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Employee types and endogenous organizational design: An experiment*

Antoni Cunyat and Randolph Sloof**

Abstract

When managers are sufficiently guided by social preferences, incentive provision through an organizational mode based on informal implicit contracts may provide a cost-effective alternative to a more formal mode based on explicit contracts and monitoring. This paper reports the results from a laboratory experiment designed to test whether organizations make full effective use of the available preference types within their work force when drafting their organizational design. Our main finding is that they do not do so; although the importance of social preferences is recognized by those choosing the organizational mode, the significant impact managers' preferences have on the behavior of workers in the organization seems to be overlooked.

Jel Classification

C91; J40; M50.

Keywords

Employee, organizational design, social preferences.

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1 Introduction

A major research theme within organizational economics is how to motivate employees to exert well-directed effort. This issue is typically addressed using the principal-agent model as point of departure. In the standard version of this model the agent is assumed to solely care about his own monetary compensation and to dislike effort. Similarly so, the principal just wants to maximize her own net profit and does not care about the agent's well-being. Given these assumptions it is derived how monetary incentives should be optimally designed to motivate the agent to put in sufficient effort.

Many empirical studies have found, however, that people may have alternative motivations that go beyond material self-interest. Fairness, altruism, empathy and a preference to react in kind to kind or unkind actions of others (reciprocity) are among the various alternative motivations identified. The presence of such 'social preferences' may have profound implications for the provision of effort incentives. One of these is that they may make non-enforceable, 'implicit' contracts possible. Workers are more easily persuaded to exert effort when they know that their manager cares about their well-being and thus will reward higher effort with a larger (non-contractible) bonus. Effort levels will then be higher in equilibrium, thereby increasing efficiency. For this reason it may actually pay for firms to select and hire 'empathic' managers who do not solely care about profit maximization; their personality type helps in overcoming a difficult incentive problem with the workers (cf. Rotemberg and Saloner (1993), Rotemberg (1994), and Hermalin (2001, Section 4.2)). In the same spirit, firms may want to assign particular preference types within their work force to jobs where these social preferences are most effective.

In this paper we intend to test empirically whether organizations indeed make effective use of managers' social preferences to motivate workers. We do so by studying whether the organizational design chosen optimally exploits the existing social preferences within the work force.[1] Because it is notoriously difficult to gather field data on this, we make use of laboratory experiments to test the relevant theoretical predictions at hand. Compared to the existing literature, a novel and important feature of our experiment is that we explicitly study how organizational design choices and the endogenous allocation of jobs to employees vary with the observed characteristics ('track records') of these employees.

In our experiment we simplify matters by assuming that there are two organizational modes, each corresponding to a different role for managers. In the first type managers are hired to inspire and to motivate the work force. Rather than implementing a system based on explicit incentive contracts and active monitoring, managers should instill and maintain a culture that hard work will be rewarded by the organization. This implicit contract then substitutes for a more costly explicit performance measurement and evaluation system. We capture this organizational mode in highly reduced form with motivation game M depicted in Figure 1a below. This game corresponds to the trust game used by Kreps (1990) to model corporate culture and also to a simplified version of the game used by Rotemberg and Saloner (1993) to study the impact of leadership style on workers' incentives to innovate.[2]

[1] We thus leave aside the issue of (self-) sorting of employees into firms. Recent theoretical papers focus on the endogenous sorting of employees with heterogeneous social preferences into firms with different corporate cultures (see e.g. Kosfeld and von Siemens (2007) and the references therein).

[2] In spirit the M-game corresponds to the 'loose supervision' regime in the model of supervision and workgroup identity studied by Akerlof and Kranton (2005). The inspection game I (to be discussed shortly) then corresponds to their 'strict supervision' regime.

Figure 1a. Motivation game *M*

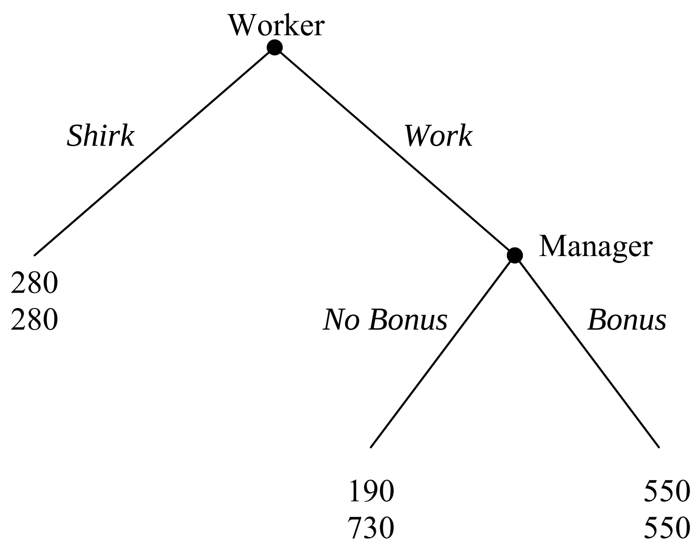
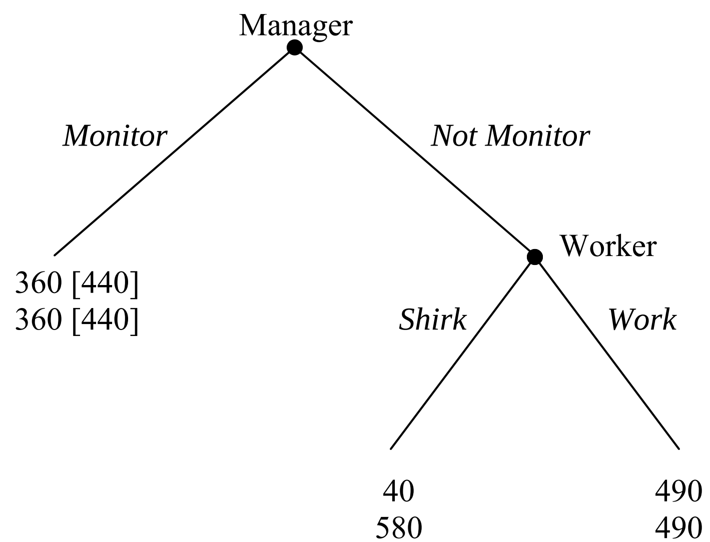


Figure 1b: Inspection game I_H [I_L]



In game M a worker first decides whether to shirk or to work. In case the worker shirks, he does not get a reward (on top of his wage). If, however, the worker exerts effort, the manager decides whether to reward him with a bonus or not. Because this bonus is non-contractible, a selfish manager will not pay it and, anticipating this, the worker will not work. But if the manager could credibly commit to pay the bonus (only) when the worker exerts effort, the worker would be motivated to do so.

In the second organizational mode the role of managers is to supervise and to monitor that the workers do not deliver substandard work (cf. Calvo and Wellisz (1978)). Workers receive a given wage for putting in effort, but are fined or fired whenever they are caught shirking. This mode is captured by inspection game I depicted in Figure 1b, for high (I_H) and low (I_L) inspection costs separately. In this game the manager first decides whether to monitor or not. If she does so, the worker will work for sure. But if the manager decides not to monitor, the worker chooses between shirking and working. Payoffs are such that selfish workers will shirk if not monitored. Realizing this, the manager commits to monitor in the first stage.[3]

Assuming selfish preferences, the worker is predicted to work in mode I but not in mode M. In that case the inspection mode is more efficient and will be preferred by the owner of the firm. Things change when employees have social preferences. Putting a very empathic employee in the manager's position under mode M will then yield first best. This follows because, anticipating that he will be rewarded by the empathic manager, the worker puts in effort and does not shirk. And compared to structure I, organizational mode M saves on the costs of the monitoring technology.[4] The M-mode thus becomes relatively more attractive the more empathic the employees are. Moreover, because the M-mode relies on empathic management, the owner will put the more empathic employees within the work force in the manager's role whereas in the I mode this is not the case. A final intuitive prediction is that the more cost-effective the inspection system under mode I is, the less likely it is that the owner prefers mode M. Lower inspection costs are represented in Figure 1b by having payoffs of 440 (instead of 360) after the manager's decision to monitor.

The experiment that we use to test these predictions has two parts. In part one subjects make 18 decisions in 9 different games that all have the same entry-reward structure as in Figure 1. These decisions are used to generate individual 'track records' (e_i,r_i), with e_i (r_i) the number of entry (reward) choices the subject made. This track record is taken as a (imprecise) measure of a subject's preference type.

In part two subjects either take the role of owner or of employee and in each period firms consisting of one owner and two employees are formed (based on a strangers design). Given the observed track records of her two employees, the owner decides which employee becomes manager and who gets the role

[3]Game I reflects a simplified version of an inspection game where the manager can commit to a particular inspection strategy. In a more general setup, the manager commits to a particular inspection probability, such that the worker is just induced to exert effort with probability one; see Section 5 in Avenhaus et al. (2002) for a full discussion and justification of this game. In their real effort experiment Dickinson and Villeval (2008) also use an inspection game in which the principal/manager can commit ex ante to a given monitoring technology. For simplicity, here we restrict the manager to inspection probabilities of either zero (no monitoring at all) or one (always monitor).

[4]This explains why the maximum joint payoffs for the worker and the manager under M (1100) are higher than the maximum joint payoffs under I (980). Apart from installation and operational monitoring costs, another type of monitoring costs is that the worker dislikes being monitored as it gives him the negative feeling of being controlled (cf. Frey (1993) and Falk and Kosfeld (2006) who find that being monitored may lower work morale). Even if he works, his payoffs in the inspection mode therefore depend on being monitored (either 360 or 440) or not (490). In the Appendix we provide an elaborate justification of the particular parameterization depicted in Figure 1.

of worker.[5] After that the two employees take decisions in the organizational mode that applies. In the first ten periods the organizational mode is exogenously given (with first 5 times one mode and then 5 times the other), in the final 5 periods the owner first chooses the organizational mode before she assigns roles. Employees' payoffs are as in Figure 1 and the owner's payoffs equal those of the manager (but are private information to her).

Our main findings are as follows. First, in both modes employees with the first mover role are more likely to 'enter' the higher the r_i value is of the second mover with whom they are matched. This confirms that the more 'empathic' second movers are, the higher the willingness of first movers to enter the reciprocal relationship. Second, firm owners seem to overlook this mechanism when assigning their employees to different roles. They naively assume that first mover decisions are mainly driven by the track record characteristics of the first mover himself. As a result, in the M-mode they typically assign the manager role (second mover) to the employee with the *lower* r_i-value, i.e. to the *less* empathic employee. These assignments appear suboptimal, because profits would have been higher if they would allocate roles the other way around. Third, given suboptimal role allocation under the M mode, also the choice between organizational modes is distorted. Nevertheless, the loss owners bear due to their suboptimal allocation of roles is rather small and they in general do correctly realize that social preferences within their work force make the M-mode relatively more attractive. Overall we therefore conclude that owners in our experiment do recognize the importance of social preferences for organizational outcomes, but do not make use of the available preferences within their work force to the fullest extent possible.

Numerous experiments have already been conducted that relate to the above discussed issues of endogenous organizational design. In a series of important papers, for instance, Ernst Fehr and various coauthors have studied the firm's choice of optimal incentive contracts. A main common finding is that social preferences can serve as a cost-effective contract enforcement device and contracts may therefore deliberately be left incomplete.[6] This suggests that in practice firms may prefer implicit contracts over explicit incentive contracts, although under selfish preferences the latter would be optimal. Other experiments focus on the relation between workers' social preferences and their self-sorting into different pay for performance schemes (see e.g. Cabrales et al. (2007), Dohmen and Falk (2006), Eriksson and Villeval (2004) and Teyssier (2008)). Also the effect of monitoring on worker behavior has already been studied in the lab; see e.g. Dickinson and Villeval (2008) and Schweitzer and Ho (2005). Compared to these experiments, we study (implicit and explicit) contracts and monitoring in highly reduced form (cf. Figure 1). The main contribution of our study is that we explicitly relate these (reduced form) organizational choices to the observed characteristics ('track records') of the employees that are to be affected by these instruments. Apart from that, another new feature is that we explore the endogenous allocation of roles within organizations.

This paper proceeds as follows. Assuming that employees may care about the well-being of others, we first derive the formal hypotheses that are put to the test. Section 3 presents the details of our experimental design whereas Section 4 reports the results. The final section summarizes and concludes.

[5] Clearly, in reality the manager's and worker's position may require different capabilities and a given employee may not be suitable for both positions. In the experiment we focus on a situation where such differences in ability requirements are of lesser importance. A real world example in which this is the case is provided by the field experiment study of Bandiera et al. (2007a, 2007b). They consider a soft fruit producing firm where the main task of workers is to pick fruit, whereas managers have to monitor the quality of picking and to organize logistics. Both managers and workers are hired from the same population of Eastern European university students that are of similar age and background.

[6] See e.g. Fehr et al. (1997, 2007), Fehr and List (2004) and Fehr and Schmidt (2000,2004).

2 Theoretical predictions and hypotheses

Our experiment is based on the two games depicted in Figure 1.[7] These games have the same general decision structure, which is reflected in Figure 2 below. Player A first chooses between Out and Enter. If player A enters, player B subsequently chooses between Reward and No reward. Payoffs are such that choosing No reward yields B the most in monetary payoffs, whereas Reward corresponds to sacrificing to reward A for the 'kind' choice to enter. From $d > c > b > a$ it immediately follows that, if both players are selfish, (Out, No reward) is the unique subgame perfect equilibrium.

Social preferences may lead players away from the inefficient (Out, No reward) outcome. Various alternative motivations have been identified in the literature – like fairness, altruism, empathy and reciprocity – and a number of theoretical models have been developed to capture these in a formal way. Prominent examples include Fehr and Schmidt (1999)´s model of inequality-aversion, Charness and Rabin (2002)´s model of quasi-maximin preferences, and Rabin (1993)´s model of intention-based reciprocity (see also Dufwenberg and Kirschsteiger (2004)). Although these models can lead to quite different predictions in particular situations, a common theme they share is that social preferences may be efficiency enhancing. It is this common aspect that we want to emphasize here.[8]

To illustrate the impact alternative motivations may have, we capture them in a very simple and stylized way. Let π_i and π_j denote player i's and j's monetary payoffs. Following Charness and Rabin (2002), we assume that player i's preferences take the following form (with $i \neq j$ and $i, j \in \{A, B\}$):

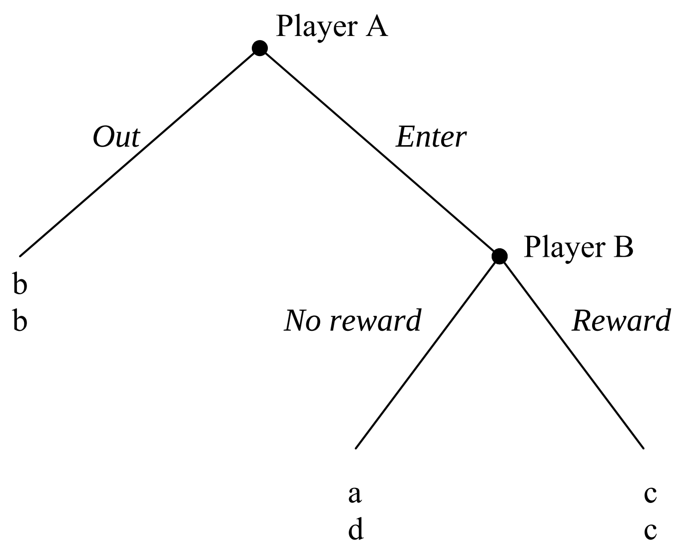
$$\begin{aligned} U_i(\pi_i, \pi_j) &= \rho_i \cdot \pi_j + (1 - \rho_i) \cdot \pi_i \quad \text{if} \quad \pi_i > \pi_j \\ &= \sigma_i \cdot \pi_j + (1 - \sigma_i) \cdot \pi_i \quad \text{if} \quad \pi_i \leq \pi_j \end{aligned} \tag{1}$$

In this specification, parameter ρ_i gives the weight player i attaches to the other player's payoffs when she herself is ahead. Parameter σ_i reflects the corresponding weight when she is behind. Without any restrictions on ρ_i and σ_i utility function (1) can capture a range of different motivations. Charness and Rabin (2002) use the results of a variety of simple games with a similar decision structure as in Figure 2, to estimate the values of ρ_i and σ_i. They find that on average players do not care about other players' payoffs when they are behind, but put a positive weight on the well-being of others when they are ahead. In line with their estimates we therefore assume that $0 < \rho_i < 1$ and that $\sigma_i \leq 0$. These assumptions incorporate the inequality-aversion model of Fehr and Schmidt (1999), which corresponds to $\sigma_i < 0 < \rho_i < 1$ and $|\sigma_i| \geq \rho_i$. They are also in line with Hermalin (2001, Section 4.2), who assumes that a player suffers from 'remorse' only if he is ahead.

[7] In the Appendix we discuss a basic reduced form model of endogenous organizational design that underlies these two specific games. This Appendix also discusses our choice of parameters and thereby motivates the monetary payoffs the subjects earn in different roles.

[8] Our experiment thus neither should be taken as an attempt to discriminate between various types of social preferences, nor as providing a test of a particular version of social preferences per se. Although in this section we use quasi-maximin preferences to derive and illustrate the main implications in a parsimonious way, similar predictions would have been obtained under relevant alternative specifications. For instance, incorporating Dufwenberg and Kirschsteiger (2004)'s type of intention-based reciprocity motivations leads to qualitatively the same predictions.

Figure 2. General decision structure
(with d > c > b > a and d+a ≤ 2c)



Assuming preferences as in (1), the game is again easily solved by backward induction. Player B will choose to reward whenever $\rho_B \geq \rho^* \equiv \frac{d-c}{d-a}$. Anticipating this, player A enters only when ρ_B exceeds this threshold. Hence the predicted outcome is Out when $\rho_B < \rho^*$ and (Enter, Reward) in case $\rho_B \geq \rho^*$. (Outcome (Enter, No reward) is thus never observed on the equilibrium path.) This establishes that when player B cares sufficiently about A's well-being, the inefficient outcome Out is avoided. Note that ρ_i is the key parameter here. Following Rotemberg and Sloner (1993), we say that a player is more *empathic* the higher his ρ_i is. This yields our first main hypothesis.

H1 The more empathic player B is (i.e. the higher ρ_B is), the more likely it is that player A enters.

Players A and B represent the work force of a given firm. The role of owner of this firm is captured by player C, who decides on role assignment. In particular, given the empathy characteristics of her two employees as reflected by the ρ_i-values, she decide which employee gets role A and who gets role B. For ease of exposition we assume that, unlike her two employees, player C is selfish. Her monetary payoffs are equal to those of the manager and therefore depend on the version of the general game in Figure 2 that is played. In the I-games the payoffs of player C equal those of player A, in the M-game they correspond to those of player B.[9] Because in equilibrium the outcome either equals Out or (Enter, Reward) and A and B thus always obtain the same (either b or c), the predictions regarding role assignment are actually the same for these two games. Player C prefers to assign role B to the more empathic employee, because this maximizes the probability that the more efficient outcome (Enter, Reward) is obtained.[10]

H2 Players C will assign the role of player B to the more empathic employee within her work force (i.e. to the one with the higher ρ_i-value).

A direct consequence of the above prediction is that managers (players A) in the inspection mode will on average be more selfish than managers (players B) in the motivation mode.

Apart from role assignment, player C may possibly also choose between game M and game I. These two games differ in the values of the payoff parameters a through d. Here we simply work with the numbers in Figure 1, but the reasoning applies more generally. In both games, the only two possible equilibrium outcomes are Out and (Enter, Reward). Player C therefore prefers game M only if the latter outcome is expected in that game. If not, player C prefers game I. The latter follows because the payoff of 280 from outcome Out in game M falls short of both 360[440] and 490 in game $I_H[I_L]$. From the above it follows that only when the empathy level of player B exceeds the critical threshold of $\rho^* = \frac{1}{3}$ $\left(= \frac{730-550}{730-190}\right)$, outcome (Enter, Reward) is expected in the M-game. Therefore, only if player C has an employee within her work force with an empathy level that exceeds this threshold, she prefers game M.[11] Hence we obtain that C is more likely to choose game M the more empathic her employees are.

[9] In the experiment player C's payoffs are private information to her, so the observed behavior of A and B cannot be driven by the actual payoffs player C obtains. This justifies that (1) does not include π_C.

[10] Note that role assignment effectively makes a difference only when $\rho_i < \rho^* < \rho_j$ for employees i and j. Then the outcome is (Enter, Reward) when employee j is put in the B-role and Out when employee i is put in the B-role. Because $c > b$ player C prefers the former assignment. Moreover, because in each of these two outcomes all players earn the same, exactly the same predictions follow when player C is also guided by social preferences similar to those in (1).

[11] More generally this reasoning applies whenever $b^I > b^M$ and $c^I < c^M$ (with the superscripts of these payoff parameters referring to the type of game). As explained in the Appendix, the first inequality reflects the idea that the value of the worker's effort exceeds the overall costs of a formal monitoring system. Restriction $c^I < c^M$ derives from the natural assumption that installing a monitoring technology brings about (fixed) investment costs, even when it is not actively used in the end.

Table 1: Overview of sessions and treatments (in part 2)

session	rounds $1-5$	rounds $6-10$	rounds $11-15$
1	I_L	M	I_L versus M
2	M	I_L	M versus I_L
3	I_H	M	I_H versus M
4	M	I_H	M versus I_H

H3 The more empathic the work force is (i.e. the higher ρ_i of the more empathic employee), the more likely it is that player C prefers the M-game over the I-game.

Hypotheses H1 through H3 are the main predictions we want to test. Yet another interesting aspect to consider is the role of inspection costs in the I-game. Higher inspection costs correspond to lower payoffs attached to the Out outcome in this game (i.e. $b = 440$ in I_L versus $b = 360$ in I_H). If player C would be perfectly informed about her employees' empathy parameters ρ_i, variations in these payoffs would not affect the predicted outcomes (as long as these exceed the payoffs of the corresponding Out outcome in the M-game). However, it seems reasonable to assume that parameter ρ_i is employee i's private information. The owner may have a good idea about what the value of ρ_i is, but she may not be completely sure about its exact value. She is therefore unsure whether outcome Out or (Enter, Reward) will result in each of the two games. Other things equal, her expected payoffs of choosing the I-game are then lower the lower the value of parameter b in that game is. Player C is thus more likely to choose game M over I_H than over I_L.

Clearly, also in the experiment employees do not observe the level of empathy of their colleagues precisely, and neither do so owners C. Based on an observable track record of past choices, however, an estimate r_i of a player's empathy level ρ_i can be obtained. Exactly how individual track records are generated in the experiment is explained in the next section.

3 Experimental design

Our experiment is based on a 2 by 3 treatments design. In each session we kept the two types of games (game M and game I) fixed. Between sessions we varied the particular version of the inspection game, having either the one representing low inspection costs (I_L) or the other one with high inspection costs (I_H). We ran four sessions in total, which differed according to (the order of) the treatments considered. Table 1 provides an overview. All sessions were run in May 2007 at the LINEEX laboratory of the University of Valencia. Overall 180 subjects participated, with 45 subjects per session. The subject pool consisted of undergraduate students at the University of Valencia. The vast majority of them (88%) were students in Economics or Business, 57% were male. They earned on average 24.5 euros in somewhat less than 2 hours, including a show up fee of 7 euros.

At the beginning of each session subjects were informed that the experiment consisted of two parts. They were also informed that possibly some of the choices they made in part 1 would become observable to some other participants in part 2. In particular, the instructions for part one explained that:[12]

[12] The experiment was conducted in Spanish. An English translation of the entire instructions can be found at the first author's website: http://www.uv.es/acunat/instructions_employee.pdf.

Table 2: Overview of the nine games in part one

game	A stays out (b,b)	If A enters, B chooses (a,d) vs. (c,c)	sacrifice $d-c$	reward $c-a$	ρ^*
I	(1400,1400)	(950,3650) vs. (2750,2750)	900	1800	0.33
II	(1800,1800)	(200,2900) vs. (2450,2450)	450	2250	0.17
III	(2200,2200)	(200,2900) vs. (2450,2450)	450	2250	0.17
IV	(1400,1400)	(200,2900) vs. (2450,2450)	450	2250	0.17
V	(1800,1800)	(950,3650) vs. (2750,2750)	900	1800	0.33
VI	(2200,2200)	(950,3650) vs. (2750,2750)	900	1800	0.33
VII	(1400,1400)	(1250,3950) vs. (2600,2600)	1350	1350	0.5
VIII	(1800,1800)	(1250,3950) vs. (2600,2600)	1350	1350	0.5
IX	(2200,2200)	(1250,3950) vs. (2600,2600)	1350	1350	0.5

Remark: It holds that $\rho^* = \frac{sacrifice}{sacrifice+reward} = \frac{(d-c)}{(d-c)+(c-a)}$.

> "...It may happen that in part two some other participants get some information about the decisions you made in part one. It may also happen though that none of your part one decisions will ever become known to any other participant..."

Apart from this information, subjects were kept ignorant about the actual content of part 2 until that part actually started. The above announcement has the clear disadvantage that it may influence subjects' decisions in part 1. We considered it necessary though, in order to avoid any potential impression of deception. Moreover, if we would not make the announcement, subjects would be surprised at the start of part 2 when their choices of part 1 became known, and might think that it is quite likely that another "surprise" will follow. This might then affect their behavior in part 2.

In part 1 subjects made decisions for a series of nine extensive form games that all have the same decision structure as in Figure 2. We used a neutral frame for the entire experiment, with A's choosing between A1 (Out) and A2 (Enter) and B's choosing between B1 (No reward) and B2 (Reward). Table 2 provides an overview of the games used. Subjects first made 9 decisions as player A, after that they made 9 *conditional* (on entry) decisions as player B. They did not get any feedback about the actual outcomes of these games. They were just informed that at the end of the experiment one of the 18 choices made in part 1 would be randomly selected and paid (see below for a more detailed explanation).

The nine different games of part 1 have been chosen as follows. The first three games are just (five times) upscaled versions of the M-game, the I_H-game and the I_L-game, respectively. These games differ in two important ways. First, they correspond to different ratios of the amount player B has to sacrifice in order to give player A a particular reward. According to the theory discussed in Section 2, player B is only willing to give this reward if his empathy parameter ρ_i exceeds threshold ρ^*. This threshold differs between the M-game and the two I-games, see the final column in Table 2. Second, the M and I games also differ in the amount player A forgoes by choosing to enter.

The remaining six games have been chosen using games I through III as starting point. Game IV combines the payoffs of the 'stay-out' option of the M-game with the sacrifice-reward values of the two I-games. Games V and VI do so vice versa. The final three games combine the stay-out payoffs of games I through III with equal sacrifice-reward values such that an ρ^* of one half results.

We used part 1 to generate a 'track record' for each individual. Such a track record consisted of a two-tuple (e_i, r_i), with $e_i, r_i \in \{0, 1, ..., 9\}$ the number of enter choices subject i made as player A and the number of 'reward' choices s/he made as player B. Under the assumptions of the theory spelled out in Section 2, only decisions made as a second mover can serve as a proxy for social preferences. We therefore (only) use r_i as an estimate of a subject's empathy level ρ_i.

Part two of the experiment consisted of 15 periods. Subjects first learned their roles, being either an owner ("person C") or an employee ("group member"). Subjects kept the same role throughout all 15 periods. Roles were assigned as follows. In each session we ranked the 45 subjects on the basis of the number of 'right' choices r_i in their track record. Subjects with rank 16 to 30 were assigned the role of owner and the remainder the role of employee. This procedure – unknown to the subjects – secured that we had enough variation in empathy types among employees.

At the beginning of a period, firms (called "groups" in the experiment) consisting of one owner and two employees were exogenously formed. Matching was based on a stranger design. In each period each owner was matched to two different subjects from the lowest and highest tercile in the ranking of r-choices, respectively. We made sure that each subject met each other subject only once. Subjects were thus never confronted with the same firm member again and were explicitly informed about that.

The 15 periods were divided into three blocks of five. In the first two blocks the game to be played was exongenously given (see Table 1 above). Here the owner first decided, on the basis of the observed track records (e_1, r_1) and (e_2, r_2) of her two assigned employees, which role to assign to each of them (either A or B). Also the two employees observed the track record of each other. After employees were assigned their roles, they played the game that applied, making decisions for the role assigned. This determined their period payoffs, as given in the respective extensive form games. The owner received a period payoff equal to those of player A in the I-game and equal to those of player B in the M-game. To easily remind owners about this fact, we labelled the I-game as game "Azul" and the M-game as game "Blanco" (and we printed these games against the corresponding background color). The complete setup of the game was common knowledge, except for the payoffs of the owner, which were known to players C only. We did so to prevent that employees' decisions were guided by empathic feelings towards player C. In the final five periods 11 to 15, the owner first chose which game to play. Once a game had been chosen, the order of decisions was as before.

Except for the decisions made within their own firm in a given period, subjects did not get any information on how the other subjects behaved in part 2. Although they may have recorded the decisions made by previous firm members in earlier periods, this information is of limited value because they would never meet with the same other subject again. The observable track records they obtained from part 1 were thus the main clue they could use to predict the behavior of other subjects within their firm. The track record of owners was never made public. Therefore, for one third of the subjects the decisions made in part one remained private information throughout the experiment.

Payoffs were determined in the following way. From the first part one game was selected at random. For this particular game subjects were then randomly coupled in pairs and were randomly assigned roles.[13] The individual payoffs that resulted from these pairings gave the earnings for the first part. To this amount we added the overall payoffs from the second part. The conversion rate was such that 500

[13] Because we had an odd number of subjects within each session (45), we actually assigned 22 subjects the A-role and 23 subjects the B-role. The decision of one randomly selected A-subject was then used twice to determine the payoffs of two different B-roles.

Table 3: Overall distribution of individual track records

	number of e choices										
# of r's	0	1	2	3	4	5	6	7	8	9	Total
0	**10**	11	9	4	4	3				1	42
1	1	**2**	4	5	5	4		2			23
2			**2**	5	1	7	1		2		18
3		2	5	**3**	6	4	3		3	1	27
4			3	6	**13**	5	4			2	33
5		1	2	3	4	**6**	1				17
6			1		1	2		1	1		6
7					1	2	1				4
8			1			1					2
9					2	1	1		1	**3**	8
Total	11	16	27	26	37	35	11	3	7	7	180

Remark: Numbers on the diagonal where $e_i = r_i$ appear in bold.

points in the experiment corresponded with 1 euro in money. Apart from that, subjects received a show up fee of 7 euros.

The experiment was computerized using the z-tree programming package (cf. Fischbacher (2007)). Subjects started with written instructions for the first part, which were also read aloud by the experimenter. At the end of the first part subjects received new instructions for the second part. Before the second part started, subjects played one practice period. After finishing the second part subjects filled in a short questionnaire. Having completed this, the experimental points earned were exchanged for money and subjects were paid individually and discreetly.

4 Results

In this section we first describe the distribution of individual 'track records' generated by the choices subjects made in part one. Next we look at how players A and B behave in the three games M, I_H and I_L at hand. We are particularly interested in testing our first hypothesis that A's are more likely to enter the higher the r-value of player B they are coupled with. The final subsection looks at the organizational design choices made by players C. It is tested whether they assign the B-role to the employee with the higher r-value and whether they are more likely to choose the M-game when this r-value is higher.

4.1 Individual track records

In part one each subject makes nine entry decisions as player A and nine (conditional) reward choices as player B. From these 18 choices, an individual track record (e_i, r_i) results. Table 3 gives the overall distribution observed for the 180 subjects in our experiment.

On average subjects choose to enter 3.76 times as player A and to reward on average 2.83 times as player B. As the frequency distribution makes clear though, there is quite some heterogeneity. Most observations are scattered around the diagonal, suggesting that the number of entry and reward choices are correlated. Indeed, for our full sample of 180 subjects the Spearman rank correlation between e and r choices equals 0.48 and is highly significant ($p = 0.000$). This also holds when we compute correlations

Table 4: Number of outcomes by period for Game I_L

Outcome	Periods 1-5	Periods 6-10	Periods 11-15	Total
Out	62 (83%)	73 (97%)	70 (95%)	205 (92%)
E&N	7 (9%)	1 (1%)	2 (3%)	10 (4%)
E&R	6 (8%)	1 (1%)	2 (3%)	9 (4%)
Total	75 (100%)	75 (100%)	74 (100%)	224 (100%)

Table 5: Number of outcomes by period for Game I_H

Outcome	Periods 1-5	Periods 6-10	Periods 11-15	Total
Out	55 (73%)	61 (81%)	30 (75%)	146 (77%)
E&N	11 (15%)	5 (7%)	6 (15%)	22 (12%)
E&R	9 (12%)	9 (12%)	4 (10%)	22 (12%)
Total	75 (100%)	75 (100%)	40 (100%)	190 (100%)

for each of the four sessions in isolation. Moreover, many entries in Table 3 are above the diagonal. This indicates that subjects typically choose to enter somewhat more often as player A than they choose to reward as player B, which is corroborated by formal signrank tests.[14]

There are some minor differences in the observed track records across sessions. Comparing the number of r-choices by means of a Kruskal-Wallis test, we do not find a significant difference (at the 5% level) between the four sessions ($p = 0.0723$). For the number of enter choices there are some differences though ($p = 0.0131$). Both ranksum and Kolmogorov-Smirnov tests reveal that subjects in session 3 have a lower e-value than those in sessions 1 and 4. In the former the average equals 2.87, in the latter two 4.13 and 3.96, respectively. But even in session 3 the average e-value (2.87) exceeds the average r-value (2.44). The main observation of a substantial correlation between e and r-choices with (slightly) higher e-choices thus applies to all sessions.

As explained in the previous section, after part one we ordered the subjects on the basis of their r-scores and assigned those in the second tercile the role of player C. In sessions 1 and 4 these were subjects with $r_i = 2$ to $r_i = 4$, whereas in sessions 2 and 3 these where subjects with $r_i = 1$ to $r_i = 3$ and with $r_i = 1$ to $r_i = 4$, respectively. Recall that in every period players C were assigned one employee from the low-r group and another one from the high-r group.

4.2 Employees' choices

To get a first impression of how players A and B behaved in part two, Tables 4 through 6 provide an overview of the outcomes observed in the three different games.

In periods 1 to 10 the game was exogenously given whereas in the last five periods it was endogenously chosen by player C. The predominant outcome in game I_L is that player A chooses Out. In the very few instances that A chooses to enter, player B is about equally likely to reward (R) or not (N). The latter also applies for game I_H, but there player A is somewhat more likely to enter. Finally, in the motivation game it is (much) more likely that player A enters than in the two inspection games. But there player B also appears less likely to reward.

[14] Only in session 3 we do not find a significant difference (at the 5%-level) in indivivual e and r scores. But for the three other sessions we do, as well as overall.

Table 6: Number of outcomes by period for Game M

Outcome	Periods 1-5	Periods 6-10	Periods 11-15	Total
Out	84 (56%)	98 (65%)	130 (70%)	312 (64%)
E&N	47 (31%)	40 (27%)	47 (25%)	134 (28%)
E&R	19 (13%)	12 (8%)	9 (5%)	40 (8%)
Total	150 (100%)	150 (100%)	186 (100%)	486 (100%)

The first hypothesis we want to test is whether player A's are more likely to enter the higher the r-value of player B they are coupled with. We do so by estimating a random effects probit model of the probability that A chooses to enter. The four specifications reported in Table 7 all include player B's r-value from his track record. Apart from that, in the first column two 0/1-dummies for respectively the I_H-game and the M-game are incorporated (so I_L serves as baseline), together with a time trend 'period'. The second column adds the remaining elements of B's and A's track record. These two specifications do not distinguish between whether the game played is the first or the second exogenous game played in a row, or whether it is endogenously chosen by player C. Specifications (3) and (4) add additional zero-one dummies to identify potential order and treatment effects in this regard.

Before turning to the results obtained, it is important to point out that the coefficient estimates in Table 7 do not suffer from a sample selection bias. For sure, employees' roles are not assigned randomly but are endogenously chosen by players C. When C's take the track records of their two employees into account in making this assignment choice (as the theory predicts), the track records of the two employees A and B are no longer exogenous. The crucial thing to note here, however, is that selection has been based on *observables*. As has been observed in the literature, selection on observables per se does not lead to a sample selection bias in the estimates.[15] For such a bias to occur the (for the experimenter) unobserved characteristics of C that drive her assignment decision should be correlated with the (for the experimenter) unobserved characteristics of A that drive his entry decision. Given that all the information subjects within a matching group have about each other comes from the experimenter (viz. the track records) and the experiment is based on a stranger design, so reputational concerns are absent by construction, there is no compelling reason at all for such a correlation to exist. Player A's entry decision can thus be studied independently from C's assignment choice. For the very same reason it can also be analyzed separately from C's choice of organizational mode in periods 11 to 15.

In all specifications of Table 7, the r-value in B's track record (first row) is a highly significant determinant of A's decision to enter. The higher r_B is, the larger A's entry propensity. This finding is in line with our first hypothesis. Entry is also significant more likely in the I_H and the M-game as compared to the I_L-game. Apart from that, also player A's own r_A-value increases his probability of choosing to enter. The e-values in the employees' track records do not play a significant role. In particular, the level of e_A does not provide much information about A's probability of entry.[16] The time trend 'period' is

[15] See e.g. Vella (1998, Section II) and Cameron and Trivedi (2005, Section 16.5.7). Paraphrasing the words of Vella (1998, p. 129): "When the relationship between the work [assignment] decision and the wage [entry decision] is purely through the observables, however, one can control for this by including the appropriate conditioning variables in the wage [entry decision] equation. Thus, sample selection bias will not arise purely because of differences in observable characteristics." Vella continues to explain that differences in observables across two samples "...is by no means necessary, or even indicative, of selection bias."

[16] The insignificance of e_A in specifications (2) and (4) of Table 7 is only partly due to the fairly substantial correlation between e_A and r_A (potentially leading to problems of multi-collinearity). If we leave r_A out of specification (2), we obtain

Table 7: Random effects probit estimations of A choosing Enter

	(1)	(2)	(3)	(4)
r_B	0.105***	0.176***	0.103***	0.158***
	(0.022)	(0.033)	(0.023)	(0.044)
I_H-game	0.702***	0.754***	0.548*	0.669*
	(0.197)	(0.198)	(0.281)	(0.367)
M-game	1.384***	1.364***	1.206***	0.680**
	(0.170)	(0.172)	(0.249)	(0.316)
period	-0.055***	-0.056***	-0.134***	-0.139***
	(0.012)	(0.012)	(0.036)	(0.051)
r_A		0.106***		0.094*
		(0.037)		(0.052)
e_A		0.012		-0.009
		(0.035)		(0.050)
e_B		-0.004		0.021
		(0.031)		(0.043)
second (per. $6-10$)			-0.169	0.110
			(0.437)	(0.589)
endo (per. $11-15$)			0.679	0.991
			(0.487)	(0.655)
I_H·second			0.353	0.205
			(0.488)	(0.636)
M·second			0.517	0.238
			(0.454)	(0.602)
I_H·endo			0.491	-0.004
			(0.449)	(0.578)
M·endo			0.210	-0.273
			(0.371)	(0.493)
constant	-1.559***	-2.111***	-1.165***	-2.293***
	(0.199)	(0.286)	(0.256)	(0.460)
Log L	-451.243	-445.721	-445.301	-214.979
N (clusters)	900 (60)	900 (60)	900 (60)	900 (60)
rho	0.187***	0.158***	0.193***	0.202***
LR-chi2	120.354***	131.399***	132.238***	50.572***

Remark: Standard errors in parentheses. ***/**/* indicates significance at the 1/5/10% level. Rho gives the proportion of overall variance contributed by the panel-level component; its significance is based on a likelihood ratio test that rho=0. LR-chi2 reports the test statistic from testing that all coefficients (except the constant) are zero.

significantly negative, indicating that the propensity to enter decreases over time. We summarize our main finding from Table 7 in Result 1.

Result 1. The higher r_B is, the more likely it is that player A enters.

We also calculated random effects probit estimates of the probability that B chooses to reward entry, for the same four specifications as in Table 7. (To save space these estimates are not reported.) We did so mainly as a consistency check of whether B's with a higher r_B-value as measured in part one are (ceteris paribus) indeed more likely to reward entry in part two. The estimates obtained reveal that this is the case; a higher r_B value makes it significantly more likely that B rewards entry. It is also found that the e-values in the track records of A and B do not have a significant impact on B's reward probability.

These findings are consistent. The higher r_B in the track record of player B is, the more likely it is that he will reward entry. This in turn makes it more attractive for A to enter, in line with what we observe in Result 1. Player B's track record thus contains valuable information about how he is going to behave, which is actually used by player A to guide her entry decision. In the next subsection we investigate whether this mechanism is recognized as such by player C when deciding on organizational design.

Another important observation that follows from our findings is that, given the employees' r-values, their e-values do not provide useful additional information about their likely future behavior. Put differently, the informational value of the individual track records lies in the r-values. The e-values are informative only to the extent that they are correlated with the r-values.

4.3 Allocation of roles and organizational design

In part 2 player C makes two types of choices. First, in every period she decides on role assignment. Observing the track records of her two employees, player C decides who gets the role of player A and who becomes player B. Moreover, in periods 11 to 15 player C also chooses, before role assignment, the game that is going to be played. These two different choices are discussed in turn.

4.3.1 Role assignment

In studying the assignment choices we focus on the data of the first ten periods only where the game is exogenously given. We do so because in periods 11 to 15 C's assignment decision cannot be treated independently from C's choice of organizational design. These interdependent choices are studied in the next subsection.

Tables 8 through 10 provide an overview of the assignment decisions in the three different games. These tables reveal whether the employee who obtained role B is the one with the higher r-value in his track record ($r_A < r_B$) or whether this is the other way around ($r_A > r_B$), and similarly so for the e-values. Owing to our role assignment procedure based on the ranking of r_i-values, the two employees within a firm never had the same r-value. This does not apply to the e_i-values though, explaining the additional row where $e_A = e_B$ in these tables.

a coefficient estimate of 0.056 for e_A with a p-value of 0.084. If we leave r_A out of specification (4), the coefficient for e_A remains insignificant ($p = 0.460$).

Table 8: Assignment of roles in I_L-game (periods 1-10)

	$r_A > r_B$	$r_A < r_B$	Total
$e_A > e_B$	54 (36%)	8 (5%)	62 (41%)
$e_A = e_B$	6 (4%)	11 (7%)	17 (11%)
$e_A < e_B$	4 (3%)	67 (45%)	71 (47%)
Total	64 (43%)	86 (57%)	150 (100%)

Table 9: Assignment of roles in I_H-game (periods 1-10)

	$r_A > r_B$	$r_A < r_B$	Total
$e_A > e_B$	43 (29%)	6 (4%)	49 (33%)
$e_A = e_B$	4 (3%)	8 (5%)	12 (8%)
$e_A < e_B$	8 (5%)	81 (54%)	89 (59%)
Total	55 (37%)	95 (63%)	150 (100%)

From the observed assignment patterns it immediately follows that our second hypothesis is rejected; players C do not predominantly assign the role of player B to the employee with the higher r-value in his track record. In the two inspection games it does hold that C is (weakly) more likely to assign role B to the employee with the higher r-value. In the motivation game this is actually the other way around. There player C is more likely to assign role A to the higher r-value within her work force.[17] Given the fairly high correlation between subjects' r and e-values, the order of e-values among the two employees typically corresponds with the order of r-values. Assignment on the basis of relative e-values thus often (but not always) coincides with allocation on the basis of relative r-values.

Comparing assignment patterns of r-values across games, we find that these do not differ between the two inspection games. But they are significantly different for the motivation game; the average value of r_B (per individual player C) is lower in the motivation game as compared to the average value of r_B in the inspection games.[18] As a result of this, managers in the M-game (players B) have on average an r-score that does not differ significantly from managers in the I-game (players A).[19] This finding contrasts with the theoretical prediction that managers in the M-game will be more empathic than managers in the

[17] To account for the multiple assignment decisions per player C, we formally test this as follows. For each individual player C we compute the average values of r_B and r_A for each (exogenous) game separately. We then compare these individual means $\overline{r}_B$ and $\overline{r}_A$ by means of signrank tests. In the I_L-game there is no significant difference ($p = 0.2058$) while for the I_H-game $\overline{r}_B$ is significantly larger than $\overline{r}_A$ ($p = 0.0082$). For the M-game $\overline{r}_B$ is significantly lower than $\overline{r}_A$ ($p = 0.0001$).

[18] These conclusions are based on comparing the means $\overline{r}_B$ of individual player C's across games. For I_L versus M and I_H versus M signrank tests (for matched pairs) yield p-values of 0.0140 and 0.0035, respectively. For I_L versus I_H a ranksum test (unmatched data) gives $p = 0.6732$.

[19] This follows from comparing (per individual player C) $\overline{r}_B$ under game M with $\overline{r}_A$ under games I_L and I_H, respectively. Using signrank tests we obtain a p-value of 0.4715 for M versus I_L and of 1.000 for M versus I_H.

Table 10: Assignment of roles in M-game (periods 1-10)

	$r_A > r_B$	$r_A < r_B$	Total
$e_A > e_B$	165 (55%)	18 (6%)	183 (61%)
$e_A = e_B$	24 (8%)	8 (3%)	32 (11%)
$e_A < e_B$	7 (2%)	78 (26%)	85 (28%)
Total	196 (65%)	104 (35%)	300 (100%)

I-game.

Result 2. Players C quite often do not assign the role of player B to the employee with the higher r-value. In the inspection games C is (weakly) more likely to assign role B to the high-r employee, in the motivation game she is more likely to give role B to the low-r employee.

Result 2 is opposite to what we expected. Especially in the M-game it is important for player C to stimulate entry, because the payoff after Out is low, and assigning the high-r employee to role B appears an effective instrument to do so (cf. Result 1). Yet the majority of player C's does not do this.

A potential explanation why C's in game M tend to assign role B to the low-r employee is that they naively assume that A's and B's decisions are (only) driven by their own e_A and r_B values, respectively. In particular, C's may overlook that A's actual entry decision is mainly guided by the value of r_B. If C's indeed have such naive expectations, they would prefer to assign the high-e employee to role A and the low-r employee to role B. This follows because C gets the same as player B in game M and thus is necessarily better off when A enters instead of staying out (and she is best off when B chooses no reward in reaction). This could explain the direction in the assignment patterns we observe; high (e_i, r_i) types typically get role A whereas low (e_i, r_i) types usually get role B. Moreover, one would expect naive C's to focus predominantly on relative e-values in order to stimulate entry, because stimulating no reward in reaction to entry is useful only when entry can be induced.

For the two inspection games matters are less clear under naive expectations. Surely, C then prefers to give role B to the high-r employee. This maximizes the probability that B chooses to reward after A enters. But given that C gets the same as A in these games, entry is now risky for player C. She may end up with the lowest payoff when B decides not to reward A's entry choice. It is therefore a priori unclear whether a naive C wants to increase the probability of entry by assigning the high-e employee to role A, or whether she prefers to avoid the worst outcome (Enter, No reward) in this game by giving the low-e employee role A. Under naive expectations one thus expects that allocation decisions may be driven by both the relative r-values and the relative e-values of the two employees.

Given the substantial correlation between e_i and r_i, it is difficult to identify precisely their separate effects on the probability of obtaining role B. But the random effects probit estimates in Table 11 provide suggestive evidence. These estimates are calculated as follows. For each allocation decision of player C we focus on the employee with the lower subject id in player C's current group of employees. Because subject id's are allocated at random, this corresponds to a random selection of one of the two employees player C has in a given period. For these employees we estimate the probability that they are assigned role B, where the random effects procedure takes account of the fact that we have multiple allocation decisions per player C within our sample. Two different specifications are estimated. In the first the data from the two inspection games are effectively pooled, in the second they are treated separately.

Two main explanatory variables are considered: (i) the difference in r-values between the lower id employee and the other employee $(r_1 - r_2)$ and (ii) the difference in e-values between them $(e_1 - e_2)$. These variables are interacted with game dummies to test whether their impact differ across different games. As before we also include the game dummies, a time trend 'period' and a dummy for potential order effects (i.e. 'second') as controls.

The results for the motivation game are clear cut. In this game C's are mostly concerned with getting the low-e employee in role B and thus assigning the high-e value to role A. This follows from

Table 11: RE probit estimations of (lower id) employee getting role B

	I-games pooled	I_L and I_H separate
$r_1 - r_2$	-0.031	-0.032
	(0.020)	(0.020)
$(r_1 - r_2) \cdot I$-game	0.079***	
	(0.028)	
$e_1 - e_2$	-0.083***	-0.081***
	(0.030)	(0.030)
$(e_1 - e_2) \cdot I$-game	0.096**	
	(0.042)	
I-game	-0.003	
	(0.109)	
$(r_1 - r_2) \cdot I_L$		0.089***
		(0.034)
$(r_1 - r_2) \cdot I_H$		0.048
		(0.036)
$(e_1 - e_2) \cdot I_L$		0.056
		(0.047)
$(e_1 - e_2) \cdot I_H$		0.204***
		(0.064)
I_L-game		0.029
		(0.136)
I_H-game		-0.002
		(0.133)
second (per. $6 - 10$)	-0.082	-0.056
	(0.216)	(0.217)
period	-0.012	-0.010
	(0.037)	(0.037)
constant	0.110	0.085
	(0.145)	(0.146)
Log L	-390.837	-388.040
N (clusters)	600 (60)	600 (60)
rho	0.001	0.004
LR-chi2	49.776***	55.369***

Remark: Standard errors in parentheses. ***/**/* indicates significance at the 1/5/10% level. The lower id employee is labelled employee 1, the other employee is labelled employee 2. Rho gives the proportion of overall variance contributed by the panel-level component; its significance is based on a likelihood ratio test that rho=0. LR-chi2 reports the test statistic from testing that all coefficients (except the constant) are zero. Estimates are based on period $1 - 10$ data only.

the fact that the coefficient of $e_1 - e_2$ is negative and highly significant, whereas the one belonging to $r_1 - r_2$ is insignificant. For the two inspection games opposite results are found. When the two versions of the inspection game are considered jointly, relative r-values do play a role. The interaction term between $r_1 - r_2$ and the I-game dummy is highly significant. The employees relative e-values are then immaterial.[20] It thus appears that in the inspection game players C predominantly focus on getting the high r-value in role B. When the I_L and the I_H game are considered in isolation, however, a more nuanced picture emerges. In the I_L-game players C appears mostly concerned with getting the high r-value in role B, whereas in game I_H C's seem to focus on getting the low e-value employee in role A. Note, however, that given the high correlation between e_i and r_i, assigning the higher r-value to role B typically coincides with assigning the lower e-value to role A. Therefore, for many allocation decisions this shift in focus does not matter.

These patterns make sense when C's have naive expectations as described earlier. In the two inspection games C's will be mostly concerned with avoiding the very unattractive outcome (Enter, No reward), and they think they can do so either by having the higher r-value in role B and/or the lower e-value in role A. In the motivation game players C particularly would like to stimulate entry. Naive C's think that this is best accomplished by assigning the higher e-value to role A.

The observation that C's may have naive expectations is in line with earlier experimental findings that people tend to analyze extensive form games in a forward rather than in a backward manner. Johnson et al. (2002) consider a three-round alternating offer bargaining game in which the pie up for division shrinks over time. The actual pie sizes in each of the three rounds were hidden in boxes on the computer screen, which could be opened by moving the cursor into the box. The computer software recorded which box was opened, for how long, the order in which the boxes were opened etc.. Strikingly, most subjects focused on the first round box and did not sufficiently look ahead. In a non-negligible fraction of observations, subjects did not even open the round two and round three boxes.[21] In our setting naive C's also do not backward induct sufficiently. They simply look forward at the first (entry) decision taken by player A, overlooking the fact that this decision is affected by player A's expectation about B's likely choice (for which r_B provides relevant information).

The above discussion suggests that (naive) players C make suboptimal allocation decisions, especially in the motivation game. Result 1 namely indicates that entry is best stimulated by assigning the higher r-value to role B. On the other hand, such an allocation also stimulates B to reward entry and – conditional on entry – C would be better off if B chooses no reward instead. To assess the overall effect we therefore investigate how player C's profits vary with her allocation decision. The upper panel of Table 12 presents random effects regression estimates of player C's profit for each of the three games separately. Here the data is again restricted to the first ten periods in which the game is exogenously given. As explanatory variables we include the track record characteristics of C's two employees, together with an order dummy and a time trend.

First focusing on the M-game, we observe that the e-values of players A and B do not significantly affect player C's profits. The r_B-value, on the other hand, significantly increases profits. Player C would thus make more profit if she would give the employee with the higher r-value role B. Because

[20] This can be concluded from the fact that the coefficients belonging to $e_1 - e_2$ and $(e_1 - e_2) \cdot I$-game are not significantly different from each other.

[21] In a class room experiment Rubinstein (1999) also finds that people have a natural tendency to analyze extensive form games forward rather than backwards.

Table 12: Random effects regressions of player C's profit

	I_L-game	I_H-game	M-game
r_B	1.067	1.422	16.179**
	(4.860)	(6.493)	(7.546)
r_A	-8.550	6.863	10.334
	(5.390)	(7.180)	(7.445)
e_A	0.272	0.538	10.254
	(3.795)	(6.944)	(6.257)
e_B	-7.182**	6.528	8.867
	(3.523)	(6.937)	(6.759)
second	61.553*	47.736	104.712**
	(34.913)	(42.818)	(52.354)
period	-6.770	-7.931	-27.120***
	(4.933)	(6.365)	(7.705)
constant	474.848***	316.958***	392.742***
	(42.017)	(41.344)	(56.861)
Overall R^2	0.082	0.040	0.072
N (clusters)	150 (30)	150 (30)	300 (60)
rho	0.233	0.162	0.248
Wald-chi2	10.966*	5.379	27.391***
Actual profit	421	341.47	438.40
Optimal profit	416.04[a]		454.96[a]

Remark: Standard errors in parentheses. ***/**/* indicates significance at the 1/5/10% level. Rho gives the proportion of overall variance contributed by the panel-level component. In all three specifications a Lagrange multiplier test for random effects is insignificant. Wald-chi2 reports the test statistic from testing that all coefficients (except the constant) are zero. [a] indicates that the Optimal profit differs significantly from the Actual profit according to a signrank test (1% level) she typically does not do so (cf. Result 2), allocation decisions in the motivation game are indeed suboptimal. In regard to the inspection games no significant effects are found for the employees' r-scores. An explanation for this is that a higher r_B-value not only makes outcome (Enter, Reward) more likely, but also the worst possible outcome (Enter, No reward).[22] The regression results suggest that the payoff consequences of these two opposing effects cancel out. Somewhat surprising, however, we do find that e_B has a significant negative impact on profits in the I_L-game. A plausible explanation here is that, because e_B and r_B are highly correlated, their independent effects cannot be well isolated. Jointly the two coefficients belonging to e_B and r_B are insignificant, suggesting that also here (like in game I_H), profit levels are largely insensitive to assignment.[23]

To explore this issue further, the lower panel of Table 12 reports the average estimated profits players C could have obtained from using the 'optimal' allocation decision as suggested by the profit regressions. For the M-game this corresponds to always assigning role B to the employee with the highest r-value. If players C consistently do so, the estimated profit level on average equals 455. This appears to be significantly larger than the actual average profits of 438 (signrank test, $p = 0.0000$). In case of the I_L-game the suggested optimal assignment corresponds to having the low e-value in role B (and if employees have equal e-values, the one with the higher r-value should get role B). If this assignment rule would be followed, players C would actually obtain significantly less than with their actual assignment decisions (again signrank test, $p = 0.0014$). Overall we conclude that players C make suboptimal assignment decisions only in the motivation game.

Result 3. In the motivation game Players C make more profit when they assign the high-r employee to role B. In the inspection games profit levels are largely insensitive to the assignment of the employees.

4.3.2 Game choice

We finally look at the choices players C make in the final five periods of part 2. Player C then decides on both the organizational mode and on role assignment and therefore these decisions are considered jointly. Table 13 first provides an overview of the actual choices made. With respect to assignment this table indicates whether the employee with the higher r-value obtains role A ($r_A > r_B$) or whether s/he obtains role B ($r_B > r_A$).

Regarding game choice it can be observed that when player C chooses between I_L and M, she is about equally likely to choose either game. But when the choice is between I_H and M, she chooses the motivation game in around 73% of the cases. In line with theoretical predictions, therefore, C is more likely to choose M over I_H than M over I_L. With regard to assignment patterns the findings are the same as before. In the motivation game players C allocate role B to the low r-value employee in overall 72% of the cases where this game is endogenously chosen. This compares well with the 68% observed for the exogenous M-game (cf. Table 10). Taking the two inspection games together the corresponding percentages are 36% for the endogenous treatments and 39% in the exogenous games. Hence, also when the inspection game is endogenously chosen, player C is more likely to assign role B to the high-r employee. These findings corroborate Result 2.

[22] This follows from running separate RE probit estimates of the probability of outcome (Enter, Reward) and (Enter, No reward), respectively.

[23] The coefficients belonging to e_B and r_B are jointly significant only in the regression for the M-game.

Table 13: Game choices and assignment by session

Session	Game I_L		Game I_H		Game M		Total
	$r_A > r_B$	$r_A < r_B$	$r_A > r_B$	$r_A < r_B$	$r_A > r_B$	$r_A < r_B$	
1	13 (17%)	26 (35%)			24 (32%)	12 (16%)	75 (100%)
2	12 (16%)	23 (31%)			36 (48%)	4 (5%)	75 (100%)
3			11 (15%)	13 (17%)	35 (47%)	16 (21%)	75 (100%)
4			5 (7%)	11 (15%)	38 (51%)	21 (28%)	75 (100%)
All	25 (8%)	49 (16%)	16 (5%)	24 (8%)	133 (44%)	53 (18%)	300 (100%)

In order to explore which employees' characteristics drive game choice we estimate a multinomial probit model with the dependent variable attaining four possible values: (1) choose game M and give the low-r employee role B, (2) choose game M and assign the high-r employee role B, (3) choose game I and give the low-r employee role B and (4) choose game I and assign the high-r employee role B. To take account of the multiple decisions per individual player C, observations are clustered using the id's of player C as the clustering variable. Apart from the track record characteristics of player C's two employees, we also include as explanatory variables a dummy equal to one iff I_H is the alternative to game M and a variable $\pi_M - \pi_I$ measuring the difference in average realized profits player C obtained from the two games in the first ten periods (where these games were exogenously given). Intuitively, one would expect that C is more likely to choose game M when I_H is the alternative and when game M yielded her higher profits than game I did in the past. We also include a time trend 'period' and player C's own track record characteristics as controls.

Instead of the estimated coefficients, Table 14 reports for each outcome the estimated increase in probability of observing the corresponding outcome (i.e. marginal effects). From these estimates a consistent pattern emerges regarding game choice. First, the higher e_{High} is, the more likely it becomes that player C chooses the M-game. The other variables in the employees' track records are typically insignificant.[24] Hence the estimates do not lend support to the hypothesis that the higher the value of r_{High} within player C's work force is, the more likely it is that the M-game is chosen. Second, the single two other important determinants of game choice are the profit difference $\pi_M - \pi_I$ and the M versus I_H dummy. Not surprisingly, the better (relative) experience player C has with game M in the past, the more likely she is to choose this game over the inspection game. The same applies when the alternative to the M-mode is worse, i.e. I_H instead of I_L.

Result 4. (i) Players C's choice between the motivation game and the inspection game is not guided by the r_i-values in her employees' track records. From these records only the highest e-value e_{High} matters; the higher e_{High}, the more likely it is that C chooses game M. (ii) player C is more likely to choose game M over game I_H than over game I_L.

Even though role assignment is suboptimal in the M-game (cf. Result 3), subjects may still make close to optimal game choices. To explore this we perform random effects regressions of player C's profits

[24] The single exception here is the marginal effect of r_{High} on the probability of observing the joint choice of game M and $r_A < r_B$. In the multinomial probit estimation, however, the joint hypothesis that the coefficients belonging to r_{High} are all zero cannot be rejected ($p = 0.1637$). Therefore, r_{High} plays a minor role at most in explaining the variation across the four different outcomes.

Table 14: Estimated marginal effects on C's joint game and assignment choice

	game M $r_A > r_B$	game M $r_A < r_B$	game I $r_A > r_B$	game I $r_A < r_B$
r_{High}	-0.0046	0.0283*	-0.0196	-0.0041
	(0.0199)	(0.0159)	(0.0144)	(0.0167)
r_{Low}	0.0321	0.0366	0.0081	-0.0767
	(0.0512)	(0.0438)	(0.0276)	(0.0501)
e_{Low}	-0.0356	0.0236	0.0090	0.0030
	(0.0256)	(0.0153)	(0.0126)	(0.0196)
e_{High}	0.0586***	-0.0038	-0.0219	-0.0330**
	(0.0191)	(0.0147)	(0.0137)	(0.0156)
r_C	-0.0385	0.0181	-0.0177	0.0380
	(0.0468)	(0.0376)	(0.0263)	(0.0308)
e_C	-0.0005	0.0121	-0.0289*	0.0173
	(0.0235)	(0.146)	(0.0150)	(0.0142)
$\pi_M - \pi_I$	0.0017***	-0.0006	-0.0002	-0.0010**
	(0.0005)	(0.0004)	(0.0003)	(0.0003)
M versus I_H	0.0141	0.2291***	-0.0852	-0.1581**
	(0.0847)	(0.0692)	(0.0544)	(0.0642)
period	-0.0243	0.0064	0.0014	0.0165
	(0.0204)	(0.0153)	(0.0124)	(0.0208)

Remark: Standard errors in parentheses. ***/**/* indicates significance at the 1/5/10% level. r_{High} (r_{Low}) refers to the r-value of the employee with the higher (lower) r in his track record. e_{High} and e_{Low} are defined similarly. Marginal effects follow from multinomial probit estimates with player C as the clustering variable (data from periods $11-15$ only).

Table 15: Average predicted profits, average actual profits and game choice

Profit	Game	I_L chosen over M ($n = 74$)	M chosen over I_L ($n = 76$)	I_H chosen over M ($n = 40$)	M chosen over I_H ($n = 110$)
	I_L	431	442		
	I_H			323	268
Pred.	M	377	372	419	413
	M_{opt}	395	401	444	452
Actual		430	384	325	422

Remark: The first four rows report the average (empirically) predicted profits in the four different games. These predictions are based on random effects regressions of player C's profits in periods 11 to 15, for each chosen game separately (i.e. regressions similar to those in Table 12). M_{Opt} gives the estimated profit player C would obtain under optimal role assignment in the M-game. Within columns all differences are significant according to a signrank test (1% level).

similar to those reported in Table 12, but now restricted to periods 11-15 only.[25] These estimates are subsequently used to predict the profits player C in reality may obtain from either one of the two organizational modes. Table 15 provides an overview of the average (empirically) predicted profits, together with the average actual profits in the final row. The table also lists the average estimated profit player C could have obtained under optimal role assignment in the M-game (see the row labelled M_{Opt}).

Some interesting observations can be made from Table 15. First, compared to the theoretical predictions under selfish preferences, the M-mode does much better than predicted (predicted profits equal 280), whereas the two I-games do slightly worse (theoretically predicted profits of 440 and 360, respectively). This finding is well in line with the many earlier experimental studies showing that social preferences may greatly enhance efficiency, especially under informal implicit contracts. Here the direct consequence is that the profits player C can attain under the I_H-game are in practice significantly less than under the M-game. Subjects by and large realize this, because in 73% of the cases players C opt for the M-game when the alternative is the I_H-game. Players C thus broadly recognize that the social preferences within their work force make the M-mode relatively more attractive. Second, although role assignment under the M-game is suboptimal and significantly reduces profits, the average loss in profits is relatively small in absolute magnitude (around $20 - 40$ points in the periods with endogenous game choice).

Overall the following general picture emerges. For players C the motivation game is attractive only if entry can be induced in this game. They naively think that this can be best accomplished by allocating role A to the employee with the highest e_i-value. Player Cs are therefore likely to choose game M only when this e_{High}-value is relatively high. In case e_{High} is low Cs are more likely to choose the inspection game and will assign this player the role of B. A rationale for this assignment is that player C hopes to avoid the very bad outcome (Enter, No reward) in this way. Allocation decisions are naive in the sense that Cs seem to overlook the significant impact of B's track record (in particular r_B) on A's entry choices, especially in game M where this relationship is of vital importance. They therefore mainly look at the employee's own track record to form expectations about how he would behave in role A. This leads to suboptimal allocation choices in game M. In turn, the choice between games is distorted

[25] Compared to Table 12 the dummies 'second' and 'endo' have been dropped and in the regression for the M-game a 0/1 dummy has been added that indicates whether I_H (instead of I_L) is the alternative.

as well, because it is mainly guided by the employees' e_i-values. Nevertheless, the loss in profits due to a distorted allocation of employees is rather small under the M-game and players Cs in general do correctly realize that social preferences make mode M more attractive than mode I_H. They thus seem to recognize the general impact of social preferences, but do not make full effective use of it.

5 Conclusion

Organizations differ widely in the practices they use to motivate their employees. Some organizations heavily rely on formal contracts with explicit incentives and active monitoring. Here an important task of managers is to supervise and inspect workers in order to detect potential shirking. Other organizational modes are predominantly based on implicit informal agreements that hard work will be rewarded. In this case the main task of managers is to inspire and to motivate the work force. In these organizations employment contracts are largely incomplete and a substitute mechanism is needed to convince workers that the organization is indeed committed to reward high effort. Apart from repeated interaction and reputation (cf. Kreps (1990)), appointing managers that empathize with their employees may provide such a commitment (cf. Rotemberg and Sloner (1993)). This motivational mode where managers with social preferences are hired saves on the costs of using a formal performance measurement system.

In this paper we test several predictions concerning organizational design by means of a laboratory experiment. Theory predicts that the motivation-mode is viable only if managers are sufficiently empathic whereas for the inspection-mode this is not the case. The more empathic employees within the work force should therefore be given the managerial positions in the M-mode (but not in the I-mode). And the more empathic these managers are, the more attractive organizational mode M becomes relative to the inspection mode.

Our main findings are that firm owners by and large overlook the significant impact of a manager's preference type on worker behavior in the M-mode. They naively assume that the worker's effort decision is mainly guided by the preference type of the worker himself. They therefore allocate roles suboptimally in the M-mode, with workers rather than managers being the more empathic types. As a result of this, choices between organizational modes differ from theoretical predictions as well. Nevertheless, owners do correctly realize that the (potential) existence of social preferences within their work force makes the motivation mode relatively more attractive. Taken together, we conclude that owners in our experiment do recognize that social preferences matter, but do not make full effective use of the available preference types within their work force when drafting their organizational design.

Appendix: basic model of endogenous organizational design

In the experiment subjects are confronted with the simple games depicted in Figure 1. To motivate our choice of monetary payoffs in these games, we consider in this Appendix a bare bone reduced form model of endogenous organizational design. Because the main purpose here is to justify our parameter choices, in this model we abstract away from the owner's assignment decision.

A firm consists of three agents: the owner who owns the firm, a manager hired to run the firm on her behalf and a worker doing the productive work. The worker can either put in low effort ('shirk') or high effort ('work'). In the former case the value of his productivity equals v_0 whereas in the latter case it is v_1 (here all parameters are positive). The worker's disutility of putting in high effort equals g. Therefore, a selfish worker will shirk if no additional measures are taken.

One way to motivate the worker to put in high effort is to set up a performance monitoring system. We assume that such a system, when fully implemented, always induces the worker to work. It brings about three types of costs though. First, there are the costs k of setting up and installing the monitoring technology. Investments in technological equipment and organizational procedures are needed to allow accurate measurement of the worker's productivity.[26] Second, h denotes the firm's inspection costs. Even with the monitoring technology in place, scarce resources like the manager's time need to be devoted to monitor the worker. Third, the worker dislikes being monitored because it gives him the feeling of being controlled (cf. Frey (1993), Falk and Kosfeld (2006)), leading to a disutility of d. We assume that the overall costs of the formal monitoring system fall short of the net benefits of getting the worker to work:

$$k + h + d < v_1 - v_0 - g. \tag{A1}$$

Therefore, in the absence of alternative incentive instruments, the firm would benefit from using a formal monitoring system. As in the main text we will refer to this as the 'inspection mode', or I-mode in short. In regard to compensation we assume that the worker receives a fixed wage w_I. The manager is paid on the basis of performance pay, getting a share $f_I \in (0, 1)$ of the firm's net profits (while the owner gets the remainder).

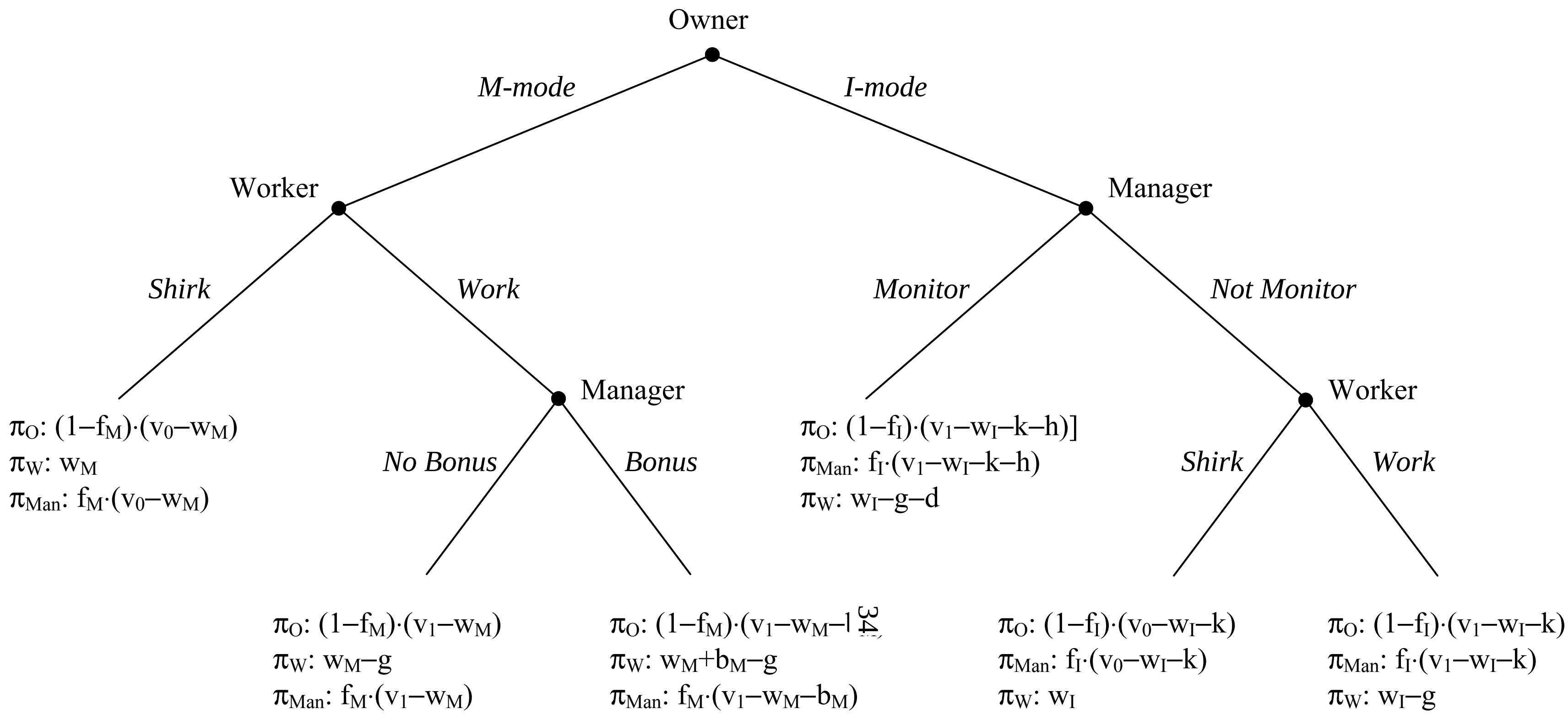
An alternative way to motivate the worker is to promise him a bonus whenever he puts in high effort. Because effort itself is non-contractable, this bonus payment cannot be made part of a formal contract though. The incentive system thus relies on an *implicit* contract that the promise will be kept. This type of organizational design is labelled as the motivation mode, or M-mode in short. Here the worker receives a wage w_M and is promised a bonus b_M on top of that if he exerts high effort. The manager gets a fraction $f_M \in (0, 1)$ of firm profits. This performance pay gives a selfish manager an incentive to renege on the promised bonus payment.

Overall the game model of Figure A1 results. First the owner chooses the organizational mode. If the M-mode is chosen, the worker moves next by deciding whether to shirk or the work. Only if the worker works, the manager decides whether to pay the promised bonus or not. (Here the implicit assumption is that the manager never wants to reward shirking with a bonus.) In the I-mode the manager moves before the worker does. The manager either commits to monitor or not to do so. In the former case the worker is assumed to work, because the disutility of working falls short of the costs of getting caught shirking. If the manager does not monitor, the worker chooses between shirking or working. The players' payoffs then follow from the assumptions made above.

If players are selfish, the predicted outcome is easily determined by backwards induction. A selfish manager will not pay the bonus in the M-mode (given $f_M \cdot b_M > 0$). Anticipating this, a selfish worker

[26] These costs are equivalent to the investments in verification technology required under explicit contracts in the experiments of Fehr and Schmidt (2000) and Fehr et al. (2007).

Figure A1. The basic (reduced form) game



Legend:

π_i: monetary payoffs for player $i \in \{O, Man, W\}$;
v_1 (v_0) = value productivity if worker works (shirks);
g = worker's cost of effort;
k = costs of setting up monitoring technology;
h = firm's costs of inspection;
d = worker's disutility of being monitored;
w_M (w_I) = wage worker in M (I) mode;
b_M = size of bonus payment in M-mode;
f_M (f_I) = profit sharing fraction manager in M (I) mode.

will shirk under this organizational design. In the inspection mode a selfish worker will shirk if not monitored by the manager, therefore the manager will monitor him.[27] The outcome is that the worker does work under this mode, at the expense of the overall costs of the monitoring technology $(k+h+d)$. Given assumption $(A1)$, under selfish preferences the I-mode is more efficient than the M-mode is. Hence if the payoff parameters are such that the owner shares in these efficiency gains, she would choose the I-mode over the M-mode.[28] It would be more efficient, however, if the worker could be motivated to work in the M-mode, as this would save the overall costs of the monitoring technology.

Of course, in a fully fledged model the compensation parameters w_M, w_I, b_M, f_M and f_I would be endogenous. Here we just make the following simplifying assumptions. First, mainly for practical reasons we focus on the case in which $f_M = f_I = \frac{1}{2}$.[29] The share fraction is thus the same for the two organizational modes, such that the owner does not simply prefer one mode over the other because she can pay the manager less. Second, with respect to the wage and bonus payments w_M, w_I and b_M we assume that:

$$w_M = \frac{f_M \cdot v_0}{1+f_M};\; w_I = \frac{f_I \cdot (v_1 - k - h) + g + d}{1+f_I};\text{ and } b_M = \frac{f_M \cdot (v_1 - v_0) + g}{1+f_M}$$

The wage level w_M $(= v_0/3)$ ensures that all firm members earn the same when the worker chooses to shirk in the M-mode. Similarly so, w_I is set such that all firm members get the same when the manager monitors in the I-mode. Finally, b_M makes that all members earn the same when the manager pays the bonus in the M-mode after the worker decided to work. Effectively, payoff differences are minimized in the three most relevant outcomes and potential efficiency gains are shared equally.

Under these assumptions, the resulting payoffs in the two modes follow directly from the exogenous production technology parameters appearing in inequality $(A1)$. The payoffs appearing in Figure 1 then result from making the following choices:

$$v_0 = 840;\; v_1 = 1740;\; g = 90;\; k = 180;\; h = 260\,[100] \text{ and } d = 130\,[50]$$

where for h and d the first value refers to I_H and the second to I_L.

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[27] Note that $f_I \cdot (v_1 - w_I - k - h) > f_I \cdot (v_0 - w_I - k)$ follows from $(A1)$.

[28] In particular this requires $(1 - f_M) \cdot (v_0 - w_M) < (1 - f_I) \cdot (v_1 - w_I - k - h)$.

[29] A share fraction of one half is convenient in the experiment, because the owner's (i.e. player C's) earnings then simply correspond to those of the second mover (player B) in the M-mode and the first mover (player A) in the I-mode.

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