift-exchange game ‘firms’ are composed of three members: one ‘Employer’ and two ‘Employees’. The game begins with the Employer choosing wages for the two employees. Wages are publicly observed before employees choose costly effort which is beneficial to the Employer. Previous experimental work with this type of game shows the existence of a positive ‘own-wage effect’: employees often reciprocate higher wage offers with higher effort, as in standard two-person gift-exchange game experiments. However, previous studies also show that the presence of information about the co-worker’s wage and/or effort can systematically affect the magnitude of this own wage effect. Some of these studies focus on the effects of wage comparisons with mixed results: in some cases information about co-workers’ wages systematically affects employees’ effort decisions (e.g., Abeler et al., 2010; Gächter and Thöni, 2010; Nosenzo, 2010), while in other cases such effects are weak or absent (e.g., Gächter et al., 2010; Charness and Kuhn, 2007; Güth et al., 2001). Other experimental studies focus on effort comparison effects, i.e. on how information about co-workers’ effort choices affect an employee’s effort decisions when there are no earnings interdependencies between the employees. Both Gächter et al. (2010, GNS henceforth) and Thöni and Gächter (2011) find that when the effort of the co-worker is publicly observable employees’ willingness to reciprocate high wage offers depends on whether the co-worker is also willing to do

so. Thus, a positive and systematic correlation between employees' efforts has been documented in trilateral gift-exchange game experiments.

Our study is based on the three-person gift-exchange game used by GNS. Their game has three players labeled 'Employer', 'Employee 1' and 'Employee 2'. All players move sequentially: the Employer moves first and chooses a wage  $w_i \in \{16,32\}$  for each Employee  $i \in \{1, 2\}$ . Employee 1 observes both wages and then chooses an effort level  $e_1 \in \{1,2,3,4\}$ . Finally, Employee 2 observes both wages *and* the effort chosen by Employee 1, and then chooses an effort level  $e_2 \in \{1,2,3,4\}$ . After Employee 2's choice, the game ends and the Employer's earnings are computed as:

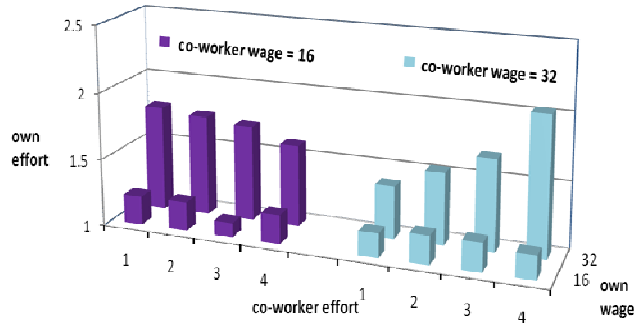
$$\pi_{ER} = 10 \cdot (e_1 + e_2) - w_1 - w_2 \quad (1)$$

and employee  $i$ 's earnings are computed as:

$$\pi_i = w_i - 5 \cdot (e_i - 1) \quad (2)$$

In their experiment, GNS implemented a one-shot version of this game using the strategy method (Selten, 1967), i.e. subjects have to make contingent decisions for all nodes at which they may have to play. Thus, each Employee 2 made sixteen effort choices, one for each possible combination of wages and effort chosen by the Employer and Employee 1. Figure 1 shows the average effort expended by Employees 2 in each contingency.

**Figure 1:** Employees 2 average effort in the GNS experiment



Employee 2's average effort in the experiment by Gächter, Nosenzo and Sefton (2010) (n=28).

As in many other gift-exchange game experiments, GNS observe a positive own-wage effect: Employees 2 reward the Employer with higher effort when they are paid a higher wage. GNS also observe a peer effect when both employees are paid a high wage. Here Employee 2 strongly reciprocates the high wage if Employee 1 expends high effort, but chooses low effort if



Employee 1 expends minimal effort.<sup>2</sup> Thöni and Gächter (2011) also find peer effects in a closely related trilateral gift-exchange game experiment using the direct response method.

What underlies these peer effects? In the next sub-sections we discuss two alternative explanations: models of social preferences and social norm compliance.

### 2.1. Explaining Peer Effects: the Social Preferences Approach

Thöni and Gächter (2011) show that the positive correlation between employees' efforts observed in their experiment can be explained by the model of inequity aversion proposed by Fehr and Schmidt, 1999 (FS), but not by other leading models of social preferences. This is also the case for the game used by GNS.<sup>3</sup>

Our analysis focuses on the subgames starting when Employee 2 chooses effort. An Employee 2 motivated by inequity aversion is assumed to have a utility function:

$$U_2(\pi_2, \pi_{ER}, \pi_1) = \pi_2 - \frac{\alpha_2}{2} (\max\{\pi_{ER} - \pi_2, 0\} + \max\{\pi_1 - \pi_2, 0\}) - \frac{\beta_2}{2} (\max\{\pi_2 - \pi_{ER}, 0\} + \max\{\pi_2 - \pi_1, 0\})$$

where  $\pi_{ER}$  and  $\pi_{i \in \{1,2\}}$  are respectively the Employer's and employee  $i$ 's material payoff from the game. The parameter  $\alpha_2$  measures the strength of the employee's aversion to disadvantageous payoff inequality, and  $\beta_2$  measures the strength of the employee's aversion to advantageous inequality. As in FS, we assume  $\alpha_2 \geq \beta_2$  and  $0 \leq \beta_2 < 1$ .

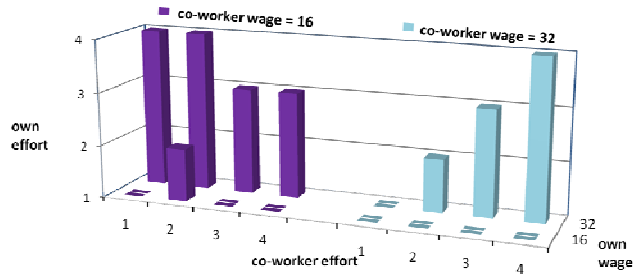
The model prediction depends on the degree of 'superiority aversion'  $\beta_2$ . If Employee 2 is not sufficiently superiority averse (i.e.,  $\beta_2 \leq 1/2$  for the GNS parameters), she will choose minimal effort irrespective of the wage she is offered and of the wage and effort of the co-worker. On the contrary, a sufficiently superiority averse Employee 2 ( $\beta_2 \geq 1/2$ ) may choose non-minimal effort as shown in Figure 2.

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<sup>2</sup> The correlations between employees' efforts in the other three wage combinations are statistically insignificant.

<sup>3</sup> Models that assume that players care about payoff comparisons but do not assume that Employee 2 *directly* compares her payoff with Employee 1's payoff (e.g., Bolton and Ockenfels, 2000; Falk and Fischbacher, 2006) predict that employees' efforts are negatively related. The model by Charness and Rabin (2002) assumes that Employee 2 directly compares her payoff with Employee 1's payoff when the latter is the least well off among the three firm members. This is not the case in the wage combinations where both wages are high, and so the model does not predict a positive relation between efforts for this wage combination. Models of altruism (Cox et al., 2007; 2008) predict a negative relation of efforts. Pure reciprocity models (e.g., Dufwenberg and Kirchsteiger, 2004) do not predict any relation between employees' efforts because the effort chosen by one employee has no impact on the payoff of the other employee.

**Figure 2:** FS predictions for the GNS game



Predicted effort choices of a superiority averse Employee 2 ( $\beta_2 \geq 1/2$ ).

Note how these predictions bear out the two most distinctive features of the GNS experiment reproduced in Figure 1: firstly, the positive own-wage effect whereby higher effort is chosen in response to a higher wage, and secondly, the strong positive relation between employees' efforts in the wage combination where both wages are high. In the model, the own-wage effect results from Employee 2's superiority aversion: when she is paid a high wage, Employee 2 is generally better off than the other firm members. By choosing non-minimal effort levels she can reduce the advantageous payoff differences relative to the Employer and Employee 1 and attain more equitable earnings distributions. The one-to-one complementary relation between employees' efforts when both employees are paid a high wage results from the fact that Employee 2 is generally unwilling to choose non-minimal effort if by doing so her payoff falls (too much) short of the payoff of another firm member. Thus, when matched with a highly-paid co-worker, Employee 2 is willing to expend effort and reduce advantageous payoff inequalities only to the extent to which the co-worker is also willing to do so.<sup>4</sup>

## 2.2. Explaining Peer Effects: the Social Norms Approach

Peer effects could also be the result of pressures to comply with norms of 'socially appropriate' behavior, i.e., collectively recognized rules of conduct that prescribe socially acceptable behaviors in a given situation. The literature typically distinguishes between two different types of norms (see, e.g., Cialdini et al., 1990; Keizer et al., 2008): 'injunctive' norms, defining what one ought to do in a given situation, and 'descriptive' norms, reflecting what actually constitutes 'normal' or 'regular' behavior in a given situation. A relevant injunctive norm that may

<sup>4</sup> Note that the model generates a (somewhat weaker) negative relation between employees' efforts when Employee 2 is paid a high wage and the co-worker a low wage. This results from the fact that Employee 2 would earn less than the Employer if she chose maximum effort when the co-worker chooses 3 or 4 units of effort: then, she prefers to reduce her effort by one unit. GNS observe a negative but statistically insignificant correlation between efforts in this case.

exist in the GNS experiment is the ‘norm of reciprocity’ whereby individuals respond with kindness/unkindness to kind/unkind actions by others (see, e.g., Gouldner, 1960; Cialdini, 2001). In the context of the experiment, the norm of reciprocity would prescribe that employees choose higher effort in response to higher wage offers made by employers. Descriptive norms are informed by observation of others’ behavior in comparable situations. In the GNS experiment, observing how the co-worker responds to a high wage offer may systematically influence Employees 2’s perception of what constitutes an appropriate reciprocal response to a high wage offer. Thus, if a descriptive social norm exists in the GNS experiment and behavior is guided by such norms, Employees 2’s effort choice may be systematically influenced by the co-worker’s effort choice.

Explaining phenomena by appealing to the influence of social norms can be problematic because of the difficulties of precisely identifying and measuring norms. In particular, often what may or may not constitute a norm is based on intuition or casual empiricism. For a more objective approach toward identifying whether social norms are relevant to the experimental environment studied by GNS, and whether they can explain the patterns of behavior discussed above, we adapted an experimental norms-elicitation procedure recently introduced by Krupka and Weber (2010) for dictator games. We describe this procedure for our trilateral gift-exchange game in the next section.

### **3. Identifying Social Norms in the Trilateral Gift-Exchange Game**

The norms-elicitation experiment consisted of one session with 51 students recruited at the University of Nottingham and paid £5 for their participation. Upon arrival subjects learnt that their task was to read a description of four different ‘situations’ in which a ‘decision-maker’ had to choose among a number of possible alternative actions.<sup>5</sup> The situations reproduced the following four possible contingencies faced by Employees 2 in the GNS experiment:<sup>6</sup>

- 1) Employer pays a wage of 32 to Employee 1 and a wage of 16 for Employee 2. Employee 1 chooses 1 unit of effort;
- 2) Employer pays a wage of 32 to Employee 1 and a wage of 16 for Employee 2. Employee 1 chooses 4 units of effort;
- 3) Employer pays a wage of 32 to both employees. Employee 1 chooses 1 unit of effort;

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<sup>5</sup> Instructions for the norms-elicitation experiment are reproduced in Appendix B2.

<sup>6</sup> We only elicited judgments about four of the sixteen possible situations faced by Employees 2 in order to keep the size of the task and the duration of the experiment reasonable for subjects.

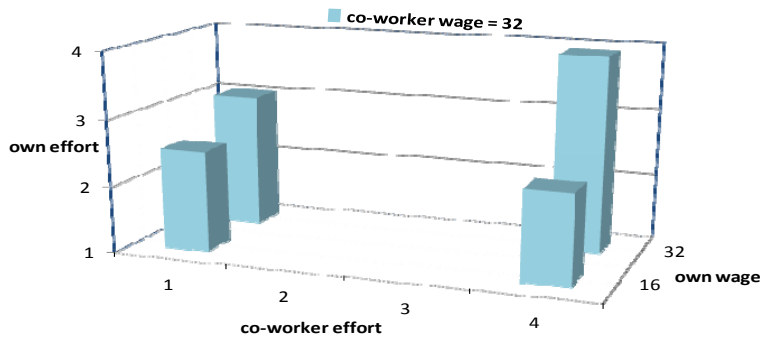
4) Employer pays a wage of 32 to both employees. Employee 1 chooses 4 units of effort.

These situations were chosen to identify any norm of reciprocity (Situation 1 vs. Situation 3, and Situation 2 vs. Situation 4), and to examine how normative judgments are affected by observation of co-workers' actions (Situation 1 vs. Situation 2, and Situation 3 vs. Situation 4).

For each of these situations and for each effort choice available to Employee 2 subjects had to rate whether the effort choice was 'very socially appropriate', 'somewhat socially appropriate', 'somewhat socially inappropriate', or 'very socially inappropriate'. Subjects were told that at the end of the session the experimenter would randomly select one of the four situations, and one possible effort choice in that situation. Subjects received an additional £3 if their appropriateness rating for the selected situation and choice matched the modal rating of other subjects in the session. Thus, subjects were given incentives to reveal their perception of the *most prevalent* appropriateness judgment in the session, and not their personal judgment.<sup>7</sup>

The main results of our norms-elicitation experiment can be gauged by the following exercise (see Appendix A1 for a summary of subjects' appropriateness ratings across the four situations they evaluated). Assume that, if asked to make an effort choice in the role of Employee 2 in each of the four situations they evaluated, the 51 raters in our experiment would select the level of effort that they evaluated as the 'most' socially appropriate for that situation.<sup>8</sup> Figure 3 shows the average effort that our 51 raters would then expend in each of the four situations that they were asked to evaluate.

**Figure 3:** Socially most appropriate effort choices in the trilateral gift-exchange game



Effort choices that the 51 raters would make on average if they chose the most socially appropriate effort level in the four situations they evaluated.

<sup>7</sup> See Krupka and Weber (2010) for a discussion of how the use of such 'pure matching' coordination games constitutes an incentive-compatible tool to elicit social norms. See Burks and Krupka (2010) and Krupka et al. (2010) for other recent applications of the norms-elicitation procedure introduced by Krupka and Weber (2010).

<sup>8</sup> If a subject assigns the highest appropriateness rating to more than one effort level, we select the effort level which gives him/her the highest material payoff.

Two features of Figure 3 are most distinctive: firstly, for a given effort choice of the co-worker, the most appropriate level of effort in response to a high own wage is higher than the most appropriate level of effort in response to a low own wage (Wilcoxon matched-pairs signed-ranks tests:  $p = 0.003$  when the co-worker chooses 1 unit of effort;  $p = 0.000$  when the co-worker chooses 4 units of effort). These differences in the average appropriate effort levels reproduce the positive own-wage effect observed in GNS (see Figure 1 above), and are consistent with the existence of a norm of reciprocity. Secondly, when the Employer pays a high wage to both employees, Employee 2's most appropriate effort response depends positively on the co-worker's effort response: the average appropriate level of effort increases from 3.02 when the co-worker chooses 1 unit of effort to 3.92 when the co-worker chooses 4 units of effort (Wilcoxon matched-pairs signed-ranks test:  $p = 0.000$ ).<sup>9</sup> Thus, the perception of what constitutes an appropriate reciprocal response to a high wage offer is influenced by a descriptive norm which is based on the observation of how the co-worker behaves in similar circumstances. Overall, our norms-elicitation experiment reveals that a social norms approach can also explain the peer effects observed in the GNS experiment.

## 4. Disentangling Social Preferences and Social Norms

### 4.1. The Experimental Games

Our experiment is based on two main treatments. Subjects in the BASELINE treatment played the same game played by subjects in the GNS experiment. Here, as outlined in the previous section, a positive correlation between employees' efforts in the high wages combination is consistent with both the FS model and social norms compliance. To disentangle these two explanations we introduce the RANDOM treatment, where the FS model predicts no correlation between employees' efforts while the social norms-based explanation may still be consistent with positive peer effects.

Subjects in the RANDOM treatment played the game used in BASELINE except that, after all members of the firm have made their decision, Nature randomly selects one of the two employees: either Employee 1 or Employee 2 with equal probability. Only the wage and effort

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<sup>9</sup> Employee 1's behavior does not systematically affect appropriateness ratings when the Employer pays different wages to the employees (Wilcoxon matched-pairs signed-ranks test:  $p = 0.515$ ). This is in line with the idea that the behavior of others has a stronger influence on the perception of what constitutes socially appropriate behavior when others are in comparable situations.

decisions regarding the selected employee are implemented. In RANDOM the payoff functions (1) and (2) above are then modified such that the Employer's earnings are computed as:<sup>10</sup>

$$\pi_{ER} = \begin{cases} 20 + 10 \cdot (e_1) - w_1 & \text{if Employee 1 is selected} \\ 20 + 10 \cdot (e_2) - w_2 & \text{if Employee 2 is selected} \end{cases} \quad (1')$$

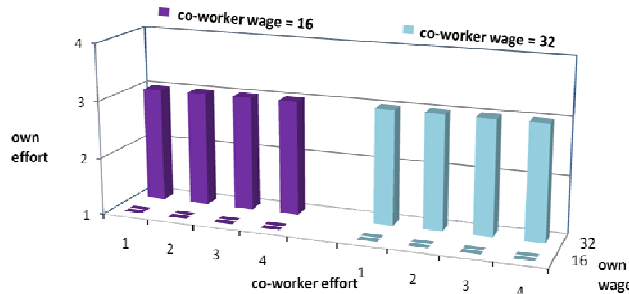
and employee  $i$ 's earnings are computed as:

$$\pi_i = \begin{cases} w_i - 5 \cdot (e_i - 1) & \text{if Employee } i \text{ is selected} \\ 0 & \text{if Employee } i \text{ is not selected} \end{cases} \quad (2')$$

#### 4.2. Behavioral Predictions in RANDOM: the FS Model

For the RANDOM treatment the FS model yields dramatically different predictions relative to BASELINE. The predicted efforts of an inequity averse Employee 2 (with  $\beta_2 \geq 1/2$ ) in RANDOM are shown in Figure 4: while the FS model still predicts a positive own-wage effect, it predicts *no* relation between employees' efforts. Intuitively, in the RANDOM treatment only the state of the world where Employee 2 is selected matters for an inequity averse Employee 2, as in the state of the world where she is not selected her actions cannot affect the distribution of earnings. In the state of the world where Employee 2 is selected the co-worker's effort and wage have no impact on the distribution of earnings, and hence they do not affect the choices of an inequity averse Employee 2.<sup>11</sup>

**Figure 4:** FS predictions for the RANDOM treatment



Predicted effort choices of a superiority averse Employee 2 ( $\beta_2 \geq 1/2$ ).

<sup>10</sup> Note that a constant is added to the Employer's payoff in RANDOM. As explained in detail in the next subsection, this is done to refine our theoretical predictions for the RANDOM treatment.

<sup>11</sup> The prediction of no correlation between employees' efforts in RANDOM is robust across models of social preferences where utilities are defined over outcomes. However, if utilities are defined over expected outcomes, as in Trautmann (2009), employees' efforts may be correlated. In order to exclude this possibility we added 20 points to the Employer's payoff such that Employee 2 is worse off than the Employer in expectation and thus is generally unwilling to supply effort above the minimal level in any contingency.

### *4.3. Behavioral Predictions in RANDOM: the Social Norms Approach*

What does the social-norms approach predict about Employee 2's effort decisions in the RANDOM treatment? Since high (low) wage offers still represent a kind (unkind) action by the Employer, the injunctive norm of reciprocity should have bite in the RANDOM treatment, and induce employees to respond with higher effort to higher wages. Moreover, because *ex ante* (i.e. before Nature selects one of the two employees) Employee 1's actions still indicate how she would respond to the Employer's wage offer, they may exert an influence on Employee 2's perception of what constitutes an appropriate reciprocal response to the wage they are offered. Thus, the social-norms approach may yield similar predictions in RANDOM and BASELINE. In particular, such a framework may still predict that Employee 2's effort decisions are positively influenced by the co-worker's decisions.

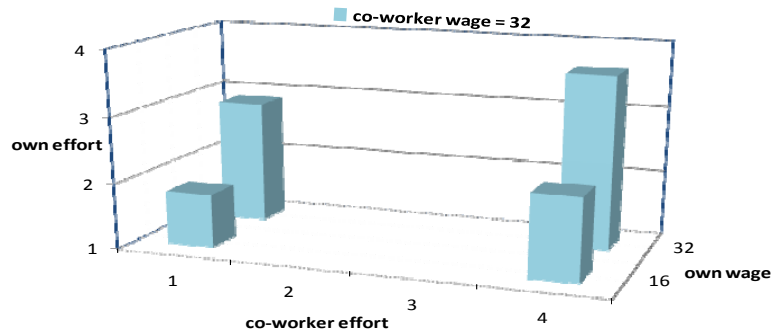
To substantiate this prediction, we conducted a second norms-elicitation experiment using the same procedures used for the norms-elicitation experiment described in the previous section. We recruited 47 new subjects who were given a description of four situations reproducing four of the sixteen possible contingencies faced by Employees 2 in RANDOM. The situations corresponded to those used in the norms-elicitation experiment for the GNS game. For each situation and for each possible effort choice available to Employee 2 subjects rated whether an effort choice was socially appropriate or socially inappropriate using the same 4-point scale described above. Subjects were paid £5 for their participation, plus an additional £3 if their appropriateness rating for one randomly selected situation and effort choice matched the modal rating of other subjects for the corresponding situation and choice.

The main results of our second norms-elicitation experiment are shown in Figure 5. As for Figure 3, we computed the average effort that our 47 raters would expend in each situation if they selected the level of effort that they indicated as the most socially appropriate for each situation.<sup>12</sup>

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<sup>12</sup> As for Figure 3, if two or more effort levels received the highest appropriateness rating we used the effort level yielding the highest material payoff to the subject. Subjects' appropriateness ratings are summarized in Appendix A1.

**Figure 5:** Socially most appropriate effort choices in RANDOM



Effort choices that the 47 raters would make on average if they chose the most socially appropriate effort level in the four situations they evaluated.

As in Figure 3, Figure 5 exhibits a clear reciprocity norm: the level of effort which is on average judged as most appropriate when the own wage is high is higher than the level of effort judged as most appropriate when the own wage is low (Wilcoxon matched-pairs signed-ranks tests:  $p = 0.000$  both when the co-worker chooses 1 and 4 units of effort). Also, the level of effort that is perceived as the most appropriate response to a high wage offer depends positively on the co-worker's effort: the most appropriate effort response to a high wage increases from 2.87 when the co-worker chooses 1 unit of effort to 3.62 when the co-worker chooses 4 units of effort (Wilcoxon matched-pairs signed-ranks test:  $p = 0.000$ ).<sup>13</sup>

The key aspect of our treatment comparison is the relation between employees' efforts in the wage combination where both wages are high. A positive relation between efforts in BASELINE, but not in RANDOM, is consistent with the FS model, while a positive relation in both BASELINE and RANDOM is inconsistent with the FS model and suggests a social norms-based explanation for the observed effects.

#### 4.4. Implementation of the Experiment

Both treatments of the experiment were implemented in two parts. In the first part the relevant experimental game was implemented using the strategy method, as in GNS, while in the second part the same game was played in direct-response mode, i.e. subjects had to make decisions in response to the decisions actually made by other players. In both parts of the experiment we implemented a one-shot version of the relevant game, which was described to subjects using the same labor market frame that we use throughout the text. At the beginning of

<sup>13</sup> In RANDOM Employee 1's behavior affects appropriateness ratings even when the Employer pays different wages to the employees (Wilcoxon matched-pairs signed-ranks test:  $p = 0.001$ ).



the experiment subjects were informed that the experiment consisted of two parts, but detailed information about the second part was only given once everyone had completed the first part. Subjects remained matched with the same participants throughout the whole experiment, and any information about outcomes from the first part of the experiment was only given at the end of the second part. Subjects knew from the beginning that only one randomly determined part of the experiment would be taken into consideration for determining earnings.

The empirical analysis presented in the next section will be based on choices elicited with the strategy method in the first part of the experiment. In fact, Part One of the experiment provides a rich source of data for examining how subjects in the role of Employee 2 respond to situations that differ in the wage they are offered and in the wage and effort of the co-worker. Part Two of the experiment is used to address concerns that decisions elicited by the strategy method do not differ systematically from those elicited by the direct response method.

The experiment was conducted at the University of Nottingham using the software z-Tree (Fischbacher, 2007). Subjects were students from a wide range of disciplines recruited through the online recruitment system ORSEE (Greiner, 2004). No subject took part in more than one session. We conducted a first wave of experiments in autumn 2009: for each treatment we ran seven sessions, with 9 or 12 participants per session and a total of 81 subjects (27 firms) per treatment. We increased the sample size in the RANDOM treatment by conducting six additional sessions in autumn 2010 with 9, 12 or 15 participants per session and a total of 72 subjects (24 firms). Thus, including the data from GNS, we observe behavior in 55 firms in the BASELINE setup and 51 firms in the RANDOM setup. Subjects were given detailed instructions about the experiment, had to solve control questions before proceeding to the decision stage of the experiment, and could use at any time during the experiment an on-screen electronic calculator (the *What-if-calculator*) to compute their and other players' payoffs. We provide a detailed description of the procedures used in the experiment in Appendix B1, where we also reproduce the experimental instructions.

The experimental sessions lasted 75 minutes on average. All participants were endowed with an initial amount of 95 points in each part of the experiment, and earnings from the decision task (which could be negative) were added to this initial amount.<sup>14</sup> At the end of the session, the

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<sup>14</sup> Note that subjects in the role of the Employer could incur losses from the decision task. The initial endowment outweighed any possible losses.

final point earnings were converted into British Pounds at a rate of £0.10 per point. Subjects were paid in private and in cash at the end of each session. Subject earnings ranged from £6.10 to £13.90, averaging £10.46.

## 5. Results

All data presented in this section are from Part One of the experiment where subjects' decisions were elicited using the strategy method. In Part Two subjects performed in direct-response mode the decision task they had performed in Part One. To check whether choices elicited with the strategy method differ systematically from those elicited with the direct-response method, we compare a subject's choice in Part Two at a node of the game tree actually reached during the experiment with the choice he or she made at that node in Part One. We find that across our two treatments 79 percent of Employers, 86 percent of Employees 1 and 87 percent of Employees 2 made the same choices in the two parts of the experiment.<sup>15</sup> These results are in line with evidence from experimental studies that have used both the direct response method and the strategy method. These studies show that eliciting choices with the strategy method does not introduce systematic biases in behavior (for a review see Brandts and Charness, 2009). In particular, Gächter and Thöni (2010) show that the two elicitation methods produce very similar results in a trilateral gift-exchange game.

In our experiments Employers can choose from four possible wage combinations. Of the 78 Employers, 12 percent paid a high wage to both employees, 14 percent paid a high wage to one employee and a low wage to the other, and 74 percent paid a low wage to both.<sup>16</sup> The 78 Employees 1 who participated in our experiments expended on average more effort if they were paid a high wage than a low wage ( $p < 0.001$  in all comparisons).<sup>17</sup> Their effort decisions were instead not systematically affected by the wage offered to Employee 2 ( $p > 0.317$  in all

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<sup>15</sup> In BASELINE 63 percent of Employers, 78 percent of Employees 1 and 74 percent of Employees 2 made the same choices in the two parts of the experiment. In RANDOM 88 percent of Employers, 90 percent of Employees 1 and 94 percent of Employees 2 made the same choices in the two parts of the experiment

<sup>16</sup> There may be a number of reasons why employers may want to introduce pay differentials even in the absence of productivity differences between employees. For example, employers may find it optimal to choose unequal wages if they believe workers will supply high effort only if they are paid more than co-workers, or if employers think that some employees will respond reciprocally whereas others will not and employers therefore try their luck by using a "mixed payment strategy". In fact, Gächter and Thöni (2010) find that employers choose unequal wages relatively often in their trilateral gift-exchange game.

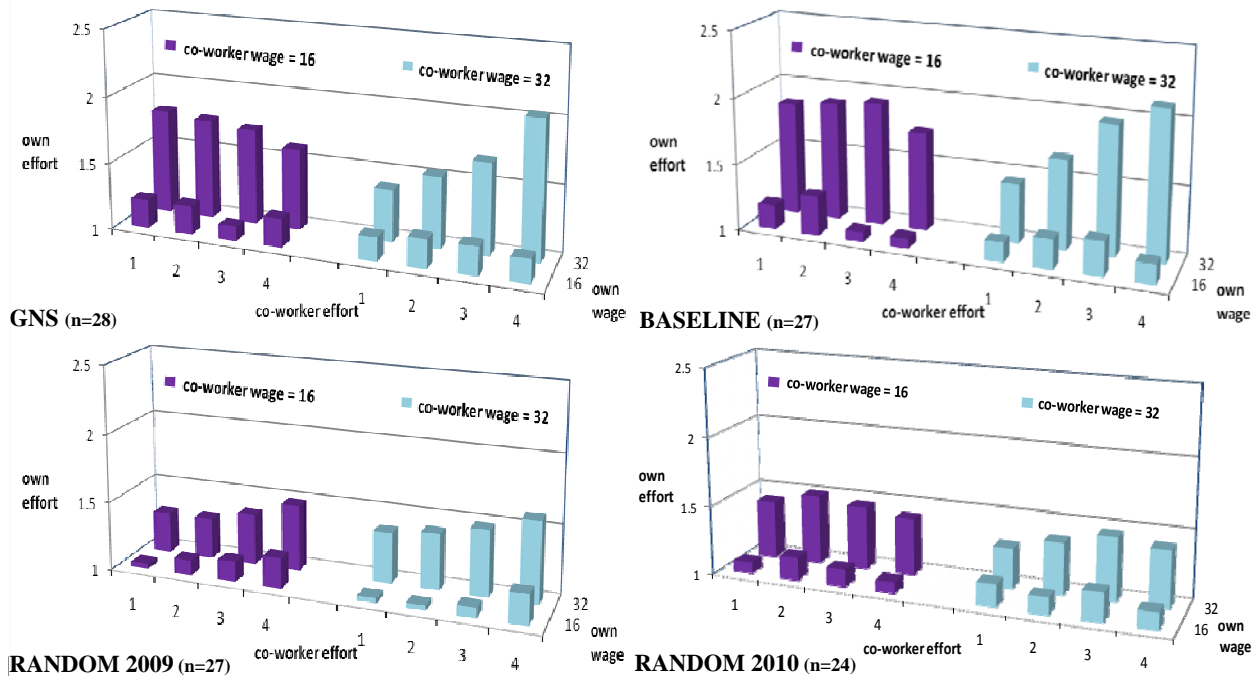
<sup>17</sup> Unless reported otherwise, all p-values in the paper are based on two-sided Wilcoxon matched-pairs signed-ranks tests using each Employee as an independent observation.

comparisons). In the rest of the section we examine the effort decisions made by the 78 Employees 2 who participated in our experiments.

5.1. Peer Effects: Social Norms or Social Preferences? BASELINE vs. RANDOM

Figure 6 displays the average effort of Employees 2. The top panel of Figure 6 displays the effort choices in the BASELINE treatment (top-right panel) and, for comparison, the effort choices in the GNS experiment already shown in Figure 1 (top-left panel). The bottom panels display the effort choices in the two waves of experiments of the RANDOM treatment.

**Figure 6: Employee 2 Average Effort – GNS, BASELINE & RANDOM**



Employee 2 average effort per wage combination disaggregated by different levels of the co-worker’s effort.

A striking feature of the top panels of Figure 6 is the similarity of our BASELINE data with the data from GNS. First, consider the own-wage effect: in our BASELINE treatment Employees 2 increase their effort when they are paid a high wage. Employee 2’s effort when the own wage is 16 (averaging across contingencies, i.e. across the eight front bars of the top-right panel of Figure 6) is 1.18, and when the own wage is 32 (again, averaging across contingencies) is 1.82. The difference

is highly significant ( $p < 0.001$ ).<sup>18</sup> In fact, for each combination of co-worker's wage and co-worker's effort level shown in Figure 6, the mean increase in Employee 2's effort after an increase in the own wage differs from zero at  $p < 0.026$ .<sup>19</sup>

A positive own-wage effect is also observed in the RANDOM treatment (bottom panels of Figure 6). Combining the data from the two waves of the RANDOM experiments and averaging across contingencies with the same own wage we find that increasing Employees 2's wage from 16 to 32 increases effort by about 0.292 on average, and the effect is highly significant ( $p < 0.001$ ).<sup>20</sup> The own-wage effect in RANDOM is however smaller than the one observed in BASELINE (Wilcoxon-Mann-Whitney rank-sum test:  $p = 0.008$ ). In fact, the fraction of Employees 2 who behave 'non-selfishly' (i.e. who make at least one non-minimal effort choice) is significantly lower in RANDOM than in BASELINE (29 percent vs. 63 percent,  $\chi^2(1) = 8.21$ ,  $p = 0.004$ ). This latter finding is difficult to reconcile with the FS model as the threshold value of the advantageous inequality parameter  $\beta_2$  by which Employees 2 are predicted to expend non-minimal effort is the same in both treatments.<sup>21</sup>

Turning to peer effects, the FS model predicts a positive correlation between employees' efforts when both wages are high in BASELINE, but not in RANDOM. Our norms-elicitation procedure, however, reveals that the co-worker's behavior affects the perception of what constitutes appropriate behavior in both treatments. Hence, social norms compliance predicts a positive relation between employees' efforts in both treatments.

Figure 6 shows that in BASELINE Employee 2's effort in the high wage combination increases with the co-worker's effort. Employee 2's average effort increases from 1.44 when the co-worker chooses 1 unit of effort to 2.11 when the co-worker chooses 4 units of effort. A Page

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<sup>18</sup> By comparison, in GNS increasing Employees 2's wage from 16 to 32 significantly increased average effort from 1.19 to 1.69. The own-wage effect in BASELINE is not significantly different from the one observed in GNS (Wilcoxon-Mann-Whitney rank-sum test:  $p = 0.569$ ).

<sup>19</sup> The p-values range from 0.0255 for the case where the co-worker is paid a high wage and supplies minimal effort to 0.0001 for the case where the co-worker is paid a low wage and supplies 3 units of effort.

<sup>20</sup> For each combination of co-worker's wage and co-worker's effort level shown in Figure 6, the p-values range from 0.034 for the case where the co-worker is paid a high wage and supplies minimal effort to 0.0009 for the cases where the co-worker is paid a low wage and supplies 3 or 4 units of effort and the case where she is paid a high wage and supplies 4 units of effort.

<sup>21</sup> The fact that there are fewer 'non-selfish' Employees 2 in RANDOM than in BASELINE may however reflect the fact that individuals care about 'expected' inequity, as in Trautmann (2009). In RANDOM these individuals are predicted to choose minimal effort most of the times, and this may explain why we seem to have a lower fraction of 'non-selfish' Employees 2 in RANDOM.

test for ordered alternatives shows that the effect is highly significant ( $p = 0.004$ ).<sup>22</sup> In the first wave of RANDOM experiments conducted in autumn 2009 we find that Employees 2 slightly increase their effort as the co-worker expends higher effort: from an average of 1.37 when the co-worker chooses 1 unit of effort to an average of 1.59 when the co-worker chooses 4 units of effort. However, this effect is *not* significant according to a Page test for ordered alternatives ( $p = 0.222$ ). In the second wave of RANDOM experiments conducted in autumn 2010 we find a non-monotonic relation between employees' efforts: Employee 2's average effort increases from 1.29 when the co-worker chooses 1 unit of effort to 1.42 when the co-worker chooses 4 units of effort. However, the effect is again not statistically significant according to a Page test for ordered alternatives ( $p = 0.336$ ).<sup>23</sup> In fact, in RANDOM only four out of fifty-one Employees 2 monotonically increase their effort when the co-worker chooses higher effort in the high wages combination. By comparison, pooling the data from GNS and BASELINE nineteen out of fifty-five Employees 2 monotonically increase their effort with the co-worker's effort in the high wages combination. This difference in proportions is highly significant ( $\chi^2(1) = 11.10$ ,  $p = 0.001$ ). Overall, these results suggest that the FS model organizes well the peer effects observed in our experiment. While our norms-elicitation experiments have documented the existence of clear social norms in our experimental environment, our behavioral data suggest that individuals do not conform to the norms' prescriptions in RANDOM, where these prescriptions conflict with the predictions of the FS model.

This suggests that the social preferences approach is a parsimonious explanation of peer effects in pro-social behavior in our setting. But are peer effects robust to asymmetries in how employees are treated? This question is legitimate because we derived peer effects in a highly stylized setting where employees are treated in a generous way *and* receive equal wages. Our conclusions about peer effects might only hold for that special case. We address this concern in the next section.

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<sup>22</sup> By comparison, GNS found that Employees 2's effort increased from an average of 1.39 units when the co-worker's effort was 1 to an average of 2.04 units when the co-worker's effort was 4. Applying a Page test for ordered alternatives to their data shows that this effect is also highly significant ( $p < 0.001$ ).

<sup>23</sup> We obtain the same result if we combine the data from the two waves of RANDOM and conduct a Page test for ordered alternatives using 51 independent observations:  $p = 0.198$ .

## 6. How Robust Are Peer Effects?

To address whether peer effects are robust when employees are treated generously but do not receive equal wages, we designed an ASYMMETRIC treatment where employees earn slightly different wages in the high wages condition.<sup>24</sup> Subjects play the same game used in BASELINE except that, while the Employer can still choose a wage of 16 or 32 for Employee 1, the wage the Employer pays to Employee 2 can be either 16 or 30. Thus, in the wage combination where both wages are high Employee 1 is paid a wage of 32 and Employee 2 a slightly lower wage of 30. With this small perturbation in Employee 2's high wage the FS model still predicts a positive relation between employees' efforts in the wage combination where both employees receive a high wage (see Appendix A2 for details). To assess how norms are affected by these wage asymmetries, we also conducted a norms-elicitation experiment using the same experimental procedures as above, but with 46 new subjects.<sup>25</sup>

Figure 7 shows the average effort that the raters considered as the most socially appropriate in each of the four situations they evaluated.<sup>26</sup> Note that the perception of what constitutes an appropriate response to a high wage offer is positively influenced by the co-worker's effort: the most appropriate effort response to an own wage of 30 increases from 2.74 when the co-worker chooses 1 unit of effort to 3.74 when the co-worker chooses 4 units of effort (Wilcoxon matched-pairs signed-ranks test:  $p = 0.000$ ). Moreover, this average increase by 1 unit of effort across these two situations does not differ significantly from the corresponding average increase in BASELINE (Wilcoxon rank-sum test:  $p = 0.724$ ). Thus, and perhaps surprisingly, the norms-

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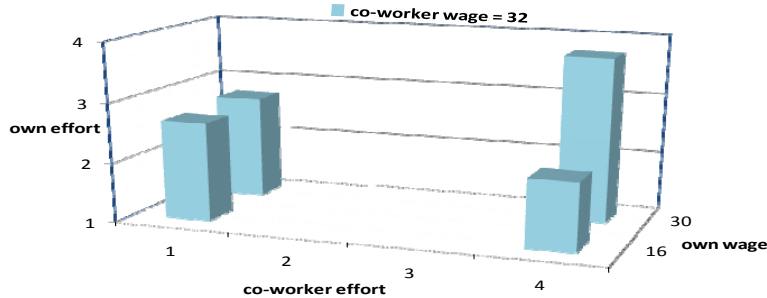
<sup>24</sup> Of course, also in the previous treatments we had wage combinations where employees are treated asymmetrically (where one employee gets a wage of 16 and the other 32). However, for these wage combinations no non-minimal effort is predicted in the first place. Therefore we focus on the case where both employees are treated generously.

<sup>25</sup> Asymmetric wages may introduce "moral wiggle room" opportunities (Dana et al. 2007) that may eliminate the descriptive norm regulating the relationship between employees' efforts. The reason is that employees are now in different situations and what one employee does may no longer provide a relevant benchmark for what is appropriate behavior by the other. Dana et al. (2007) find evidence of exploitation of moral wiggle room possibilities in variants of the dictator game. Haisley and Weber (2010) show that people adopt favorable attitudes towards ambiguous risk when this can excuse self-interested behavior. Thöni and Gächter (2011) observe that subjects in a trilateral gift-exchange game decrease their effort strongly when they observe a co-worker who expends less effort than them, but barely increase effort when they observe that the co-worker expends more effort. Xiao and Bicchieri (2010) find that individuals faced with competing behavioral motivations in a trust game comply with the motivation that best suits their own self-interest. Also related is the finding that individuals prefer to quietly opt out from dictator games if given the opportunity to do so (e.g., Dana et al., 2006; Broberg et al., 2007; Lazear et al., 2010). Other related studies also point to the existence of a *self-serving* or *egocentric bias* when one's self-interest is at stake: see Konow (2005) for an overview and related literature. In the context of the gift exchange game, see Charness and Haruvy (2000).

<sup>26</sup> As before, we used the effort level maximizing the subject's material payoff in case of ties in the appropriateness ratings of two or more effort levels. Subjects' appropriateness ratings by situation are summarized in Appendix A1.

elicitation experiment suggests that the perception of what constitutes appropriate behavior depends on the co-worker's effort, even in the presence of small asymmetries in wages.

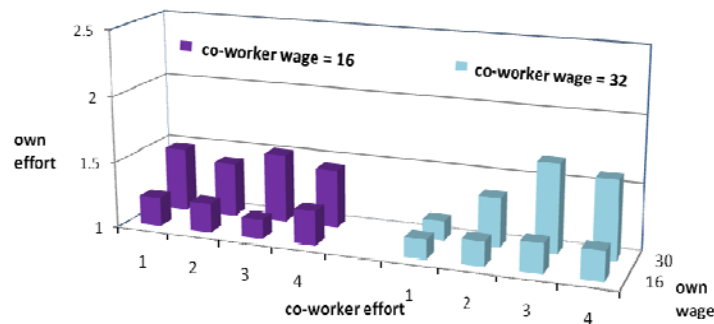
**Figure 7:** Socially most appropriate effort choices in ASYMMETRIC



Effort choices that the 46 raters would make on average if they chose the most socially appropriate effort level in the four situations they evaluated.

We ran seven experimental sessions using 81 new subjects using the same procedures as described in Section 4. Figure 8 shows the average effort of the twenty-seven Employees 2 in the ASYMMETRIC treatment.

**Figure 8:** Employee 2 Average Effort – ASYMMETRIC Treatment



Employee 2 average effort per wage combination disaggregated by different levels of the co-worker's effort (n=27).

As in our two other treatments, there are clear own-wage effects.<sup>27</sup> More interestingly, in the wage combination where both employees get a high wage Employee 2's effort is positively correlated to the co-worker's effort. A Page test for ordered alternatives confirms that Employee 2's effort increases as the co-worker's effort increases ( $p = 0.021$ ). We conclude that the peer effects observed in GNS and our BASELINE treatment are robust to small asymmetries in wages.

<sup>27</sup> When the co-worker is paid a high wage of 32 and supplies minimal effort Employee 2 does not increase her effort significantly when her wage is increased from 16 to 30 ( $p = 0.694$ ). Otherwise, the own-wage effect significantly differs from zero at p-values ranging from 0.002 to 0.099.

The observed peer effect is consistent with FS predictions. Thus, our main conclusion that social preferences are a parsimonious explanation of peer effects is robust to small asymmetries in how employees are treated. Moreover, this experiment shows that elicited norms are also robust to small wage asymmetries (which arguably invite moral wiggle room opportunities).

## 7. Discussion & Conclusions

Several experimental studies have shown that many individuals engage in costly pro-social behavior. Some studies have found that individuals' willingness to behave pro-socially depends on the extent to which they observe pro-social behavior on the part of others. Our study examines whether these behavioral regularities are best organized by a social preferences approach (the Fehr and Schmidt 1999 model), or by compliance to social norms. Using an experimental procedure recently introduced by Krupka and Weber (2010) to identify social norms, we find evidence for the empirical relevance of social norms in all our experiments. However, *behavior* conforms to elicited norms only when not in conflict with the FS prediction. Thus, we conclude that inequity aversion is a parsimonious explanation of peer effects in pro-social behavior in our setting.

While the observed patterns of pro-social behavior within each treatment are well organized by the FS model, we also observe differences across treatments in the proportion of individuals who engage in pro-social behavior. The proportion of employees who expend non-minimal effort is significantly lower in RANDOM than in BASELINE despite the fact that the threshold value of the advantageous inequity parameter by which an employee is predicted to expend non-minimal effort is the same in both treatments, and that subjects are randomly assigned to treatment conditions. These effects are more difficult to reconcile with the FS model predictions, and are reminiscent of findings from a number of studies pointing out that, while social preferences models can be successful in organizing aggregate deviations from self-interested behavior in different games, they are less successful in predicting when and whether an individual will deviate from self-interest (e.g., Blanco et al., *forthcoming*; Herrmann and Orzen, 2008).

Our study contributes to a hitherto small literature that explores the relative predictive power of social norms and social preferences models in a variety of experimental settings. For example, Bardsley and Sausgruber (2005) have proposed an experimental design that allows to examine the extent to which conditional cooperativeness in public goods game experiments can be attributed to reciprocity rather than to 'normative conformity', i.e. conformity to others'



actions because these are perceived as a guide to what is socially appropriate. They find evidence of the existence of conformity, but they also find that individual behavior responds to a greater extent to reciprocity than to conformity.<sup>28</sup> On the other hand, several anomalies found in variants of the dictator game challenge the predictive power of social preferences models: for example, List (2007) and Bardsley (2008) study dictator games where the payoff space is expanded to include opportunities for the dictator to take money from the recipient. They find that these ‘taking opportunities’ are selected by many people, and that those who do not select them still give less to the recipient than in the standard game. This ‘generosity reversal’ challenges a social preferences-based explanation of dictator giving. A social norms-based approach, however, can organize these anomalies: Krupka and Weber (2010) show that perceptions of what constitutes appropriate behavior differ across games with and without taking opportunities. Thus, individuals who care for social norms compliance should behave differently in the two versions of the game.

The fact that social norms compliance seems to organize behavioral regularities quite well in some experimental settings (e.g., in dictator game experiments), but not so well in others (e.g., in our trilateral gift-exchange game) is an interesting finding that deserves further investigation.<sup>29</sup> A possible interpretation is that social norms may have more behavioral bite in non-strategic settings such as dictator games where individuals may find it natural to follow simple rules of conduct that prescribe socially appropriate behavior. In more complex social environments, such as in our gift-exchange games, social norm identification and compliance may not be so straightforward. Whereas our norms-elicitation experiments reveal clear patterns in the way individuals evaluate the appropriateness of different actions in our games, it may be less clear to subjects how to act on these in the presence of a number of relevant, and possibly conflicting, motivational forces (e.g. self-interest, reciprocity considerations, concerns over distributions of outcomes, compliance with social norms). Our data suggest that in the presence of conflicting motivations, subjects deviate from self-interested behavior in directions predicted by inequity aversion.

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<sup>28</sup> Also see Brandts and Fatas (2004) and Carpenter (2004) on the role of conformity in public goods games.

<sup>29</sup> That the nature of pro-social behavior in dictator games differs from that in other settings is also suggested by a recent study by van der Weele et al. (2010). They find that reciprocal behavior in trust games (Berg et al., 1995) and moonlighting games (Abbink et al., 2000) is robust to experimental manipulations that have been shown to reduce generosity in dictator games.

## Appendices

### Appendix A

Appendix A1 contains summaries of subjects' social appropriateness ratings in the four situations that they were asked to evaluate during the norms-elicitation experiments. Data are presented disaggregated by treatment. Appendix A2 contains predictions of the Fehr and Schmidt (1999) model in the treatment ASYMMETRIC.

#### Appendix A1 – Social appropriateness ratings in the norms-elicitation experiments

The three tables below summarize subjects' appropriateness ratings in the three norms-elicitation experiments. The exposition of results follows Krupka and Weber (2010).

Each table is divided by thick solid lines into four areas corresponding to the four different situations that subjects were asked to evaluate. For each situation, subjects had to evaluate whether each of the four possible effort levels available to Employee 2 was “very socially inappropriate” (indicated with a – in the tables), “somewhat socially inappropriate” (-), somewhat socially appropriate (+), or “very socially appropriate” (++). The first column in each area (containing bold numbers ranging from -1 to +1) reports the mean of the social appropriateness ratings: these were converted into numerical scores assigning value -1 to “very socially inappropriate”, value -1/3 to “somewhat socially inappropriate”, value +1/3 to “somewhat socially appropriate”, and value +1 to “very socially appropriate”. The next four columns report the distribution of responses for each given effort level. Shaded cells indicate the modal response of the corresponding row.

Stars in the tables report significance levels of Wilcoxon matched-pairs tests (\* = 10%; \*\* = 5%; \*\*\*= 1%). Stars reported in the same cell as the mean of the social appropriateness ratings are significance levels of Wilcoxon matched pairs tests comparing the distribution of responses across situations where the own wage varies, *ceteris paribus*. Stars reported in the last column of each table are significance levels of Wilcoxon matched pairs tests comparing situations where the co-worker's effort varies, *ceteris paribus*.

#### Elicited Norms - BASELINE

Wage combination	Empl. 2 effort	Empl. 1 effort = 1					Empl. 1 effort = 4					Wilcoxon matched-pairs test
		avg	--	-	+	++	avg	--	-	+	++	
w1=32 w2=16	1	<b>-.268</b>	0.37	0.29	0.20	0.14	<b>-.320</b>	0.31	0.37	0.29	0.02	***
	2	<b>.046</b>	0.08	0.41	0.37	0.14	<b>.542</b>	0	0.14	0.41	0.45	
	3	<b>.163</b>	0.10	0.23	0.49	0.18	<b>.255</b>	0	0.29	0.53	0.18	
	4	<b>.216</b>	0.23	0.16	0.16	0.45	<b>-.033</b>	0.35	0.16	0.18	0.31	
w1=32 w2=32	1	<b>-.569</b> ***	0.61	0.23	0.06	0.10	<b>-.908</b> ***	0.88	0.10	0.02	0	***
	2	<b>-.111</b> *	0.12	0.47	0.37	0.04	<b>-.386</b> ***	0.16	0.76	0.08	0	***
	3	<b>.203</b>	0.04	0.25	0.57	0.14	<b>.307</b>	0	0.12	0.80	0.08	***
	4	<b>.359</b>	0.14	0.19	0.16	0.51	<b>.974</b> ***	0	0	0.04	0.96	***

-- very socially inappropriate; - somewhat socially inappropriate; + somewhat socially appropriate; ++ very socially appropriate.

### Elicited Norms - RANDOM

Wage combination	Empl. 2 effort	Empl. 1 effort = 1					Empl. 1 effort = 4					Wilcoxon matched-pairs test
		avg	--	-	+	++	avg	--	-	+	++	
w1=32 w2=16	1	<b>.305</b>	0.13	0.21	0.23	0.43	<b>-.078</b>	0.22	0.30	0.32	0.15	***
	2	<b>.347</b>	0.02	0.19	0.53	0.26	<b>.461</b>	0.04	0.17	0.34	0.45	
	3	<b>-.050</b>	0.06	0.55	0.28	0.11	<b>.078</b>	0.04	0.43	0.40	0.13	
	4	<b>-.418</b>	0.62	0.13	0.02	0.23	<b>-.291</b>	0.55	0.08	0.11	0.26	
w1=32 w2=32	1	<b>-.489***</b>	0.57	0.21	0.09	0.13	<b>-.830***</b>	0.85	0.09	0.2	0.04	***
	2	<b>.021***</b>	0.00	0.57	0.32	0.11	<b>-.319***</b>	0.11	0.81	0.04	0.04	***
	3	<b>.404***</b>	0.00	0.21	0.47	0.32	<b>.248*</b>	0.02	0.17	0.72	0.08	***
	4	<b>.333***</b>	0.17	0.13	0.23	0.47	<b>.801***</b>	0.04	0.00	0.17	0.79	***

-- very socially inappropriate; - somewhat socially inappropriate; + somewhat socially appropriate; ++ very socially appropriate.

### Elicited Norms - ASYMMETRIC

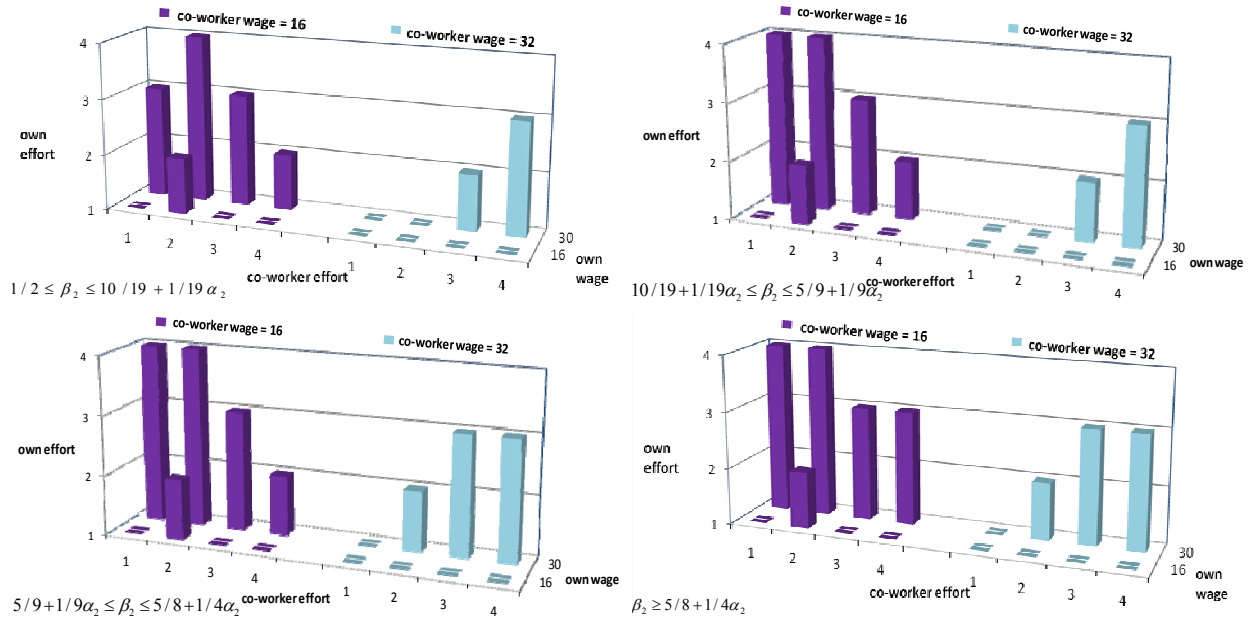
Wage combination	Empl. 2 effort	Empl. 1 effort = 1					Empl. 1 effort = 4					Wilcoxon matched-pairs test
		avg	--	-	+	++	avg	--	-	+	++	
w1=32 w2=16	1	<b>-.348</b>	0.50	0.22	0.09	0.19	<b>-.232</b>	0.33	0.33	0.21	0.13	***
	2	<b>-.043</b>	0.06	0.48	0.41	0.04	<b>.522</b>	0.00	0.11	0.50	0.39	
	3	<b>.116</b>	0.02	0.37	0.52	0.09	<b>.188</b>	0.00	0.41	0.39	0.20	
	4	<b>.087</b>	0.33	0.13	0.13	0.41	<b>-.377</b>	0.43	0.33	0.11	0.13	
w1=32 w2=32	1	<b>-.348</b>	0.56	0.11	0.11	0.22	<b>-.826***</b>	0.80	0.13	0.07	0.00	***
	2	<b>-.072</b>	0.07	0.56	0.28	0.09	<b>-.333***</b>	0.11	0.80	0.07	0.02	***
	3	<b>.087</b>	0.04	0.37	0.50	0.09	<b>.319*</b>	0.02	0.09	0.78	0.11	***
	4	<b>.101</b>	0.24	0.24	0.15	0.37	<b>.826***</b>	0.04	0.00	0.13	0.83	***

-- very socially inappropriate; - somewhat socially inappropriate; + somewhat socially appropriate; ++ very socially appropriate.

## Appendix A2 – Fehr and Schmidt (1999) predictions in ASYMMETRIC

The predictions of the Fehr and Schmidt (1999) model in the treatment ASYMMETRIC depend on the threshold value of Employee 2's superiority aversion parameter  $\beta_2$ . There are four possible thresholds of  $\beta_2$ , illustrated in Figure A2.1, and for all of them a positive correlation between employees' effort emerges in the high wages combination.

**Figure A2.1:** FS predictions – ASYMMETRIC treatment



Predicted effort choices of Employees 2 in ASYMMETRIC for different thresholds of  $\beta_2$ .

## **Appendix B (online only)**

Appendix B1 contains the instructions and material used in the behavioral experiments, as well as a detailed description of the experimental procedures. Appendix B2 contains the instructions and material used in the norms elicitation experiments.

### **Appendix B1 - Instructions & Experimental Procedures**

Instructions and all material given or read to subjects during the behavioral experiments are reproduced at the end of this Appendix for the BASELINE treatment.

The following experimental procedures were observed in all treatments. Upon arrival subjects were given instructions informing them that the experiment consisted of two parts. After these preliminary instructions were read aloud by the experimenter, subjects were given a written set of instructions for Part One of the experiment and they had 15 minutes to read through the instructions. Then, the experimenter read aloud a briefer précis outlining the most important points contained in the instructions.

Part One of the experiment then began with subjects being randomly assigned to a group and a role. All decisions were made anonymously, and neither during nor after the experiment were subjects informed about the identity of the other members of their group. Before proceeding to the decision stage, subjects were guided through two role-specific video presentations which carefully illustrated the main features of the decision screens they were going to use during the experiment.<sup>30</sup> The first video presentation explained the functioning of an on-screen electronic calculator (the *What-if-calculator*) that subjects could use to compute their and other players' payoffs. At the end of the first video presentation, subjects were asked to solve a set of control questions and they could not enter the decision stage unless they had solved all the questions correctly. The second video presentation showed subjects how to enter their choices in a Decision Table and explained once again the structure of the game and the strategy method.

Once everyone in the room had completed their choices for Part One of the experiment, but without revealing any outcomes, instructions for Part Two were distributed. Subjects again read through the instructions on their own before a briefer précis was read aloud. Part Two of the experiment began with a short video presentation showing subjects how to enter choices in the

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<sup>30</sup> Video presentations were shown to subjects individually in z-Tree. Video presentations and the software are available upon request.

Decision Table and explaining once more the structure of the game. Subjects then proceeded to the decision stage: participants in the role of Employers made their decisions first, while other participants were waiting. After all Employers had made a decision, participants in the role of Employee 1 learned the choices made by the Employer in their group and made an effort decision. Finally, after all Employees 1 had made a decision, participants in the role of Employee 2 learned the choices made by the other members of their group and chose an effort level. Once everyone in the room had made a decision in Part Two of the experiment a computer screen showed subjects the firm members' decisions and their own earnings from the two parts of the experiment. A coin was then tossed to determine whether all participants in the session were paid according to earnings from Part One or Part Two.

### **Preliminary Instructions (common to all treatments)**

Welcome!

You are about to take part in a decision-making experiment. It is important that you do not talk to any of the other participants until the experiment is over. If you have a question at any time, raise your hand and a monitor will come to your desk to answer it.

This experiment consists of two parts: PART 1 and PART 2.

In each part of the experiment you will be asked to make one or more decisions. Decisions that will be made in one part of the experiment will not affect decisions or earnings in the other part of the experiment.

You will be informed of any outcome (including your earnings) from PART 1 and PART 2 of the experiment only once everyone in the room has completed PART 2 of the experiment. Therefore everyone will make their decisions in PART 2 of the experiment without knowing any outcome from PART 1 of the experiment.

Only one part of the experiment will be taken into account in determining your final earnings from today's experiment. At the end of PART 2 of the experiment, we will toss a fair coin. If the coin lands heads all participants in today's experiment will be paid according to their earnings from PART 1 of the experiment. If the coin lands tails all participants in today's experiment will be paid according to their earnings from PART 2 of the experiment.

Your earnings will then be paid out to you in private and in cash.

Shortly, you will receive detailed instructions about PART 1 of the experiment. You will receive detailed instructions about PART 2 of the experiment once everyone in the room has completed PART 1 of the experiment.

### **Instructions for PART 1 (BASELINE)**

In PART 1 of the experiment your earnings will be calculated in points. You will receive an initial endowment of 95 points, which will be enough to cover any loss that might occur during PART 1. The points you lose will be subtracted from your endowment.

At the end of the experiment we will convert your point earnings from PART 1 of the experiment into money at the following rate:

$$1 \text{ Point} = 10 \text{ Pence}$$

If PART 1 of the experiment will be selected for payment, your total money earnings from PART 1 will be paid out to you in private and in cash at the end of the experiment.

## 1. Introduction

In PART 1 of the experiment you will be randomly matched with two other participants to form a group of three persons. We will refer to each group as a **firm**, and to the three group members as **Employer**, **Employee 1** and **Employee 2**. You will be assigned to a firm and a role entirely at random, and the computer will inform you of your role before the decision-making phase of PART 1 begins. 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.

## 2. Decisions within a firm

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

- ✓ First, **the Employer** chooses the wages to pay to Employee 1 (**Wage<sub>1</sub>**) and Employee 2 (**Wage<sub>2</sub>**). The Employer can choose among four possible wage combinations:
  - The Employer can choose to pay Wage<sub>1</sub>=16 and Wage<sub>2</sub>=16.
  - The Employer can choose to pay Wage<sub>1</sub>=16 and Wage<sub>2</sub>=32.
  - The Employer can choose to pay Wage<sub>1</sub>=32 and Wage<sub>2</sub>=16.
  - The Employer can choose to pay Wage<sub>1</sub>=32 and Wage<sub>2</sub>=32.
- ✓ Next, **Employee 1** learns the wage combination chosen by the Employer, and then chooses an effort level (**Effort<sub>1</sub>**), either 1, 2, 3 or 4.
- ✓ Finally, **Employee 2** learns the wage combination chosen by the Employer, and also the effort decision of Employee 1. Employee 2 then chooses an effort level (**Effort<sub>2</sub>**), either 1, 2, 3 or 4.

## 3. Distribution of earnings within a firm

Earnings within the firm are determined according to the following rules:

### **Employer**

The Employer receives revenue from the effort chosen by the two Employees, and incurs costs from the wages paid to the two Employees. The revenue produced by each Employee equals 10 times the effort he or she chooses. The costs are simply the sum of the two wages the Employer pays to the Employees. The Employer's earnings are therefore:

$$\text{Employer's Earnings} = 10 * (\text{Effort}_1 + \text{Effort}_2) - \text{Wage}_1 - \text{Wage}_2$$

The Employer's earnings increase with higher effort levels. The higher the wages the Employer pays to the two Employees, the lower are the Employer's earnings. Note that the Employer's earnings could be negative.

### **Employee 1**

Employee 1 receives the wage from the Employer as revenue, and may incur an effort cost. The minimum effort choice of 1 is costless. Each additional unit of effort costs 5 points to the Employee. Therefore the effort cost is calculated as:  $5 * (\text{Effort} - 1)$ . The earnings of Employee 1 are therefore:

$$\text{Employee 1's Earnings} = \text{Wage}_1 - 5 * (\text{Effort}_1 - 1)$$

The earnings of Employee 1 only depend on his or her own wage and effort. The higher the wage, the higher are the earnings. The higher the effort he or she chooses, the lower are the earnings.

### **Employee 2**

The earnings of Employee 2 are calculated in the same way as those of Employee 1, except, of course, that Employee 2's earnings depend on his or her own wage (**Wage<sub>2</sub>**) and his or her own effort choice (**Effort<sub>2</sub>**):

$$\text{Employee 2's Earnings} = \text{Wage}_2 - 5 * (\text{Effort}_2 - 1)$$

#### HYPOTHETICAL EXAMPLE FOR DEMONSTRATION PURPOSES

ASSUME THAT THE EMPLOYER CHOOSES THE FOLLOWING WAGES FOR HIS OR HER EMPLOYEES:

WAGE FOR EMPLOYEE 1 = 32

WAGE FOR EMPLOYEE 2 = 16

THE EMPLOYEES CHOOSE THE FOLLOWING EFFORT:

EFFORT EMPLOYEE 1 = 2

EFFORT EMPLOYEE 2 = 3

THIS SITUATION RESULTS IN THE FOLLOWING EARNINGS:

**EMPLOYER'S EARNINGS:** THE EMPLOYER RECEIVES REVENUE FROM THE EFFORT OF THE TWO EMPLOYEES, I.E.:  $10*(2 + 3) = 50$ . THE EMPLOYER PAYS A TOTAL OF 48 POINTS TO THE EMPLOYEES.

THE EARNINGS OF THE EMPLOYER ARE:  $50 - 48 = 2$ .

**EMPLOYEE 1'S EARNINGS:** EMPLOYEE 1 RECEIVES A WAGE OF 32. THE EFFORT CHOICE OF 2 HAS A COST OF  $5*(2 - 1) = 5$ .

THE EARNINGS OF EMPLOYEE 1 ARE:  $32 - 5 = 27$ .

**EMPLOYEE 2'S EARNINGS:** EMPLOYEE 2 RECEIVES A WAGE OF 16. THE EFFORT CHOICE OF 3 HAS A COST OF  $5*(3 - 1) = 10$ .

THE EARNINGS OF EMPLOYEE 2 ARE:  $16 - 10 = 6$ .

#### 4. The Decision Task

Although the structure of the decision-making within each firm is the one described above, in PART 1 of the experiment we ask you to take a decision for each possible situation that may arise. Please note that one of these situations will be actually relevant, so make your choices carefully.

The situations you face when making your decisions will depend on your role.

If you are an **Employer you must choose two wages**, one for each Employee within the firm. You can choose among four possible wage combinations:

- Wage<sub>1</sub> = 16 and Wage<sub>2</sub> = 16;
- Wage<sub>1</sub> = 16 and Wage<sub>2</sub> = 32;
- Wage<sub>1</sub> = 32 and Wage<sub>2</sub> = 16;
- Wage<sub>1</sub> = 32 and Wage<sub>2</sub> = 32.

Depending on the choice of the Employer one of four situations will arise:

- Employee 1 and Employee 2 could both have a wage of 16;
- Employee 1 could have a wage of 16 while Employee 2 has a wage of 32;
- Employee 1 could have a wage of 32 while Employee 2 has a wage of 16;



- Employee 1 and Employee 2 could both have a wage of 32.

If you are **Employee 1** you will be in one of these four situations. However, before knowing which of these situations you are actually in, you will be asked to **indicate what you would do for each of the four possible situations** you may be in. Your computer screen will contain a Decision Table as the one below:

Decision Table: Your effort choice		
Please choose your effort. You have to choose a level of effort between 1 and 4 for all <i>four</i> possible combinations of the wages you and Employee 2 receive.		
	Suppose the wage for <i>you</i> is: <b>16</b>	Suppose the wage for <i>you</i> is: <b>32</b>
Suppose the wage for <i>Employee 2</i> is: <b>16</b>	<input type="text"/>	<input type="text"/>
Suppose the wage for <i>Employee 2</i> is: <b>32</b>	<input type="text"/>	<input type="text"/>

Each box represents one of the four possible situations you may be in. In each of these boxes, you must enter an effort choice, either 1, 2, 3 or 4. Your actual effort choice will depend on which of these four possible situations will actually realise, i.e. on the wage combination actually chosen by the Employer.

Depending on the choices of the Employer and Employee 1 one of sixteen situations may arise:

- Employer could choose  $Wage_1 = 16$  and  $Wage_2 = 16$  while Employee 1 chooses 1 unit of effort;
- Employer could choose  $Wage_1 = 16$  and  $Wage_2 = 16$  while Employee 1 chooses 2 units of effort;
- ...and so on.

If you are **Employee 2** you will be in one of these sixteen situations. However, before knowing which of these situations you are actually in, you will be asked to **indicate what you would do for each of the sixteen possible situations** you may be in. Your computer screen will contain a Decision Table as the one below:

Decision Table: Your effort choice				
Please choose your effort. You have to choose a level of effort between 1 and 4 for all <b>sixteen</b> possible combinations of the wages you receive and the wages and effort of Employee 1.				
	Suppose the wage for <b>you</b> is: <b>16</b>  Suppose the wage for <b>Employee 1</b> is: <b>16</b>	Suppose the wage for <b>you</b> is: <b>16</b>  Suppose the wage for <b>Employee 1</b> is: <b>32</b>	Suppose the wage for <b>you</b> is: <b>32</b>  Suppose the wage for <b>Employee 1</b> is: <b>16</b>	Suppose the wage for <b>you</b> is: <b>32</b>  Suppose the wage for <b>Employee 1</b> is: <b>32</b>
Suppose <b>Employee 1</b> chooses effort: <b>1</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Suppose <b>Employee 1</b> chooses effort: <b>2</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Suppose <b>Employee 1</b> chooses effort: <b>3</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Suppose <b>Employee 1</b> chooses effort: <b>4</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Each box represents one of the sixteen possible situations you may be in. In each of these boxes, you must enter an effort choice, either 1, 2, 3 or 4. Your actual effort choice will depend on which of these sixteen possible situations will actually realise, i.e. on the wage combination actually chosen by the Employer and on the effort actually chosen by Employee 1.

More information about how to solve your specific Decision task will be provided to you via computer later on during PART 1 of the experiment, once your role has been determined.

Note that the decision task in PART 1 of the experiment will be performed **only once**.

### 5. How do we determine your actual earnings from PART 1 of the experiment?

Although Employee 1 will take four effort decisions, **only one** will be relevant in determining the earnings of the members of the firm. Similarly, only one of the sixteen effort decisions made by Employee 2 will be actually used in the earnings' computation.

Which decision is actually relevant will be determined at the end of PART 1, once everyone in the firm has taken his or her decisions: the actual wage combination chosen by the Employer will determine which of the four possible situations is relevant for Employee 1. Employee 1's choice in this relevant situation will determine which of the sixteen possible situations is relevant for Employee 2.

You will be informed of your earnings from PART 1 at the end of the experiment.

### 6. What happens next?

- I. When the experiment starts you will be informed about whether you are an Employer or an Employee in PART 1 of the experiment. In case you are an Employee, it will be specified whether you are Employee 1 or Employee 2.
- II. When you press the "Continue" button, a screen with a brief video-presentation about the main features of the PART 1 of the experiment will appear. In this video-presentation you will receive some information about the "What-if-calculator", a tool you can use to facilitate your computations. It is important to note that no other

participant will be informed about your calculations and that these calculations do not have any effect on your earnings.

- III. After this brief video-presentation, you will access a new screen where you will be asked to answer a few questions. You will have to calculate the earnings of all members of your firm for five hypothetical scenarios, with the help of the “*What-if-calculator*”. Press “Check” when you have answered all the questions. You will be informed about whether your answers are correct.
- IV. Once you have answered all the questions correctly, you will be guided to a new short video-presentation that will give you specific information about how to enter your decisions into the Decision Table.
- V. After that, you will finally enter the Decision Task screen. Depending on whether you are an Employer or an Employee you will have to choose wages or effort levels. In this screen, you will again have the possibility to use the “*What-if-calculator*”.
- VI. When everyone has made a decision, PART 1 of the experiment will be finished. The experiment will then proceed to PART 2.

Please, raise your hand if you have any questions.

### **Script read to subjects in PART 1 (BASELINE)**

I will now briefly summarize the content of the instructions you have just read.

At the beginning of PART 1 of the experiment you will be randomly matched with two other participants to form a group of three people and you will be randomly assigned a role within this group, which we will call “firm”. You will be either the Employer or Employee 1 or Employee 2.

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

First, **the Employer** chooses one wage to pay to Employee 1 (**Wage<sub>1</sub>**) and one wage to pay to Employee 2 (**Wage<sub>2</sub>**).

Next, **Employee 1** learns the wages the Employer pays to each Employee, and then chooses an effort level (**Effort<sub>1</sub>**).

Finally, **Employee 2** learns the wages the Employer pays to each Employee and also the effort decision of Employee 1, and then chooses an effort level (**Effort<sub>2</sub>**).

The Employer’s earnings increase with higher effort levels and decrease with higher wages.

The Employees’ earnings increase in the wage they receive and decrease with higher effort. The earnings of each Employee only depend on his or her own wage and effort.

**Although the structure of the decision-making within each firm is the one I have just described, in PART 1 of today’s experiment we ask you to take a decision for each possible situation that may arise. This is a crucial point, so make sure you have understood it correctly.**

The possible situations you will face when making your decisions will depend on your role.

If you are an **Employer you must choose two wages**, one for each Employee within the Firm. Thus, depending on the choice of the Employer one of four situations will arise:

- Both Employees could get a wage of 16;
- Both Employees could get a wage of 32;
- And the two situations where one Employee gets a wage of 16 while the other Employee gets a wage of 32;

If you are **Employee 1** you must indicate an effort choice for each of these four possible situations, before knowing which one you are actually in. Remember, one of these four decisions will be the one that is actually relevant, so make your choice carefully.

Depending on the choices of the Employer and Employee 1 one of sixteen situations may arise:

- Both Employees get a wage of 16 and Employee 1 chooses 1 unit of effort

- Both Employees get a wage of 16 and Employee 1 chooses 2 units of effort;
- ...and so on...

Since there are 4 possible levels of effort and 4 possible wage combinations, 16 situations in all may arise.

If you are **Employee 2** you must indicate an effort choice for each of the sixteen possible situations. Remember, one of these sixteen decisions will be the one that is actually relevant, so make your choice carefully.

Which decision is actually relevant will be determined at the end of PART 1, once everyone in the firm has taken his or her decisions: the actual wage combination chosen by the Employer will determine which of the four possible situations is relevant for Employee 1. Employee 1's choice in this relevant situation will determine which of the sixteen possible situations is relevant for Employee 2.

Please note that the decision task in PART 1 of the experiment will be performed only once.

Please, raise your hand if you have any questions.

## Instructions for PART 2 (BASELINE)

In PART 2 of the experiment your earnings will be calculated in points. You will receive an initial endowment of 95 points, which will be enough to cover any loss that might occur during PART 2. The points you lose will be subtracted from your endowment.

At the end of the experiment we will convert your point earnings from PART 2 of the experiment into money at the following rate:

$$1 \text{ Point} = 10 \text{ Pence}$$

If PART 2 of the experiment will be selected for payment, your total money earnings from PART 2 will be paid out to you in private and in cash at the end of the experiment.

### 1. Introduction

In PART 2 of the experiment you will be matched with the **same two participants** with whom you have been matched in PART 1. You and the two other participants will again form a group of three persons – a firm - , and you will keep the **same role in the firm** as in PART 1. That is, if you were an Employer in PART 1, you will be assigned the role of Employer also in PART 2. If you were an Employee 1 in PART 1, you will also be assigned the role of Employee 1 in PART 2. If you were an Employee 2 in PART 1, you will also be assigned the role of Employee 2 in PART 2. As before, 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.

### 2. Decisions within a firm

The structure of the decision-making within each firm is the same as in PART 1 of the experiment:

- ✓ First, **the Employer** chooses the wages to pay to Employee 1 (**Wage<sub>1</sub>**) and Employee 2 (**Wage<sub>2</sub>**). The Employer can choose among four possible wage combinations:
  - The Employer can choose to pay Wage<sub>1</sub>=16 and Wage<sub>2</sub>=16.
  - The Employer can choose to pay Wage<sub>1</sub>=16 and Wage<sub>2</sub>=32.
  - The Employer can choose to pay Wage<sub>1</sub>=32 and Wage<sub>2</sub>=16.
  - The Employer can choose to pay Wage<sub>1</sub>=32 and Wage<sub>2</sub>=32.
- ✓ Next, **Employee 1** learns the wage combination chosen by the Employer, and then chooses an effort level (**Effort<sub>1</sub>**), either 1, 2, 3 or 4.
- ✓ Finally, **Employee 2** learns the wage combination chosen by the Employer, and also the effort decision of Employee 1. Employee 2 then chooses an effort level (**Effort<sub>2</sub>**), either 1, 2, 3 or 4.

### 3. Distribution of earnings within a firm

Earnings within the firm are determined according to the same rules as in PART 1 of the experiment:

#### Employer

The Employer receives revenue from the effort chosen by the two Employees, and incurs costs from the wages paid to the two Employees. The revenue produced by each Employee equals 10 times the effort he or she chooses. The costs are simply the sum of the two wages the Employer pays to the Employees. The Employer's earnings are therefore:

$$\text{Employer's Earnings} = 10 * (\text{Effort}_1 + \text{Effort}_2) - \text{Wage}_1 - \text{Wage}_2$$

The Employer's earnings increase with higher effort levels. The higher the wages the Employer pays to the two Employees, the lower are the Employer's earnings. Note that the Employer's earnings could be negative.

#### Employee 1

Employee 1 receives the wage from the Employer as revenue, and may incur an effort cost. The minimum effort choice of 1 is costless. Each additional unit of effort costs 5 points to the Employee. Therefore the effort cost is calculated as:  $5 * (\text{Effort} - 1)$ . The earnings of Employee 1 are therefore:

$$\text{Employee 1's Earnings} = \text{Wage}_1 - 5 * (\text{Effort}_1 - 1)$$

The earnings of Employee 1 only depend on his or her own wage and effort. The higher the wage, the higher are the earnings. The higher the effort he or she chooses, the lower are the earnings.

#### Employee 2

The earnings of Employee 2 are calculated in the same way as those of Employee 1, except, of course, that Employee 2's earnings depend on his or her own wage ( $\text{Wage}_2$ ) and his or her own effort choice ( $\text{Effort}_2$ ):

$$\text{Employee 2's Earnings} = \text{Wage}_2 - 5 * (\text{Effort}_2 - 1)$$

#### HYPOTHETICAL EXAMPLE FOR DEMONSTRATION PURPOSES

ASSUME THAT THE EMPLOYER CHOOSES THE FOLLOWING WAGES FOR HIS OR HER EMPLOYEES:

WAGE FOR EMPLOYEE 1 = 32

WAGE FOR EMPLOYEE 2 = 16

THE EMPLOYEES CHOOSE THE FOLLOWING EFFORT:

EFFORT EMPLOYEE 1 = 2

EFFORT EMPLOYEE 2 = 3

THIS SITUATION RESULTS IN THE FOLLOWING EARNINGS:

**EMPLOYER'S EARNINGS:** THE EMPLOYER RECEIVES REVENUE FROM THE EFFORT OF THE TWO EMPLOYEES, I.E.:  $10*(2 + 3) = 50$ . THE EMPLOYER PAYS A TOTAL OF 48 POINTS TO THE EMPLOYEES.

THE EARNINGS OF THE EMPLOYER ARE:  $50 - 48 = 2$ .

**EMPLOYEE 1'S EARNINGS:** EMPLOYEE 1 RECEIVES A WAGE OF 32. THE EFFORT CHOICE OF 2 HAS A COST OF  $5*(2 - 1) = 5$ .

THE EARNINGS OF EMPLOYEE 1 ARE:  $32 - 5 = 27$ .

**EMPLOYEE 2'S EARNINGS:** EMPLOYEE 2 RECEIVES A WAGE OF 16. THE EFFORT CHOICE OF 3 HAS A COST OF  $5*(3 - 1) = 10$ .

THE EARNINGS OF EMPLOYEE 2 ARE:  $16 - 10 = 6$ .

#### 4. The Decision Task

Differently from PART 1, in PART 2 of the experiment Employees will be informed of the situation they are in before they make their effort choice. Therefore, in PART 2 of the experiment everyone will take **exactly one decision**:

**The Employer will choose a wage combination** among four possible alternatives:

- Wage<sub>1</sub> = 16 and Wage<sub>2</sub> = 16;
- Wage<sub>1</sub> = 16 and Wage<sub>2</sub> = 32;
- Wage<sub>1</sub> = 32 and Wage<sub>2</sub> = 16;
- Wage<sub>1</sub> = 32 and Wage<sub>2</sub> = 32.

Next, **Employee 1** will be informed of the wage combination the Employer has actually chosen and will then be asked to **choose an effort level for that specific wage combination**. If you are Employee 1, your computer screen will contain a Decision Table as the one below:

**Decision Table: Your effort choice**

---

The Employer has chosen to pay a wage of  $\text{xx}$  to **you**.

The Employer has chosen to pay a wage of  $\text{xx}$  to **Employee 2**.

Please choose **your** effort.  
You have to choose a level of effort between 1 and 4.

Your Effort Choice

Finally, **Employee 2** will be informed of the wage combination the Employer has actually chosen, and of the effort that Employee 1 has actually chosen in that wage combination. Employee 2 will then be asked to **choose an effort level for that specific combination of wages and effort chosen by the Employer and by Employee 1**. If you are Employee 2, your computer screen will contain a Decision Table as the one below:

**Decision Table: Your effort choice**

---

The Employer has chosen to pay a wage of  $\text{xx}$  to **you**.

The Employer has chosen to pay a wage of  $\text{xx}$  to **Employee 1**.

**Employee 1** has chosen effort  $\text{xx}$ .

Please choose **your** effort.  
You have to choose a level of effort between 1 and 4.

Your Effort Choice

As in PART 1 of the experiment, PART 2 decision task will be performed **only once**.

#### 5. How do we determine your actual earnings from PART 2 of the experiment?

The wage combination chosen by the Employer and Employees' effort choices in that wage combination will translate into earnings according to the rules explained at point 3 above.

#### 6. What happens next?

- I. PART 2 of the experiment will start with a welcome screen. By pressing the “Continue” button in that screen you will access another screen where you will be shown a brief video-presentation with summary information about your Decision Task in PART 2 of the experiment.
- II. You will then enter the Decision Task screen. Depending on whether you are an Employer or an Employee you will have to choose wages or effort levels. In this screen, you will have the possibility to use the “*What-if-calculator*”, as in PART 1.
- III. When everyone has made a decision, PART 2 of the experiment will be finished. You will then be shown a screen informing of your earnings from PART 1 and PART 2 of the experiment. As explained in the PRELIMINARY INSTRUCTIONS, a coin toss will then determine whether every participant in today’s experiment will be paid according to their earnings from PART 1 or PART 2.

Please, raise your hand if you have any questions.

### Script read to subjects in PART 2 (BASELINE)

I will now briefly summarize the content of the instructions you have just read.

In PART 2 of the experiment you are matched with the same two participants with whom you were matched in PART 1. You will also keep the same role in the firm as in PART 1 of the experiment.

The structure of the decision-making within each firm and the rules for determining earnings are the same as in PART 1 of the experiment.

**The only difference between PART 1 and PART 2 of the experiment is the following: while in PART 1 of the experiment Employees had to make their effort decisions before knowing which situation they were in, in PART 2 of the experiment they will learn the situation they are in before making their effort decisions.**

Therefore, in PART 2 of the experiment everyone will take **exactly one decision**:

**Employers will choose a wage combination** among four possible alternatives:

- Wage<sub>1</sub> = 16 and Wage<sub>2</sub> = 16;
- Wage<sub>1</sub> = 16 and Wage<sub>2</sub> = 32;
- Wage<sub>1</sub> = 32 and Wage<sub>2</sub> = 16;
- Wage<sub>1</sub> = 32 and Wage<sub>2</sub> = 32.

Next, **Employees 1** are informed of the wage combination the Employer has actually chosen and will then be asked to **choose an effort level for that specific wage combination.**

Finally **Employees 2** will be informed of the wage combination the Employer has actually chosen. They will also be informed of the effort that Employee 1 has actually chosen in that wage combination. They will then be asked to **choose an effort level for that specific combination of wages and effort chosen by the Employer and by Employee 1.**

The wage combination chosen by the Employer and Employees’ effort choices in that wage combination will determine the firm members’ earnings in PART 2 of the experiment.

Once PART 2 will be completed, a coin toss will determine whether everyone in the room will be paid according to PART 1 of the experiment or according to PART 2.

Please note that the decision task in PART 2 of the experiment will also be performed only once.

Please, raise your hand if you have any questions.

## Appendix B2 - Instructions for the norms-elicitation experiment

This Appendix contains the instructions used for the norms-elicitation experiment in BASELINE.

### 1) General Instructions (common to all treatments)

Welcome to the experiment! This is a study on decision making. For your participation, you will be paid a participation fee of £5. In addition, you may receive some additional money based on your choices and the choices of others during the experiment.

If you have any questions during the study, please raise your hand and wait for an experimenter to come to you. Please do not talk, exclaim, or try to communicate with other participants during the experiment. Participants intentionally violating the rules may be asked to leave the experiment and may not be paid.

In a few minutes you will receive a set of paper sheets containing descriptions of a series of situations. These descriptions correspond to situations in which one person, "Employee 2," must make a decision. For each situation, you will be given a description of the decision faced by Employee 2. This description will include several possible choices available to Employee 2.

After you read the description of the situation, you will be asked to evaluate the different possible choices available to Employee 2 and to decide, for each of the possible choices, whether taking that choice would be "*socially appropriate*" and "*consistent with moral or proper social behavior*" or "*socially inappropriate*" and "*inconsistent with moral or proper social behavior*". By socially appropriate, we mean behavior that most people agree is the "correct" or "ethical" thing to do. Another way to think about what we mean is that if Employee 2 were to select a socially inappropriate choice, then someone else might be angry at Employee 2 for doing so. In each of your responses, we would like you to answer as truthfully as possible, based on your opinions of what constitutes socially appropriate or socially inappropriate behavior.

To give you an idea of how the experiment will proceed, we will go through an example and show you how you will indicate your responses. On the next page you will see an example of a situation.

#### Example Situation

Employee 2 is at a local coffee shop near campus. While there, Employee 2 notices that someone has left a wallet at one of the tables. Employee 2 must decide what to do. Employee 2 has four possible choices: take the wallet, ask others nearby if the wallet belongs to them, leave the wallet where it is, or give the wallet to the shop manager. Employee 2 can choose only one of these four options.

The table below presents a list of the possible choices available to Employee 2. For each of the choices, please indicate whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate. To indicate your response, please place an "x" inside one box for each row.

Employee 2's choice	Very Socially Inappropriate	Somewhat Socially Inappropriate	Somewhat Socially Appropriate	Very Socially Appropriate
Take the wallet				
Ask others nearby if the wallet belongs to them				
Leave the wallet where it is				
Give the wallet to the shop manager				

**Please make sure that you have placed one "x" in each row.**

If this were one of the situations for this study, you would consider each of the possible choices above and, for that choice, indicate the extent to which you believe taking that action would be "*socially appropriate*" and "*consistent with moral or proper social behavior*" or "*socially inappropriate*" and "*inconsistent with moral or proper social behavior*".



Recall that by socially appropriate we mean behavior that most people agree is the “correct” or “ethical” thing to do.

For example, suppose you thought that taking the wallet was *very socially inappropriate*, asking others nearby if the wallet belongs to them was *somewhat socially appropriate*, leaving the wallet where it is was *somewhat socially inappropriate*, and giving the wallet to the shop manager was *very socially appropriate*. Then you would indicate your responses as follows:

<b>Employee 2's choice</b>	<i>Very Socially Inappropriate</i>	<i>Somewhat Socially Inappropriate</i>	<i>Somewhat Socially Appropriate</i>	<i>Very Socially Appropriate</i>
Take the wallet	<b>X</b>			
Ask others nearby if the wallet belongs to them			<b>X</b>	
Leave the wallet where it is		<b>X</b>		
Give the wallet to the shop manager				<b>X</b>

**Are there any questions about this example situation or about how to indicate your responses?**

### **Your Task in Today's Experiment**

In a few minutes you will receive a set of paper sheets containing descriptions of four situations, all dealing with decisions that “Employee 2”, a participant in an experiment, might have to make. For each situation, you will read a description of the situation and indicate whether each possible choice available to Employee 2 is socially appropriate or socially inappropriate. For each situation, you will indicate your responses using a table similar to the one shown above for the example situation. The experimenter will then collect your responses.

### **How Your Cash Earnings Are Determined**

At the end of the experiment today, we will select one of the four situations, by randomly drawing a number from 1 to 4. For this situation, we will also randomly select one of the possible choices that Employee 2 could make. Thus, we will select both a situation and one possible choice at random. For the choice selected, we will determine which response was selected by the most people here today. If you give the same response as that most frequently given by other people, then you will receive an additional £3. This amount will be paid to you, in cash, at the conclusion of the experiment. For instance, if we were to select the example situation above and the possible choice “Leave the wallet where it is” and if your response had been “*somewhat socially inappropriate*” then you would receive £3, in addition to the £5 participation fee, if this was the response selected by most other people in today's session. Otherwise you would receive only the £5 participation fee.

If you have a question at any time, raise your hand and a monitor will come to your desk to answer it.

## **2) General Description of the Decision Task faced by Employee 2 (BASELINE)**

All the four situations you will be asked to evaluate deal with decisions that “Employee 2”, a participant in an experiment, might have to make in the decision task described below.

In the decision task participants enter choices into a computer and earn points as explained below. All participants start the experiment with an endowment of 95 points, which will be enough to cover any loss that might occur during the experiment. The points lost by a participant during the experiment will be subtracted from that participant's endowment. At the end of the experiment point earnings are converted into cash at a rate of 10p per point.

At the beginning of the decision task, three participants are randomly matched together to form a group of three persons, which we will refer to as a “**firm**”. The matching is anonymous, meaning that neither participant will ever know the identity of the other participants with whom he or she is matched. Each participant is then randomly assigned

a role within the firm: **Employer**, **Employee 1** or **Employee 2**.

The structure of the decision-making within a firm is as follows:

- First, **the Employer** chooses the wages to pay to Employee 1 (**Wage<sub>1</sub>**) and Employee 2 (**Wage<sub>2</sub>**). The Employer can choose among four possible wage combinations:
  - The Employer can choose to pay Wage<sub>1</sub>=16 and Wage<sub>2</sub>=16.
  - The Employer can choose to pay Wage<sub>1</sub>=16 and Wage<sub>2</sub>=32.
  - The Employer can choose to pay Wage<sub>1</sub>=32 and Wage<sub>2</sub>=16.
  - The Employer can choose to pay Wage<sub>1</sub>=32 and Wage<sub>2</sub>=32.
- Next, **Employee 1** learns the wage combination chosen by the Employer, and then chooses an effort level (**Effort<sub>1</sub>**), either 1, 2, 3 or 4.
- Finally, **Employee 2** learns the wage combination chosen by the Employer, and also the effort decision of Employee 1. Employee 2 then chooses an effort level (**Effort<sub>2</sub>**), either 1, 2, 3 or 4.

Point earnings within a firm are determined according to the following rules:

### **Employer**

The Employer receives revenue from the effort chosen by the two Employees, and incurs costs from the wages paid to the two Employees. The revenue produced by each Employee equals 10 times the effort he or she chooses. The costs are simply the sum of the two wages the Employer pays to the Employees. The Employer's earnings are therefore:

$$\text{Employer's Earnings} = 10 * (\text{Effort}_1 + \text{Effort}_2) - \text{Wage}_1 - \text{Wage}_2$$

The Employer's earnings increase with higher effort levels. The higher the wages the Employer pays to the two Employees, the lower are the Employer's earnings. Note that the Employer's earnings could be negative.

### **Employee 1**

Employee 1 receives the wage from the Employer as revenue, and may incur an effort cost. The minimum effort choice of 1 is costless. Each additional unit of effort costs 5 points to the Employee. Therefore the effort cost is calculated as:  $5 * (\text{Effort} - 1)$ . The earnings of Employee 1 are therefore:

$$\text{Employee 1's Earnings} = \text{Wage}_1 - 5 * (\text{Effort}_1 - 1)$$

The earnings of Employee 1 only depend on his or her own wage and effort. The higher the wage, the higher are the earnings. The higher the effort he or she chooses, the lower are the earnings.

### **Employee 2**

The earnings of Employee 2 are calculated in the same way as those of Employee 1, except, of course, that Employee 2's earnings depend on his or her own wage (**Wage<sub>2</sub>**) and his or her own effort choice (**Effort<sub>2</sub>**):

$$\text{Employee 2's Earnings} = \text{Wage}_2 - 5 * (\text{Effort}_2 - 1)$$

## **HYPOTHETICAL EXAMPLE FOR DEMONSTRATION PURPOSES**

ASSUME THAT THE EMPLOYER CHOOSES THE FOLLOWING WAGES FOR HIS OR HER EMPLOYEES:

WAGE FOR EMPLOYEE 1 = 16

WAGE FOR EMPLOYEE 2 = 32

THE EMPLOYEES CHOOSE THE FOLLOWING EFFORT:

EFFORT EMPLOYEE 1 = 2

EFFORT EMPLOYEE 2 = 3

THIS SITUATION RESULTS IN THE FOLLOWING EARNINGS:

**EMPLOYER'S EARNINGS:** THE EMPLOYER RECEIVES REVENUE FROM THE EFFORT OF THE TWO EMPLOYEES, I.E.:  $10*(2 + 3) = 50$ . THE EMPLOYER PAYS A TOTAL OF 48 POINTS TO THE EMPLOYEES.

THE EARNINGS OF THE EMPLOYER ARE:  $50 - 48 = 2$ .

**EMPLOYEE 1'S EARNINGS:** EMPLOYEE 1 RECEIVES A WAGE OF 16. THE EFFORT CHOICE OF 2 HAS A COST OF  $5*(2 - 1) = 5$ .

THE EARNINGS OF EMPLOYEE 1 ARE:  $16 - 5 = 11$ .

**EMPLOYEE 2'S EARNINGS:** EMPLOYEE 2 RECEIVES A WAGE OF 32. THE EFFORT CHOICE OF 3 HAS A COST OF  $5*(3 - 1) = 10$ .

THE EARNINGS OF EMPLOYEE 2 ARE:  $32 - 10 = 22$ .

After everyone in the firm has made a decision, all three participants are informed of the choices made and are paid accordingly in private and in cash.

The four situations you are asked to evaluate deal with effort decisions that **Employee 2** has to make after different combinations of wage and effort choices made by the **Employer** and **Employee 1**.

On each of the four attached sheets you will find a description of each situation as well as a table where you will indicate your responses.

Please raise your hand if you have any questions.

### 3) Decision Sheets (BASELINE)

Participant ID Number \_\_\_\_\_

#### Situation 1

Please write your Participant ID Number in the space provided above.

The Employer chooses a wage of **32** for Employee 1 and **16** for Employee 2.

Employee 1 learns the wages chosen by the Employer, and then chooses **1 unit of effort**.

Employee 2 learns the wages chosen by the Employer and the effort chosen by Employee 1 and has to decide whether to expend 1, 2, 3 or 4 units of effort.

The table below summarizes the payoffs of Employer, Employee 1 and Employee 2 when Employee 2 chooses 1, 2, 3 or 4 units of effort.

**SITUATION 1: Employee 1 wage = 32; Employee 2 wage = 16; Employee 1 effort = 1**

Employee 2 chooses:	1 unit of effort	2 units of effort	3 units of effort	4 units of effort
Employer earnings	-28	-18	-8	2

Employee 1 earnings	32	32	32	32
Employee 2 earnings	16	11	6	1

The table below presents a list of the possible choices available to Employee 2. For each of the choices, please indicate whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate. To indicate your response, please place an “x” inside one box for each row.

<b>Employee 2's choice</b>	<i>Very Socially Inappropriate</i>	<i>Somewhat Socially Inappropriate</i>	<i>Somewhat Socially Appropriate</i>	<i>Very Socially Appropriate</i>
1 unit of effort				
2 units of effort				
3 units of effort				
4 units of effort				

**Please make sure that you have placed one “x” in each row.**

**Participant ID Number** \_\_\_\_\_

### Situation 2

Please write your Participant ID Number in the space provided above.

The Employer chooses a wage of **32** for Employee 1 and **16** for Employee 2.

Employee 1 learns the wages chosen by the Employer, and then chooses **4 units of effort**.

Employee 2 learns the wages chosen by the Employer and the effort chosen by Employee 1 and has to decide whether to expend 1, 2, 3 or 4 units of effort.

The table below summarizes the payoffs of Employer, Employee 1 and Employee 2 when Employee 2 chooses 1, 2, 3 or 4 units of effort.

**SITUATION 2: Employee 1 wage = 32; Employee 2 wage = 16; Employee 1 effort = 4**

<i>Employee 2 chooses:</i>	<i>1 unit of effort</i>	<i>2 units of effort</i>	<i>3 units of effort</i>	<i>4 units of effort</i>
Employer earnings	2	12	22	32
Employee 1 earnings	17	17	17	17

Employee 2 earnings	16	11	6	1
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The table below presents a list of the possible choices available to Employee 2. For each of the choices, please indicate whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate. To indicate your response, please place an "x" inside one box for each row.

Employee 2's choice	Very Socially Inappropriate	Somewhat Socially Inappropriate	Somewhat Socially Appropriate	Very Socially Appropriate
1 unit of effort				
2 units of effort				
3 units of effort				
4 units of effort				

**Please make sure that you have placed one "x" in each row.**

**Participant ID Number** \_\_\_\_\_

**Situation 3**

Please write your Participant ID Number in the space provided above.

The Employer chooses a wage of **32** for Employee 1 and **32** for Employee 2.

Employee 1 learns the wages chosen by the Employer, and then chooses **1 unit of effort**.

Employee 2 learns the wages chosen by the Employer and the effort chosen by Employee 1 and has to decide whether to expend 1, 2, 3 or 4 units of effort.

The table below summarizes the payoffs of Employer, Employee 1 and Employee 2 when Employee 2 chooses 1, 2, 3 or 4 units of effort.

<b>SITUATION 3: Employee 1 wage = 32; Employee 2 wage = 32; Employee 1 effort = 1</b>				
Employee 2 chooses:	1 unit of effort	2 units of effort	3 units of effort	4 units of effort
Employer earnings	-44	-34	-24	-14
Employee 1 earnings	32	32	32	32
Employee 2 earnings	32	27	22	17

The table below presents a list of the possible choices available to Employee 2. For each of the choices, please indicate

whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate. To indicate your response, please place an "x" inside one box for each row.

<b>Employee 2's choice</b>	<i>Very Socially Inappropriate</i>	<i>Somewhat Socially Inappropriate</i>	<i>Somewhat Socially Appropriate</i>	<i>Very Socially Appropriate</i>
1 unit of effort				
2 units of effort				
3 units of effort				
4 units of effort				

**Please make sure that you have placed one "x" in each row.**

**Participant ID Number** \_\_\_\_\_

**Situation 4**

Please write your Participant ID Number in the space provided above.

The Employer chooses a wage of **32** for Employee 1 and **32** for Employee 2.

Employee 1 learns the wages chosen by the Employer, and then chooses **4 units of effort**.

Employee 2 learns the wages chosen by the Employer and the effort chosen by Employee 1 and has to decide whether to expend 1, 2, 3 or 4 units of effort.

The table below summarizes the payoffs of Employer, Employee 1 and Employee 2 when Employee 2 chooses 1, 2, 3 or 4 units of effort.

**SITUATION 4: Employee 1 wage = 32; Employee 2 wage = 32; Employee 1 effort = 4**

<i>Employee 2 chooses:</i>	<i>1 unit of effort</i>	<i>2 units of effort</i>	<i>3 units of effort</i>	<i>4 units of effort</i>
Employer earnings	-14	-4	6	16
Employee 1 earnings	17	17	17	17
Employee 2 earnings	32	27	22	17

The table below presents a list of the possible choices available to Employee 2. For each of the choices, please indicate whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate. To indicate your response, please place an "x" inside one box for each row.

<b>Employee 2's choice</b>	<i>Very Socially Inappropriate</i>	<i>Somewhat Socially Inappropriate</i>	<i>Somewhat Socially Appropriate</i>	<i>Very Socially Appropriate</i>
1 unit of effort				
2 units of effort				
3 units of effort				
4 units of effort				

**Please make sure that you have placed one “x” in each row.**

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