
DEPARTMENT OF ECONOMICS,
MANAGEMENT AND STATISTICS

UNIVERSITY OF MILAN – BICOCCA

DEMS WORKING PAPER SERIES

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No. 299 – April 2015

Dipartimento di Economia, Metodi Quantitativi e Strategie di Impresa
Università degli Studi di Milano - Bicocca
http://dems.unimib.it/

# Backscratching in Hierarchical Organizations*

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**Abstract**

In this paper we investigate the role of reciprocity in sustaining the emergence of implicit collusive agreements in hierarchical organizations. We conduct a laboratory experiment in which an agent hires, on behalf of the principal, one worker out of two candidates. The two candidates differ in their ability and, once employed, the worker chooses a level of non-contractible effort to exert in two tasks: one benefits the organization (that is both the principal and the agent) while the other one is less profitable, only benefits the agent and provides him with higher earnings. We provide evidence that: i) low ability workers are more likely to exert effort in the task that is exclusively beneficial to the agent; ii) as a consequence, agents distort the hiring process in favor of the 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

*Acknowledge: We acknowledge the Max Planck Institute of Economics and the University of Manchester for their financial support. We thank Maria Bigoni, David Hugh-Jones, Marco Piovesan, Pedro Rey-Biel, Marie Claire Villeval for useful comments. We are indebted with Oliver Kirchkamp for letting us use the Experimental laboratory of the Friedrich Schiller University in Jena. We also thank participants at the 3rd Annual Behavioral and Experimental Economics Workshop in Toulouse, the workshop on Understanding employee dishonesty behaviors in the workplace in Dijon, the 8th Alhambra Experimental Workshop in Rome, the 63rd Annual Meeting of the French Economic Association (AFSE) in Lyon, the 2014 ASSET meeting in Aix-en-Provence, the workshop on Industrial Organization: Theory, Empirics and Experiments in Alberobello, the workshop Norms Actions Games in London, the workshop Incentives and Unethical Behavior Conference in San Diego for useful comments.

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# 1 Introduction

In his book "Nomenklatura: The Soviet Ruling Class", Mikhail Voslensky offers a vivid picture of how backscratching was a common feature among members at different tiers of the Communist Party of the Soviet Union: *"Petrov, now used to power and therefore distinctly more stupid than he used to be, takes a liking to young Ivanov, who flatters him splendidly, and is always prepared to commit some action on his behalf at the merest hint"* (Voslensky, 1984, p.87).

The possibility that managers and bureaucrats buy the cooperation and the loyalty of their subordinates at the expense of the organization also characterizes many hierarchical organizations in modern capitalistic systems (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). Few theoretical studies have addressed the potential threat of reciprocal exchanges conducted at the expense of third parties in hierarchical organizations. 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, 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, we design an incentive scheme that leads the members at the lowest level of the hierarchy to identify themselves as insiders in the organization, finally limiting 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.[1] 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 an activity Y, that provides a private benefit solely to the agent (i.e., the entire value generated by this activity is assigned 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 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.

We implement a between subjects design and consider three treatments: *Baseline*, *Selection* and *Profit Sharing*. In all treatments, 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. In the *Baseline* treatment, the agent has to follow the principal's instructions and thus cannot take any decision (i.e. the set of available actions to the agent once the principal has moved is a singleton). In the *Selection* treatment, the agent is not forced to follow the instructions received by the principal. In the *Profit Sharing* treatment we replicate the design implemented in the *Selection* treatment with the single difference that the fraction of the value generated in project X that was previously assigned to the agent is now equally shared between the agent and the hired worker.

The comparison between the *Baseline* and *Selection* treatments allows us to investigate how the introduction of a powerful hierarchical level in the organization affects i) the probability of hiring low ability workers and ii) the amount of effort exerted by each worker in project X and in activity Y, depending on his ability. 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

[1] In what follows, we use the female pronoun for the agent and the male pronoun for the principal and for the workers.

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.

In the *Profit Sharing* treatment, distributing a small fraction of the profits to the workers is effective in reducing the low ability workers' effort distortion in favor of agents observed in the *Selection* treatment. Our result suggests that even the presence of a tiny link between payment and effort is relevant in shaping workers' attitudes towards the organizations.

The remainder of this paper is organized as follows. Section 2 sets our paper within the related literature. Section 3 presents a theoretical analysis of the games that subjects play in the experiment. Section 4 describes the design and procedures of the experiment. In Section 5, we present our experimental results. Section 6 contains a final discussion.

# 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, Hannan et al., 2002, Charness, 2004, Eriksson and Villeval, 2012, Maximiano et al., 2013) and in the field (Gneezy and List, 2006, Bellemare and Shearer, 2009, Hennig-Schmidt et al., 2010, Kube et al., 2013). 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 favoritism 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 when they are promoted, on the basis of subjective rather than objective reasons.[2] Managers may indeed favor workers according to their social

[2]An exception is provided by the field experiment with children by Belot and Van de Ven (2011), where the authors show that favoritism does not necessarily hurt efficiency: children who select a group member to do a task in favor of the team, tend to favor their friends, but those who are selected on the basis of friendship have better performance.

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 ingratiatory behavior regardless of their objective ability (Robin et al., 2014). With respect to 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.[3]

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 favor", 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).[4] 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 Schmidt (2012) 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 Schmidt (2012), 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

[3]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.

[4]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). In a recent paper Finan and Schechter (2012) show the negative effect of reciprocity in fostering electoral corruption. They provide evidence that vote buying can be sustained by an internalized norm of reciprocity and, therefore, politicians target reciprocal individuals.

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 (Baron, 2013, Montinari et al., 2014). 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). In particular, our evidence is in line with the results of Akerlof and Kranton (2000, 2005, 2008): profit sharing compensation schemes facilitate workers' identification with the organization, counter-acting the collusive behavior among workers and the agents who selected them.[5]

# 3 A simple model of reciprocity in hierarchical organizations

Consider an organization formed by a group of four players. We will refer to the members of the organization as Principal (P), Agent (A), Low ability worker ($L$ worker) and High ability worker ($H$ worker). The principal needs a worker to carry out a project, denoted by $X$, but being unable to distinguish between the ability of the two candidates, he hires an informed agent to select the worker. The principal gives instructions to the agent about

[5]While most of the experimental studies on this topic induced the group identity by implementing the minimal group paradigm designed by Tajfel and Turner (2004) where groups are created using trivial tasks (Chen and Li, 2009, Kranton et al., 2012), we induce group identity by the symbolic use of an incentive scheme.

which worker to hire, either $H$ or $L$, and the agent selects the worker. Once selected, the worker receives a fixed wage and chooses an effort level $e_X \geq 0$, in project $X$, which produces value for the organization (both for the agent and the principal), and an effort level $e_Y \geq 0$ in activity $Y$, which exclusively benefits the agent. $H$ and $L$ workers differ only with respect to their ability in executing project $X$, with worker $H$ being more productive than worker $L$ when exerting the same level of effort. Both $H$ and $L$ workers have the same productivity in performing activity $Y$. Effort cost is increasing in the total effort and does not depend on whether it is exerted in $X$ and/or $Y$. After the worker's decision, payoffs are determined and the game ends. The principal's utility function is

$$U^P = \alpha^P(\beta_t + e_X) + E - w - m,$$

where $\alpha^P \in (0,1)$ is the fraction of the value of $X$ that is assigned to the principal, $\beta_t$ is the ability parameter of worker $t \in \{H, L\}$, with $\beta_H > \beta_L \geq 0$; $E$ is a monetary endowment, $w$ and $m$ are the fixed part of the compensation paid to the worker and the agent, respectively. The agent's utility function is

$$U^A = m + \alpha^A(\beta_t + e_X) + \delta e_Y,$$

where $0 < \alpha^A \leq \alpha^P$ is the fraction of the value of project $X$ that is assigned to the agent and $\delta$ is the marginal utility from the effort $e_Y$ exerted in activity $Y$, with $\delta > \alpha^A$. By assumption, hence, the agent prefers that the worker exerts his effort in activity $Y$ rather than in project $X$. Let $s^P \in \{H, L\}$ denote the action chosen by the principal, that is the instructions given to the agent on which worker to hire. Let $\hat{s}_t^P \in [0,1]$ denote the beliefs of worker $t$ on the action played by the principal, that is the probability that worker $t \in \{H, L\}$ assigns to $s^P = t$, conditional on being hired. Let $e = e_X + e_Y$ denote the total amount of effort exerted by the worker. Worker $t \in \{H, L\}$ has utility function equal to

$$U^t = w + (1 - \alpha^P - \alpha^A)(\beta_t + e_X) - c(e) + \rho_t \hat{s}_t^P U^P + \rho_t(1 - \hat{s}_t^P)U^A,$$

where the cost of effort $c(e)$ is a differentiable function of $e$, with $c'(e) > 0$ and $c''(e) > 0$ for all $e \in \mathbb{R}_+$, and $\rho_t \in [0,1)$ is worker $t \in \{H, L\}$ reciprocity concern.[6]

We analyze three different games: Baseline, Selection and Profit Sharing game. In the

[6]Whether principal and agent could exhibit reciprocal concerns or not is irrelevant in our games; the principal cannot reciprocate any kind action played by the other players and has no opportunity to be kind to the agent. Workers are the only players whose reciprocal concerns may affect the principal's and agent's decisions.

Baseline game (BSL) the principal gives binding instructions to the agent on which worker to hire: either worker L or worker H. So, by design, the agent has actually no choice to make. In the Selection game (SEL) and in the Profit Sharing game (PS) the agent can choose any worker, irrespectively of the received instructions.

In the BSL game $\alpha^P + \alpha^A = 1$ and the principal gives binding instruction to the agent on which worker to hire. Therefore $\hat{s}_t = 1$ for both $t \in \{H, L\}$ because it is common knowledge that principal makes the selection. Easy computation shows that in equilibrium worker $t \in \{H, L\}$ once hired, chooses $(e^{BSL}_{X,t}, e^{BSL}_{Y,t})$ with $e^{BSL}_{Y,t} = 0$ and $c'(e^{BSL}_{X,t}) = \rho_t \alpha^P$ if $\rho_t > \frac{c'(0)}{\alpha^P}$, and $e^{BSL}_{X,t} = 0$, otherwise, for both $t \in \{H, L\}$. A reciprocity concerned worker $t \in \{H, L\}$ exerts an effort higher than the minimum level in project $X$, and no effort in activity $Y$. The principal selects worker $H$ if and only if $\beta_H - \beta_L > e^{BSL}_{X,L} - e^{BSL}_{X,H}$. Notice that if $\rho_H = \rho_L = \rho$, then $e^{BSL}_{X,H} = e^{BSL}_{X,L}$ and the principal hires the $H$ worker.

Consider now the SEL game. In the SEL game $\alpha^P + \alpha^A = 1$ and workers never observe (neither ex-post) principal's instructions, and there are multiple equilibria depending on which worker the principal suggests to hire. We focus on the equilibrium in which the principal gives the same instructions as in the BSL game. In equilibrium workers' beliefs on principal's instructions are correct and workers exhibit reciprocity concerns towards the agent when they expect to be hired by her against the instruction of the principal. Let $r \in \{H, L\}$ denote the type of worker that the principal suggests to hire in the equilibrium of the SEL game; then $\hat{s}^P_r = 1$ and $\hat{s}^P_t = 0$ for $t \neq r$. Worker $r$ chooses $(e^{SEL}_{X,r}, e^{SEL}_{Y,r})$ with $e^{SEL}_{X,r} = e^{BSL}_{X,r}$, and $e^{SEL}_{Y,r} = e^{BSL}_{Y,r} = 0$ , while worker $t \neq r$ chooses $(e^{SEL}_{X,t}, e^{SEL}_{Y,t})$ with $e^{SEL}_{X,t} = 0$ and $c'(e^{SEL}_{Y,t}) = \rho_t \delta$ if $\rho_t > \frac{c'(0)}{\delta}$ and $e^{SEL}_{Y,t} = 0$, otherwise. It follows that the agent selects worker $r$ if and only if $\alpha^A(\beta_r + e^{SEL}_{X,r}) \geq \delta e^{SEL}_{Y,L}$. Therefore in the SEL game the $r$ worker behaves as in the BSL game, while $t \neq r$ worker makes zero effort in activity $X$ and (if $\rho_t > \frac{c'(0)}{\delta}$) exerts a positive effort in activity $Y$. As argued above, if $\rho_H = \rho_L = \rho$, in the BSL the principal hires the $H$ worker; interestingly, in the SEL game the agent does not always follow the principal's suggestion: in fact, if $\beta_H < \frac{\delta e^{SEL}_{Y,L} - \alpha^A e^{SEL}_{X,H}}{\alpha^A}$, the agent maximizes her payoff by hiring the $L$ worker.

In the PS game the agent selects the worker as in the SEL game, but now the worker is offered a profit sharing contract[7] with $\alpha^W = \alpha^A < c'(0)$ and $\alpha^P = 1 - \alpha^A - \alpha^W$. Therefore, the level of profit sharing is small and should not significantly affect the workers' effort choice. However, we conjecture that a profit sharing compensation scheme, consistently

[7]The profits of the organization are defined as the value produced in project X, $(e_X + \beta_t)$, plus the monetary endowment, $E$, minus the fixed wage paid to the worker, $w$, and the fixed part of the agent's compensation, $m$. Note that in our simple setting revue sharing and profit sharing are the same.

with the idea of identity and work incentives modelled in Akerlof and Kranton (2005, 2008), makes salient the interests of the organization in the eyes of the worker. Thus, the following version of the workers' utility function introduces an additional term: worker $t$ with identity $\iota = \{G, O\}$ has utility

$$U^t = w + \alpha^W(\beta_t + e_X) - c(e) + \rho_t \hat{s}_t^P U^P + \rho_t(1 - \hat{s}_t^P)U^A - \phi_\iota \max\{(e_X^r - e_X), 0\}$$

where $\phi_\iota$ scales the utility loss of a worker with identity $\iota$ generated when deviating below a reference level $e_X^r$. We assume that $\phi_O = 0$, when the worker does not identify with the organization and considers himself as an outsider (as in the previous games), while $\phi_G > 0$, when a profit sharing compensation scheme including the worker makes him identify as insider in the organization. Workers with a work group identity feel guilty in exerting an effort lower than the reference level. How much group identification influences workers' efforts depends on parameters $\phi_G$ and $e_X^r$; nevertheless, definitely, in equilibrium worker $r$ (the worker hired by the principal in the BSL) chooses a pair $(e_{X,r}^{PS}, e_{Y,r}^{PS})$ with $e_{X,r}^{PS} \geq e_{X,r}^{BSL}$ and $e_{Y,r}^{PS} = e_{Y,r}^{BSL} = 0$ and worker $t \neq r$ chooses $e_{X,t}^{PS} \geq e_{X,t}^{SEL}$ and $e_{Y,t}^{PS} \leq e_{Y,t}^{SEL}$.

# 4 Experimental design and parameters

We conduct one treatment for each of the games previously described: *Baseline* (BSL), *Selection* (SEL) and *Profit Sharing* (PS) treatment. In each treatment, we match four randomly selected participants acting respectively as the principal, agent, L worker and H worker and it is made clear that the agent is hired to work in the interest of the principal. Once informed of the principal's instruction, in the SEL and PS treatments the agent is free not to follow it when selecting one of the two workers.

In all treatments, we give the agent 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). Moreover, in the SEL and PS treatments we give the agent the opportunity to privately suggest to the hired worker a level of effort to exert both in X and Y. These features of our experimental design allow us to understand the agent's motivation in selecting a worker of ability $t \in \{H, L\}$; the agent, in fact, can choose worker $t$ because she believes he will exert more effort in X than worker $r \neq t$, or because she expects more effort in Y by the selected worker. In the former case, an agent who cares about the organization should refuse to keep the value produced in activity Y, and suggest the hired worker to exert his effort in project X.

Therefore, there are two differences between the BSL treatment and the SEL and PS ones: in the latter treatments, the agent has the possibility i) not to follow the principal's instruction and ii) to suggest an effort level in project X and activity Y. In order to control for the role of the agents' suggestion on the workers' effort decision, we conducted a control treatment identical to the SEL one with the only exception that the agent cannot suggest any effort level to the worker. We will refer to this treatment as cSEL.

Table 1 summarizes the values assigned to the parameters in each treatment. We set $\alpha^P$ equal across the treatments, while we vary the way the remaining share of the value produced in X is allocated between the agent and the worker in the SEL (cSEL) and PS treatments.

| Parameter | Value |
|---|---|
| $e_X$ | $\in \{1, 2..., 10\}$ |
| $e_Y$ | $\in \{0, 1..., 5\}$ |
| $e_X + e_Y$ | $\in \{1, 2, ..., 10\}$ |
| $\sigma$ | $\sim u[0.8, 1.2]$ |
| $\beta_H$ | 0.5 |
| $\beta_L$ | 0 |
| $\delta$ | 0.4 |
| $w = m$ | 50 |
| $E$ | 100 |
| $\alpha^P$ | 0.85 |
| $\alpha^A$ | 0.15 BSL, SEL, cSEL<br>0.075 PS |
| $\alpha^W$ | 0 BSL, SEL, cSEL<br>0.075 PS |

Note: If not differently specified, the values are the same in the three treatments.

| Monetary Payoffs when worker $t \in \{H, L\}$ is hired. | |
|---|---|
| Principal | $E - m - w + \alpha^P(e_X + \beta_t)\sigma$ |
| Agent | $m + \alpha^A(e_X + \beta_t)\sigma + \delta e_Y$ |
| Worker t | $w + \alpha^W(e_X + \beta_t)\sigma - c(e_X + e_Y)$ |

Table 1: Experimental Parameters

In the experiment, the levels of effort exerted in X and Y are integer numbers between $\{1, 2..., 10\}$ and $\{0, 1, ..., 5\}$, respectively and their sum has to be greater than one and less than or equal to ten. The cost of the total effort exerted by the hired worker (i.e. $e_X + e_Y$) is reported in Table 2 and it is taken from Fehr et al. (1998b), with the cost of

the minimum level of enforceable effort (i.e. 1 in project X) being equal to 0. Note that, in the experiment, the value produced by the workers' effort in project X is affected by a random variable, denoted by $\sigma$, which is uniformly distributed on the interval $[0.8, 1.2]$. The random variable 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. For any given level of effort exerted the value produced in X is larger than the value produced in Y for all the realizations of the random variable $\sigma$ and for both types of workers. In the Appendix, Table 11 reports the monetary payoffs for each member of the organization.

In all treatments, the non-selected worker receives 10 ECUs as unemployment benefit. Given our parameters, the agent has the highest monetary payoff. As a consequence, a worker motivated by inequality aversion should not exert any effort in Y, since any effort exerted in Y would increase the inequality both between the worker and the agent and between the principal and the agent.

The experiment consisted of two parts. In the first part, participants play one of the games 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.[8]

| $e_X + e_Y$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| $c(e_X + e_Y)$ | 0 | 1 | 2 | 4 | 6 | 8 | 10 | 12 | 15 | 18 |

Table 2: Costs of total effort exerted in X and Y

Participants were informed that the experiment was composed of two parts, but they only received instructions on part two after completing part one.[9] In part 2 feedbacks are provided to every participant at the end of each of the 15 periods. The principal receives information regarding the value produced in X, the agent about the effort exerted in both X and Y. 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. Spreading this information regarding others'

[8]Since each session is played by 28/32 participants, the probability of meeting exactly the same group of players in two periods of the second part of the game is quite low; moreover, participants have no opportunity to communicate with each other and thus to recognize players they have already been matched with.

[9]Participants were informed that feedback about choices and payoffs from part 1 would be communicated at the end of the experiment.

behavior in the game is critical in explaining individual's behavior. Indeed, as previous research has suggested (Keizer et al., 2008, Gino et al., 2009, Diekmann et al., 2011), others' norms violation affects individual choices: we, thus, expect that when a "corruptive" 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 agents to pursue their personal interest at the expense of the organization increases, generating a snowball effect (Chang and Lai, 2002).

### *4.1 Procedures*

The experiment was programmed using zTree (Fischbacher, 2007). We conducted 21 sessions of the BSL, SEL and 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 PS treatments, with about 28/32 individuals taking part in each session. In January 2015 we conducted 9 sessions of the cSEL treatment at the experimental laboratory of the Friedrich Schiller University in Jena. Due to the limited number of seats available in the lab, 16 participants took part in each sessions.

| | Participants | Groups | Sessions |
|---|---|---|---|
| BSL | 216 | 54 | 7 |
| SEL | 212 | 53 | 7 |
| PS | 216 | 54 | 7 |
| cSEL | 140 | 39 | 9 |
| Total | 784 | 200 | 30 |

Table 3: Participants and Treatments

In all treatments, participants were undergraduate students from the Friedrich Schiller University in Jena, recruited via the ORSEE software (Greiner, 2004). Upon arrival at the laboratory, each participant was randomly assigned to one visually isolated computer terminal. It was common knowledge that the experiment was composed of two parts. First, each subject received written instructions for the first part of the game.[10] The instructions for the first part were read aloud and then individuals were asked to answer a set of control questions on the screen. Roles were then randomly assigned to subjects, who played the

[10]The English version of the experimental instruction (originally in German) is reproduced in the Online Appendix C.

first part of the game. After the completion of part one, instructions on the second part of the experiment were distributed and read aloud. At the end of each session, one period of part two was randomly selected for payment. The payoff of this period was added to the payoff of part one and then converted into Euros. 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 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). We analyze agents' intention by looking at the suggestions they made to the selected workers (subsection 5.3). Finally, we discuss the effect of conflicts of interest on welfare and its distribution among the members of the organization (subsection 5.4). Throughout the analysis we focus on the 15 periods of part 2, when information about others' behavior is spread among participants.[11] Results are analyzed considering each session as a single observation to account for the fact that spreading information may render participants' choices dependent upon previous periods in the same session.

## *5.1 Hiring*

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

**Result 1**. *The probability that L worker is hired is higher in the SEL and PS treatments than in the BSL one despite the fact that the principals' instructions are not different across treatments. When hiring L worker the majority of agents do not comply with the instructions given by the principals.*

Support for Result 1 can be found in Figure 1, which reports the proportion of principals giving instruction to hire L worker and the proportion of agents hiring L worker. When considering the hiring decision of the agents, despite the fact that the instructions given by the principals are not significantly different across treatments we find that both in the SEL and PS treatments a significantly higher proportion of L workers are hired, compared to the BSL one, according to a set of Two-sample Mann Whitney tests, one-sided (MW,

[11] Results of Part 1 are contained in the Online Appendix B.

henceforth):[12] *Agents' hiring decisions*: BSL vs SEL: $z = 2.05$, $p = 0.02$; BSL vs PS:


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

$z = 2.24$, $p = 0.01$; and SEL vs PS: $z = 0.19$, $p = 0.45$; *Principals' instruction:* BSL vs SEL: $z = 1.02$, $p = 0.16$; BSL vs PS: $z = 0.58$, $p = 0.29$; and SEL vs PS: $z = 0.51$, $p = 0.31$. We interpret this evidence as a potential threat for the organization in light of the fact that, in the majority of the cases, agents hire L workers without following the instructions given by the principal. Specifically, this happens in 58.56% ($N = 219/374$) of the cases in the SEL treatment and in 59.95% ($N = 220/367$) of the cases in the PS treatment (MW test: z=0.39, p=0.35).[13]

[12] All statistical tests reported are two samples and one-sided unless differently specified.

[13] Compared to the SEL, the cSEL treatment has no impact on the agents' hiring behavior. The proportion of L workers hired in cSEL is equal to 0.48, which is not significantly different compared to the SEL (and PS), while it is significantly higher than in the BSL treatment, (MW test: BSL vs cSEL: $z = 2.18$, $p = 0.03$; cSEL vs SEL $z = 0.21$, $p = 0.83$; cSEL vs PS: $z = 0.43$, $p = 0.80$). 0.34 of the principal give instruction to hire L workers (MW test: cSEL vs BSL: $z = 0.25$, $p = 0.41$; cSEL vs SEL: $z = 0.11$, $p = 0.46$; cSEL vs PS: $z = 1.11$, $p = 0.14$). Finally, the proportion of agents who hire L workers without following the instruction given by the principal is 0.56.

*5.2 Workers' effort*

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

**Result 2**. *In the BSL treatment H and L workers exert on average the same level of effort in both project X and in activity Y. The effort exerted in activity Y is lower than the effort exerted in project X.*

Result 2 shows that the workers' reciprocity does not vary depending on the worker's ability. Consistently with our theoretical prediction when $\rho_H = \rho_L$, in the BSL treatment principals hire H workers with higher probability than L workers (71.70% vs 28.30%, respectively).

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

As suggested by our theoretical model, L workers reciprocate agents' hiring choice by exerting more effort in activity Y while exhibiting less gratitude toward the principal, reducing their effort in project X. H workers, instead, do not modify their behavior in the SEL treatment compared to the BSL one. Finally, Result 4 illustrates workers' behavior in the PS treatment.

**Result 4**. *In the PS treatment sharing a small part of the value produced in project X with the worker: i) lowers the effort exerted in activity Y to the level of the BSL treatment; ii) increases the effort exerted in project X compared to the BSL and SEL treatments.*
*In the PS treatment, both H and L workers increase their effort in project X and reduce their effort in activity Y, compared to the SEL treatment. However, L workers still exert higher effort in activity Y compared to H workers.*

Result 4 highlights that distributing a small share of profits to workers enhances their identification with the organization, offsetting the workers reciprocal concern for the agent. Support for Results 2 to 4 can be found in Tables 4 and 5 and in Figure 2. Consider Table 4 first: it compares the total effort $(e_X + e_Y)$ exerted by the hired workers across treatments. Differences are not statistically significant showing that the treatments affect how workers

allocate their effort between project X and activity Y, but not the total effort exerted per se. We, thus, interpret the effort exerted in activity Y as effort distortion.[14]

| | Average total effort $e_X + e_Y$ | | | MW test | | |
|---|---|---|---|---|---|---|
| | BSL | SEL | PS | BSL vs SEL | BSL vs PS | SEL vs PS |
| $H$ workers | 3.44 | 3.32 | 3.52 | $z = 0.06$ | $z = 0.32$ | $z = 0.06$ |
| | (.51) | (.96) | (.80) | $p = 0.48$ | $p = 0.38$ | $p = 0.48$ |
| $L$ workers | 3.62 | 3.94 | 3.79 | $z = 0.70$ | $z = 0.19$ | $z = 0.96$ |
| | (.89) | (.45) | (.87) | $p = 0.24$ | $p = 0.43$ | $p = 0.17$ |

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

Table 4: Total effort $(e_X + e_Y)$ exerted by the workers, standard deviation in parenthesis.

Consider now the effort allocation between project X and activity Y. Figure 2 plots the average effort exerted in X and Y in each treatment depending on workers' ability. The inspection of Figure 2 reveals that L and H workers exert similar levels of effort in X and in Y in the BSL treatment, as supported by the results of a set of MW tests, ($e_{X,H}$ vs $e_{X,L}$: $z = 0.06$, $p = 0.48$; $e_{Y,H}$ vs $e_{Y,L}$: $z = 0.45$, $p = 0.33$).[15] When comparing the BSL and SEL treatments, L workers reduce their effort in X and increase their effort in Y (BSL vs SEL, for $e_{X,L}$: $z = 1.34$, $p = 0.09$; for $e_{Y,L}$: $z = 2.75$, $p = 0.00$)[16] while, when looking at the PS treatment, the behavior looks similar to the BSL treatment (PS vs BSL: for $e_{X,L}$: $z = 1.09$, $p = 0.14$; for $e_{Y,L}$: $z = 0.45$, $p = 0.33$).[17]

Differently than L workers, the behavior of H workers seems more stable across treatments. We observe no significant differences when comparing the BSL and SEL treatments (for $e_{X,H}$: $z = 0.96$, $p = 0.17$; $e_{Y,H}$: $z = 0.32$, $p = 0.38$), and a slight increase in effort in X and a slight decrease in effort in Y in the PS treatment with respect to the BSL one (PS vs BSL, $e_{X,H}$: $z = 0.96$, $p = 0.17$ $e_{Y,H}$: $z = 1.60$, $p = 0.06$. PS vs SEL $e_{X,H}$: $z = 1.47$, $p = 0.07$; $e_{Y,H}$: $z = 1.60$, $p = 0.05$).

[14] In the cSEL treatment, the total effort exerted is equal to 3.14 (*Std.Dev*.1.19) and 3.37 (*Std.Dev*.0.96) for the H and L workers, respectively. Differences between the cSEL and the other treatments are not statistically significant, detailed results are reported in the online Appendix A, Section 1.

[15] This is not the case in the SEL and PS treatments, where L workers exert higher effort in Y compared to H workers, SEL $e_{Y,H}$ vs $e_{Y,L}$: $z = 2.36$, $p = 0.01$. In PS $e_{Y,H}$ vs $e_{Y,L}$: $z = 1.34$, $p = 0.09$. See also Table A.1 in the online Appendix A.

[16] Note that $e_{Y,t} > 0$ cannot be explained by workers' inequality aversion since the agent is the member with the better relative position. A worker aimed at equalizing payoffs between himself, the agent and the principal should exert $e_{X,t} = 5$ and $e_{Y,t} = 0$. In our data, a One-Sample Wilcoxon Signed Rank 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.

[17] For $e_{X,L}$: SEL vs PS: $z = 2.11$, $p = 0.02$; $e_{Y,L}$: $z = 2.75$, $p = 0.00$.

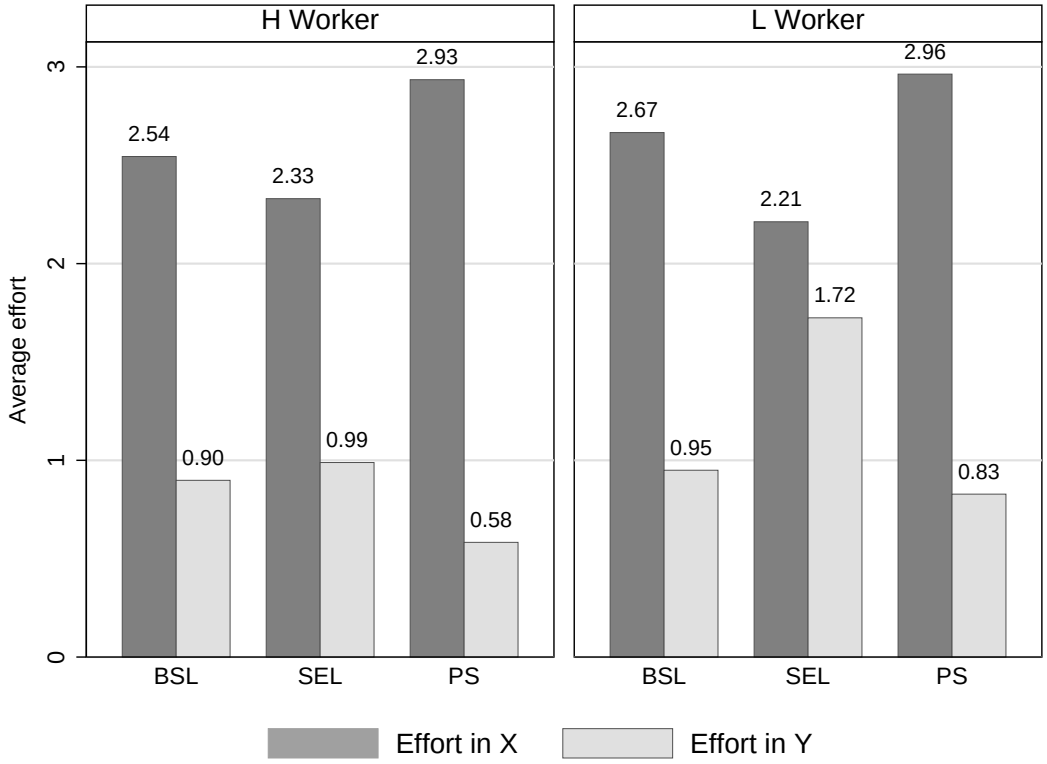


Figure 2: Average effort exerted in project X and activity Y in each treatment depending on workers' ability

In the cSEL treatment we do find the same pattern of behavior. L workers exert an average effort of 2.21 (Std. Dev. 0.75) and 1.16 (Std. Dev. 0.50) in Y. H workers exert an average effort equal to 2.20 (Std. Dev. 0.96) in X and 0.95 (Std. Dev. 0.48) in Y. When comparing cSEL with the BSL we note that H workers do not modify their effort choices in project X and activity Y. L workers, instead, decrease their effort in project X while they increase their effort in activity Y, even if the effect has a lower magnitude compared to the SEL treatment.

In order to provide further evidence for our results, in Table 5 we present a joint study of how effort is allocated between X and Y by the mean of a set of Zellner's seemingly unrelated regressions.[18] This estimation method simultaneously estimates two equations (where the dependent variables are the agents' effort exerted by the workers in X and Y, respectively) allowing for errors to be correlated. In this way we are able to take into

[18]Table 9 in the Appendix contains a description of all variables and acronymous used in the main text.

account the fact that workers simultaneously choose an effort level in X and Y.[19]

| Model | 1 | | 2 | | 3 | |
|---|---|---|---|---|---|---|
| | a | b | a | b | a | b |
| Estimation Method | Seemingly Unrelated Regressions | | | | | |
| Dependent variable | $e_X$ | $e_Y$ | $e_X$ | $e_Y$ | $e_X$ | $e_Y$ |
| Independent variables | | | | | | |
| SEL | -.336*** | .442*** | -.107 | .263*** | -.109 | .272*** |
| | (.095) | (.078) | (.116) | (.086) | (.097) | (.078) |
| cSEL | - | - | - | - | -.327** | .194** |
| | | | | | (.142 ) | (.089) |
| PS | .290*** | -.257*** | .412*** | -.282*** | .407** | -.274*** |
| | (.107) | (.066) | (.130) | (.064) | (.137) | (.070) |
| L Worker | .077 | .420*** | .428*** | .219 | .421** | .235*** |
| | (.096) | (.058) | (.168) | (.110) | (.145) | (.108) |
| Hired in t-1 | .035 | .060 | .064 | .043 | .035 | .087* |
| | (.083) | (.060) | (.085) | (.048) | (.073) | (.046) |
| SEL x L Worker | - | - | -.602*** | .442*** | -.600*** | .426*** |
| | | | (.211) | (.139) | (.174) | (.136) |
| cSEL x L Worker | - | - | - | - | -.433** | -.022 |
| | | | | | (.219) | (.172) |
| PS x L Worker | - | - | -.383* | .124 | -.378* | -.114 |
| | | | (.200) | (.139) | (.209) | (.149) |
| Periods 6-10 | -.250*** | .084* | -.242** | .047 | -.243*** | .168*** |
| | (.083) | (.050) | (.103) | (.077) | (.084) | (.054) |
| Periods 11-15 | -.421*** | -.136*** | -.408*** | -.147*** | -.346*** | -.107** |
| | (.093) | (.060) | (.099) | (.061) | (.084) | (.049) |
| Constant | 2.860*** | .771*** | 2.730*** | .848*** | 2.731*** | .768** |
| | (.107) | (.086) | (.122) | (.072) | (.096) | (.071) |
| N | 2254 | 2254 | 2254 | 2254 | 2744 | 2744 |
| Subjects | 318 | 318 | 318 | 318 | 389 | 389 |
| Periods | 2-15 | 2-15 | 2-15 | 2-15 | 2-15 | 2-15 |
| Treatments | BSL,SEL, PS | | | | BSL, SEL cSEL, PS | |
| R2 | 0.026*** | 0.026*** | 0.026*** | 0.026*** | 0.030*** | 0.08*** |
| Breusch Pagan test | 32.246*** | | 34.900*** | | 30.315*** | |

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$. In Models 1-2 (3) standard errors are bootstrapped at the level of 21(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 5: The effort exerted in project X and activity Y.

[19]The correspondent independent OLS regressions for models $1a-3a$ and $1b-3b$ are reported in Table A.2 of the Online Appendix A. The main results are mostly unchanged if the single equations are estimated by mean of a Tobit regression, see Table A.3 of the same Online Appendix.

In all models standard errors are bootstrapped at the level of session. Models $1a - 3a$ use as dependent variable the workers' effort in X, while models $1b - 3b$ use the effort in Y. In all six models we use as independent variables a set of dummies to identify the SEL and PS treatments, as well as a dummy to identify the ability of the worker (*L worker* which takes value 1 if the worker has low ability, and 0 otherwise) and a dummy to identify whether the worker was hired in the previous period (i.e., *hired in t-1*). In models $2a - b$ we include interactions between the treatment dummies and the worker's ability. In model $3a - b$ we include in our analysis also the cSEL treatment. 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 12%. By looking at models 1 and 2 it can be seen that the SEL and the PS treatments have opposite effects on the effort exerted in X and Y, when compared to the BSL treatment. The SEL treatment has a positive and significant effect on the effort in Y, while it has a negative and significant effect on the effort exerted in X. We interpret these effects as a signal of effort distortion due to the conflict of interest between the principal and the agent. The PS treatment has the opposite effects: positive and significant on the effort exerted in X and negative and significant on the effort exerted in Y. The dummy accounting for the worker's ability is positive and significant for Y, indicating that, once hired by the agent, the L worker exerts higher effort in Y to reciprocate her choice.

Consider now models $2a - 2b$, where the interaction terms between the treatments and the worker's ability are included. Overall, our results are confirmed with some small differences. The SEL treatment has a positive effect on Y. L workers, as captured by the dummies for worker's ability and treatment and by the interaction terms, significantly decrease their effort in X (linear combination of coefficients: $-.281$, $p = 0.02$) and increase their effort in Y (linear combination of coefficients $= 0.92$, $p = 0.00$). Similarly, when looking at the effect of the PS treatment, we find a confirmation of the positive effect on X and of the negative effect on Y, as evidenced by models $1a - 1b$. In addition, the net effect of effort exertion in X is positive for L workers (linear combination of coefficients for the dummy on worker's ability, treatment as well as for the interaction term $= 0.46, p = 0.00$). Our results also show that being hired in the previous period has no effect on the effort exertion of workers, in either of the models.

Finally, consider models $3a - 3b$ where also data from the cSEL are included. We find that, compared to the BSL treatment, in the cSEL treatment, L workers reduces the effort in project X while increasing the effort in activity Y. Moreover, if we focus on L workers, and

compare the coefficients of SEL and cSEL, we find that the effort exerted in activity Y is significantly higher in SEL compared to cSEL (linear combination of coefficients = 0.53, $p = 0.00$), while differences in the effort exerted in project X are not significant (coefficient = 0.05, $p = 0.64$). Other effects remain basically unchanged. The results of the cSEL treatment are consistent with previous studies showing that communication restricted to numerical suggestion has little impact on individuals' behavior (Charness and Dufwenberg, 2010, Montinari et al., 2014) and they highlight that the agents' suggestion mainly act in clarifying the agent's intention to engage in a backscratching relationship with L workers.

### *5.3 The role of the agents' effort suggestion*

We have shown that the backscratching between the agents and L workers takes place even in the cSEL treatment, where agents cannot make explicit their expectations to the selected worker. In this section we analyze the effort suggestions to the worker. Result 5 summarizes our findings.

**Result 5**. *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 higher effort in X compared to agents who hire L workers against the principal's instructions.*

Agents who hire workers without following the principal's instructions are more likely to do so in their own personal interest.[20] Support for Result 5 can be found in Tables 6 and 7.

Table 6 reports, for each treatment, the average effort suggested by the agents in project X and activity Y, depending on the ability of the selected worker. Comparisons across treatments and abilities are reported in the table and are based on MW tests. We find that in the SEL treatment, overall, agents suggest higher effort in Y to L workers compared to H workers. In the PS treatment, agents suggest higher effort in X to H workers compared to L workers, while no differences are observed in the suggestion about Y.

[20] Another element of our experimental design which allows us to isolate the agents' intentions is whether they ex-ante decide to accept the value eventually produced in Y. If we restrict our attention only to those agents who do not accept it, we do not find any significant difference in the percentage of L workers hired in the SEL treatment with respect to the BSL one (MW test: $z = 1.05$, $p = 0.145$). On the contrary, when considering those agents who are willing to accept it, we find that they are more likely to select L workers in the SEL treatment with respect to the BSL one (MW tests, BSL vs SEL: $z = 1.57$, $p = 0.06$). These results provide evidence that those agents ex ante refusing the value eventually produced in Y do not distort the hiring process compared to the case when the principals are taking the hiring decision.

| | SEL Effort Suggested in | | PS Effort Suggested in | | MW test SEL vs PS | |
|---|---|---|---|---|---|---|
| | $e_X$ | $e_Y$ | $e_X$ | $e_Y$ | $e_X$ | $e_Y$ |
| $H$ workers | 4.07 | 2.59 | 4.90 | 2.62 | $z = 1.98$ | $z = 0.45$ |
| | (.71) | (.55) | (.85) | (.84) | $p = 0.02$ | $p = 0.33$ |
| $L$ workers | 3.43 | 3.29 | 4.00 | 2.72 | $z = 1.09$ | $z = 0.96$ |
| | (.88) | (.33) | (1.02) | (.93) | $p = 0.14$ | $p = 0.17$ |
| $H + L$ workers | 3.79 | 2.94 | 4.47 | 2.29 | $z = 1.21$ | $z = 0.70$ |
| | (.79) | (.40) | (.96) | (.89) | $p = 0.11$ | $p = 0.24$ |
| 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 6: Effort suggested by the agents, standard deviation in parenthesis.

Table 7 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 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.[21]

Our results thus show that suggestions are crucial in making the agents' intentions clear. However, backscratching is also present in the cSEL treatment, when agents cannot suggest any effort level to the workers.

### *5.4 Conflicts of Interest and Welfare*

We first analyze how the distorsions on workers' effort and agents' selection affect the earnings of principals and agents, and then we analyze the effect of backscratching on the welfare of the society, defined as the sum of the monetary payoffs of the worker, the agent and the principal. Note that workers' effort in activity Y is inefficient, because the same amount of effort exerted in project $X$ would increase the sum of the earnings of the principal and the agent, without changing the worker's earnings.[22]

[21]The whole regression and a more complete analysis of the determinants of the effort suggestion is provided in the Online Appendix A, Section 2.

[22]Exerting effort in activity Y would be welfare enhancing compared to not exerting any effort at all. However, this does not seem to occur in our experiment, where, as shown in Table 4, the treatment manipulations affected the effort allocation between X and Y rather than the total effort exerted.

| | Dependent Variable: Effort Suggested in project X | | in activity Y | |
|---|---|---|---|---|
| | Net effect of Coefficient (Std. Error) | z p-value | Net effect of Coefficient (Std. Error) | z p-value |
| Workers hired following P's suggestion | .26 (.11) | 2.29 0.02 | -.08 (.08) | 1.04 0.30 |
| *L* Workers hired following P's suggestion | .47 (.17) | 2.78 0.00 | -.04 (.11) | 0.33 0.74 |

Note: The complete estimation of the regression is reported in Models 3 and 4 of Table 5 in the Online Appendix A.

Table 7: Effort suggested by the agents depending on principal's instructions.

**Result 6**. *Compared to the BSL treatment, in the SEL treatment the distortions in the hiring process and in effort exertion increase the agent's earnings, but they reduce both the principal's earnings, and the welfare of the society. A profit sharing compensation scheme restores the principal's earnings as well as the welfare of the society to the level of the BSL treatment, and reduces the earnings of agents compared to both the SEL and BSL treatments.*

Support for Result 6 can be found in Table 8, where panels $a - c$ report, for each treatment, the average agents' earnings, the average principals' earnings and the average welfare, respectively. Consider the agents first: compared to the BSL treatment, in the SEL treatment they experience an increase in their earnings, which is essentially due to the effort distortion in Y by L workers. When the profit sharing compensation scheme is introduced agents' earnings are lower compared to both the SEL and BSL treatments. This effect is due to the fact that in the PS treatment agents only receive 7.5% of the value produced in X, and that L workers significantly reduce their effort exertion in Y compared to the SEL treatment. Note that, as supported by the MW test reported in Table 8, despite being low in magnitude, all treatment effects for agents' earnings are strongly significant.

Principals' earnings are significantly lower in the SEL treatment compared to the BSL one (22.22 ECUs versus 25.88 ECUs) but, once a profit sharing compensation scheme is introduced, they rise to 27.47 ECUs, a level which does not significantly differ from the BSL.[23] This result highlights how the profit sharing compensation scheme, despite being

[23]In the cSEL treatment the main results are basically unchanged compared to the SEL treatment.

Panel a. Average Earnings of Agents
(wage+ share of value produced in X+ value produced in Y)

| BSL | SEL | PS | BSL vs SEL | BSL vs PS | SEL vs PS |
|---|---|---|---|---|---|
| 58.42 | 60.09 | 55.54 | $z = 2.24$ | $z = 2.62$ | $z = 3.13$ |
| (1.41) | (.85) | (1.54) | $p = 0.02$ | $p = 0.00$ | $p = 0.00$ |

Panel b. Average Earnings of Principals
(E - $w$-$m$ + 85% of value produced in X)

| BSL | SEL | PS | BSL vs SEL | BSL vs PS | SEL vs PS |
|---|---|---|---|---|---|
| 25.88 | 22.22 | 27.47 | $z = 1.98$ | $z = 0.64$ | $z = 1.98$ |
| (2.43) | (3.33) | (5.55) | $p = 0.03$ | $p = 0.26$ | $p = 0.03$ |

Panel c. Average Welfare of the Society
(sum of monetary payoffs of the worker, the agent and the principal)

| BSL | SEL | PS | BSL vs SEL | BSL vs PS | SEL vs PS |
|---|---|---|---|---|---|
| 130.38 | 128.09 | 131.39 | $z = 1.47$ | $z = 0.32$ | $z = 1.21$ |
| (2.55) | (3.13) | (5.52) | $p = 0.07$ | $p = 0.37$ | $p = 0.21$ |

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

Table 8: Value produced and its allocation.

ineffective in solving the distortion in the workers' selection (as shown in Section 5.1, the fraction of L workers hired by agents is higher in the SEL and PS treatments compared to BSL treatment), has an important effect in limiting the negative effort distortion observed in the SEL treatment. In fact, principals' earnings in the PS treatment are also significantly higher than in the SEL treatment.[24]

Consider now the welfare of the society generated in each treatment. When comparing the SEL to the BSL treatment, the average welfare decreases by about 2%, from 130.38 to 128.09 ECUs. In the PS treatment, the profit sharing scheme affects the L workers' behavior: they substantially increase their effort in X and reduce their effort in Y, compared

The average earnings of the principals equal to 21.01 ECUs (MW tests: cSEL vs SEL, z=0.69, p=0.25), while the agents' average earnings equal to 58.45 ECUs (MW tests: cSEL vs SEL, z=1.09, p=0.06). The average welfare equals to 129.46 ECUs (MW tests: cSEL vs SEL, z=1.22, p=0.11). All comparisons across treatments are reported in the Online Appendix A, section 3.

[24]When analyzing the differences in the principals' earnings depending on the ability of the hired worker, we observe that even if the L worker is exerting a higher effort in Y than the H one (thus, producing higher earnings for the agent), both workers are devoting almost the same level of effort in X, with the H workers being more productive than the L ones. As a consequence, total earnings of the principals do not vary significantly depending on the ability of the hired worker.

to the SEL treatment (see also section 5.2); as a consequence, welfare in the PS treatment is higher than in the other treatments.

# 6 Conclusion

In this paper we provide evidence that workers' reciprocity concerns may exacerbate, rather than alleviate, conflicts of interest within a hierarchical organization. A tiny profit sharing compensation scheme, which fosters workers' identification with the organization, is effective in reducing workers' inefficient effort exertion in favor of their foremen. 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.

Three final remarks are worth discussing. First, 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. Ability, however, is only one of the workers' characteristics that could be relevant in determining their entitlement for the job. Any other characteristic, such as gender, ethnicity or religion, by making the worker identifiable as a member of a discriminated group, could be used by agents to make workers feel (more) indebted toward them. Alternatively, agents may favor members of their own social group expecting that the reduced social distance strengthens their reciprocity, as in Bramoullé and Goyal (2014).

Second, 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.

Finally, a different perspective may occur if the possibility to pander to the agent were given to the worker. It would be interesting to study whether workers compete by promising future benefits to the agent, and how their different entitlements affect the fulfillment of their promises.

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# Appendix

The Online Appendix can be found by clicking here.

Table 9 contains a description of all the acronyms used in the main text.

| **Variable** | Description |
|---|---|
| **Suggested** $e_X$ | Identifies the effort suggested by the agent in project X. It can take integer values between 1 and 10 inclusive. |
| **Suggested** $e_Y$ | Identifies the effort suggested by the agent in activity Y. It can take integer values between 0 and 5 inclusive. |
| **SEL** | Identifies the SEL treatment, 1= treatment is SEL; 0= otherwise. |
| **cSEL** | Identifies the cSEL treatment, 1= treatment is cSEL; 0= otherwise. |
| **PS** | Identifies the PS treatment, 1= treatment is PS; 0= otherwise. |
| **L Worker** | Ability of the worker hired, 1= hired worker is a L worker; 0= otherwise. |
| **Hired in t-1** | Takes into account if the worker was hired in the previous period; 1= the worker was hired in the previous period t-1; 0= otherwise. |
| **SEL x L worker** | Interaction between L worker and SEL, 1= hired worker is a L worker and treatment is SEL; 0= otherwise. |
| **cSEL x L worker** | Interaction between L worker and cSEL, 1= hired worker is a L worker and treatment is cSEL; 0= otherwise. |
| **PS x L worker** | Interaction between L worker and PS, 1= hired worker is a L worker and treatment is PS; 0= otherwise. |
| **Periods 6-10** | It takes value 1 for periods between 5 and 10 inclusive; 0 otherwise. |
| **Periods 11-15** | It takes value 1 for periods between 11 and 14 inclusive; 0 otherwise. |

Table 9: Variables used in main text

| Variable of the Model | Experimental Parameter | Description | Treatments |
|---|---|---|---|
| $e_X$ | $\in \{1, 2..., 10\}$ | Effort in X, beneficial for both the principal and agent. | All |
| $e_Y$ | $\in \{0, 1..., 5\}$ | Effort in Y, beneficial only for the agent. | All |
| $\beta_t$, $t = H, L$ | $\beta_H = 0.5$ | The worker' s ability when exerting $e_X$ | All |
| | $\beta_L = 0$ | | All |
| $\delta$ | 0.4 | Productivity of $e_Y$, $\delta > \alpha_A$ | All |
| $w = m$ | 50 | Fixed Payment for the agent and worker | All |
| $E$ | 100 | The principal's endowment | All |
| $\alpha^P$ | 0.85 | The principal's share of the value produced by $e_X$ | All |
| $\alpha^A$ | 0.15 | The agent's share of the value produced by $e_X$ | BSL, SEL, cSEL |
| | 0.075 | | PS |
| $\alpha^W$ | 0 | The worker's share of the value produced by $e_X$ | BSL, SEL, cSEL |
| | 0.075 | | PS |
| | | Monetary Payoffs | |
| Principal | $E - m - w + \alpha^P(e_X + \beta_t)\sigma$ | | |
| Agent | $m + \alpha^A(e_X + \beta_t)\sigma + \delta e_Y$ | | |
| Worker | $w + \alpha^W(e_X + \beta_t)\sigma - c(e_X + e_Y)$ | | |
| Note: $\sigma \sim u[0.8, 1.2]$ is a random variable affecting $e_X$ introduced in the experiment. | | | |

Table 10: Variables, Experimental Parameters and Monetary Payoffs

**Panel a. Earnings of the worker**

**Panel a.1**. Fixed Part (all treatments)

| | $e_X + e_Y$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H, L | $w - c(e_X + e_Y)$ | 50 | 49 | 48 | 46 | 44 | 42 | 40 | 38 | 35 | 32 |

**Panel a.2.** Variable Part from project X (PS treatment)

| | $e_X$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H | $\alpha_W(e_X + \beta_H)\sigma$ | 1.1 | 1.9 | 2.6 | 3.4 | 4.1 | 4.9 | 5.6 | 6.4 | 7.1 | 7.9 |
| L | $\alpha_W(e_X + \beta_L)\sigma$ | 0.8 | 1.5 | 2.3 | 3.0 | 3.8 | 4.5 | 5.3 | 6.0 | 6.8 | 7.5 |

**Panel b. Earnings of the agent**

**Panel b.1**. Fixed Part (all treatments)

| | $e_X + e_Y$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H, L | $m$ | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |

**Panel b.2**. Variable Part from project X (BSL, SEL, cSEL treatments)

| | $e_X$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H | $\alpha_A(e_X + \beta_H)\sigma$ | 2.3 | 3.8 | 5.3 | 6.8 | 8.3 | 9.8 | 11.3 | 12.8 | 14.3 | 15.8 |
| L | $\alpha_A(e_X + \beta_L)\sigma$ | 1.5 | 3.0 | 4.5 | 6.0 | 7.5 | 9.0 | 10.5 | 12.0 | 13.5 | 15.0 |

**Panel b.3.** Variable Part from project X (PS treatment)

| | $e_X$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H | $\alpha_A(e_X + \beta_H)\sigma$ | 1.1 | 1.9 | 2.6 | 3.4 | 4.1 | 4.9 | 5.6 | 6.4 | 7.1 | 7.9 |
| L | $\alpha_A(e_X + \beta_L)\sigma$ | 0.8 | 1.5 | 2.3 | 3.0 | 3.8 | 4.5 | 5.3 | 6.0 | 6.8 | 7.5 |

**Panel b.4**. Variable Part from activity Y (all treatments)

| | $e_Y$ | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| H, L | $\delta e_Y$ | 0 | 4.3 | 8.5 | 12.8 | 17.0 | 21.3 |

**Panel c. Profits of the principal (all treatments)**

| | $e_X$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H | $\alpha_P(e_X + \beta_H)\sigma$ | 12.8 | 21.3 | 29.8 | 38.3 | 46.8 | 55.3 | 63.8 | 72.3 | 80.8 | 89.3 |
| L | $\alpha_P(e_X + \beta_L)\sigma$ | 8.5 | 17.0 | 25.5 | 34.0 | 42.5 | 51.0 | 59.5 | 68.0 | 76.5 | 85.0 |

Note. In Panels a-c the values are obtained considering a realization of $\sigma = E(\sigma) = 1$. Panel b.2. (a.2 and b.3) reports 15% (7.5%) of the value produced in project X.

Table 11: Material Payoffs of participants depending on the effort choices of the hired worker.