



Management Science

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

The Dark Side of Competition for Status

Gary Charness, David Masclet, Marie Claire Villeval

To cite this article:

Gary Charness, David Masclet, Marie Claire Villeval (2014) The Dark Side of Competition for Status. Management Science 60(1):38-55. <http://dx.doi.org/10.1287/mnsc.2013.1747>

Full terms and conditions of use: <http://pubsonline.informs.org/page/terms-and-conditions>

This article may be used only for the purposes of research, teaching, and/or private study. Commercial use or systematic downloading (by robots or other automatic processes) is prohibited without explicit Publisher approval, unless otherwise noted. For more information, contact permissions@informs.org.

The Publisher does not warrant or guarantee the article's accuracy, completeness, merchantability, fitness for a particular purpose, or non-infringement. Descriptions of, or references to, products or publications, or inclusion of an advertisement in this article, neither constitutes nor implies a guarantee, endorsement, or support of claims made of that product, publication, or service.

Copyright © 2014, INFORMS

Please scroll down for article—it is on subsequent pages



INFORMS is the largest professional society in the world for professionals in the fields of operations research, management science, and analytics.

For more information on INFORMS, its publications, membership, or meetings visit <http://www.informs.org>

The Dark Side of Competition for Status

Gary Charness

Department of Economics, University of California, Santa Barbara, Santa Barbara, California 93106,
charness@econ.ucsb.edu

David Masclet

Center for Research in Economics and Management, National Center for Scientific Research,
University of Rennes, 35000 Rennes, France; and Center for Interuniversity Research and Analysis of Organizations,
Montreal, Quebec H3A 2A5, Canada, david.masclet@univ-rennes1.fr

Marie Claire Villeval

University of Lyon, Lyon F-69007, France; National Center for Scientific Research,
Group for Economic Analysis and Theory Lyon Saint-Etienne, 69130 Ecully, France; and
Institute for the Study of Labor, 53113 Bonn, Germany, villeval@gate.cnrs.fr

Unethical behavior within organizations is not rare. We investigate experimentally the role of status-seeking behavior in sabotage and cheating activities aiming at improving one's performance ranking in a flat-wage environment. We find that average effort is higher when individuals are informed about their relative performance. However, ranking feedback also favors disreputable behavior. Some individuals do not hesitate to incur a cost to improve their rank by sabotaging others' work or by increasing artificially their own performance. Introducing sabotage opportunities has a strong detrimental effect on performance. Therefore, ranking incentives should be used with care. Inducing group identity discourages sabotage among peers but increases in-group rivalry.

Data, as supplemental material, are available at <http://dx.doi.org/10.1287/mnsc.2013.1747>.

Key words: status; ranking; feedback; sabotage; doping; competitive preferences; experiment

History: Received November 8, 2011; accepted February 18, 2013, by John List, behavioral economics.

Published online in *Articles in Advance* August 2, 2013.

1. Introduction

It is traditionally assumed in standard economic theory that competition is desirable for several different reasons. Competition leads to an efficient allocation of productive resources on the market, giving consumers better products to a lower price. It promotes innovation by increasing the cost of failing to invest in research and development. Competition also enhances overall performance within firms by inducing employees to exert higher work effort. The tournament literature has shown how monetary prizes based on ranking of performance provide strong incentives to outperform (e.g., Lazear and Rosen 1981, Bull et al. 1987, Hannan et al. 2008).

While feedback on relative performance may motivate employees to work harder by strengthening competitive preferences, the feedback may also potentially encourage some individuals to engage in unethical activities to improve their ranking, which may have important detrimental effects for the firm (Lazear 1989, Konrad 2000, Chen 2003).¹ For instance,

a worker can increase his chances of winning a contest by reducing the output of a person with whom he is competing through means of sabotage (Lazear 1989, Garicano and Palacios-Huerta 2006, Harbring et al. 2007, Falk et al. 2008, Harbring and Irlenbusch 2008, Carpenter et al. 2010, Balafoutas et al. 2012, Abbink and Hermann 2013).² Similarly, workers may also cheat to artificially improve their

have been a victim of unethical behavior, including sabotage in the workplace. Such unethical activities can seriously harm the overall performance of the firm by discouraging effort, increasing absenteeism, or inducing health problems. In the same vein, a survey by the Workplace Bullying Institute reports that 35% of the 4,210 respondents have experienced repeated mistreatment ranging from intimidation to sabotage in the workplace (Kura et al. 2013). This survey reports several cases of individuals who decided to leave the firm after having been sabotaged several times by other workers.

² Sabotage activities within firms can take several forms including locking someone's workstation, transferring false information to coworkers, destroying the work of others, or stealing company supplies or equipment. For instance at Digital Equipment, a major American company in the computer industry during the 1990s, workers invaded the computer files of coworkers to make electronic copies and claimed the work as their own. In academia, Maher (2010) cites the example of a postdoctoral student who destroyed a colleague's experiments to get ahead, a cautionary note for supervisors.

¹ According to the SUMER (Surveillance Médicale des Risques) survey on working conditions and hostile behavior in the workplace (49,984 respondents), conducted by the French Ministry of Employment (Bué and Sandret 2008), 17% of workers declare that they

performance by the use of performance-enhancing drugs, forgery, use of ghostwriters, or plagiarism (List et al. 2001, Preston and Szymanski 2003, Enders and Hoover 2004, Shleifer 2004, Fanelli 2009, Schwieren and Weichselbaumer 2010).

In this current paper, we contribute to the existing literature by investigating the extent of unethical activities such as sabotage or cheating activity to improve one's own performance and their consequences on overall performance. We aim primarily at investigating the determinants of unethical activities. In particular, we check whether a pure taste for having the best rank in the performance distribution, apart from any possible material benefits associated or not with this rank, serves as a motivation for engaging in unethical activities.³ The previous literature has assumed that unethical activities are motivated by the possibility of receiving higher earnings. However, one may reasonably argue that such unethical activities may also be driven at least in part by the pure intrinsic desire for having a higher rank. This could be the case for instance if individuals have a strong concern for status and if status seeking is related to the desire for dominance in competition (Charness and Grosskopf 2001, Charness and Rabin 2002, Abbink and Sadrieh 2009).

Status seeking can also be related to self-image (Benabou and Tirole 2006, Köszegi 2006), public recognition (Frank 1985, Moldovanu et al. 2007, Rustichini 2008), or the joy of outperforming others (Dohmen et al. 2011, Chowdhury and Sheremeta 2012).⁴ Some recent research in neuroeconomics and biology has shown that such intrinsic competitive preferences may be "evolutionarily" rooted in our behaviors (Tran and Zeckhauser 2012). Outperforming others would be associated with higher concentrations of serotonin, a neurotransmitter in the brain that enhances feelings of well-being (Madsen 1994) by

activating the neural circuitry associated with reward processing (Dohmen et al. 2011). Other recent behavioral studies have provided some evidences that people may be willing to harm others even in the absence of immediate or future expected monetary return, which may be partially explained by a strong desire for dominance (Zizzo and Oswald 2001, Zizzo 2003, Abbink and Sadrieh 2009, Abbink et al. 2009, Bolle et al. 2010).⁵

From a methodological point of view, we chose to implement a flat-wage scheme with equal wages in order to properly isolate this pure effect of competitive preferences from the monetary reasons why feedback about rank may incite individuals to engage in unethical activities.⁶ Indeed in a context where monetary incentives are strong enough to actually motivate people to work hard, it is difficult to disentangle the pure motive of competitive preferences from other motives. We acknowledge that in many firms more sophisticated remuneration schemes either based on individual or group performance are common and that long-term material concerns, including future promotions or salary increases, are likely to be related to performance rank.

Nevertheless, the use of a fixed-pay regime is not totally disconnected from real life. Indeed despite the important literature showing the positive effects of performance-based remuneration schemes (e.g., Lazear 2000), the use of flat-wage schemes remains surprisingly high within firms (e.g., Nguyen and Leung 2009, Bartling and von Siemens 2010, Franceschelli et al. 2010).⁷ These observations were

³ Although surveys provide interesting information regarding the extent of unethical behavior in the workplace, the individual determinants of unethical activities can hardly be observed directly in survey data because of the hidden nature of these activities. Controlled laboratory experiments may help in investigating these determinants. See Charness and Levine (2010) for survey evidence on attitudes toward sabotage in various scenarios.

⁴ The role of relative position in individual utility has been substantially investigated in many social sciences. However, mainstream microeconomic theory has traditionally assumed that utility is a function only of one's own absolute income, with the notable exception of Duesenberry (1949), Veblen (1949), and Frank (1985). Experimental studies have demonstrated both the importance given by individuals to status and how it affects behavior in negotiations (Ball and Eckel 1996), markets (Ball and Eckel 1998, Ball et al. 2001), coordination games (Eckel and Wilson 2007), and organizations either in cooperative settings (Eckel et al. 2010) or in competitive settings (Huberman et al. 2004, Rustichini and Vostroknutov 2008).

⁵ In a seminal paper, Zizzo and Oswald (2001) design a game where subjects can reduce (burn) other subject's money at own costs. Despite the own cost of burning money, the majority of subjects choose to destroy some part of others' money. Abbink and Sadrieh (2009) go one step further by considering the case of two players who can simultaneously destroy each other's endowment without any conventional reason to do so. The authors observe that up to 40% of subjects are willing to burn money, in particular when agents can hide their action and assume impunity. In a recent study, Bolle et al. (2010) investigate the determinants of vendettas. The authors observe that vendettas frequently occur even when initial endowments are equal and despite the fact that vendettas are pointless. In a related money-burning experiment, Abbink et al. (2009) observe that equal distributions are also particularly prone to destruction.

⁶ We note that this is a reasonably standard approach in experimental economics. For example, this was also the strategy used in Dohmen and Falk (2010) and Falk and Ichino (2006). From Falk and Ichino (2006, p. 54), "In our experiment, we implemented a fixed-pay regime, that is, payments were not conditioned on output. This was done in order to keep things as simple as possible."

⁷ Indeed, there are some cases, particularly in the public sector, where promotions and salary are almost wholly unaffected by performance. For example, promotions and salary increases for civil servants in the U.S. Postal Service are almost entirely based on seniority, and these workers are also largely immune from being fired for poor performance.

summarized 20 years ago by Holmstrom and Milgrom (1991, p. 24): “It remains a puzzle for this theory that employment contracts so often specify fixed wages and more generally that incentives within firms appear to be so muted, especially compared to those of the market.” The role played by flat-wage schemes is even more prominent when considering the public sector where employees are paid fixed salaries depending strictly on time worked (e.g., Ding et al. 2001, Prentice et al. 2007, Bartling and von Siemens 2010).⁸ Furthermore, while remuneration is in some cases tied to performance, the fixed portion still constitutes the larger proportion of workers’ compensation.

Unethical activities may be possible in such an environment because paying a flat wage does not necessarily imply the absence of any feedback on relative performance. Indeed, firms commonly provide relative performance information to their employees even when employees’ compensation is not tied to peers’ performance (e.g., Anderson et al. 1982, Nordstrom et al. 1990, Taftkov 2013). In such contexts, individuals simply substitute wage comparisons for effort comparisons and relative position is therefore determined not by income but by work performance.⁹ In banking, for example, some branch managers disclose to their tellers the number of new accounts opened by each of their colleagues even though teller compensation has no incentive-based pay (Gino and Staats 2011). In the public sector, employees are typically paid a flat wage but are still evaluated and ranked by their supervisor. And even when firms do not provide direct feedback on relative performance, the degree of proximity among coworkers may lead them to compare each other (e.g., Falk and Ichino 2006, Mas and Moretti 2009).

Another aim of this study is to investigate how the opportunity for unethical behavior influences the impact of social information on overall output. While economic theory has discussed in depth the positive effects of relative performance information in tournaments or under piece-rate payment schemes (Hannan et al. 2008; Azmat and Iriberry 2010a, b; Blanes i

Vidal and Nossol 2011; and Eriksson et al. 2009; find more nuanced results), the effects of feedback on relative performance in a flat-wage environment that permits unethical behavior are unclear a priori. Some studies observed a positive effect of feedback with fixed compensation (Falk and Ichino 2006, Mas and Moretti 2009, Kuhn and Tymula 2012, Taftkov 2013). Other studies have shown that feedback about rank may also demotivate the lowest-performing employees (e.g., Barankay 2012). However, while the studies mentioned above have focused their attention on the incentive effect of relative performance information under full wage compression, they are silent about the unethical activities in such contexts. Sabotage activities may have both direct and indirect negative impacts on performance. Its direct effect is that it destroys valuable resources, and particularly resources created by the most able individuals who are also those who are sabotaged more often (Chen 2003). Indirect effects include demoralization and retaliation (Harbring et al. 2007, Abbink and Hermann 2013). Sabotage may also lead workers to exert less effort because they anticipate that they might be the victims of sabotage (Carpenter et al. 2010). We do not expect such a negative impact of an artificial increase of performance compared to sabotage activities, because it does not affect directly any coworker’s output. However, it may indirectly reduce the motivating impact of ranking feedback, as individuals know that this information can be biased. To the best of our knowledge, we provide the first experiment on sabotage and cheating activities under a flat wage.

Our experiment consists of four treatments. In our *baseline treatment*, participants are matched in groups of three, and each participant is required to perform a real-effort task (a decoding task) under a flat-wage scheme without any feedback on relative performance. The *ranking treatment* is similar to the baseline treatment except that each participant is now informed about her relative performance. Our two remaining treatments (the *sabotage treatment* and the *redemption treatment*) are identical to the ranking treatment except that we add a new stage in which participants can pay to change their relative performance either by reducing the performance of their coworkers (sabotage) or by purchasing extra units of “output” to increase artificially their own performance (redemption). We ran two variants of the ranking, sabotage, and redemption treatments, with or without symbols to visually emphasize the performance ranks in the group.¹⁰ By comparing behavior in our different

⁸ Several factors may explain the persistence of flat-wage schemes within firms including the role of egalitarian concerns (Ding et al. 2001, Bartling and von Siemens 2010), monitoring costs, and centralization of authority (Prentice et al. 2007). Some authors have also investigated the reasons behind the persistence of flat-wage schemes in the public sector. These factors include the specificities of multifaceted tasks and intrinsic motivation for public service that may compensate for quite low and relatively flat extrinsic incentives that the sector offers (Georgellis et al. 2011).

⁹ In our experiment, relative position is determined by work performance in a real-effort task. Therefore, status is endogenous. In most experimental studies, status is assigned exogenously (with the exception of Ball and Eckel 1998, Huberman et al. 2004, and Rustichini and Vostroknutov 2008).

¹⁰ In companies, status is often reinforced by means of symbolic awards, such as the “Bravo Award” at IBM, the “Employee of the Month” at McDonald’s, or gold medals for good attendance.

treatments, we can isolate the pure effect on performance of the feedback on relative performance from the effects of introducing opportunities of either sabotage or redemption activities when wages are fixed.

Our results show that, even when wages are fixed, many individuals exhibit competitive behavior. Individual performance is positively influenced by feedback on one's relative position in the group, because people exert significantly more effort when they know they will receive ranking feedback. However, while providing feedback on ranking creates additional incentives, it also invites unethical behavior, because some individuals are willing to pay to improve their rank by sabotaging others' work or by increasing artificially their own relative performance. Indeed, introducing the opportunity to sabotage others' output has a strong negative direct and indirect impact on performance. The effect of redemption activities on performance is also negative, but to a more moderate degree. We also find evidence that people from the same school are more likely to improve their own relative position artificially, although they are less likely to sabotage people from the same school than people from other schools. This suggests that group identity favors rivalry but discourages destructive competition. Overall, our findings provide evidence of competitive preferences in nonmonetary competitive settings.

The remainder of this paper is organized as follows. Section 2 describes the experimental design. Section 3 presents our behavioral conjectures about the expected treatment effects. Section 4 presents the results of the study. Section 5 discusses our findings. Section 6 concludes the paper.

2. Experimental Design

2.1. Treatments

Our experiment consists of four main treatments with 10 periods each and is based on a between-subject design. In our baseline treatment, each person is matched with two other participants. We use a stranger matching protocol, so that groups are

randomly reformed at the beginning of each new period. Participants are paid a flat wage of 10 experimental currency units (ECUs) (with 10 ECUs equal to 1 euro) at the beginning of each period; it is common information that wage is uncorrelated to performance. Participants have to perform a task during a maximum of two minutes. This task consists of decoding sets of one-digit numbers into letters from a grid of letters that is displayed on the computer screen (see the instructions in the online appendix, available at ftp://ftp.gate.cnrs.fr/Appendix/CharnessMascletVilleval_Ms_OnlineAppendix.pdf). In each new period, a different grid of letters and different decoding numbers appear. This fastidious and boring task was chosen to induce sufficient disutility. Participants must press a button to start a new period and immediately receive the wage for the period. In every period they can solve as many problems as they wish. They can stop working at any time during the course of the period, they can resume work at will, and they can choose not to perform the task at all. To allow for alternative leisure activities on the job, two magazines are provided in each cubicle, and the instructions indicate that the magazines can be read at any time. In the field, leisure at work takes multiple forms: surfing the net, long coffee breaks, office gossiping, etc.

The participants are continuously informed about their current number of correct answers. If a submitted answer is not correct, the same letter is displayed until the correct answer is provided. Once the two minutes have elapsed, a vertical bar is displayed on the screen; its height indicates the total number of correct answers. In this treatment, people receive no feedback about the performances of the other two group members.

The ranking treatment is identical to the baseline treatment except that the computer displays three vertical bars with the performance of each of the three group members at the end of each period. Each person is therefore able to see her relative performance and her rank; the worker who has performed the best in her group is ranked first while the lowest performer is ranked last. We ran two variants of the ranking treatment, with or without symbols to visually illustrate the relative performance in the group. Specifically, in the treatment with symbols, the worker who has performed the best in her group receives a "gold medal" while the lowest performer gets a "donkey hat" on his computer screen. We consider whether adding symbolic rewards and sanctions crowd in or crowd out the effect of feedback on performance.

The redemption treatments (with and without symbols) are identical to the ranking treatments, except that we add a second stage in which participants can modify their performance. In the second stage,

Similarly, informal sanctions may take several forms such as frowning "emoticons," social embarrassment, or public disgrace. In the workplace, Grasmick and Kobayashi (2002) showed that non-monetary sanctions based on socially imposed embarrassment are proposed to be deterrents to employee noncompliance with organizational rules. Regulators are also experimenting with the public disclosure of inspection results, names of violating companies in public registers, or shaming offenders in the media (Van Erp 2008). In Denmark and the United Kingdom, scores on the doors are associated with negative smileys showing the extent to which restaurants do not comply with hygiene standards. In California, a utility company gave customers feedback by printing neighborhood comparisons on energy bills, along with a "smiley face" for bills with relatively low energy usage and a frown for those with high usage.

participants have the opportunity to purchase extra units of “output” to artificially increase their performance and possibly their rank in the performance distribution. They can buy from 0 to 20 units of output that are added to their original performance; the cost of each unit is 0.5 ECUs. At the end of this stage, the computer program displays the final performance of each group member and the associated ranking.

The sabotage treatments are similar to the redemption treatments except that in the second stage participants can pay to reduce the performance of their coworkers. They can assign from 0 to 20 costly points to each of the other members “to reduce their score.” Each point assigned by player i to player j reduces player j ’s performance by one unit of output and this may modify the provisional ranking resulting from performing the task in the first stage. Assigning points is equivalent to sabotage. While player j ’s earnings are unaffected by receiving sabotage points, a participant who sabotages incurs a cost of 0.5 ECUs per point of sabotage that is subtracted from the wage to determine the final earnings for the period. While each sabotage or redemption point costs the same, we acknowledge that in some cases, one redemption point allows the participant to improve her position relative to the two other group members, whereas one sabotage point targets only one person. This brings up the issue of relative cost.¹¹

As in the redemption treatment, participants can observe any change in the performance of the three group members at the end of the second stage. However, while they can see if their group members have artificially increased their own score in the redemption treatment, they are not informed about who has sabotaged their output. We also conducted a variant of the sabotage treatment with symbols to illustrate ranks.

Buying redemption and sabotage points can be associated with status seeking, because the ranks or trophies earned will be displayed on the screen of the group members at the end of each period. In addition, this information will also be provided after groups have been rematched in the next periods. Indeed, the participants can see the profile of their two coworkers at the beginning of each period. In the baseline treatment, the profile includes the group members’ gender and school. In all the other treatments, it also includes a historical record of the number of times a participant has been ranked first and last throughout the previous periods. In the treatments with symbols, the screen displays the number of gold medals and donkey hats accumulated by each group member.

¹¹ In the context of public good games, it has been found that the decision to punish is influenced not only by the cost of punishment but also by its impact on the target (Masclet and Villeval 2008, Nikiforakis and Normann 2008).

The accumulation of displayable ranks and symbols builds the social image of the participant over time. It is important to provide this information “publicly” since image and status require publicity. This also allows us to investigate the importance of in-group effects on decisions, and notably whether in-group biased individuals are less willing to sabotage their peers. Indeed, the literature in social psychology and economics has shown the importance of group identity on behavior (Brewer 1999, Akerlof and Kranton 2000, Charness et al. 2007, Halevy et al. 2008, Chen and Li 2009, Delfgaauw et al. 2009).

2.2. Procedures

The experiment consists of 44 sessions of 10 periods each; 26 sessions were conducted at the Center for Research in Economics and Management–National Center for Scientific Research (CNRS) (Laboratory of Experimentation in Social Sciences) Institute of the University of Rennes 1, and 18 sessions were conducted at the Groupe d’Analyse et de Théorie Economique–CNRS Institute of the University of Lyon, France. Between 9 and 15 individuals took part in each session, for a total of 585 participants who were invited via the ORSEE (Online Recruitment System for Economic Experiments) software (Greiner 2004). The participants were undergraduate students from a variety of majors including business, economics, law, engineering, medicine, and literature. Table A in the online appendix displays summary information about the sessions. The experiment was programmed using the Z-tree platform (Fischbacher 2007). The experiment lasted, on average, 90 minutes, and each participant earned an average of 14.64 euros, including a show-up fee of 5 euros.

3. Behavioral Hypotheses

If one assumes that individuals maximize their own payoff, the theoretical prediction for the baseline treatment is straightforward: the minimum effort possible should be exerted. The same prediction applies to the ranking treatments. In the redemption and sabotage treatments, the only subgame-perfect equilibrium of the game, whether played once or finitely repeated, is for no participant to work and purchase redemption or sabotage points.

One may, however, relax some assumptions and consider that participants may have an intrinsic motivation for working. Intrinsic motivation includes self-esteem, interest and pride in one’s work, an innate sense of duty to honor contractual obligations (Baron 1988, Kreps 1997, James 2005, Ellingsen and Johannesson 2008), or a sense of fulfillment (Deci 1975, Kuhnen and Tymula 2012). Several studies of the gift-exchange game have shown that, despite the absence of any penalty for shirking, workers respond to flat wages by exerting non-null effort levels (Fehr

et al. 1993, Gneezy and List 2006, Cohn et al. 2009, Gächter and Thöni 2010, Kube et al. 2013). This holds even in the absence of repeated relationships or when wages are exogenously chosen (Falk and Ichino 2006, Kuhnen and Tymula 2012, Dohmen and Falk 2010). Based on these previous findings, we can write the following hypothesis:

HYPOTHESIS 1 (H1). *Even under flat wages, individuals exert positive levels of effort.*

Intrinsic motivation can be reinforced by feedback on relative performance and social comparisons. Individuals may be motivated by their relative performance, enjoy outperforming others, and desire even the modest status feasible in our experiment because it improves social (and perhaps even self-) image. Indeed, there is strong evidence that people care not only about their own payoffs but also about social image and status (Ball and Eckel 1998, Huberman et al. 2004, Rustichini 2008, Clark et al. 2010, Eckel et al. 2010, Kosfeld and Neckermann 2011).

Concerning performance comparisons, several studies have found positive effects of feedback on effort provision. Under a flat-wage scheme, Falk and Ichino (2006) and Mas and Moretti (2009) show that peer effects increase productivity when workers can observe each others' output. This supports the idea that individuals incur disutility when falling behind their fellow workers. Kuhnen and Tymula (2012) observe that agents work harder when they observe their ranking and underline the role played by self-esteem and desire for dominance.¹² A recent neuroeconomic study revealed that outperforming others activates the neural circuitry associated with reward processing (Dohmen et al. 2011). A notable exception is Barankay (2012), who finds a negative effect of rank feedback on salesmen's effort in a natural field experiment, due to a "demoralization effect" of being informed about a lower than expected rank. Based on most of these previous findings, we conjecture that the positive effect of rank feedback on performance should dominate.

The expected net effect on motivation of adding symbols to materialize ranks is unclear. On one hand, symbols may incite individuals to outperform others to obtain a trophy or to avoid the stigmatization of a negative symbol (e.g., Kosfeld and Neckermann 2011, Pan and Houser 2011). On the other hand, previous studies have shown that small monetary, but also nonmonetary rewards such as gold stars, candies, or thank-you gestures, may crowd out intrinsic motivation (Deci 1975, Harackiewicz 1979, Gneezy

and Rustichini 2000, Cameron et al. 2001, Frey and Jegen 2001, Shalley et al. 2004). A person may be reluctant to work for a small symbolic compensation because this may signal to others her willingness to accept a very small reward, which weakens her social image (Ariely et al. 2009). Based on these findings and on the fact that, in our current study, symbols have no real value per se, particularly in terms of recognition from the principal (Ellingsen and Johannesson 2007), we conjecture that adding symbols would reduce performance. This is summarized in the following hypothesis:

HYPOTHESIS 2 (H2). (a) *In a flat-wage environment, providing rank feedback increases performance.* (b) *The introduction of symbols has a net negative effect on performance.*

Our next hypothesis concerns the effects of sabotage or redemption. We are not aware of any study on redemption or sabotage activities in settings with a flat payment scheme. Sabotage has been widely studied in tournaments with monetary prizes (Lazear 1989, Garicano and Palacios-Huerta 2006, Harbring et al. 2007, Falk et al. 2008, Harbring and Irlenbusch 2008, Carpenter et al. 2010). These studies suggest that the rationale for sabotage lies in the urge to earn more, as its frequency increases in the size and spread of prizes. But sabotage could also result from the desire to win per se. For example, destructive activities, such as money burning, can be partly explained by a desire for dominance (Abbink and Sadrieh 2009).¹³ We conjecture that in our experiment individuals may sabotage if they value their status sufficiently highly and if they have strong competitive preferences and desire for dominance. For similar reasons, individuals may artificially increase their own performance even under a flat-wage scheme. Since for the same cost each redemption point may allow an individual to increase her position relative to the two other participants, while one sabotage point targets only one individual, we conjecture that participants buy more redemption points than sabotage points. This is stated precisely in the following hypothesis:

HYPOTHESIS 3 (H3). (a) *Individuals with strong competitive preferences may sabotage others or increase artificially their own performance.* (b) *Individuals should buy more redemption points than sabotage points.*

Our last conjecture concerns the effects of sabotage and redemption on performance. We expect strong negative effects of sabotage on net performance. Such destructive effects have been observed in

¹² A positive effect of rank feedback has been identified under piece-rate payment schemes and in tournaments (Azmat and Iriberry 2010a, b; Hannan et al. 2008); however, Eriksson et al. (2009) found mitigated results.

¹³ Sabotage may also be due to pure nastiness. In that case, one should observe that individuals sabotage indifferently the lowest and the highest ranked coworker.

the context of monetary tournaments. Sabotage may reduce the efficiency of an organization for three main reasons: (i) it destroys resources, in particular if the highest performers are also those who are more likely to be sabotaged (Chen 2003); (ii) it demotivates workers if they anticipate that they will be the victims of sabotage (Carpenter et al. 2010); and (iii) it may lead to retaliation if the saboteur's identity is revealed (Harbring et al. 2007, Abbink and Hermann 2011). In a flat-wage environment, we expect sabotage to induce a significant decrease of initial performance (by destroying output) and final performance (net of sabotage activity). Even if workers are rematched after each period, sabotage may also lead to blind revenge. We expect less negative effects of redemption activities on initial performance and motivation, as they do not alter coworkers' output. This is stated in the following hypothesis:

HYPOTHESIS 4 (H4). *Sabotage has a detrimental effect on both initial and final performance by destroying output and discouraging effort. The impact of redemption activities on initial performance is also negative, but to a more moderate degree.*

4. Experimental Results

This section presents a comparative analysis of performance across treatments, before studying the determinants of redemption and sabotage activities.

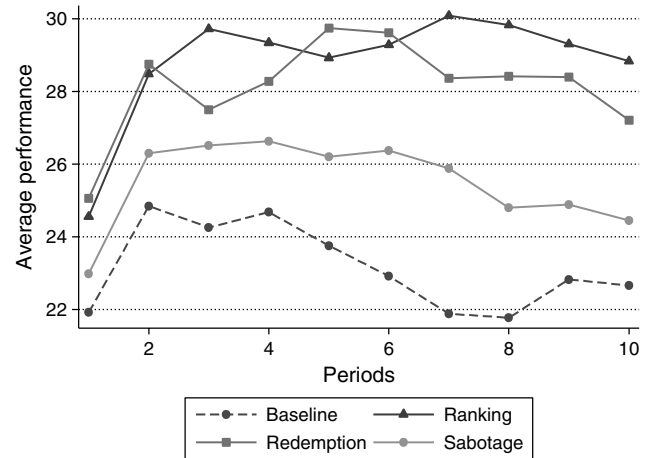
4.1. Determinants of Performance

Our findings reveal that informing participants about their relative performance in the ranking treatment increases work effort compared with the baseline treatment. Introducing the opportunity to artificially change one's own relative performance does not greatly affect work effort in the redemption treatment but decreases performance in the sabotage treatment, both in comparison to the ranking treatment.

4.1.1. Performance Levels Across Treatments.

Consider first the treatments without symbols. The average performance is 23.15 units per period in the baseline treatment and 28.84 units in the ranking treatment. A Mann–Whitney pairwise test indicates that this difference is significant ($p = 0.010$).¹⁴ These findings are consistent with H1 and H2. The mean initial score in the redemption treatment (28.14 units) is slightly (but not significantly) lower than in the ranking treatment. The mean final performance (28.99 units) is almost the same as the performance in the ranking treatment. Sabotage has a negative impact on both initial and final performance. The mean final performance is 25.09 units, which

Figure 1 Evolution of the Average Initial Performance Over Time by Treatment (Without Symbols)



is significantly lower than in the ranking treatment ($p = 0.010$). Interestingly, sabotage also has an indirect negative effect on initial performance. On average, initial performance is 25.51 units in the sabotage treatment, which is significantly lower than in both the ranking treatment ($p = 0.045$) and the redemption treatment ($p = 0.082$). Consistent with H4, these findings indicate that sabotage totally offsets the positive effects of feedback on performance both directly by destructing final performance but also indirectly by demotivating individuals.

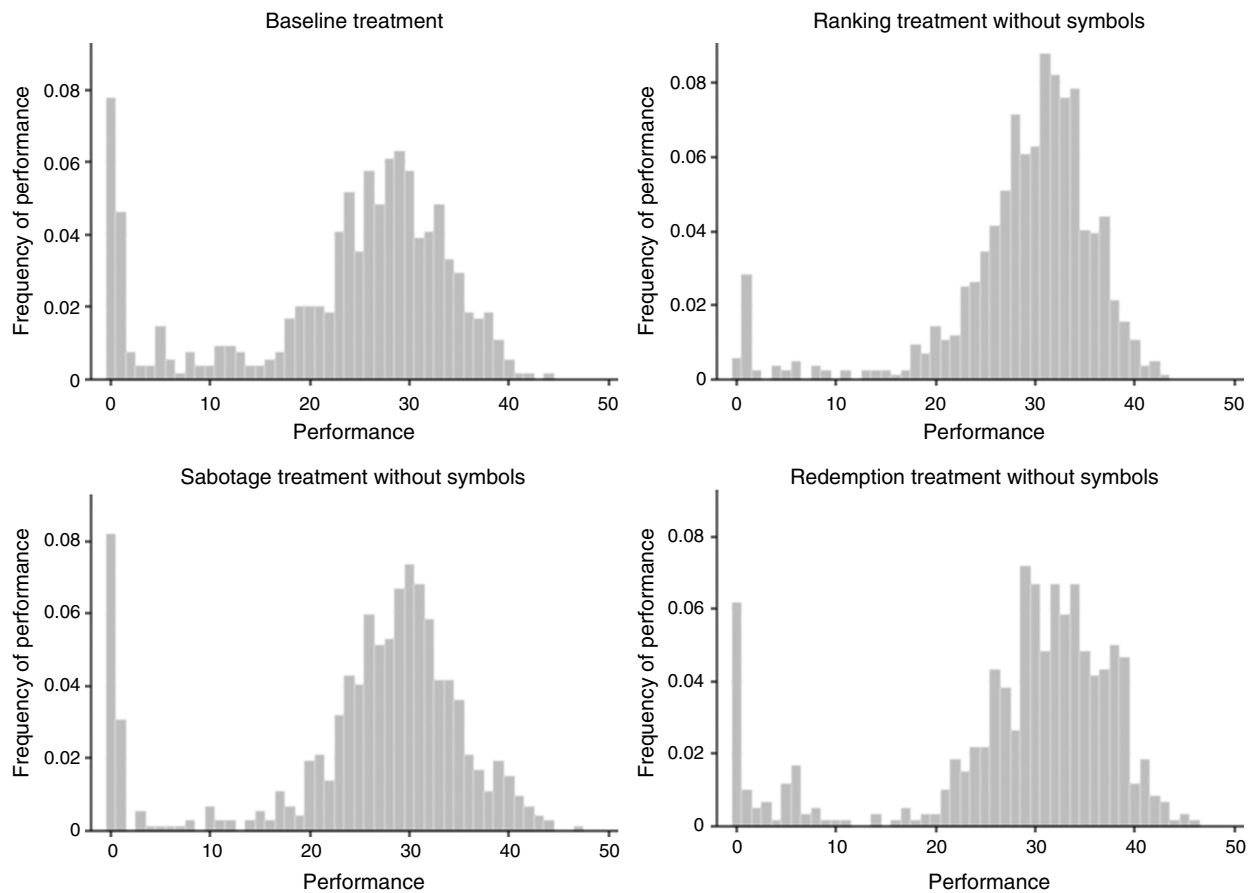
Figure 1 displays the time path of average initial performance by period in all treatments without symbols. Figure 2 describes the distribution of initial performance per treatment. The corresponding figures for the treatments with symbols are available in the online appendix (Figures A and B). These figures report similar findings.

Figure 1 shows that after an initial jump in performance between periods 1 and 2, likely due to learning, the average performance decreases after period 5 in all but the ranking treatment. This evolution suggests that performance comparisons prevent a decline in performance, provided that there is no opportunity for unethical behavior. Figure 2 indicates that feedback reduces both the variability in performance and the number of no-effort (or very low effort) choices. The frequency of no-effort choices is 7.77% in the baseline treatment and 0.60% in the ranking treatment, which differ significantly ($p = 0.018$). In sharp contrast, it is 8.19% and 6.17% in the sabotage and redemption treatments, respectively, which is not different from the baseline treatment ($p = 0.669$ and $p = 0.623$). This is probably because the positive impact of feedback is offset by the refusal of some individuals to work in such an unethical environment.

The econometric analysis reported in Table 1 provides more formal support to these results. Table 1

¹⁴ All the tests reported in this paper are two-tailed Mann–Whitney pairwise tests with each session as an independent observation, unless specified otherwise.

Figure 2 Distribution of Performance per Treatment (Without Symbols)



consists of three panels. The first panel displays the results of a regression in which the dependent variable is the initial individual performance in the treatments without symbols. The second panel displays a similar regression for the treatments with symbols. Finally, the third panel presents the results of estimates on pooled data (with and without symbols). Models (1)–(3) are generalized least squares (GLS) models with robust standard errors clustered at the session level to control for serial correlation within each session. To check the robustness of our results, models (4) and (5) are random-effect Tobit models controlling for the number of left-censored observations. The independent variables include treatment dummies, a dummy variable for periods 6–10, and several demographic variables.¹⁵ In addition, we

include in models (3)–(5) several interaction variables to check whether adding symbols influences initial performance in each treatment. Model (5) also controls for trend differences across treatments in the second half of the game.

Model (1) shows that providing feedback on relative performance has a positive and significant effect on initial performance. All else being equal, players' effort is predicted to increase by 5.89 units in the ranking treatment compared with the baseline treatment. The dummy variable *redemption* also captures a positive and significant coefficient, indicating that individuals also provide more effort in this treatment than in the baseline treatment. Performance is 5.32 units higher than in the baseline treatment. Introducing the opportunity to sabotage reduces both the value and the significance of the effect of feedback on ranking, suggesting that the positive effects of ranking are almost totally offset by the introduction of sabotage activities.

Model (2) reports qualitatively similar results for the treatments with symbols, although the coefficients are both smaller and less significant. Models (3) and (4) confirm these findings, showing that symbols have a negative effect on initial performance

¹⁵ The demographic variables include gender, being a student at the university versus in another school, studying economics, and location (Rennes or Lyon). These variables are not significant or if significant, not robust. We checked whether males were more sensitive to ranking information by including an interaction variable *ranking*gender* in the estimates (available upon request). This variable is insignificant, indicating the absence of gender effect regarding ranking information in our experiment.

Table 1 Determinants of Effort

Dependent variable:	Treatments without symbols	Treatments with symbols	All treatments		
	<i>Initial performance</i>	<i>Initial performance</i>	<i>Initial performance</i>		
	RE GLS (1)	RE GLS (2)	RE GLS (3)	RE Tobit (4)	RE Tobit (5)
Models:					
<i>Baseline</i>	Ref.	Ref.	Ref.	Ref.	Ref.
<i>Ranking</i>	5.888*** (0.627)	2.715** (1.301)	5.535*** (0.691)	5.884*** (1.681)	4.408*** (1.711)
<i>Redemption</i>	5.317*** (1.894)	2.777** (1.132)	5.107** (2.064)	5.278*** (1.797)	4.256** (1.830)
<i>Sabotage</i>	2.441* (1.332)	0.998 (1.312)	2.202* (1.290)	2.177 (1.725)	1.644 (1.757)
<i>Ranking * symbols</i>			−2.799** (1.161)	−3.030** (1.475)	−2.813* (1.503)
<i>Redemption * symbols</i>			−2.206 (2.252)	−2.268 (1.655)	−2.800* (1.686)
<i>Sabotage * symbols</i>			−1.081 (1.692)	−1.068 (1.597)	−1.123 (1.627)
<i>Ranking * periods 6–10</i>					2.972*** (0.646)
<i>Redemption * periods 6–10</i>					2.065*** (0.696)
<i>Sabotage * periods 6–10</i>					1.080 (0.670)
<i>Ranking * symbols * periods 6–10</i>					−0.428 (0.568)
<i>Redemp. * symbols * periods 6–10</i>					1.066* (0.641)
<i>Sabotage * symbols * periods 6–10</i>					0.110 (0.620)
<i>Periods 6–10</i>	0.095 (0.459)	0.314 (0.498)	0.389 (0.352)	0.254 (0.166)	−1.719*** (0.507)
Demographics	Yes	Yes	Yes	Yes	Yes
Constant	21.391*** (0.966)	22.182*** (0.979)	21.752*** (0.819)	21.365*** (1.521)	22.342*** (1.539)
Observations	2,700	2,850	5,010	5,010	5,010
Left-censored observations	—	—	—	292	292
Log-likelihood	—	—	—	−16,071.18	−16,052.21

Notes. RE GLS, random effects generalized least squares; RE Tobit, random effects Tobit. Because observations within a session may be dependent, estimates are conducted with robust standard errors clustered on sessions. Robust standard errors are in parentheses.

*Significant at the 0.1 level; **significant at the 0.05 level; ***significant at the 0.01 level.

(only significant in the ranking treatment). This supports our conjecture H2 that symbols may crowd out intrinsic motivation in absence of real value per se. In model (5), the coefficients of the interaction variables *ranking * periods 6–10* and *redemption * periods 6–10* are positive and significant. This confirms that status concern mitigates the decline of performance observed in the second half of the baseline treatment. The variable *sabotage * periods 6–10* is not significant, probably because the impact of status concern is offset by the refusal of some individuals to work in such a hostile environment.

In other Tobit regressions (available upon request), we estimate separately the determinants of final performance in the redemption and sabotage treatments,

with the ranking treatment as the reference. For the redemption treatment, we ran two estimates. In the first one, the independent variables include a dummy variable for the redemption treatment, a trend term, and the usual demographics. In the second estimate, we add the number of points purchased and a dummy for the individuals who never bought redemption points throughout the game. For the sabotage treatment, we include a dummy for the sabotage treatment, the numbers of assigned and received points, a dummy variable for the participants who never sabotaged throughout the game, as well as an interaction term to control for those who never sabotaged and do not suffer from sabotage at the current period.

The coefficient associated with the redemption variable is not significant, indicating that the final performance in the redemption treatment does not significantly differ from the ranking treatment. Indeed, we learn from the second estimate that if the number of redemption points purchased has a positive effect on final performance (coeff. = 0.806***, SE = 0.074), this effect is offset by the fact that those who never purchase redemption points have significantly lower final performance (coeff. = −5.790***, SE = 1.564). Regarding the sabotage treatment, the net effect of sabotage on final performance is clearly negative compared to the ranking treatment (coef. = −4.032***, SE = 1.472). This is mainly due to the receipt of sabotage points (coeff. = −0.886***, SE = 0.079) and to the fact that those who never sabotage decrease their effort significantly (coeff. = −5.280***, SE = 1.635). This is even the case for those who did not receive any sabotage points (coef. = −2.995***, SE = 0.641), indicating a clear demotivating effect of working in such a hostile environment. Finally, those who assign sabotage points tend to have a higher final performance, although the difference is not significant.¹⁶ Our main findings are summarized in the following result:

RESULT 1. (a) *Feedback has a positive significant effect on performance in the ranking treatment.* (b) *Relative to the ranking treatment, this effect is decreased by the introduction of sabotage due to both a destruction of final performance and a de-motivating effect on initial performance.* (c) *The introduction of symbols to illustrate rank has a slight negative effect on initial performance.*

4.1.2. Status Seeking and the Dynamics of Performance. The rank in the distribution of performance and status-seeking activities in the previous period may be important determinants of subsequent performance. To measure these effects, we now focus on the impact of feedback on changes in individual performance across periods.

Table 2 reports estimates on the determinants of changes in individual performance between period $t - 1$ and period t in random-effects GLS regressions in each treatment. The independent variables in model (2) include $rank_i^x$ variables corresponding to the position of participant i . These variables are dummies that equal 1 if the individual is in relative position x in the distribution and 0 otherwise (with $x = 1, 2$, or 3 for the highest, intermediate, and lowest position, respectively). We also include interaction terms

Table 2 First Differences in Work Effort by Treatment (Random-Effects GLS Models)

Treatments: Models:	Ranking (1)	Sabotage (2)	Redemption (3)
$Rank_i^1$ in $(t - 1)$	Ref.	Ref.	Ref.
$Rank_i^2$ in $(t - 1)$	1.260*** (0.249)	0.363 (0.573)	1.043* (0.581)
$Rank_i^3$ in $(t - 1)$	2.156*** (0.369)	1.821*** (0.498)	3.345*** (0.709)
$Rank_i^2$ in $(t - 1) * symbol$	0.119 (0.308)	0.167 (0.630)	0.825 (0.506)
$Rank_i^3$ in $(t - 1) * symbol$	0.174 (0.406)	0.133 (0.408)	−0.112 (0.690)
$Rank_i^3$ in $(t - 1) * change$		2.942 (1.856)	−1.708* (0.940)
<i>Sabotage received</i> in $(t - 1)$		−0.246** (0.125)	
<i>Sabotage assigned</i> in $(t - 1)$		0.142*** (0.029)	
<i>Redemption purchased</i> in $(t - 1)$			0.236*** (0.063)
Constant	−0.707*** (0.134)	−0.534** (0.268)	−1.282*** (0.307)
Observations	1,512	1,296	1,215

Notes. “Sabotage received,” “sabotage assigned,” and “redemption purchased” refer to the number of points. Robust standard errors are in parentheses, clustered at the session level. Demographics that are invariant across periods are not included in the estimates.

*Significant at the 0.1 level; **significant at the 0.05 level; ***significant at the 0.01 level.

$rank_i^x * symbol$ corresponding to the relative position of participant i in the treatments with symbols. In addition, we include a variable to test for the influence of changes in the relative position of a subject in the distribution of performance due to status-seeking activities in the previous period. The $rank_i^3$ in $(t - 1) * change$ variable equals 1 if the subject has ended up in the lowest rank in period $t - 1$, while she had a higher rank at the end of the first stage of the previous period, and 0 otherwise. Finally, we include the number of sabotage points assigned and received. Model (3) displays a similar estimate for the redemption treatments with the same variables as in model (1), except that we add the number of redemption points purchased by the individual in the previous period.

Table 2 indicates that, in all treatments, having a lower rank in the distribution in $t - 1$ leads people to increase their effort in the next period, confirming that performance comparisons support motivation in each treatment. This finding is consistent with studies showing that people ranked worse (better) than expected increased (decreased) output (Kuhnen and Tymula 2012). Furthermore, being a victim of sabotage has a significant negative impact on future effort. Interestingly, those who purchase sabotage or redemption points exert significantly more

¹⁶ In the redemption treatment, the mean final performance is 25.07 (SD = 12.12) for the participants who never bought redemption points and 31.87 (SD = 6.68) for the others. The corresponding values in the sabotage treatment are 21.29 (SD = 13.20) and 27.85 (SD = 6.24). These statistics are based on pooled data of treatments with and without symbols. Similar findings are obtained on separate treatments.

effort in subsequent periods, indicating that sabotage (redemption) and work effort are complementary activities. Our findings are summarized in the following result:

RESULT 2. (a) *A lower rank in period $t - 1$ induces people to increase their effort in the next period.* (b) *Individuals who buy sabotage or redemption points in $t - 1$ increase their subsequent effort.* (c) *Being a victim of sabotage in $t - 1$ has a significant negative effect on future work effort.*

4.2. Determinants of Redemption and Sabotage Activities

In the treatment without symbols, 6.94% of individuals purchase sabotage points and 15.34% buy redemption points in a period in the treatments without symbols. In the treatments with symbols, these proportions are, respectively, 13.75% and 15.20%. Although the proportions of cheaters in a period are relatively low, they may be rather realistic since one does not expect a high proportion of people in the field to engage frequently in sabotage or redemption. However, when considering the entire session, we observe that 34.72% of individuals buy at least one sabotage point during a session and 35.00% of individuals buy at least one redemption point during a session in the treatments without symbols.¹⁷ In the treatments with symbols, these percentages are 51.39% and 41.33%, respectively. Thus, a very substantial proportion (one-third to one-half) of all participants are willing to spend money to affect their relative rank without any positive effects on their own income.

The participants buy, on average, 0.41 sabotage points (SD = 2.87) and 0.85 redemption points (SD = 1.55) per period in the treatments without symbols. A Mann–Whitney pairwise test indicates that people assign significantly more redemption than sabotage points ($p = 0.068$), which is consistent with H3. The high standard deviation indicates that there is a great deal of heterogeneity among individuals. In the treatments with symbols, players buy, on average, 1.07 sabotage points (SD = 3.05) and 0.78 redemption points (SD = 2.56). These numbers are not significantly different ($p = 0.460$). Thus, more sabotage points were assigned in the treatment with symbols than without symbols ($p = 0.044$), whereas no difference was found between the two redemption treatments ($p = 0.753$). The fact that sabotage is stronger in the treatment with symbols suggests that symbols activate overtly destructive competitive preferences

more for those who are inclined to engage in unethical activities.

In the treatments without symbols, those who sabotage buy, on average, 4.00 points (SD = 3.12), which represents 20.00% of their income for the period. Similarly, those who pay to increase their performance purchase, on average, 5.59 points (SD = 5.26), representing 27.95% of their income for the period. In the treatments without symbols, those who sabotage buy, on average, 5.11 points (SD = 5.13), 25.55% of their income for the period, and those who buy redemption points purchase, on average, 5.11 points (SD = 4.59), 25.55% of their income for the period.

4.2.1. Status Seeking and Redemption. Table 3 provides a more formal analysis of the determinants of redemption and sabotage activities. The left panel reports two random-effect Tobit regressions on the determinants of the number of redemption points participant i buys to artificially increase her performance (models (1) and (2)). The right panel reports similar regressions on the determinants of sabotage (models (3) and (4)).¹⁸ In models (1) and (2), the independent variables include the participant's initial performance and its squared value to test for potential nonlinearity, the rank in the distribution, a dummy variable for periods 6–10, and another dummy for the treatment with symbols. The *tie in performance* variable equals 1 if the participant's initial performance is identical to the performance of another group member and 0 otherwise. We control for demographic variables. Model (2) also accounts for the characteristics of the two coworkers to identify the presence of in-group effects. Precisely, *same gender* equals 1 if all group members are either males or females and 0 otherwise. *Same school* equals 1 if all the group members belong to the same school and 0 otherwise. Last, *mean cumulated rank* _{i} ¹ (*mean cumulated rank* _{i} ³) variables indicate the mean number of times coworkers have received the highest (lowest) rank in total previous periods. These variables indicate the mean status of coworkers.

These regressions show that the higher their initial performance, the more individuals buy redemption points. Controlling for performance, the *rank* _{i} ² and *rank* _{i} ³ variables have highly significant positive coefficients, indicating that participants buy more redemption points when they occupy the intermediate or the lowest position in the distribution compared with those who hold the highest position. They also buy redemption points to differentiate themselves from other group members in case of a tie. These findings support H3. No difference is found across treatments with and without symbols. Last, belonging to

¹⁷ The explanation behind these differences of percentages is that most players do not buy points repeatedly. Some may buy points only when their relative performance puts them at risk of finishing the period as the worst performer; others may buy points when they are not far from getting the first rank.

¹⁸ Separate estimates for treatments with and without symbols report very similar findings.

Table 3 Determinants of Redemption and Sabotage Activities (Random-Effects Tobit Models)

Dependent variables:	Number of points purchased by <i>i</i> in the redemption treatment		Number of points assigned by <i>i</i> to <i>j</i> in the sabotage treatment	
Models:	(1)	(2)	(3)	(4)
<i>Initial performance</i>	0.443** (0.225)	0.439* (0.225)	0.642*** (0.171)	0.705*** (0.199)
<i>Initial performance</i> ²	−0.008* (0.005)	−0.008 (0.005)	−0.009*** (0.003)	−0.010*** (0.004)
<i>Rank</i> _{<i>i</i>} ¹	Ref.	Ref.	Ref.	Ref.
<i>Rank</i> _{<i>j</i>} ²	2.026*** (0.937)	2.179** (0.960)	1.759*** (0.572)	−0.617 (0.764)
<i>Rank</i> _{<i>i</i>} ³	3.340*** (1.145)	3.410*** (1.241)	2.784*** (0.710)	1.107 (0.913)
<i>Tie in performance</i>	2.637** (1.088)	2.512** (1.071)	3.174*** (0.810)	3.047*** (0.865)
<i>Rank</i> _{<i>i</i>} ² * <i>rank</i> _{<i>j</i>} ¹				3.979*** (0.679)
<i>Rank</i> _{<i>i</i>} ³ * <i>rank</i> _{<i>j</i>} ²				2.065** (0.876)
<i>Treatment with symbols</i>	0.416 (1.961)	0.671 (1.976)	3.863*** (0.883)	3.252*** (0.934)
<i>Periods 6–10</i>	−3.351*** (0.697)	−3.082*** (0.722)	−0.729* (0.427)	−0.407 (0.474)
<i>Sabotage received by i</i> <i>in (t − 1)</i>				0.209*** (0.081)
<i>Mean cumulated</i> <i>rank</i> _{<i>i</i>} ¹		−0.683 (2.196)		0.271 (1.692)
<i>Mean cumulated</i> <i>rank</i> _{<i>i</i>} ³		−2.327 (2.025)		−4.026** (1.758)
<i>Same gender</i> <i>as coworkers</i>		1.447** (0.721)		−0.058 (0.520)
<i>Same school</i> <i>as coworkers</i>		3.063** (1.207)		−2.645*** (0.998)
<i>Demographics</i> <i>Constant</i>	Yes −21.856*** (3.879)	Yes −22.327*** (3.943)	Yes −25.329*** (2.766)	Yes −25.827*** (3.322)
Observations	1,350	1,350	2,880	2,592
Left-censored observations	1,144	1,144	2,567	2,316
Log-likelihood	−918.495	−911.250	−1,453.043	−1,261.535

Notes. Data from the treatments with symbols and without symbols are pooled. Standard errors are in parentheses.

*Significant at the 0.1 level; **significant at the 0.05 level; ***significant at the 0.01 level.

the same school and having the same gender as the two coworkers has a positive and significant impact on the willingness of people to increase their performance artificially. This finding suggests the existence of rivalry between in groups. Our findings are summarized in the following result:

RESULT 3. (a) *Individuals buy redemption points to improve their ranking and to differentiate themselves from others.* (b) *There exists a positive relationship between initial performance and redemption activity.* (c) *Group identity in terms of gender and school leads individuals to artificially increase their performance.*

4.2.2. Status Seeking and Sabotage. The right panel of Table 3 reports estimates on the determinants

of the number of sabotage points assigned by player *i* to player *j*. In addition to the independent variables included in models (1) and (2), in model (4) the *rank*_{*i*}² * *rank*_{*j*}¹ and *rank*_{*i*}³ * *rank*_{*j*}² variables are dummies indicating when *i* occupies the intermediate and the lowest position and *j* occupies the highest and the intermediate one, respectively. The *tie in performance* variable equals 1 if *i*'s initial performance is identical to *j*'s performance and 0 otherwise. We control for demographic variables.

As for redemption, the harder individuals work, the more they sabotage. We find a more significant inverted U-shaped relationship between initial performance and the number of sabotage points. After

controlling for performance, the positive effect of $rank_i^2$ and $rank_i^3$ in model (3) indicates that those who are not the best performers are more likely to sabotage. The coefficients of these variables are no longer significant in model (4) when $rank_i^2 * rank_j^1$ and $rank_i^3 * rank_j^2$ are included. The positive and significant coefficients of these interaction variables suggest that individuals only target the participant who is ranked immediately above them. Participants assign more sabotage points when a coworker's performance is equal to their own. Our analysis confirms our previous findings that sabotage is significantly higher in the treatment with symbols, suggesting that symbols reinforce the competitive preferences of those who are inclined to exert unethical activities.¹⁹ Having received sabotage points in the previous period has a significant positive impact, suggesting that sabotage is also partly motivated by blind revenge.

Finally, our data indicate that the composition of the group may matter. The variable *mean cumulated rank_{-i}* has a significant and negative coefficient: The presence of low-status coworkers (who accumulated a higher number of last ranks in previous periods) reduces the willingness to sabotage. Belonging to the same school as the other group members reduces the willingness to sabotage. A possible interpretation is that people are reluctant to sabotage their peers because of in-group preferences. Belonging to the same gender does not generate the same behavior, suggesting that this confers a weaker sense of group identity. These findings differ from our previous results on redemption. One interpretation is that in a group of peers, people are particularly competitive provided that rivalry does not harm others. Our findings are summarized in the following result:

RESULT 4. (a) *Individuals sabotage (i) to achieve a better rank in the group, (ii) to differentiate in case of ties, and (iii) to retaliate blindly.* (b) *Individuals sabotage more in the treatment with symbols.* (c) *There is an inverted U-shaped relationship between sabotage and effort.* (d) *Belonging to the same school reduces the participants' willingness to sabotage.*

4.2.3. Robustness Test. One might be concerned about one assumption of our treatments because of the possibility that it is the certainty of being close to another person's performance level that drives cheating. Indeed, in real-world settings, individuals

are not always informed about their exact relative performance. Therefore, they may be more reluctant to engage in cheating, since it is more difficult to correctly anticipate its effect on final rankings. We addressed this issue by designing a new sabotage treatment with uncertainty and with symbols.²⁰ In this treatment, participants cannot observe their true relative output at the end of the first stage. They are only informed about an approximate value of each coworker's performance randomly drawn from an interval $[x - 2, x + 2]$. More explicitly, participants are informed about their exact own performance. In contrast, they can only get a signal of others' performance that is randomly chosen among the values: $x - 2$, $x - 1$, x , $x + 1$, $x + 2$. This treatment is included as a robustness test to check whether unethical activities might also be influenced by uncertainty about one's relative position.

In a period, 17.50% of the participants buy sabotage points, whereas 13.75% did so in the treatment with certainty. The direction of this difference is opposite of what would be found in relation to the concern mentioned above. When considering the entire session, our data show that the percentage of saboteurs is relatively stable with respect to the degree of uncertainty. The percentage of participants who buy at least one sabotage point during a session is 50.00% in the new treatment and 51.39% in the treatment with certainty. The estimation of a random-effects Tobit model in which the number of sabotage points is the dependent variable shows that the difference between these two treatments is not significant.²¹

This finding may be due to the existence of two opposite effects: uncertainty may refrain some individuals to engage in sabotage because it is difficult to anticipate its impact on final ranking; others may seek to compensate for the effect of uncertainty by sabotaging even more to increase their chance of getting a better rank.

5. Discussion

Our data confirm that even under a flat-wage scheme most individuals exert substantial effort, especially when they learn their ranking. This suggests that feedback about rank gives additional incentives to outperform. At the same time, rank feedback leads

¹⁹ This finding is in apparent contradiction with our previously identified crowding-out effect of symbols on performance. However, this may simply reflect the heterogeneity of participants. Those who have strong competitive preferences are even more willing to sabotage in the presence of symbols, while the others decrease their effort even more. Another possible explanation may be that people exert less initial effort in anticipation that sabotage is going to be higher.

²⁰ We chose to focus on the sabotage treatment because it provides the clearest evidence of detrimental effects on overall performance; we would expect quite similar effects of uncertainty in the redemption treatments.

²¹ This model is similar to model (4) in Table 3, except that we only consider the treatments with symbols and the independent variables include a dummy variable for the treatment with uncertainty. The p -value for this treatment dummy is $p = 0.633$. $N = 2,806$; log-likelihood = $-2,022.19$. This regression is available upon request.

some individuals to incur a cost to sabotage the work of others or to increase artificially their own output. Our intuition is that paying people a flat wage and giving them feedback on their performance ranking leads those who have competitive preferences to invest in status-seeking activities, including unethical ones.

An objection to this interpretation in terms of competitive preferences is that feedback may simply convey information regarding norms about the appropriate productivity level.²² Alternatively, individuals may work harder because they want to signal that they are smart. Although we acknowledge that these reasons are plausible, these interpretations are inconsistent with some of our findings. In particular, both redemption and sabotage activities are relatively inconsistent with an interpretation in terms of signaling or social norms.

Another possible objection to this interpretation is that both effort choices and the purchase of sabotage and redemption points may simply derive from the fact that participants feel committed to perform the task and buy points in order to please the experimenter perceived as an “authority” (see Zizzo 2010 on experimenter demand effects). Levitt and List (2007) also raise the concern that in a laboratory setting, morality issues can affect participants’ behavior, especially because their actions are scrutinized.²³ Although we acknowledge that such effects may exist, this interpretation is unlikely to account for our results for several reasons.²⁴ First, we were careful to avoid having our own students in the experiment, to use no frame in the instructions, and to minimize the interactions between the players and the experimenter.²⁵ Second, we have designed a neutral environment. Third, even if some forms of authority relationship between the participants and the experimenter did still exist, this would mirror the

field setting where such a vertical relationship exists, enhancing the external validity of our experiment. Finally, a demand effect could not explain all the differences observed across treatments.

We interpreted the fact that people exert positive effort under the flat-wage scheme in the baseline treatment in terms of intrinsic motivation. However, another interpretation is that individuals chose to perform because they may have perceived the real-effort task as simply a fun computer game. We acknowledge that this possibility may exist. Yet, several precautions have been taken to minimize such effect. First, we were careful to choose a task that was sufficiently fastidious to avoid such bias. Second, we allowed for alternative leisure activities on the job. Third, the fact that we observe variance both across treatments and among participants in the provision of effort seems to indicate that people did not simply decode for fun and that decoding tasks required a real and costly effort. In particular, several individuals chose to exert no effort at all in the baseline treatment. Finally, if the disutility of effort is decreased because the individuals find the task enjoyable, it might be considered as intrinsic motivation.

One may also argue that our observation of unethical activities may be biased. First, one might conjecture that the level of unethical behavior may be overestimated because of cost associated with such behavior in real life (notably the penalty if caught) that are absent in this study. Note, however, that because of the informal nature of such activities, it is difficult for a firm to set up mechanisms that would allow detection. It seems that peer sanctions are more probable. Second, one might also argue that the observed unethical behavior might be explained by pure nastiness (Abbink and Sadrieh 2009). However, it seems that it is not really the case as individuals buy redemption or sabotage points either to reach the highest rank in their group or to avoid the lowest one. This behavior is, therefore, more consistent with status-seeking motivated by competitive preferences and desire for dominance (Rustichini 2008). Third, one may postulate that the observed unethical behavior may simply reflect noise, confusion, or boredom. Although we cannot totally exclude the possibility that some decisions may have been taken randomly, this interpretation is unlikely to account for our results for several reasons. Our data analysis clearly shows that decisions to sabotage or to buy redemption points are not chosen randomly. As shown in our estimates, sabotage points are assigned either (i) to achieve a better rank in the group, (ii) to differentiate in case of ties, or (iii) to retaliate blindly. In the same vein, individuals buy redemption points to improve their ranking and to differentiate themselves from others. Furthermore, we also observe a positive relationship between effort

²² We thank an anonymous referee for this helpful remark.

²³ In any case, to the extent that such an effect is present, it would imply that the level of unethical behavior that we observe is something of a floor. Another typical concern of Levitt and List (2007) is that participants in typical lab experiments are not representative of the population and that the stakes are low compared to real settings. We acknowledge that our results should probably be limited to highly educated people. With regards to the stakes, it should be acknowledged that they are small in our experiment. But if we observe sabotage and redemption for such low stakes, we can reasonably anticipate that their likelihood should be higher for higher economic stakes.

²⁴ Nevertheless, to the extent that the participants feel scrutinized, it is reasonable to think that this should lead them to emphasize moral norms; if this was the case, our findings regarding sabotage and redemption activities are probably underestimated relative to a natural setting.

²⁵ A debriefing written questionnaire asking players to describe their strategy does not show any evidence for such a demand effect.

and unethical activities, which is clearly inconsistent with the notion that these reflect confusion or boredom. Indeed, we observe an inverted U-shaped relationship between sabotage and effort and a positive relationship between initial performance and redemption activity.

One might also be concerned with the assumption regarding the anonymity of sabotage activities. To what extent would providing individuals with information regarding those who sabotaged them in the past and allowing them to retaliate lead to more or less sabotage? Previous experiments on money-burning and public good experiments with punishment have shown that the effect of information is not clear-cut. On one hand, individuals refrain from destroying money if they anticipate possible retaliation (Nikiforakis 2008, Abbink and Sadrieh 2009).²⁶ On the other hand, the opportunity to avenge previous destruction may lead to escalation and vendetta (Zizzo 2003, Bolle et al. 2010). Introducing a risk of detection could be an interesting extension of our paper.

6. Conclusion

There are many examples in everyday life at work in which people invest resources in nonproductive activities to improve their own relative position in their reference group. This may lead to interpersonal or organizational deviance and to illegal or unethical practices, such as plagiarism, forgery, and sabotage. Our experiment investigates the existence of such behavior in a setting where we pay participants a flat wage to perform a task, useless and deprived from any prestige, and provide them with feedback on their performance ranking.

Our paper indicates that introducing ranking feedback motivates individuals to work harder, as the mean performance is significantly higher in the ranking treatment than in the baseline treatment. This provides evidence that people care about their relative position, and that social comparisons increase motivation for work despite the absence of monetary incentives to outperform. However, we also find that in this environment, some people are willing to incur a cost (over a quarter of their income) to artificially increase their relative position in their group without

any expectation of monetary return of any sort, either by sabotaging the work of others or by increasing their own output artificially. Sabotage and redemption activities are wasteful (apart from the destruction from sabotage), because in the field some energy and effort (which could be devoted to other activities) must be devoted to implement these. In addition, sabotage and redemption have some negative demotivating effects on initial performance. Note that sabotage and redemption activities have been observed, although our task does not require any particular talent; one can suspect that with a more prestigious and meaningful task, we could observe an even stronger concern for performance ranking.

Our work may have several managerial implications in terms of companies' feedback policies. Our findings show that providing ranking feedback creates incentives for employees even when employees are paid a flat wage. As such, it is tempting to recommend that firms give regular feedback on ranking to their employees even under full wage compression. However, sufficient precautions should be taken to avoid that such positive effects of feedback incentives be totally offset by sabotage or cheating activities. Indeed, these feedback incentives may become detrimental to the company if employees can sabotage others' work or artificially increase their performance. The firms may mitigate this problem by making binding announcements that such unethical activities, if detected, would be strongly penalized. Furthermore, it seems that making group identity more salient may also help in reducing sabotage. Indeed, when individuals are matched with peers from the same school they are less likely to sabotage their in-groups. However, while group identity appears to discourage destructive competition among peers, it seems to favor rivalry, as peers from the same gender and from the same school are more likely to increase their performance artificially.

The literature has established that the opportunities for sabotage or cheating may therefore undermine the power of tournaments and influence employers to choose wage compression by paying equal wages regardless of relative performance (Lazear 1989, Falk et al. 2008).²⁷ According to Lazear (1989), some wage compression may be optimal when the proportion of sabotage-prone workers ("hawks") in the firm

²⁶ In a repeated money-burning experiment, Abbink and Sadrieh (2009) observe significantly more destruction in the game under full information compared to a treatment where subjects can hide their destruction behind random destruction. Similarly, Nikiforakis (2008) shows that in the presence of counter-punishment opportunities, cooperators are less willing to punish free riders. As a result, cooperation breaks down and groups have lower earnings in comparison to a treatment without punishments where free riding is predominant.

²⁷ Other factors may also explain the persistence of flat-wage schemes within firms including the role of egalitarian concerns (Ding et al. 2001, Bartling and von Siemens 2010), monitoring costs, and centralization of authority (Prentice et al. 2007). Finally, some authors have investigated the reasons behind the persistence of flat-wage schemes in the public sector. These factors include the specificities of multifaceted tasks and intrinsic motivation for public service that may compensate for quite low and relatively flat extrinsic incentives that the sector offers (Georgellis et al. 2011).

is sufficiently high. In the current paper, we show that even flat and compressed wage environments are not exempt from the occurrence of unethical activities when employees receive feedback on their ranking in performance. This finding mitigates the conclusion that wage compression may be preferable when the proportion of sabotage-prone workers is relatively high since flat-wage environments are not exempt from such activities. Although our paper is not directly aimed at comparing full wage compression and performance-based schemes, it provides interesting findings regarding the issue of optimal wage dispersion. Since flat-wage schemes may also potentially lead to unethical activities, and because they provide weaker incentives than performance-based schemes (Tafkov 2013), one may reasonably argue that remuneration scheme tied to performance may be more efficient for the firm.

A natural extension of this work is to compare the extent of unethical activities under both compensation schemes where unethical activities are available. Whether these activities are higher under a flat-wage scheme compared with a performance-based scheme is a priori unclear. On one hand, individuals may have more incentives to artificially change performance under a performance-based scheme to increase their chance of winning the monetary prize. On the other hand, introducing performance-based schemes may also provide a more direct way to express one's competitive preferences, making less clear the use of unethical acts to artificially raise one's status.²⁸ Whether the first effect dominates remains an empirical question that is left for future research.

Supplemental Material

Supplemental material to this paper is available at <http://dx.doi.org/10.1287/mnsc.2013.1747>.

Acknowledgments

The authors thank Iwan Barankay, Alain Cohn, Catherine Eckel, Enrique Fatas, David Huffman, Nagore Iriberry, Peter Kuhn, Aldo Rustichini, and Rick Wilson for comments on a previous version of this paper; and participants at the World Meeting of the Economic Science Association Conference in Copenhagen, at the French Experimental Economics Association Conference in Grenoble, and at the Society of Labor Economists Conference in Chicago. The authors are grateful to E. Priour for programming the experiment. Financial support from the Agence Nationale de la Recherche [ANR-08-JCJC-0105-01, "CONFLICT" project, and ANR BLAN07-3_185547 "EMIR" project] is gratefully acknowledged.

References

Abbink K, Hermann B (2011) The moral costs of nastiness. *Econom. Inquiry* 49(2):631–633.

- Abbink K, Sadrieh A (2009) The pleasure of being nasty. *Econom. Lett.* 105(3):306–308.
- Abbink K, Masclet D, van Veelen M (2009) Reference point effects in antisocial preferences. Working paper, University of East Anglia, Norfolk, UK.
- Akerlof G, Kranton R (2000) Economics and identity. *Quart. J. Econom.* 115(3):715–753.
- Anderson D, Crowell C, Sponsel S, Clarke M, Brence J (1982) Behavior management in the public accommodations industry: A three-project demonstration. *J. Organ. Behav. Management* 4(1–2):33–66.
- Ariely D, Bracha A, Meier S (2009) Doing good or doing well? Image motivation and monetary incentives in behaving prosocially. *Amer. Econom. Rev.* 99(1):544–555.
- Azmat G, Iriberry N (2010a) The importance of relative performance feedback information: Evidence from a natural experiment using high-school students. *J. Public Econom.* 94(7–8):435–452.
- Azmat G, Iriberry N (2010b) The provision of relative performance feedback information: An experimental analysis of performance and happiness. Mimeo, Universitat Pompeu Fabra, Barcelona, Spain.
- Balafoutas L, Lindner F, Sutter M (2012) Sabotage in tournaments: Evidence from a natural experiment. IZA Discussion Paper 6316, Institute for the Study of Labor, Bonn, Germany.
- Ball S, Eckel C (1996) Buying status: Experimental evidence on status in negotiation. *Psych. Marketing* 13(4):381–405.
- Ball S, Eckel C (1998) The economic value of status. *J. Socio-Econom.* 24(4):495–514.
- Ball S, Eckel C, Grossman P, Zame W (2001) Status in markets. *Quart. J. Econom.* 116(1):161–188.
- Barankay I (2012) Rank incentives. Evidence from a randomized workplace experiment. Working paper, The Wharton School, University of Pennsylvania, Philadelphia.
- Baron J (1988) The employment relation as a social relation. *J. Japanese Internat. Econom.* 2(4):492–525.
- Bartling B, von Siemens FA (2010) The intensity of incentives in firms and markets: Moral hazard with envious agents. *Labour Econom.* 17(3):598–607.
- Benabou RJM, Tirole J (2006) Incentives and prosocial behavior. *Amer. Econom. Rev.* 96(5):1652–1678.
- Blanes i Vidal J, Nossol M (2011) Tournaments without prizes: Evidence from personnel records. *Management Sci.* 57(10):1721–1736.
- Bolle F, Tan J, Zizzo D (2010) Vendettas. CeDEx Discussion Paper 2010-02, University of Nottingham, Nottingham, UK.
- Brewer M (1999) The psychology of prejudice: Ingroup love and outgroup hate? *J. Soc. Issues* 55(3):429–435.
- Bué J, Sandret N (2008) Un salarié sur six estime être l'objet de comportements hostiles dans le cadre de son travail. *Premières synthèses, DARES*, mai (22.2).
- Bull C, Schotter A, Weigelt K (1987) Tournaments and piece rates: An experimental study. *J. Political Econom.* 95(1):1–33.
- Cameron J, Banko K, Pierce D (2001) Pervasive negative effects of rewards on intrinsic motivation: The myth continues. *Behav. Analyst* 24(1):1–44.
- Carpenter J, Matthews P, Schirm J (2010) Tournaments and office politics: Evidence from a real effort experiment. *Amer. Econom. Rev.* 100(1):504–517.
- Charness G, Grosskopf B (2001) Relative payoffs and happiness. *J. Econom. Behav. Organ.* 45(3):301–328.
- Charness G, Levine DI (2010) When is employee retaliation acceptable at work? Evidence from quasi-experiments. *Indust. Relations* 49(4):499–523.
- Charness G, Rabin M (2002) Understanding social preferences with simple tests. *Quart. J. Econom.* 117(3):817–869.

²⁸ We thank an anonymous referee for this helpful remark.

- Charness G, Rigotti L, Rustichini A (2007) Individual behavior and group membership. *Amer. Econom. Rev.* 97(4):1340–1352.
- Chen K (2003) Sabotage in promotion tournaments. *J. Law, Econom., Organ.* 19(1):119–139.
- Chen Y, Li X (2009) Group identity and social preferences. *Amer. Econom. Rev.* 99(1):431–457.
- Chowdhury SM, Sheremeta RM (2012) Strategically equivalent contests. Working Paper 10-06, Economic Science Institute, Chapman University, Orange, CA.
- Clark A, Masclet D, Villegal M-C (2010) Effort and comparison income. *Indust. Labor Relations Rev.* 63(3):407–426.
- Cohn A, Fehr E, Goette L (2009) Fair wages and effort—Evidence from a field experiment. Working paper, University of Zurich, Zurich, Switzerland.
- Deci E (1975) *Intrinsic Motivation* (Plenum Press, New York).
- Delfgaauw J, Dur R, Sol J, Verbeke W (2009) Tournament incentives in the field: Gender differences in the workplace. IZA Discussion Paper 4395, Institute for the Study of Labor, Bonn, Germany.
- Ding DZ, Ge L, Warner M (2001) A new form of Chinese human resource management? Personnel and labour-management relations in Chinese township and village enterprises: A case-study approach. *Indust. Relations J.* 32(4):327–345.
- Dohmen T, Falk A (2010) Performance pay and multi-dimensional sorting productivity, preferences and gender. *Amer. Econom. Rev.* 101(2):556–590.
- Dohmen T, Falk A, Fliessbach K, Sunde U, Weber B (2011) Relative versus absolute income, joy of winning, and gender: Brain imaging evidence. *J. Public Econom.* 95(3/4):279–285.
- Duesenberry J (1949) *Income, Saving and the Theory of Consumer Behavior* (Harvard University Press, Cambridge, MA).
- Eckel C, Wilson R (2007) Social learning in coordination games: Does status matter? *Experiment. Econom.* 10(3):317–330.
- Eckel C, Fatas E, Wilson R (2010) Cooperation and status in organizations. *J. Public Econom. Theory* 12(4):737–762.
- Ellingsen T, Johannesson M (2007) Paying respect. *J. Econom. Perspect.* 21(4):135–150.
- Ellingsen T, Johannesson M (2008) Pride and prejudice: The human side of incentive theory. *Amer. Econom. Rev.* 98(3):990–1008.
- Enders W, Hoover GA (2004) Whose line is it? Plagiarism in economics. *J. Econom. Literature* 42(2):487–493.
- Eriksson T, Poulsen A, Villegal MC (2009) Feedback and incentives: Experimental evidence. *Labour Econom.* 16(6):679–688.
- Falk A, Ichino A (2006) Clean evidence on peer pressure. *J. Labor Econom.* 24(1):39–57.
- Falk A, Fehr E, Huffman D (2008) The power and limits of tournament incentives. Discussion paper, University of Zurich, Zurich, Switzerland.
- Fanelli D (2009) How many scientists fabricate and falsify research? A systematic review and meta-analysis of survey data. *PLoS ONE* 4(5):e5738:1–11.
- Fehr E, Kirchsteiger G, Riedl A (1993) Does fairness prevent market clearing? An experimental investigation. *Quart. J. Econom.* 108:437–459.
- Fischbacher U (2007) z-Tree: Zurich toolbox for ready-made economic experiments. *Experiment. Econom.* 10(2):171–178.
- Franceschelli I, Galiani S, Gulmez E (2010) Performance pay and productivity of low- and high-ability workers. *Labour Econom.* 17(2):317–322.
- Frank R (1985) The demand for unobservable and other nonpositional goods. *Amer. Econom. Rev.* 75(1):101–116.
- Frey B, Jegen R (2001) Motivation crowding theory. *J. Econom. Surveys* 15(5):589–611.
- Gächter S, Thöni S (2010) Social comparison and performance: Experimental evidence on the fair-wage effort hypothesis. *J. Econom. Behav. Organ.* 76(3):531–543.
- Garicano L, Palacios-Huerta I (2006) Sabotage in tournaments: Making the beautiful game a little less beautiful. Mimeo, London School of Economics, London.
- Georgellis Y, Iossa E, Tabvuma V (2011) Crowding out intrinsic motivation in the public sector. *J. Public Administration Res. Theory* 21(3):473–493.
- Gino F, Staats B (2011) Driven by social comparisons: How feedback about coworkers' effort influences individual productivity. Working paper, Harvard Business School, Boston.
- Gneezy U, List JA (2006) Putting behavioral economics to work: Testing for gift exchange in labor markets using field experiments. *Econometrica* 74(5):1365–1384.
- Gneezy U, Rustichini A (2000) Pay enough or don't pay at all. *Quart. J. Econom.* 115(3):791–810.
- Grasmick H, Kobayashi E (2002) Workplace deviance in Japan: Applying an extended model of deterrence. *Deviant Behav.* 23(1):21–43.
- Greiner B (2004) An online recruitment system for economic experiments. Kremer K, Macho V, eds. *Forschung und Wissenschaftliches Rechnen GWDG Bericht 63* (Gesellschaft für Wissenschaftliche Datenverarbeitung, Göttingen, Germany).
- Halevy N, Bornstein G, Sagiv L (2008) "Ingroup love" and "Outgroup hate" as motives for individual participation in intergroup conflicts: A new game paradigm. *Psych. Sci.* 19(4):405–411.
- Hannan RL, Krishnan R, Newman D (2008) The effects of disseminating relative performance feedback in tournament and individual performance compensation plans. *Accounting Rev.* 83(4):893–913.
- Harackiewicz J (1979) The effects of reward contingency and performance feedback on intrinsic motivation. *J. Personality Soc. Psych.* 37(8):1352–1363.
- Harbring C, Irlenbusch B (2008) How many winners are good to have? On tournaments with sabotage. *J. Econom. Behav. Organ.* 65(3–4):682–702.
- Harbring C, Irlenbusch B, Kräckel M, Selten R (2007) Sabotage in asymmetric contests—An experimental analysis. *Internat. J. Econom. Bus.* 14(3):367–392.
- Holmstrom B, Milgrom P (1991) Multitask principal-agent analyses: Incentive contracts, asset ownership, and incentives. *J. Law, Econom., Organ.* 7:24–52.
- Huberman B, Loch C, Öncüler A (2004) Status as a valued resource. *Soc. Psych. Quart.* 67(1):103–114.
- James H (2005) Why did you do that? An economic examination of the effect of extrinsic compensation on intrinsic motivation and performance. *J. Econom. Psych.* 26(4):549–566.
- Konrad K (2000) Sabotage in rent-seeking contests. *J. Law, Econom., Organ.* 16(1):155–165.
- Kosfeld M, Neckermann S (2011) Getting more work for nothing? Symbolic awards and worker performance. *Amer. Econom. J.: Microeconomics* 3(3):86–99.
- Köszegi B (2006) Ego utility, overconfidence, and task choice. *J. Eur. Econom. Assoc.* 4(4):673–707.
- Kreps D (1997) Intrinsic motivation and extrinsic incentives. *Amer. Econom. Rev.* 87(2):359–364.
- Kube S, Marechal A, Puppe C (2013) Do wage cuts damage work morale? Evidence from a natural field experiment. *J. Eur. Econom. Assoc.* Forthcoming.
- Kuhnen C, Tymula A (2012) Feedback, self-esteem, and performance in organizations. *Management Sci.* 58(1):94–113.
- Kura KM, Shamsudin FM, Chauhan A (2013) Moderating effect of self-regulatory efficacy on the relationship between organizational formal controls and workplace deviance: A proposed framework. *Internat. J. Acad. Res. Bus. Soc. Sci.* 3(1):15–26.
- Lazear EP (1989) Pay equality and industrial politics. *J. Political Econom.* 97(3):561–580.
- Lazear EP (2000) Performance pay and productivity. *Amer. Econom. Rev.* 90(5):1346–1361.

- Lazear EP, Rosen S (1981) Rank-order tournaments as optimum labor contracts. *J. Political Econom.* 89(5):841–864.
- Levitt SD, List JA (2007) What do laboratory experiments measuring social preferences reveal about the real world? *J. Econom. Perspect.* 21(2):153–174.
- List JA, Bailey CD, Euzent PJ, Martin TL (2001) Academic economists behaving badly? A survey on three areas of unethical behavior. *Econom. Inquiry* 39(1):162–170.
- Madsen K (1994) Whole blood serotonin and leadership. Masters RD, McGuire MT, eds. *The Neurotransmitter Revolution: Serotonin, Social Behavior, and the Law* (Southern Illinois University Press, Carbondale, IL).
- Maher B (2010) Research integrity: Sabotage! *Nature* 467:516–518.
- Mas A, Moretti E (2009) Peers at work. *Amer. Econom. Rev.* 99(1):112–145.
- Masclet D, Villeval MC (2008) Punishment, inequality, and welfare: A public good experiment. *Soc. Choice and Welfare* 31(3):475–502.
- Moldovanu B, Sela A, Shi X (2007) Contests for status. *J. Political Econom.* 115(2):338–363.
- Nguyen Q, Leung P (2009) Choice of remuneration regime in fisheries: The case of Hawaii's longline fisheries. *J. Agricultural Res. Econom.* 34(3):498–517.
- Nikiforakis N (2008) Punishment and counter-punishment in public good games: Can we really govern ourselves? *J. Public Econom.* 92(1–2):91–112.
- Nikiforakis N, Normann H-T (2008) A comparative statics analysis of punishment in public goods experiments. *Experiment. Econom.* 11(4):358–369.
- Nordstrom R, Lorenzi P, Hall R (1990) A review of public posting of performance feedback. *J. Organ. Behav. Management* 11(2):101–123.
- Pan X, Houser D (2011) Competition for trophies triggers male generosity. *PLoS ONE* 6(4):e18050.
- Prentice G, Burgess S, Propper C (2007) Performance pay in the public sector: A review of the issues and evidence. Report, Office of Manpower Economics, London.
- Preston I, Szymanski S (2003) Cheating in contests. *Oxford Rev. Econom. Policy* 19(4):612–624.
- Rustichini A (2008) Dominance and competition. *J. Eur. Econom. Assoc.* 6(2–3):647–656.
- Rustichini A, Vostroknutov A (2008) Competition with skill and luck. Mimeo, University of Minnesota, Minneapolis.
- Schwieren C, Weichselbaumer D (2010) Does competition enhance performance or cheating? A laboratory experiment. *J. Econom. Psych.* 31(3):241–253.
- Shalley C, Zhou J, Oldham G (2004) Effects of personal and contextual characteristics on creativity: Where should we go from here? *J. Management* 30(6):933–958.
- Shleifer A (2004) Does competition destroy ethical behavior? *Amer. Econom. Rev. Papers Proc.* 94(2):414–418.
- Tafkov ID (2013) Private and public relative performance information under different compensation contracts. *Accounting Rev.* 88(1):327–350.
- Tran A, Zeckhauser R (2012) Rank as an incentive: Evidence from a field experiment. Mimeo, Harvard University, Cambridge, MA.
- Van Erp J (2008) Reputational sanctions in private and public regulation. *Erasmus Law Rev.* 1(5):145–162.
- Veblen T (1949) *The Theory of the Leisure Class* (George Allen and Unwin, London).
- Zizzo DJ (2003) Money burning and rank egalitarianism with random dictators. *Econom. Lett.* 81(2):263–266.
- Zizzo DJ (2010) Experimenter demand effects in economic experiments. *Experiment. Econom.* 13(1):75–98.
- Zizzo DJ, Oswald AJ (2001) Are people willing to pay to reduce others' incomes? *Annales d'Economie et de Statistique* (63–64):39–65.