

# Backscratching in Hierarchical Organizations\*

Valeria Maggian<sup>†</sup>, Natalia Montinari<sup>‡</sup>, Antonio Nicolò<sup>§</sup>

## Abstract

We experimentally investigate the role of reciprocity in sustaining the emergence of implicit collusive agreements in hierarchical organizations. We show that when an agent hires, on behalf of the principal, one worker out of two candidates: i) low ability workers, being less entitled to be selected, are more likely to exert effort in a task that is exclusively beneficial to the agent; ii) as a consequence, agents distort the hiring process in favor of low ability workers and iii) sharing a small part of the organization's profits with the workers alleviates their effort distortion.

*JEL classification:* C91, J50, L14, M52

*Keywords:* Conflict of Interest, Effort Distortion, Profit sharing, and Reciprocity

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<sup>†</sup>Univ Lyon, CNRS, GATE UMR 5824, F-69130 Ecully, France. E-mail: maggian@gate.cnrs.fr

<sup>‡</sup>University of Bologna. E-mail: natalia.montinari2@unibo.it

<sup>§</sup>University of Padova and University of Manchester. E-mail: antonio.nicolo@unipd.it

# 1 Introduction

The possibility that managers and bureaucrats buy the cooperation and the loyalty of their subordinates at the expense of the organization characterizes many hierarchical organizations (Edwards, 1979). Employees who are promoted or hired based on their loyalty towards their supervisors, and not on their merit, are more likely to invest their time and attention to maintaining good relations with their boss, rather than improving their job performance (Pearce et al., 2000). Tirole (1986) highlights how, in a three-tier principal-supervisor-agent model, collusion between the supervisor and the agent can be sustained by a norm of reciprocity. Laffont (1988, 1990) generalizes the notion of moral hazard to include hidden gaming, defined as the *“ability that some players may have to design and play games with other members of the hierarchy by which they benefit from others while they are not observable by the principal”* (Laffont, 1990, p.302).

In this paper, we provide the first experimental evidence that reciprocity sustains hidden gaming in hierarchical organizations. First, we show the emergence of backscratching between members at the lowest and at the intermediate level of a three-tier organization, at the expense of the principal. Agents, who select workers for a job on behalf of the principal, are more likely to hire candidates with lower ability. These candidates feel less entitled for the position and thus they are more prone to devote their effort in favor of the agent who selected them. Second, we design a compensation scheme which, without increasing the cost of the principal, limits the detrimental effect of backscratching reciprocity.

In our experiment, we render a three-tier organization formed by one principal, one agent, and one worker. The worker has to be chosen from a pool of two candidates who differ in their ability.<sup>1</sup> The principal, in contrast to the agent, is not able to distinguish the candidates' ability and, therefore, delegates the hiring decision to the latter. Once employed, the worker receives a fixed wage and chooses a level of non-verifiable effort that can be exerted both in project  $X$ , which is beneficial for the principal and the agent, and in activity  $Y$ , that provides a private benefit solely to the agent. The joint payoff of the principal and the agent is maximized when all the effort of the worker is devoted to project  $X$ ; however, the agent's payoff is maximized when the worker's effort is exerted in activity  $Y$ . Candidates differ in their abilities: for each level of effort exerted in project  $X$  the high ability candidate is more productive than the low ability one. When exerting effort in activity  $Y$ , the two candidates are equally productive. While it is public information

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<sup>1</sup>In what follows, we use the female pronoun for the agent and the male pronoun for the principal and for the workers.

that candidates have different abilities, only the agent is able to distinguish among them and this is precisely the reason why she is hired by the principal. Our aim is to capture a situation where the agent can exploit her position in order to induce subordinates to do certain activities that go beyond their formal job descriptions but give to her a personal benefit.<sup>2</sup>

In the *Baseline* treatment, the principal privately gives instructions to the agent about which candidate to hire: either the high or the low ability one. The agent selects one candidate and the hired worker chooses how much effort to exert in project  $X$  and in activity  $Y$ . The agent has to follow the principal's instructions and thus cannot take any decision. In the *Selection* treatment, the agent is not forced to follow the instructions received by the principal. Moreover, the agent has the opportunity to privately suggest to the hired worker a level of effort to exert both in  $X$  and  $Y$ . Communication renders the agent's intentions clear: the agent's decision to select one of the two candidates may be aimed either at increasing the profit of the organization as a whole or at getting personal benefits from the employment relationship. Compared to the *Baseline* treatment, we observe a significant increase in the number of low ability candidates hired in the *Selection* treatment. Moreover, we provide evidence that such a hiring distortion is due to the fact that low ability workers exert more effort in activity  $Y$  and less effort in project  $X$  than the high ability ones. Agents do strategically exploit the reciprocal concerns of low ability workers who feel less entitled to get the job and thus are more grateful to the agent for being selected.

We then examine whether distributing a small fraction of the profits to the workers is effective in limiting the emergence of backscratching reciprocity. The *Baseline-Profit sharing* and *Selection-Profit sharing* treatments replicate the design implemented in the corresponding *Baseline* and *Selection* treatments with the single difference that the worker receives a small fraction of the value generated in project  $X$ . In the *Selection-Profit sharing* treatment we find that distributing a small share of the value of project  $X$  to the workers is effective in reducing the low ability workers' effort distortion in favor of agents

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<sup>2</sup>Some concrete examples of this behavior are provided by The Conflict of Interest Board (COIB), New York. In the case No. 2010-035 (2010) COIB v. Fischetti the Senior Deputy Director for Infrastructure Technology in the Information Technology Division at the New York City Housing Authority (NYCHA) was fined for his multiple violations of the City's conflicts of interest law. In particular, "he used his NYCHA subordinate, a Data Technician, to perform work on a regular basis at the restaurant without compensation. He further admitted that he caused his subordinate to use his NYCHA computer, e-mail account, and Blackberry to perform work related to the restaurant, at times the subordinate was required to be working for the City." For further evidence look at the COIB webpage at <http://www.nyc.gov/html/conflicts/html/topic/position.shtml>

with respect to the *Selection* treatment. Moreover, when comparing the *Baseline-Profit sharing* to the *Baseline* treatment we find that workers, irrespectively from their ability, exert significantly higher effort in project  $X$ . Given that the share of the value of project  $X$  distributed to the worker is very small, we suggest that such a result is not simply driven by the monetary motive associated with the profit sharing payoff structure. It seems rather due to a positive effect on the worker's attitude toward the firm: even the presence of a tiny link between payment and effort is shown to be relevant in shaping the way workers perceive the organization.

## 2 Related Literature

There is a vast experimental literature on gift exchange games, initiated by Fehr et al. (1993) and followed by many applications both in the lab (Fehr et al., 1997, 1998a,b, Fehr and Falk, 1999, Charness, 2004, Eriksson and Villeval, 2012) and in the field (Gneezy and List, 2006, Bellemare and Shearer, 2009, Hennig-Schmidt et al., 2010, Kube et al., 2013). In the field, the effectiveness of gift exchange seems to depend on the details of the environment and, in particular, it could be enhanced when targeted toward reciprocal employees (Englmaier and Leider, 2012). These studies all focus on two-tier settings and test the positive effect of reciprocity in limiting opportunistic behaviors of workers. The novelty of our approach consists in testing the gift exchange hypothesis in three-tier organizations. By mean of an experiment we show that reciprocity may damage hierarchical organizations, when their members use it as an enforcement device to acquire personal illegitimate benefits.

A second branch of literature related to our paper refers to the distortions in the hiring process due to favouritism within organizations. Several studies have pointed out that organizations' performance is usually negatively affected when candidates' evaluation is not based on their ability (Levine et al., 2010, Kramarz and Thesmar, 2013). This can happen when candidates are hired or promoted on the basis of subjective rather than objective criteria.<sup>3</sup>Managers may indeed favor workers according to their social connections (Bandiera et al., 2009) and personal preferences when objective evaluations of workers' performance are not available (Prendergast and Topel, 1993), or may favor those who engage in ingratulatory behavior regardless of their objective ability (Robin et al., 2014). With respect to

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<sup>3</sup>An exception is provided by the field experiment with children by Belot and Van de Ven (2011).

these studies, we look to an additional motivation of the distortion of the hiring process: the attempt to induce reciprocal behavior in less entitled workers by favoring them in the selection, in the hope of receiving future benefits.<sup>4</sup> The dark side of reciprocity has already been analyzed by scholars in other disciplines. Studies in Social Psychology underline how recipients of (unsolicited) gifts feel indebted toward the gift givers and are more likely to “return the favour”, once requested. These studies show how individuals can trigger reciprocity in order to gain an unfair advantage (Cialdini, 1996). In Organizational Science backscratching is identified as (vertical) cronyism and indicates a favoritism of the superior toward subordinates (as for example the assignment of promotion, bonus, pay rise, or better job) based on criteria different than merit in exchange for the latter’s personal loyalty (Khatri and Tsang, 2003). Reciprocity has also been shown to be a key feature in sustaining corruption agreements, which cannot be enforced by third parties (Abbink et al., 2002, Abbink, 2004, Barr and Serra, 2009).<sup>5</sup> We are not aware of any experimental study looking at the emergence of implicit collusion sustained by reciprocity in hierarchical organizations. In a recent study, Malmendier and Klaus (2017) analyze the emergence of a dark side of reciprocity in a different context, a client-producer relationship. They find that when a decision maker has to buy a product on behalf of a client, and two producers compete to sell the product, the possibility of one producer sending a small gift to the decision maker increases the probability that the recipient chooses the gift-giver’s product, even if favoring the gift-giver will damage the client. Compared to Malmendier and Klaus (2017), there are two main differences in our design. First, in our experiment workers hired by agents can reciprocate towards them without damaging their principal, and therefore there is not necessarily a tension between reciprocating a gift and fulfilling a duty. Second, our design allows us to investigate the role of subjective entitlement within organizations. Following Schlicht (1998, p. 24), we define entitlements as “*subjectively perceived rights that go along with a motivational disposition to defend them*”. In our setting, the low ability candidate is less entitled to be selected for the job compared to the high ability one. The relevance of subjective entitlement has been displayed by recent papers showing that gifts offered by employers to workers who belong to relatively disadvantaged groups and/or to the lower part of the performance distribution are likely to elicit more gratitude

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<sup>4</sup>Another reason for managers to promote low quality workers is found in the fact that incompetent managers would feel threatened by competent subordinates, and inevitably drive away competent employees (Bedeian and Armenakism, 1998). In line with this reasoning, Prendergast (1993) notes that “yes men” tend to be concentrated among less able workers and among workers with less able managers.

<sup>5</sup>Gneezy et al. (2013) have provided experimental evidence that greed, rather than reciprocity, may explain the emergence of corruption.

(Baron, 2013, Montinari et al., 2016). Our findings are in line with Kolm (2006) evidencing how the beneficiaries of (unsolicited) gift tend to feel “morally indebted” toward the gift giver. Moreover, our contribution highlights the crucial role of subjective entitlement in activating this feeling.

A third branch of literature related to our work analyzes how to reduce the negative effects of internal collusion. Bac (1996) studies how hierarchical structures affect the level of corruption in an organization; Thiele (2013) suggests decreasing the incentives for employees while increasing managers’ compensations. Chang and Lai (2002) investigate the impact of social norms on supervisors’ corrupt behavior showing that, when in the presence of corruption, paying supervisors more than workers limits workers’ slack. We show that reward systems do not only provide monetary incentives but also affect workers’ attitudes towards the corporate culture, ultimately affecting their productivity. Using a profit sharing compensation scheme to increase the organizational performance, via positive changes in employees’ attitude, has already been suggested (Osterman, 1994, Knez and Simester, 2001, Coyle-Shapiro et al., 2002, Heywood et al., 2005) and is a well-known phenomenon in the economics literature (Kerr and Slocum, 1987).

### 3 The Model

The model analyzes a three-tier organization, formed by a Principal (P), an Agent (A), and a worker. The worker is selected from a pool of two candidates, a Low ability worker (L worker) and a High ability worker (H worker).

The principal needs a worker to carry out a project but, being unable to distinguish between the ability of the two candidates, he hires an informed agent and pays her a fixed compensation to select one of the two candidates. Once selected, the worker receives a fixed compensation and chooses how much effort  $x \geq 0$  to exert in the project valuable to the principal and how much effort  $y \geq 0$  in a different activity that benefits the agent, with the overall effort resulting from the sum of the two effort components:  $e = x + y$ . The (monetary) cost of effort  $c(e)$  is a differentiable, strictly increasing and convex function in the overall amount of effort  $e$  exerted by the worker, with  $c(0) = 0$ .

The principal’s monetary payoff is equal to  $\pi_P = (x + \phi_t)$ , where  $\phi_t$  is the ability of worker  $t \in \{H, L\}$ , with  $\phi_H > \phi_L \geq 0$ . The (hired) worker’s monetary payoff is equal to  $\pi_t = m_W - c(e)$ , where  $m_W > 0$  is the compensation paid to the worker which does not depend on his ability. The unemployed candidate receives a monetary payoff equal to zero.

The agent's monetary payoff is equal to  $\pi_A = m_A + y$ , with  $m_A > 0$ . We assume that  $m_A > m_W$  which implies that if a worker with ability  $t \in \{H, L\}$  exerts a total amount of effort equal to zero, then  $\pi_A > \pi_H = \pi_L > \pi_P$ .

We assume that individuals may exhibit other regarding preferences and therefore their utility may not coincide with their monetary payoff.<sup>6</sup> Specifically, the utility function of individual  $i \in \{P, A, H, L\}$  who belongs to the organization, is given by:

$$U_i = \pi_i + I \left( \sum_{j \neq i} (\theta_i \rho_{i,j} \gamma \pi_j - (1 - \theta_i) (\alpha \max \{(\pi_j - \pi_i), 0\} + \beta \max \{(\pi_i - \pi_j), 0\})) \right);$$

$I \in \{0, 1\}$ , is an index function that takes value zero if individual  $i$  is selfish and one if individual  $i$  exhibits other regarding preferences (ORP). Individual  $i$ 's ORP towards individual  $j \neq i$ , are a linear combination of two components, a reciprocity component and an inequity aversion component;  $\theta_i$  is the relative weight of the reciprocity component and  $1 - \theta_i$  of the inequity aversion. The reciprocal attitude towards individual  $j$  is described by the parameter  $\rho_{i,j}$  that takes value one if individual  $j$  has been kind with individual  $i$  and zero otherwise, and the parameter  $\gamma \in (0, 1)$ , the weight of individual  $j$ 's monetary payoff in agent  $i$ 's utility, which is assumed to be the same for every R-ORP individual. Inequity aversion is modelled according to the standard Fehr and Schmidt model (Fehr and Schmidt, 1999) with  $\beta \leq \alpha$ , and  $0 \leq \beta < 1$ . Individuals who exhibit ORP are heterogeneous with respect to the weight assigned to the reciprocity component. For sake of simplicity, we assume that  $\theta_i \in \{0, 1\}$ ; we then classify individuals with respect to their preferences in: selfish (SP), inequity averse (I-ORP) and reciprocity concerned (R-ORP). We assume that workers' preferences are not correlated with their ability and that every player is SP, I-ORP and R-ORP, respectively, with positive probability.

We consider two different games. In both games the principal plays an action  $s^P \in \{H, L\}$  that we interpret as the suggestion given to the agent on which worker to hire. In the *baseline* game the suggestion is binding, the agent is therefore a fictitious player who has no actions to play, and the hired worker  $t \in \{H, L\}$  chooses how much efforts  $x$  and  $y$  to exert. In the *selection* game the suggestion is not binding, the agent chooses which worker  $t \in \{H, L\}$  to hire, and the hired worker chooses the pair  $(x, y)$  of efforts to exert.

Players' reciprocity depend on their beliefs about the other players' actions. R-ORP worker  $i \in \{H, L\}$  shows reciprocity concerns towards either the principal or the agent,

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<sup>6</sup>We take as reference the model by Charness and Rabin (2002).

depending on his beliefs  $\hat{s}_i^P$  about which type of worker the principal has suggested to hire. Specifically, we assume that  $\rho_{i,P} = \hat{s}_i^P$ . Similarly, an R-ORP worker believes that the agent was kind with him if he was hired against the principal's suggestion, that is  $\rho_{i,A} = 1 - \hat{s}_i^P$ . An R-ORP agent does not feel any reciprocity towards the principal, while she is grateful to the type of worker who will provide her with the largest monetary payoff. Finally, principal's reciprocity towards the worker depends on his beliefs about the amount of effort  $\hat{x}_t$  that a worker of ability  $t \in \{H, L\}$  will exert. We assume that  $\rho_{P,H} = 1$  if  $\hat{x}_H > \hat{x}_L$  and zero otherwise, and  $\rho_{P,L} = 1$  if  $\hat{x}_L > \hat{x}_H$  and zero otherwise, that is the principal believes that a worker of ability  $t$  is kind with him if he exerts strictly more effort than the other worker  $\tau \in \{H, L\}$ , with  $\tau \neq t$ .<sup>7</sup>

We solve both games by backward induction.

Consider first the baseline game. Starting from the last stage, selfish workers exert zero effort both in  $x$  and  $y$ . Whatever worker  $i \in \{H, L\}$  is hired,  $\rho_{i,P} = 1$ , since the principal's suggestion is binding. Given that, by design, the principal is the player with lowest monetary payoff (at least when  $x = y = 0$ ), in equilibrium both I-ORP and R-ORP workers exert a positive amount of effort  $x$  and zero effort in  $y$ , and the amount of effort exerted by  $H$  and  $L$  workers, on average, is the same. Principals, irrespective of their preferences, hire  $H$  workers because they exert the same effort than  $L$  workers but they have higher ability. The following proposition summarizes these findings.

**Proposition 1.** *In the baseline game, selfish workers exert zero effort in  $x$  and  $y$ . Workers with ORP exert a positive amount of effort  $x$  and zero effort  $y$ . On average, workers of different abilities exert the same amount of efforts. Principals hire  $H$  workers.*

**Proof** See the Appendix.

Let  $x_t^{BSL}$  ( $x_t^{SEL}$ ) and  $y_t^{BSL}$  ( $y_t^{SEL}$ ) denote the average effort exerted in equilibrium of the baseline (selection) game by a worker of ability  $t \in \{H, L\}$ . From Proposition 1 we derive the following theoretical prediction about workers' behavior:

**Prediction 1.** *In the baseline game, on average,  $H$  and  $L$  workers behave similarly, exerting a positive level of effort in  $x$  and zero in  $y$ :  $x_H^{BSL} = x_L^{BSL} > 0$ ,  $y_H^{BSL} = y_L^{BSL} = 0$ .*

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<sup>7</sup>Principal's reciprocity towards the agent is not relevant because the principal cannot affect the agent's payoff. Nonetheless, it is natural to assume that the principal is grateful to the agent who hires the worker who exerts the highest effort  $x$ .



Consider now the selection game. This game shows a multiplicity of equilibria depending on the principal's suggestion. We focus on the equilibrium in which principals suggest to hire  $H$  workers, as in the baseline game, also because it is the unique equilibrium that exists for any possible probability distribution over workers' preferences (in fact, it is easy to check that this is the only equilibrium if all workers are selfish). Starting from the last stage, selfish workers exert zero effort. Consider R-ORP workers. In equilibrium beliefs are correct so  $\rho_{H,P} = 1$  and  $\rho_{H,A} = 0$ , while  $\rho_{L,P} = 0$  and  $\rho_{L,A} = 1$ . Therefore,  $H$  workers with R-ORP exert effort  $x$  while  $L$  workers with R-ORP exert effort  $y$ . Consider now I-ORP workers. Since the worker has always a lower monetary payoff than the agent (even when  $x = y = 0$ ) and the principal has a lower monetary payoff than workers if they choose  $x = y = 0$ , it follows that in equilibrium I-ORP workers, irrespective of their type  $t \in \{H, L\}$ , exert zero effort  $y$  and a positive amount of effort  $x$ .

The following proposition summarizes these findings.

**Proposition 2.** *There exists an equilibrium of the selection game in which principals suggest to hire  $H$  workers. In this equilibrium, selfish workers exert zero effort. Inequity-averse workers exert a positive amount of effort  $x$  and zero effort  $y$ , irrespective of their ability. Reciprocity-concerned workers of ability  $H$  exert positive effort  $x$  and zero  $y$ , while Reciprocity-concerned workers of ability  $L$  exert zero effort  $x$  and a positive effort  $y$ . Selfish and Reciprocity-concerned agents hire  $L$  workers, while Inequity-averse agents hire  $H$  workers if  $\alpha \geq \frac{c'(\gamma)^{-1}}{c'(\frac{\beta}{1-\beta})^{-1} + c'(\gamma)^{-1}}$ , and  $L$  workers otherwise.*

**Proof** See the Appendix.

From Proposition 2 we derive the following theoretical prediction about workers' behavior:

**Prediction 2.** *In the selection game, on average,  $H$  workers behave as  $H$  (and also  $L$  workers) in the baseline game, exerting a positive level of effort in  $x$  and zero in  $y$ :  $x_H^{BSL} = x_H^{SEL} = x_L^{BSL} > 0$ ,  $y_H^{BSL} = y_L^{BSL} = y_H^{SEL} = 0$ ;  $L$  workers exert on average a lower level of effort  $x$  and a higher level of effort  $y$  than  $H$  workers:  $y_L^{SEL} > 0$  and  $x_L^{SEL} < x_L^{BSL}$ .*

Finally the last theoretical prediction refers to the hiring of workers.

**Prediction 3** *The fraction of low ability workers hired in the selection game is larger*

than the fraction of low ability workers hired in the baseline game.

Up to now we have assumed, as is customary in economics, that preferences are exogenously determined by nature. According to our model, agents with ORP preferences are either inequity averse or reciprocal. However, which component of the ORP preferences, reciprocity or inequity aversion, turns out to be more prominent for an individual could also be influenced by the environment. To investigate, in an anonymous laboratory setting, whether the features of the working environment affect which one of these two potentially conflicting preferences prevails, we consider a modification of the workers' payment. In particular, we introduce a tiny profit sharing compensation scheme that assigns an additional small fraction of the principal's profits to the worker. Let  $\eta_w$  denote the fraction of the principal's profits distributed to the worker. To avoid the monetary incentives could directly influence the worker's effort  $x$ , we assume that  $\eta_w < c'(0)$ . Nevertheless, we conjecture that other regarding preferences could be influenced by the type of contract offered to the worker. Namely, a profit sharing contract could render the principal's payoff salient to the workers, and therefore could induce all workers with ORP preference to be inequity averse. As a consequence, any differences between the two games, baseline and selection, should disappear when a profit sharing contract is offered to workers.

**Conjecture 1** *If a profit sharing contract renders the principal's payoff salient to the workers, then Reciprocity-concerned workers of ability  $H$  and  $L$  exert positive effort  $x$  and zero  $y$  both in the (profit sharing) baseline and selection games. In particular, workers with ability  $L$  should behave the same in the baseline and in the selection game in the presence of a profit sharing contract.*

Before concluding this section it is worth emphasizing that our simple model predicts that every worker never simultaneously exerts both efforts,  $x$  and  $y$ . It is easy to generalize the model to admit that some workers could choose to exert positive effort  $x$  and  $y$ . Suppose that  $\theta$  has a continuous probability distribution with support  $[0, 1]$  and  $U_i = \pi_i + I \left( \sum_{j \neq i} \theta_i \rho_{i,j} \gamma \pi_j + (1 - \theta_i) \beta (|\pi_j - \pi_i|)^\alpha \right)$ , with  $0 < \gamma \leq 1$ ,  $\beta < 1$ , and  $\alpha > 1$  (to avoid both components to be linear). It is easy to check that in the baseline game all ORP workers exert positive effort  $x$  and zero  $y$ , because both reciprocity and inequity aversion are addressed towards the principal's payoff. In the selection game (focusing on the equilibrium in which principals suggest to hire  $H$  workers)  $H$  workers, irrespective of

their  $\theta$ , still exert zero effort  $y$  and positive  $x$ , while a  $L$  worker  $i$  with  $\theta_i \in (0, 1)$  will exert a positive amount of effort  $x$ , due to his inequity concern towards the principal, but also a positive amount of effort  $y$ , to reciprocate the agent's kindness. Still, the qualitative results of the simple version of the model with  $\theta \in \{0, 1\}$  remain unchanged, and, importantly, the above Predictions still hold.

## 4 Experimental Design and Parameters

In our experiment we implement a between subjects analysis in a 2x2 design, where we vary either the payoff structure of the game and whether the principal or the agent is making the hiring decision, mirroring the games discussed in the theoretical model, with few differences.

In the lab we render an organization composed by a Principal (P), an Agent (A), and a worker, either of Low ability ( $L$  worker) or High ability ( $H$  worker). The principal hires an informed agent and pays her to select one of the two candidates. The principal gives instructions to the agent about which type of worker  $t \in \{H, L\}$  to hire, either  $H$  or  $L$  worker, and the agent selects the worker. The selected worker receives a fixed compensation by the principal and chooses how much effort to exert in project  $X$  and in activity  $Y$ . After the worker's decision, payoffs are determined and the game ends. The non-selected candidate receives an unemployment benefit. In the Baseline treatment (BSL) participants play the game just described and the principal gives binding instructions to the agent about which worker to hire: either L or H worker. In the Selection treatment (SEL) players' payoffs are the same as in the BSL treatment, but the agent i) chooses whether to hire worker L or worker H, since principal's suggestion is not binding anymore; ii) may suggest to the hired worker a desired effort level to exert in  $X$  and  $Y$ .

The Baseline Profit sharing ( $BSL^{PS}$ ) and Selection Profit sharing ( $SEL^{PS}$ ) treatments are identical to the  $BSL$  and  $SEL$  treatments respectively, with the only exception that we introduce a tiny profit sharing compensation for the workers.

Panel A of Table 1 summarizes the values assigned to the parameters in each treatment, with 10 ECUs =1 Euro implemented as exchange rate.

In the experiment, we choose ability  $\phi_H = 0.5 > \phi_L = 0$ ;<sup>8</sup> the levels of effort exerted in  $X$  and  $Y$  are integer numbers between  $\{1, 2, \dots, 10\}$  and  $\{0, 1, \dots, 5\}$  respectively, and their

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<sup>8</sup>Fixing a small difference between  $\phi_H$  and  $\phi_L$  provides a more robust test for our hypotheses: everything equals, we would expect a bigger difference in ability to produce a stronger backscratching in the SEL treatment.

sum has to be greater than one and less than or equal to ten. Effort in project  $X$  generates an output  $X = (x + \phi_t)\sigma$  which is affected by a random variable, denoted by  $\sigma$ , uniformly distributed on the interval  $[0.8, 1.2]$  with mean equal to one. The random variable together with the small difference in ability makes it harder for the principal to infer the ability of the worker hired by the agent, since he only receives information about the value produced in  $X$ , which is a noisy signal of both the worker's effort and ability. Effort in activity  $Y$  generates an output  $Y = \delta y$ , with  $\delta = 0.4$ , so that the workers' ability does not affect their performance in activity  $Y$ .

Panel B of Table 1 reports the worker i' s payoff function:  $\pi_i = m_W - c(e)$ .  $m_W$  is the fixed compensation that he receives from the principal when being hired, irrespective from his type  $t \in \{H, L\}$  and  $c(e)$  is the cost of the total effort exerted by the hired worker (i.e.  $e = x + y$ ), which is taken from Fehr et al. (1998b), with the cost of the minimum level of enforceable effort (i.e.  $x = 1$  in project  $X$ ) being equal to 0. The cost of exerting effort,  $c(e)$ , is an increasing function of the overall effort and does not depend on whether it is exerted in  $X$  and/or in  $Y$ . If not hired, the worker receives a fixed unemployment benefit of 10 ECUs. In the  $BSL^{PS}$  and  $SEL^{PS}$  treatments a tiny profit sharing compensation scheme for the worker,  $\eta_W = 0.075$ , is introduced.

Panel C of Table 1 reports the monetary payoffs for the agent and the principal. The agent's monetary payoff is increasing both in the effort exerted by the hired worker in project  $X$  and in activity  $Y$ :  $\pi_A = \eta_A X + \delta y + m_A$ , where  $m_A$  is a fixed compensation paid by the principal. The fraction of the output  $X$  assigned to the agent depends on the treatment: while in the BSL and SEL treatments  $\eta_A = 0.15$ , in the  $BSL^{PS}$  and  $SEL^{PS}$  treatments it is reduced to  $\eta_A = 0.075$ , in order not to change the cost of the incentive schemes for the principal. Selfish and R-ORP agents, who believe that all workers are payoff maximizers, should choose to select H workers if  $\eta_A$  is positive. Most importantly, the agent gets the entire amount of the output produced by the worker's effort in activity  $Y = \delta y$  and, since  $\delta > \eta_A \geq 0$ , the agent's monetary payoff is higher when a given level of effort is exerted in activity  $Y$  rather than in project  $X$ . This creates a potential conflict between the principal's interests (who only benefits from effort in project  $X$ ) and the agent's ones. The agent has also the option to ex-ante refuse the value produced in activity  $Y$ , thus devoting it to the organization following the rules adopted to distribute the value produced in  $X$ . Note that agents motivated by inequality aversion (I-ORP) might prefer to choose L workers if they believe that, due to the "entitlement effect", L workers will exert more effort than H workers. The agent's possibility to send a suggestion and to

Panel A: Experimental Parameters

| Parameter   | Value                     | Treatment                             |
|-------------|---------------------------|---------------------------------------|
| $x$         | $\in \{1, 2, \dots, 10\}$ | All                                   |
| $y$         | $\in \{0, 1, \dots, 5\}$  | All                                   |
| $x + y$     | $\in \{1, 2, \dots, 10\}$ | All                                   |
| $\sigma$    | $\sim u[0.8, 1.2]$        | All                                   |
| $\phi_H$    | 0.5                       | All                                   |
| $\phi_L$    | 0                         | All                                   |
| $\delta$    | 0.4                       | All                                   |
| $m_A = m_W$ | 50                        | All                                   |
| $B$         | 100                       | All                                   |
| $\eta_P$    | 0.85                      | All                                   |
| $\eta^A$    | 0.15                      | BSL, SEL                              |
|             | 0.075                     | BSL <sup>PS</sup> , SEL <sup>PS</sup> |
| $\eta^W$    | 0                         | BSL, SEL                              |
|             | 0.075                     | BSL <sup>PS</sup> , SEL <sup>PS</sup> |

Panel B: Cost of total effort exerted in  $X$  and  $Y$  and Material Payoffs of the Worker

|           |                  | effort in $x + y$ |    |    |    |    |    |    |    |    |    |
|-----------|------------------|-------------------|----|----|----|----|----|----|----|----|----|
| Treatment |                  | 1                 | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
| All       | $c(x + y)$       | 0                 | 1  | 2  | 4  | 6  | 8  | 10 | 12 | 15 | 18 |
| All       | $m_W - c(x + y)$ | 50                | 49 | 48 | 46 | 44 | 42 | 40 | 38 | 35 | 32 |

|           |                                       | effort in $x + y$          |     |     |     |     |     |     |     |     |     |     |
|-----------|---------------------------------------|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Treatment |                                       | 1                          | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |
| H Worker  | BSL <sup>PS</sup> , SEL <sup>PS</sup> | $\eta_A(x + \phi_H)\sigma$ | 1.1 | 1.9 | 2.6 | 3.4 | 4.1 | 4.9 | 5.6 | 6.4 | 7.1 | 7.9 |
| L Worker  | BSL <sup>PS</sup> , SEL <sup>PS</sup> | $\eta_A(x + \phi_L)\sigma$ | 0.8 | 1.5 | 2.3 | 3.0 | 3.8 | 4.5 | 5.3 | 6.0 | 6.8 | 7.5 |

Panel C: Material Payoffs of the Principal and the Agent depending on the effort choices of the hired worker.

|           |                                       | effort in $x + y$          |      |      |      |      |      |      |      |      |      |      |
|-----------|---------------------------------------|----------------------------|------|------|------|------|------|------|------|------|------|------|
| Treatment |                                       | 1                          | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   |      |
| Principal | All                                   | $\eta_P(x + \phi_H)\sigma$ | 12.8 | 21.3 | 29.8 | 38.3 | 46.8 | 55.3 | 63.8 | 72.3 | 80.8 | 89.3 |
|           | All                                   | $\eta_P(x + \phi_L)\sigma$ | 8.5  | 17.0 | 25.5 | 34.0 | 42.5 | 51.0 | 59.5 | 68.0 | 76.5 | 85.0 |
| Agent     | All                                   | $m_A$                      | 50   | 50   | 50   | 50   | 50   | 50   | 50   | 50   | 50   | 50   |
|           | BSL, SEL                              | $\eta_A(x + \phi_H)\sigma$ | 2.3  | 3.8  | 5.3  | 6.8  | 8.3  | 9.8  | 11.3 | 12.8 | 14.3 | 15.8 |
|           | BSL, SEL                              | $\eta_A(x + \phi_L)\sigma$ | 1.5  | 3.0  | 4.5  | 6.0  | 7.5  | 9.0  | 10.5 | 12.0 | 13.5 | 15.0 |
|           | BSL <sup>PS</sup> , SEL <sup>PS</sup> | $\eta_A(x + \phi_H)\sigma$ | 1.1  | 1.9  | 2.6  | 3.4  | 4.1  | 4.9  | 5.6  | 6.4  | 7.1  | 7.9  |
|           | BSL <sup>PS</sup> , SEL <sup>PS</sup> | $\eta_A(x + \phi_L)\sigma$ | 0.8  | 1.5  | 2.3  | 3.0  | 3.8  | 4.5  | 5.3  | 6.0  | 6.8  | 7.5  |

|           |     | effort in $y$ |   |     |     |      |      |      |
|-----------|-----|---------------|---|-----|-----|------|------|------|
| Treatment |     | 0             | 1 | 2   | 3   | 4    | 5    |      |
| Agent     | All | $\delta y$    | 0 | 4.3 | 8.5 | 12.8 | 17.0 | 21.3 |

**Note.** In Panels B and C the values are obtained considering a realization of  $\sigma = E(\sigma) = 1$ . Panels B and C report 7.5% (15%) of the output, that is, the value produced in project X.

Table 1. Experimental Parameters, Cost Function and Material Payoff Functions

refuse the value produced in  $Y$ , are the two features of our experimental design that allow us to understand the agent’s motivation in selecting a worker of ability  $t \in \{H, L\}$ .

The principal’s payoff function is:  $\pi_P = \eta_P X + B - m_A - m_W$ , where  $\eta_P \leq 1$  is the fraction of  $X$  kept by the principal, with  $\eta_A + \eta_P = 1$ ;  $B$  is a monetary endowment while  $m_A$  and  $m_W$  are the fixed compensations paid to the worker and the agent, respectively.

The experiment consists of two parts. In the first part, subjects participate in one of the treatments described above, playing the game as one shot. In the second part, they play the same game for 15 periods, maintaining the same role as in part 1 but under a stranger random matching protocol (see the experimental protocol in the Online Appendix B). In part 2 feedbacks is provided to every participant at the end of each of the 15 periods. The principal receives information regarding the value produced in  $X$  while the agent is informed about the effort exerted in both  $X$  and  $Y$  in their organization. Finally, all participants are informed about: i) how many  $H$  and  $L$  workers have been hired in other organizations within the previous period of the session and ii) the average effort exerted in  $X$  and  $Y$  by  $H$  and  $L$  workers in other organizations.

Previous research has suggested (Keizer et al., 2008, Gino et al., 2009, Diekmann et al., 2015) that others’ norms violation affects individual choices: we thus expect that when a “collusive” norm begins to spread among players, i.e., the proportion of agents choosing  $L$  worker and/or the proportion of workers exerting effort in  $Y$  increases, then the propensity for subjects to pursue their personal interest at the expense of the organization increases, generating a snowball effect (Chang and Lai, 2002).

#### 4.1 *Experimental Procedures*

The experiment was programmed using zTree (Fischbacher, 2007). In all treatments, participants were undergraduate students from the Friedrich Schiller University in Jena, recruited via the ORSEE software (Greiner, 2004).<sup>9</sup> We conducted 21 sessions of the BSL, SEL and  $SEL^{PS}$  treatments at the experimental laboratory of the Max Planck Institute of Economics (Jena, Germany), from November 2012 to February 2013. Respectively, 216, 212 and 216 subjects participated in the BSL, SEL and  $SEL^{PS}$  treatments. 140 subjects participated in the  $BSL^{PS}$  treatment, at the lab of the Friedrich Schiller University in

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<sup>9</sup>Each subject participated only in one experimental session. We excluded those who previously participated in experiments featuring a gift exchange game or trust game and also those who participated in the sessions where data for Montinari et al. (2016) were collected since their experimental design was similar to our own.

Jena in January 2017.<sup>10</sup> The experimental procedures, length and average earnings were the same in all treatments.<sup>11</sup> More details on the experimental procedures can be found in the Online Appendix B. The duration of each session was about 110 minutes and the average payment was 17 Euros, including a show up and participation fee of 4 Euros.

## 5 Experimental results

In this section we present our experimental findings. First, we analyze the hiring decisions (subsection 5.1). Then, we focus on the effort exerted by the workers in project  $X$  and in activity  $Y$  (subsections 5.2) and on the agents' intention (subsection 5.3). Throughout the analysis we will focus on the 15 periods of part 2, when information about others' behavior is spread among participants.<sup>12</sup> Given that spreading information may render participants' choices in part 2 dependent upon previous periods in the same session, we perform both i) two-sample Mann-Whitney tests and ii) Somers' D median difference tests (Newson, 2002), reporting in the main text only i) unless the two tests give different results.<sup>13</sup>

### 5.1 Hiring

Our first result shows how the hiring decisions vary across treatments.

**Result 1.** *The proportion of  $L$  workers hired is higher in the  $SEL$  and  $SEL^{PS}$  treatments than in the  $BSL$  treatment. When hiring  $L$  workers, the majority of agents do not comply with the instructions received by the principals.*

Support for Result 1 can be found in Figure 1, which reports the proportion of principals

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<sup>10</sup>We thank an anonymous referee for suggesting us to run this additional treatment.

<sup>11</sup>The experimental laboratories of the Max Planck Institute of Economics and of the Friedrich Schiller University in Jena share the same recruiting system and, therefore, the same subject pool. Subjects' invitations for the  $BSL^{PS}$  treatment were sent to exactly the same subject pool used in the other treatments, also maintaining the same criteria for the eligibility.

<sup>12</sup>Result from Part 1 are qualitatively identical to those of Part 2 and they are reported in the Online Appendix A, section 6. Since 5/54, 8/53, 9/34 and 10/54  $L$  workers are hired in the  $BSL$ ,  $SEL$ ,  $BSL^{PS}$  and  $SEL^{PS}$  treatments, respectively, the analysis on effort has very little statistical power and would not lead to any additional benefit to the reader.

<sup>13</sup>When performing the Mann-Whitney test we average the data within a session and treat each session as a single observation. While conservative, this approach makes the power of all tests low and not robust to outliers. To account for these limitations we use the rank order statistics Somers' D (provided by the 'somersd' package in Stata) that looks at the individuals' choices accounting for the presence of clusters at the level of sessions in the data.

giving instruction to hire  $L$  worker and the proportion of agents hiring  $L$  worker in part 2. In the BSL treatment 28.30% of the principals hire  $L$  workers while this percentage increases to 47.04% when the agents are making the hiring decision in the SEL treatment. The decision to hire  $L$  workers in the BSL treatment may be motivated by the expectation that, feeling less entitled for the position, they will be more grateful than  $H$  workers and therefore will exert a higher effort in project  $X$ ; as a consequence, the productivity loss due to the difference in ability will be overcompensated, as shown by Montinari et al. (2016).<sup>14</sup> It is important to note that in the SEL treatment, in the majority of the cases,  $L$  workers are hired against the principal’s suggestion. Specifically, this happens in 58.56% ( $N = 219/374$ ) of the cases.

In the  $BSL^{PS}$  treatment principals increase the proportion of  $L$  workers hired compared to the BSL treatment (MW test:  $z=1.91$ ,  $p=0.06$ ):<sup>15</sup> the profit sharing compensation scheme appears to render more salient for them the possibility that an “entitlement” effect could induce  $L$  workers to feel more grateful for being hired.

Comparing the SEL and  $SEL^{PS}$  treatments, when agents are making the hiring decision, we find that the tendency to hire more  $L$  workers than the ones suggested by the principal is basically unchanged (WSR tests:  $L$  suggested vs  $L$  hired, SEL  $z = 1.86$ ,  $p = 0.06$ ,  $SEL^{PS}$   $z = 2.29$ ,  $p = 0.02$ ). As already noted for the SEL treatment, also in the  $SEL^{PS}$  treatment if we focus on those agents who hired  $L$  workers, we find that the majority of them did not follow the principal’s suggestion (59.95%,  $N = 220/367$ ). We interpret these results as a distortion in the hiring process, which is not surprising if we consider that in the  $SEL^{PS}$  treatment the agents only get  $\eta_A = 0.075$  of the value produced in project  $X$ , i.e. 50% less than what they got in the SEL treatment, and therefore they have less incentive to hire  $H$  workers.

When focusing on the individual hiring decisions, we find that in the BSL and  $BSL^{PS}$  treatments, on average, 52.27% of the principals decides to hire a  $L$  worker between 0 to 4 times while only 25.23% of the agents do so in the SEL and  $SEL^{PS}$  treatments; on average 42.99% of agents hires  $L$  workers 8 or more times. This suggests that the reported differences between treatments are not driven by the behavior of a minority of agents. The dynamics of the hiring decision reveals that in the SEL and  $SEL^{PS}$  treatments the distortion in hiring emerges from the first period and persists until the last one: the

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<sup>14</sup>In Montinari et al. (2016) about 30% of employers hire low ability workers.

<sup>15</sup>All statistical tests reported are two samples and two-sided unless differently specified. When we have clear, explicit and theory-driven predictions about agents’ and workers’ behavior in the different treatments we used one-sided tests.





Figure 1: Proportion of  $L$  workers suggested by the principals and hired by the agents across treatments

proportion of  $L$  workers hired increases across periods starting from an average of 41.12% in periods 1 – 5; increasing to 47.48% in periods 6 – 10 and reaching 49.91% in the last five periods.<sup>16</sup>

## 5.2 Workers' effort

In the following we concentrate on the effort exerted by the hired workers. Results 2-4 state our main findings, statistical support is provided afterwards.

**Result 2.** *In the BSL and  $BSL^{PS}$  treatment the average level of effort exerted in project  $X$  and in activity  $Y$  is the same for  $H$  and  $L$  workers.*

Result 2 shows that, on average, workers' reciprocity does not vary depending on the worker's ability: in the BSL and  $BSL^{PS}$  treatments  $H$  and  $L$  workers behave similarly (MW tests  $H$  vs  $L$  workers: BSL, for  $x$ :  $z = 0.06$ ,  $p = 0.95$ ; for  $y$ :  $z = 0.45$ ,  $p = 0.65$ .  $BSL^{SEL}$  for  $x$ :  $z = 0.75$ ,  $p = 0.45$ ; for  $y$ :  $z = 0.57$ ,  $p = 0.56$ ). Workers exert an average effort in project  $X$  equals to 2.68 and 3.71 in the BSL and  $BSL^{PS}$  treatments respectively, which are significantly higher than the minimum level of effort of 1 (Wilcoxon signed-rank

<sup>16</sup>See the Online Appendix A.1.2 for additional analyses on the dynamics of part 2.

test, BSL:  $z = 2.37$ ,  $p = 0.02$ ;  $BSL^{PS}$ :  $z = 7.67$ ,  $p = 0.00$  WSR test, henceforth).<sup>17</sup>

In activity  $Y$  both workers exert an effort significantly higher than zero and equals to 0.89 and 0.71 in BSL and  $BSL^{PS}$  treatments, respectively, (WSR test, BSL:  $z = 2.37$ ,  $p = 0.02$ ;  $BSL^{PS}$ :  $z = 7.67$ ,  $p = 0.00$ ).<sup>18</sup>

**Result 3.** *In the SEL treatment workers exert greater effort in activity  $Y$  and less effort in project  $X$  compared to the BSL treatment. This difference is driven by the behavior of  $L$  workers, who on average increase their effort in activity  $Y$  and reduce their effort in project  $X$ .*

When comparing the BSL treatment to the SEL treatment, in line with our theoretical predictions,  $L$  workers reciprocate the agents' hiring choice. In the SEL treatment workers exert more effort in activity  $Y$  and reduce their effort in project  $X$ . In particular,  $L$  workers reduce their effort in  $X$  of about 17% passing from an average of 2.67 to 2.21 and increase their effort in  $Y$  of about 81% passing from an average of 0.95 to 1.72 (MW one-sided tests: BSL vs SEL, for  $x$ :  $z = 1.34$ ,  $p = 0.09$ ; for  $y$ :  $z = 2.75$ ,  $p = 0.00$ ). Note that, according to our model, a positive amount of effort in  $Y$  identifies the behavior of R-ORP workers; I-ORP workers indeed would never exert effort in  $Y$  since it advantages the agent, who is the member of the organization with highest monetary payoff.<sup>19</sup>  $H$  workers, instead, do not significantly modify their behavior: they exert an average effort of 2.33 in project  $X$  and of 0.99 in activity  $Y$  (MW test BSL vs SEL, for  $x$ :  $z = 0.96$ ,  $p = 0.34$ ; for  $y$ :  $z = 0.32$ ,  $p = 0.75$ ).

**Result 4.** *Profit sharing is effective in limiting backscratching by  $L$  workers: differences in the effort exerted in activity  $Y$  are not significant when comparing the  $BSL^{PS}$  and  $SEL^{PS}$  treatments.*

The profit sharing compensation scheme has quite a strong effect on the effort exerted in project  $X$ , despite workers only getting a small fraction  $\eta_W = 0.075$  of the value

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<sup>17</sup>In both BSL and  $BSL^{PS}$  treatments,  $H$  workers exert less effort than  $L$  workers in project  $X$  (2.54 vs. 2.67, in the BSL and 3.46 vs. 3.98 in the  $BSL^{PS}$ ), but this difference fails to reach significance.

<sup>18</sup>We fixed a minimum effort for project  $X$  equal to 1 and this may have created an anchoring effect, inducing some workers to exert a positive effort in  $Y$  too.

<sup>19</sup>A worker aimed at equalizing payoffs of all members of the organization should exert  $x_t = 5$  and  $y_t = 0$ . In our data, a One-Sample WSR test rejects the null hypothesis that the average effort exerted by the hired worker in project  $X$  is equal to five in each treatment,  $p < 0.02$  in all cases.

generated in  $X$ . We find that, overall, workers increase their effort in  $X$  of about 40% in the  $BSL^{PS}$  treatment compared to the  $BSL$  treatment, and of about 26% in the  $SEL^{PS}$  treatment compared to the  $SEL$  treatment. This increase is significant when considering  $L$  and  $H$  workers separately, according to a set of MW tests, one-sided:  $BSL^{PS}$  vs  $BSL$ ,  $x_H, z = 2.17, p = 0.03$ ;  $x_L, z = 1.53, p = 0.06$ .  $SEL^{PS}$  vs  $SEL$ ,  $y_H, z = 1.45, p = 0.07$ ;  $y_L, z = 2.11, p = 0.02$ . Moreover, we observe that the profit sharing induces a reduction of the effort exerted in  $Y$ . When comparing the  $SEL^{PS}$  and  $SEL$  treatments, we find that both  $H$  and  $L$  workers significantly reduce their effort in  $Y$  (MW tests, one-sided:  $y_H, z = 1.60, p = 0.06$ ;  $y_L, z = 2.75, p = 0.01$ ).

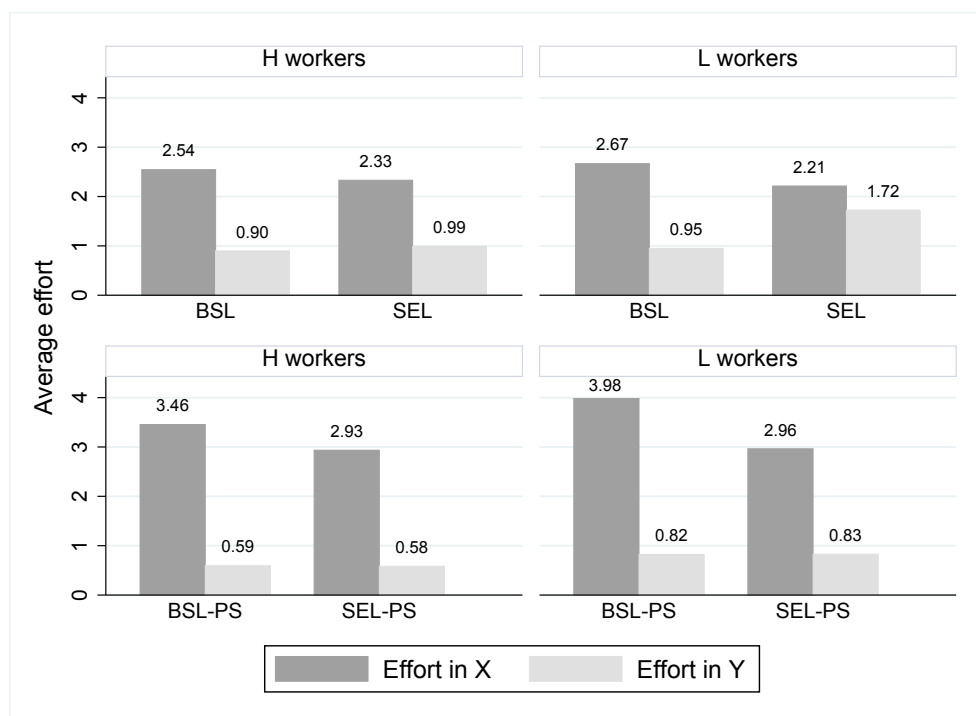


Figure 2: Average effort exerted in project  $X$  and activity  $Y$  in each treatment depending on workers' ability.

Further support for Results 2-4 can be found in Tables 2 and 3 and in Figure 2. Figure 2 plots, separately for  $H$  and  $L$  workers, the average effort exerted in  $X$  and  $Y$  in each treatment.

Consider now Table 2: it compares the total effort ( $e = x + y$ ) exerted by the hired workers across the four treatments. The average total effort exerted by the hired workers (irrespective of their ability) is equal to 3.53 and 3.63 in the  $BSL$  and  $SEL$  treatments and

to 4.43 and 3.65 in the  $BSL^{PS}$  and  $SEL^{PS}$  treatments, respectively. Pairwise comparisons across treatments are not statistically significant except for the BSL and  $BSL^{PS}$  treatments ( $z = 1.79$ ,  $p = 0.07$ ). Our results show that, overall, the treatments affect how workers allocate their effort between project  $X$  and activity  $Y$ , but not the total effort exerted per se. In the SEL treatment, therefore, we interpret the effort exerted in activity  $Y$  as an effort distortion while in the  $BSL^{PS}$  and  $SEL^{PS}$  treatments the profit sharing payment scheme acts by shifting effort from activity  $Y$  to project  $X$ .

|             | MW test       |               |                          |                          |
|-------------|---------------|---------------|--------------------------|--------------------------|
|             | BSL           | SEL           | BSL vs SEL               | BSL vs $BSL^{PS}$        |
| $H$ workers | 3.44<br>(.51) | 3.32<br>(.96) | $z = 0.06$<br>$p = 0.95$ | $z = 0.90$<br>$p = 0.37$ |
| $L$ workers | 3.62<br>(.89) | 3.94<br>(.45) | $z = 0.70$<br>$p = 0.48$ | $z = 1.64$<br>$p = 0.10$ |

|             | MW test        |               |                          |                          |
|-------------|----------------|---------------|--------------------------|--------------------------|
|             | $BSL^{PS}$     | $SEL^{PS}$    | $BSL^{PS}$ vs $SEL^{PS}$ | SEL vs $SEL^{PS}$        |
| $H$ workers | 4.05<br>(1.07) | 3.52<br>(.80) | $z = 0.58$<br>$p = 0.56$ | $z = 0.06$<br>$p = 0.95$ |
| $L$ workers | 4.80<br>(1.73) | 3.79<br>(.87) | $z = 1.54$<br>$p = 0.12$ | $z = 0.96$<br>$p = 0.34$ |

Note: The tests are conducted considering each session as an independent observation, i.e. 7(9) sessions for BSL, SEL,  $SEL^{PS}$  ( $BSL^{PS}$ ).

Table2. Average total effort ( $x + y$ ) exerted by the workers, standard deviation in parentheses.

Additional analyses focusing on the frequency of individual effort choices reveal that the observed backscratching is not due to the behavior of a small minority of workers, but it is rather a widespread phenomena, see the Online Appendix A.2.1 for more details. The dynamics of the effort exertion in  $X$  and  $Y$  reveals that in the SEL backscratching emerges from the first period and persists until the last one, detailed results are reported in the online Appendix A.2.1.

Table 3 allows us to evaluate the impact of the profit sharing incentive scheme on the emergence of backscratching, by performing a difference in differences analysis that compares the difference in effort exertion in project  $X$  and in activity  $Y$  between the  $BSL$  and  $SEL$  treatments to the difference between the  $BSL^{PS}$  and  $SEL^{PS}$  treatments. The estimations reported are obtained by means of from a set of Zellner's seemingly unrelated regressions,

which simultaneously estimates two equations (where the dependent variables are the effort exerted by workers in  $X$  and  $Y$ , respectively) allowing for errors to be correlated. This estimation method allows us to account for the fact that workers simultaneously choose an effort level in  $X$  and  $Y$ . Standard errors are bootstrapped at the level of session.<sup>20</sup>

In all models we use as independent variables a set of dummies to identify the Selection treatments (i.e. *Selection* takes value 1 for the *SEL* and *SEL<sup>PS</sup>* treatments and 0 otherwise) and the profit sharing incentive scheme (i.e. *profit sharing* takes value 1 for the *BSL<sup>PS</sup>* and *SEL<sup>PS</sup>* treatments and 0 otherwise). The variable *L worker* takes value 1 if the worker has low ability and 0 otherwise while *hired in t-1* identifies whether the worker was hired in the previous period or not. Results of the Breusch-Pagan test of independence confirm that residuals from the two equations are not independent ( $p < 0.000$  in both cases), with a coefficient of correlation of the residuals of around 14%.

Consider models 1a and 1b: the coefficient associated to the variable *Selection* shows the difference between the BSL and SEL treatments, as the BSL treatment is the omitted category. In model 1a, the coefficient has a negative and significant effect, while it has a positive and significant effect in model 1b, confirming our previous findings: when passing from the BSL to the SEL treatment, we observe a reduction in the effort exerted in  $X$  and an increase in the effort exerted in  $Y$ , signalling the emergence of backscratching.

The coefficient associated to the variable *Profit sharing* represents the difference between the *BSL* and the *BSL<sup>PS</sup>* treatments, which is positive for the effort exerted in  $X$  and negative for the effort exerted in  $Y$ .

In models 2a and 2b, we introduce the interaction between the *Selection* and the *Profit sharing* treatments. The coefficient of the interaction term identifies the difference in differences, that is the difference in effort exertion between the BSL and SEL treatments vs the difference in effort exertion between the *BSL<sup>PS</sup>* and *SEL<sup>PS</sup>* treatments. We observe that this coefficient has a negative and significant effect on the effort exerted both in  $X$  and  $Y$ , while other effects remain unchanged.

Finally, in models 3a and 3b, we introduce the interaction terms between: i) the *Selection* treatment and *L* workers; ii) the *Profit sharing* treatment and *L* workers, and iii) the *Selection* treatment, the *Profit sharing* treatment and *L* workers. In model 3a, the coefficients of *Selection* and of the interaction between *Selection* and *Profit sharing* lose significance,

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<sup>20</sup>For the estimations, we used the “sureg” command in Stata. For the standard errors, we used the “bootstrap” command in Stata, which executes a nonparametric bootstrap of the statistics in the list of the explanatory variables by resampling observations (with replacement) from the data in memory 1000 times. Our results do not change if we cluster the standard errors at the subjects level.

| Model                                    | 1                                 |                    | 2                   |                    | 3                  |                   |
|--|-----------------------------------|--------------------|---------------------|--------------------|--------------------|-------------------|
|  | a                                 | b                  | a                   | b                  | a                  | b                 |
| Estimation Method                        | Seemingly Unrelated Regressions   |                    |                     |                    |                    |                   |
| Dependent variable                       | effort $x$                        | effort $y$         | effort $x$          | effort $y$         | effort $x$         | effort $y$        |
| Independent variables                    |                                   |                    |                     |                    |                    |                   |
| Selection                                | -.556***<br>(.076)                | .260***<br>(.045)  | -.366 ***<br>(.098) | .447***<br>(.063)  | -.107<br>(.118)    | .260***<br>(.077) |
| Profit sharing                           | .816***<br>(.074)                 | -.517***<br>(.045) | 1.056***<br>(.128)  | -.279***<br>(.065) | .803***<br>(.160)  | -.269**<br>(.082) |
| Selection x Profit sharing               | -                                 | -                  | -.425***<br>(.156)  | -.422***<br>(.090) | -.285<br>(.209)    | -.277**<br>(.109) |
| L Worker                                 | .251***<br>(.079)                 | .405***<br>(.046)  | .232***<br>(.081)   | .386***<br>(.048)  | .429***<br>(.162)  | .211**<br>(.100)  |
| Selection x L Worker                     | -                                 | -                  | -                   | -                  | -.604***<br>(.195) | .449***<br>(.140) |
| Profit sharing x L Worker                | -                                 | -                  | -                   | -                  | .510*<br>(.278)    | -.034<br>(.144)   |
| Selection x Profit sharing<br>x L Worker | -                                 | -                  | -                   | -                  | .290<br>(.337)     | -.353*<br>(.196)  |
| Hired in t-1                             | .036<br>(.081)                    | .038<br>(.049)     | .035<br>(.075)      | .037<br>(.047)     | .062<br>(.076)     | .025<br>(.049)    |
| Periods 6-10                             | -.263 ***<br>(.097)               | .065<br>(.055)     | -.262***<br>(.096)  | .066<br>(.057)     | -.264***<br>(.098) | .061<br>(.057)    |
| Periods 11-15                            | -.396***<br>(.094)                | -.141**<br>(.057)  | -.396***<br>(.096)  | -.141**<br>(.055)  | -.387***<br>(.100) | -.149**<br>(.054) |
| Constant                                 | 2.900***<br>(.109)                | .890***<br>(.064)  | 2.811***<br>(.108)  | .805***<br>(.068)  | 2.733***<br>(.118) | .871***<br>(.072) |
| N  | 2730                              | 2730               | 2730                | 2730               | 2730               | 2730              |
| Subjects                                 | 200                               | 200                | 200                 | 200                | 200                | 200               |
| Periods                                  | 2-15                              | 2-15               | 2-15                | 2-15               | 2-15               | 2-15              |
| Treatments                               | BSL, $BSL^{PS}$ , SEL, $SEL^{PS}$ |                    |                     |                    |                    |                   |
| R2                                       | 0.059***                          | 0.079***           | 0.062***            | 0.086***           | 0.071***           | 0.091***          |
| Breusch Pagan test                       | 14.788***                         |                    | 13.173***           |                    | 19.853***          |                   |

Note: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . In all models standard errors are bootstrapped at the level of 30 sessions. N identifies the number of participants who took at least one decision in the second part of the experiment. Over the 15 periods of play, both L and H workers have the chance to be selected in each period.

Table 3. The effect of profit sharing: Comparison of BSL -SEL vs  $BSL^{PS}$  - $SEL^{PS}$

the first interaction displays a negative and significant effect, while the second a positive and significant effect. No significant effect is found for the third triple interaction, meaning that there is no additional effect on the exertion of effort in project x that can be explained when considering the behavior of L workers. Other results remain unchanged with respect to model 2a.

When considering model 3b, we find that our main results from model 2b remain unchanged. In addition, the interaction between the *Selection* treatment and *L workers*, and the in-

teraction between the *Selection* treatment, the *Profit sharing* treatment and *L workers* display a negative and significant effect: when considering the exertion of effort in *Y*, we observe a difference in differences between the *BSL* vs *SEL* treatment and the *BSL<sup>PS</sup>* vs *SEL<sup>PS</sup>* treatment, plus an additional effect related to the behavior of *L* workers.

Our results based on the difference in differences analysis confirm that the profit sharing incentive is effective in limiting the emergence of backscratching by *L* workers (linear combination of coefficients:  $-.419$ ,  $p = 0.070$ ): despite the agents still hiring a high fraction of *L* workers in the attempt to engage in a backscratching relationship, the selected *L* workers significantly reduce their reciprocal response toward them, shifting their effort exertion from activity *Y* to project *X*. Most importantly, these results indicate that reward systems do not only provide monetary incentives but they may also affect workers' attitudes towards the organization: the small incentive provided to workers is not enough to change their behavior because of a merely pecuniary motive.

### 5.3 *The agents' intentions*

In this section we investigate the agents' intentions by looking i) at the effort suggestions to the hired worker and ii) at their decision to refuse the effort exerted in activity *Y*. Moreover, we report the results of a robustness treatment, identified as *control-Selection* (cSEL), aimed at testing the role of the agent's suggestion in shaping backscratching reciprocity. Result 5 summarizes our findings.

**Result 5.** *On average agents suggest exerting more effort in activity Y and less effort in project X to L workers compared to H workers. Agents who hire L workers following the instructions of the principal suggest on average higher effort in X compared to agents who hire L workers against the principal's instructions. Agents who select L workers are more likely to accept what was produced in Y in the SEL treatment than in the BSL treatment.*

Support for Result 5 can be found in Table 4 and 5. Table 4 reports, for the *SEL* and *SEL<sup>PS</sup>* treatments, the average effort suggested by the agents in project *X* and in activity *Y*, depending on the ability of the selected worker. It can be noted that in the different treatments agents try to engage in a backscratching relationship in different ways: in the *SEL* treatment they suggest to *L* workers to exert more effort in *Y* compared to *H* workers; in the *SEL<sup>PS</sup>* treatment they suggest to *L* workers to exert less effort in *X* compared to

*H* workers.

|                  | SEL                 |               | <i>SEL</i> <sup>PS</sup> |               | MW test                         |                          |
|------------------|---------------------|---------------|--------------------------|---------------|---------------------------------|--------------------------|
|                  | Effort Suggested in |               |                          |               | SEL vs <i>SEL</i> <sup>PS</sup> |                          |
|                  | <i>x</i>            | <i>y</i>      | <i>x</i>                 | <i>y</i>      | <i>x</i>                        | <i>y</i>                 |
| <i>H</i> workers | 4.07<br>(.71)       | 2.59<br>(.55) | 4.90<br>(.85)            | 2.62<br>(.84) | $z = 1.98$<br>$p = 0.02$        | $z = 0.45$<br>$p = 0.33$ |
| <i>L</i> workers | 3.43<br>(.88)       | 3.29<br>(.33) | 4.00<br>(1.02)           | 2.72<br>(.93) | $z = 1.09$<br>$p = 0.14$        | $z = 0.96$<br>$p = 0.17$ |
| MW test:         | $z = 1.21$          | $z = 2.24$    | $z = 1.73$               | $z = 0.32$    |                                 |                          |
| H vs L           | $p = 0.11$          | $p = 0.02$    | $p = 0.04$               | $p = 0.38$    |                                 |                          |

Note: The p-values reported refer to the one-sided tests. The tests are conducted considering each session as an independent observation, i.e. 7 sessions in each treatment.

Table 4. Effort suggested by the agents, standard deviation in parenthesis.

Table 5 reports the net effect (i.e. the linear combination) of the coefficients of a Zellner’s seemingly unrelated regression analysis focusing on the agents’ suggestions and on the principals’ instruction. The dependent variables are represented by the effort suggested in *X* and *Y*. We find that the effort suggested in *X* is significantly higher when a worker is hired following the principal’s instruction than when he is not, and this is true also when restricting the analysis to the agents who hire *L* workers.<sup>21</sup>

|  | Dependent Variable: Effort Suggested |                           |
|--|--------------------------------------|---------------------------|
|  | in project <i>X</i>                  | in activity <i>Y</i>      |
|  | Net effect of Coefficient            | Net effect of Coefficient |
| Workers hired following<br>P’s suggestion          | .26**<br>(.11)                       | -.08<br>(.08)             |
| <i>L</i> Workers hired following<br>P’s suggestion | .47 ***<br>(.17)                     | -.04<br>(.11)             |

Note: The complete estimation of the regression is reported in Models 3 and 4 of Table A.7 in Section A.3 of the Online Appendix A.

Table 5. Effort suggested by the agents depending on principal’s instructions (Std. Error in parenthesis).

When considering those agents who ex-ante decide not to accept the value eventually produced in *Y*, we do not find any significant difference in the percentage of *L* workers hired in the SEL and in the *SEL*<sup>PS</sup> treatments with respect to the BSL one (MW tests one-sided:  $z = 1.05$ ,  $p = 0.145$ , and  $z = 0.657$ ,  $p = 0.256$ , respectively). On the contrary,

<sup>21</sup>The whole regression and a more complete analysis of the determinants of the effort suggestion is provided in the Online Appendix A.3



when considering those agents who are willing to accept what produced in  $Y$ , we find that they are more likely to select  $L$  workers in the SEL and in the  $SEL^{PS}$  treatments with respect to the BSL one (MW tests one-sided:  $z = 2.00$ ,  $p = 0.023$ , respectively).

Our results thus show that both the effort suggestion to workers and the possibility to ex-ante refuse the value produced in  $Y$  are important features of our design in making the agents' intentions clear: agents who select  $L$  workers act in this way to maximize their own monetary payoff.

However, compared to the BSL treatment, in the SEL treatment two features of the experimental design changed: 1) the possibility for the agent not to follow the principal's suggestion and 2) the possibility to suggest to the hired worker a desired effort level. In our robustness treatment cSEL we replicated the SEL treatment with the only exception that the agent cannot make any suggestion to the hired worker about how much effort to exert in  $X$  and  $Y$ . When considering both the agents' hiring behavior and the workers' effort exertion, in the cSEL treatment we do find a similar pattern of behavior with respect to the SEL treatment, even if the effects have a lower magnitude. Compared to the BSL treatment,  $L$  workers increase their effort in activity  $Y$  while reducing their effort in project  $X$ . This allows us to exclude that backscratching is merely explained by the agents' suggestion; nonetheless, the possibility of communication magnifies it, by making agents' intentions more salient to the  $L$  workers. See the Online Appendix A.4 for a detailed analysis.

#### 5.4 Conflicts of interest and earnings

In this section we focus on how the distortions on workers' effort and agents' selection affect the monetary payoffs of each member of the organization and the total earnings achieved by the organization. Our main findings are summarized in result 6. In the Online Appendix A.5 we provide further analysis.

**Result 6.** *A profit sharing compensation scheme increases the earnings of the principals in both the  $BSL^{PS}$  and the  $SEL^{PS}$  treatments compared to the BSL and SEL treatments, respectively. It decreases the earnings of the agents in the  $SEL^{PS}$  compared to the SEL treatment, displaying its effectiveness in limiting backscratching.*

*As regards the total earnings, the maximum amount is reached in the  $BSL^{PS}$  treatment, while the minimum amount is obtained in the SEL treatment.*

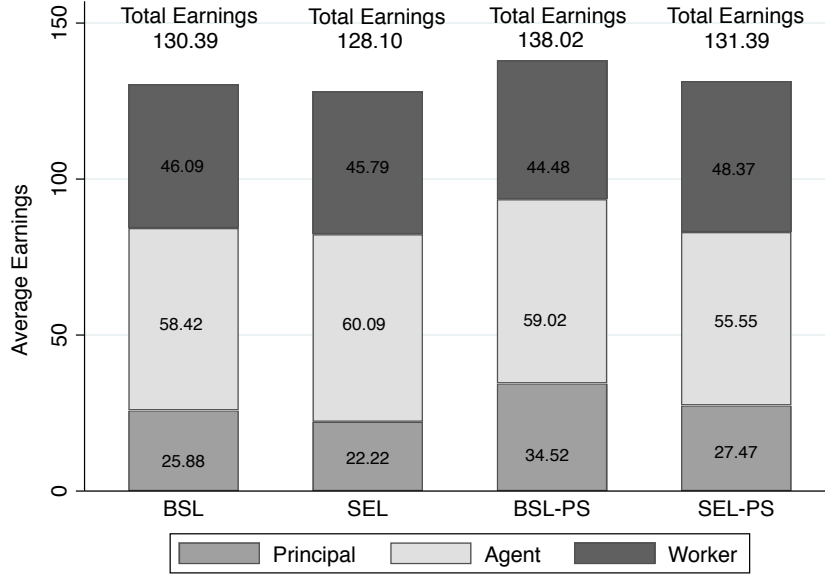


Figure 3: Average earnings of the Principal, Agent and Worker in each treatment.

Support for Result 6 is provided in Figure 3. With respect to the *BSL* treatment, the distortions in the hiring process and in the effort exertion in the *SEL* treatment result in a significant increase of the agent’s earnings and a reduction of the principal’s earnings (MW tests *BSL* vs *SEL*, one-sided: principal,  $z=1.98$ ,  $p=0.03$ ; agent,  $z=2.24$ ,  $p=0.02$ ). When comparing the *SEL* and the *SEL<sup>PS</sup>* treatments we observe that, once the profit sharing is introduced, the principal’s earnings increase while the earnings of the agents decrease (MW test *SEL* vs *SEL<sup>PS</sup>*: principal,  $z=1.98$ ,  $p=0.03$ ; agent  $z=3.13$ ,  $p=0.00$ ). In particular, in the *SEL* treatment, hiring a *L* worker rather than a *H* worker is beneficial for the agents, providing them with higher earnings, while this is not the case in the *SEL<sup>PS</sup>* treatment (MW test one-sided *H* vs *L*: *SEL*  $z = 1.60$ ,  $p = 0.06$ ; *SEL<sup>PS</sup>*  $z = 0.45$ ,  $p = 0.33$ ). The opposite effect is observed when considering the principal’s earnings (MW test one-sided *H* vs *L*: *SEL*  $z = 1.47$ ,  $p = 0.07$ ; *SEL<sup>PS</sup>*  $z = 1.09$ ,  $p = 0.14$ ).

When considering the total earnings of the organization, obtained as the sum of the monetary payoff of all its members, they decrease by about 2% in the *SEL* treatment with respect to the *BSL* treatment. In the *SEL<sup>PS</sup>* treatment total earnings increase since the profit sharing affects *L* workers’ behavior: they substantially increase their effort in *X* and reduce their effort in *Y*, compared to the *SEL* treatment. In the *BSL<sup>PS</sup>* treatment, all workers exert more effort than in the *BSL* treatment in project *X*, which is beneficial for the

organization: the largest amount of total earning is obtained in absence of backscratching reciprocity.

Note that, in our design, exerting effort in activity  $Y$  would increase total earnings compared to not exerting any effort at all. However, this does not seem to occur in our experiment where, as shown in Table 2, the treatment manipulations affected the effort allocation between  $X$  and  $Y$  rather than the total effort exerted.

To get an idea of the distortion associated to backscratching, we can calculate the hypothetical earnings across all parties, i.e. the total earnings obtained if the all the effort would have been exerted in  $X$ . The hypothetical earnings would have been equal to 135.48 and 136.26 in the  $BSL$  and  $SEL$  treatments and to 144.96 and 137.95 in the  $BSL^{PS}$  and  $SEL^{PS}$  treatments, respectively. By comparing the hypothetical and actual earnings across all parties we can get a measure of the loss in the total earnings of the organization, which is equal to 5.1, 8.17, 6.93 and 6.56 ECU's in the  $BSL$ ,  $SEL$ ,  $BSL^{PS}$  and  $SEL^{PS}$  treatment, respectively. It can be noted how the losses in the total earnings are the highest in the absence of profit sharing and, in particular, in the  $SEL$  treatment, providing additional evidence of the distortion induced by backscratching.

## 6 Conclusion

In this paper we provide evidence that workers' reciprocity concerns may exacerbate, rather than alleviate, conflicts of interest within a hierarchical organization. We find that agents are more likely to hire low ability workers than high ability ones, since they are more likely to exert effort in an activity benefiting the agent rather than the principal. The organizational performance is negatively affected by the emergence of hidden gaming, because of the hiring and effort distortions observed in our main treatment. We show that a tiny profit sharing compensation scheme, which may foster workers' identification with the organization, is effective in reducing workers' inefficient effort exertion in favor of their foremen. This result is in line with the social psychology literature (Haslam, 2004) and more recent studies in economics (Akerlof and Kranton, 2005, 2008) suggesting that workers' effort also depends on how they view themselves in relation to the organization. Interestingly, sharing part of the profits with the agents is not enough to modify their selfish behavior, while extending this compensation scheme to workers significantly reduces their distorted reciprocity towards agents: other-regarding preferences seem to be more susceptible than self-regarding ones to external stimuli induced by different institutional and organizational

frameworks.

In our experiment, workers' subjective entitlements are based on their different abilities: low ability workers, who do not expect to be hired, are more grateful toward their agents compared to the high ability ones. However, other individuals' observable characteristics could possibly be used to induce the emergence of backscratching reciprocity. For example, the decision to hire a candidate identifiable as a member of a discriminated group might be used to make him/her feel (more) indebted towards the agent. Alternatively, agents may favor members of their own social group expecting that the reduced social distance strengthens their reciprocity, as in Bramoullé and Goyal (2016). Compared to the gift exchange literature, we extend the hierarchical structure of the organization by adding an intermediate level: we focus our attention on how workers' reciprocity toward the agent affects the organization. However, in the present study, we do not allow the principals to act kindly toward the agent or toward the worker, leaving room for future research to study the effects of multiple and simultaneous exchanges of gifts among the different levels of the hierarchy.

## 7 Appendix

### Proof of Proposition 1

It is straightforward to note that selfish workers exert zero effort. Consider any RORP worker  $i$ . For both  $t \in \{H, L\}$ , worker  $i$  is grateful to the principal, then  $\rho_{i,P}^t = 1$  and  $\rho_{i,A}^t = 0$  and therefore  $y_i^* = 0$  and  $x_i^* = c'(\gamma)^{-1} > 0$ . Consider any IORP worker  $i$ . Since the principal has zero payoff when  $x = y = 0$ , and the agent has higher payoff than the worker for any pair  $(x, y)$ , then  $y_i^* = 0$  and  $x_i^* = c'(\frac{\beta}{1-\beta})^{-1}$ . Workers exert the same level of effort irrespective of their ability. By assumption  $\phi_H > \phi_L$ , hence principals, irrespective of their preferences, select workers with ability  $H$ .

### Proof of Proposition 2

Suppose that principals suggest to hire a  $H$  worker in equilibrium, and notice immediately that if any principal deviates and play  $\tilde{s}^P = L$ , the deviation is not observed by any worker and therefore has no consequence. Beliefs are correct in equilibrium and therefore  $H$  workers behave as in the baseline game: selfish  $H$  workers exert zero effort; RORP  $H$  worker  $i$  chooses  $y_i^* = 0$  and  $c'(\gamma)^{-1} = x_i^*$ ; a IORP  $H$  worker  $i$  chooses  $y_i^* = 0$  and  $x_i^* = c'(\frac{\beta}{1-\beta})^{-1}$ . Consider now any  $L$  worker  $i$ ; if he is selfish, then he exerts zero effort; if he has RORP then  $\rho_{i,A}^L = 1$  and therefore  $y_i^* = c'(\gamma)^{-1}$  and  $x_i^* = 0$ ; finally if he has IORP preferences then he chooses  $y_i^* = 0$  and  $x_i^* = c'(\frac{\beta}{1-\beta})^{-1}$ . Finally, selfish and RORP agents choose  $L$  workers, because only low ability workers exert effort with positive probability; IORP agents choose to hire  $L$  workers only if

$$c'(\gamma)^{-1} - \alpha(m_A + c'(\gamma)^{-1}) \leq -\alpha(m_A - c'(\frac{\beta}{1-\beta})^{-1}),$$

that is

$$\alpha \geq \frac{c'(\gamma)^{-1}}{c'(\frac{\beta}{1-\beta})^{-1} + c'(\gamma)^{-1}}.$$

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