University of Heidelberg

Department of Economics

Discussion Paper Series | No. 589

Managerial bonuses, subordinates' disobedience, and coercion

Nikos Nikiforakis, Jörg Oechssler, and Anwar Shah

March 2015

Managerial bonuses, subordinates' disobedience, and coercion*

Nikos Nikiforakis, Jörg Oechssler, and Anwar Shah†

March 24, 2015

Abstract

This study provides evidence from a laboratory experiment showing that managerial bonuses can affect adversely a manager's subordinates. In our set up, managers compete to obtain a large bonus which depends partly on the effort exerted by their subordinates. Managers can suggest an effort level and coerce subordinates who disobey by punishing them. When managers compete for individual bonuses, we find that subordinates do not obey their demands. This doubles coercion rates relative to a control treatment without bonuses. In contrast, when managers compete for pooled bonuses which give managers discretionary power over the allocation of the bonus, most subordinates exert maximal effort. Although managers share a substantial fraction of the bonus, they are not worse off than they are with an individual bonus. A model in which agents care about inequality in earnings can account for the main findings in our experiment.

JEL codes: C91, C72, D74.
Keywords: coercion, managerial incentives, disobedience, hierarchy, tournament.

---

*We would like to thank Matthias Kräkel and seminar participants at the Paris School of Economics, at the Universities of Cologne, Hamburg, Heidelberg, Mannheim, Melbourne, Regensburg, and the Max-Planck Institute in Munich for helpful comments. Funding from the Faculty of Business & Economics at the University of Melbourne and the University of Heidelberg is gratefully acknowledged. The project was approved by the Ethics Committee of the Faculty of Business & Economics at the University of Melbourne.

†`Nikiforakis`: (*i*) Department of Economics, New York University, Abu Dhabi, email: nikiforakis@gmail.com; `Oechssler`: Department of Economics, University of Heidelberg, Bergheimer Str. 58, 69115 Heidelberg, Germany, email: oechssler@uni-hd.de; `Shah:` School of Economics, Quaid-I-Azam University, 45320 Islamabad, Pakistan, email: anwar@qau.edu.pk.

1 Introduction

Managerial performance bonuses are used widely in modern organizations (Hall and Liebman 1998; Hall and Murphy 2003; Oyer and Schaefer 2004) and often form a significant part of a manager's pay package (Lazear and Shaw, 2007).[1] Empirical work to date has mainly focused on the impact of managerial incentives on firm productivity (Chevalier and Ellison 1997; Groves et al. 1994; Oyer, 1998). There is little evidence however on how managerial bonuses impact on the welfare of the managers' subordinates. This is an interesting question as, by nature, a manager's performance (and hence bonus) depends largely on the performance of their subordinates. The answer, therefore, may have important consequences for the optimal design of compensation schemes. As Lazear and Shaw (2007, p.6) write: "Very large pay spreads induce high effort, but they also create a work environment in the firm that is not very pleasant."

High-powered incentives have been known to have potentially adverse effects on other *competitors*, i.e., employees at the same level in the hierarchy, by increasing the incidence of sabotage (e.g., Lazear, 1989) and undermining cooperation between co-workers (e.g., Drago and Turnbull, 1991). In this paper, we ask whether managerial bonuses could also have adverse effects on subordinates, i.e., individuals *not affected directly* by the bonuses. In particular, we investigate how managerial bonuses affect the subordinates' willingness to obey orders and whether they increase the likelihood they are coerced by their managers. The reason we focus on coercion is because organizations typically bestow the power to coerce upon managers. Although coercion is considered essential for the efficient operation of organizations (e.g., Coleman, 1990; Day, 1963), managers can abuse it for their private benefit (e.g., Vafaï, 2002; Wertheimer, 1987).

While empirical evidence on bonuses exists (e.g., Prendergast, 1999), obtaining data on how managers (mis)treat their subordinates is much harder. Coercion tends to be covert as it is socially shunned and difficult to identify (Wertheimer, 2008). This may explain partly why despite the public attention on large managerial bonuses and the close link between managers' and subordinates' performance, the potentially adverse effects of managerial bonuses on subordinates have been largely unexplored. To overcome this problem we use a laboratory experiment to address our research question. Although the laboratory

[1] In the case of top managers, bonuses can exceed the fixed salary. In January 1999, British newspaper *The Guardian* launched a website and started posting regularly information regarding large managerial bonuses and salaries. To date, the site counts more more than 3,500 newspaper articles. (http://www.theguardian.com/business/executive-pay-bonuses?)

environment undoubtedly differs from that in the field, it has the advantage that it allows one to examine situations where it is easier to establish what constitutes fair treatment of a worker, what constitutes coercion and exploitation, and to manipulate the environment in a controlled way to determine conditions that may affect employees adversely.[2]

The basic set up in our experiment is as follows. A manager is placed in charge of a project. He must complete the project together with a subordinate. It is common knowledge that the two workers are equally efficient at project-related work, i.e., the more effort the subordinate exerts on the project, the less effort the manager needs to exert. The manager makes a suggestion about how much effort the subordinate should exert. The subordinate is not bound by this suggestion and can disobey the manager by choosing to exert a different level of effort. The manager observes the subordinate's effort and has the power to punish her at a personal cost. The two parties interact repeatedly for a finite number of periods. As we explain in section 3, our set up is chosen such that it allows us to easily determine if managers abuse the power to coerce.

To evaluate the impact of managerial bonuses, we compare behavior in three experimental treatments. In the first, our *Control* treatment, there are no bonuses for managers. The set up is exactly as described above. This treatment provides us with a benchmark for evaluating the incentive effects of bonuses. We examine two different bonuses. The first type of bonus is a standard performance bonus. In the *Individual Bonus* (IB) treatment, several managers compete for two very large bonuses. The bonuses, which differ in size, are awarded to the two managers with the highest profits at the end of the experiment. As is typical with bonuses, their recipients get to keep them for themselves.

The second type of bonus – to the best of our knowledge – is new in the incentives literature. The aim is to examine whether a different kind of bonus can alleviate any tension generated between managers and subordinates. In the *Pooled Bonus* (PB) treatment, instead of individual bonuses, the two managers with the highest profits at the end of the experiment are each awarded a very large *bonus pool* (of the same size as the individual bonuses in the IB treatment). Along with the bonus, they are given discretionary power of how to allocate it: they can keep it all for themselves or share part of it with their

[2] For similar reasons, laboratory experiments have been previously used to study other issues in organizational economics such as the gift-exchange relationships between employers and employees (e.g. Fehr et al., 1993), the adverse effects of monitoring workers (e.g., Falk and Kosfeld, 2006), factors that may facilitate coordination within firms (e.g., Brandts and Cooper, 2006; Weber, 2006), delegation of authority (Hamman et al., 2010) and the impact of group membership (Goette et al., 2012).

subordinates. Sharing the bonus is voluntarily and no explicit promises can be made.[3] Apart from the ability to share the bonus at the end of the experiment, the PB and IB treatment are identical.

Our findings confirm the intuition that managerial bonuses can have adverse effects for subordinates. Managers are nearly twice as likely to coerce subordinates when competing for individual bonuses, than they are in the *Control* treatment without any bonuses. This is despite the fact that coercion does not pay off in monetary terms. The difference is largely driven by the increased unwillingness of subordinates to heed managers' suggestions. The result is that the earnings of subordinates in the IB treatment are lower than in the *Control*.

Pooled bonuses perform at least as well as individual bonuses in our experiment, and in some cases they perform better. In particular, we observe that although managers make far greater demands from their subordinates than in any of the other treatments, the level of coercion is not higher than in the *Control* treatment. This is because most subordinates tend to obey their managers (high) demands. Remarkably, although subordinates exert much higher effort levels, they are not worse off in monetary terms than in the *Control* treatment as managers are willing to share a substantial fraction of their bonus with hard-working subordinates. Managers earn significantly more than in the *Control* treatment and, although they share a large part of the bonus, they do not earn less than with individual bonuses. Therefore, in contrast to individual bonuses, pooled bonuses are found to make *both* managers and their subordinates better off relative to the *Control* treatment. This indicates that managerial pooled bonuses may alleviate some of the adverse effects of managerial bonuses without this being at the expense of managers.

Although we consider relative performance bonuses, we see no apparent reason why our findings may not carry over to situations where bonuses are awarded based on absolute target levels. We discuss this and other extensions of our work in the concluding section. In the next section, we offer a review of the related theoretical and experimental literature. In section 3, we present our experimental design in detail, along with a theoretical investigation of our game using the Fehr-Schmidt (1999) model of inequality aversion. We show that this model is capable to account for most of our findings. Section 4 summarizes our experimental results.

[3] It is a common practice in firms across a variety of industries to specify an overall bonus amount for groups of managers – a *bonus pool* (Ederhof et al., 2011), but not how it will be divided between managers. For example, Murphy and Oyer (2001) find that 70% of the firms they surveyed used discretion in allocating bonus pools across managers. In our set up, we allow for the bonus pool to be divided by a manager with his team/subordinate.

2 Related literature

One of the main insights from our experiment is the potential managerial bonuses have to affect negatively the welfare of their subordinates without making managers necessarily better off. Previous studies have already shown that competition for large rewards can have adverse effects. Lazear (1989) was the first to indicate that as the incentives for competitors become steeper their incentive to engage in sabotage raises as it undermines the relative position of their opponents. Several empirical studies have validated this prediction (e.g., Balafoutas et al., 2012; del Corral et al., 2010; Garicano and Palacios-Huerta, 2005). Drago and Turnbull (1991), similarly, demonstrated that co-workers competing for promotion will be less willing to cooperate with each other. This prediction has also found support in empirical studies both in the lab and in the field (e.g., Carpenter, et al., 2010; Drago and Garvey, 1998; Drago and Turnbull, 1991; Harbring and Irlenbusch, 2008). Our study contributes to this literature by showing that competition for large rewards can affect adversely not only other competitors, but also third parties – the managers' subordinates – who are not *directly* involved in the competition.

Bandiera et al. (2007, 2009) were the first to provide evidence from a field experiment showing that managerial incentives may affect the welfare of workers. The authors studied how the introduction of bonuses for managers in a fruit-picking farm impacts on the allocation of workers to different tasks (Bandiera et al., 2007), and favoritism towards workers (Bandiera et al., 2009). Similar to our experiment, workers were employed for a fixed term, while bonuses depended on the performance of a manager's subordinates. Bandiera et al. (2009) found that bonuses reduced favoritism towards workers with whom managers are socially connected, but are not necessarily the most productive at work. Bandiera et al. (2007) found that the introduction of managerial bonuses increased both the mean and dispersion of subordinates' productivity as managers targeted their efforts towards high-ability workers, while the least able workers were less likely to be selected into employment. An important difference between the set up studied by Bandiera et al. and ours is that in their experiments there was an excess supply of subordinates. This implies that excluding low-performing workers may improve not only firm productivity, but also equity, i.e., although some low-performing workers are excluded, this benefits high-performing workers. As there is no excess supply of subordinates in our experiment, we are able to show clearly that managerial bonuses have the potential to affect subordinates adversely, as managers are prepared to coerce subordinates to increase their chances of obtaining one of the bonuses.[4]

There is a rich literature on coercion which however is mostly philosophical (e.g., Wertheimer, 1987; Wertheimer, 2008). Empirical data on coercion in the workplace is (unsurprisingly) rare, at a high level of aggregation, and plagued with measurement problems. Two studies have recently tried to fill this gap by investigating coercion in laboratory experiments. Nikiforakis et al. (2014) is the one most closely related to the present study as it uses the same basic set up to study the relationship between information and coercion/exploitation. In that study, we found managers tried repeatedly to use their power to exploit subordinates, but these attempts were successful only under incomplete information regarding how subordinates' effort impacts on managers' earnings. In the other study, Bolle et al. (2011) use a finitely-repeated game with complete information where a principal can use his punishment power to extort resources from an agent. Similar to Nikiforakis et al. (2014) these authors find little evidence of coercion being successful under complete information. We are not aware of any studies associating performance incentives such as bonuses with coercion in manager-subordinate relations.

The other important insight from our study is that pooled bonuses, i.e., rewarding managers by giving them discretionary power over a bonus pool, can lead to better outcomes than giving them individual bonuses. Since managers and subordinates interact for a finite number of times and the bonus is paid only once at the end of the experiment, pooled bonuses should not work better than individual bonuses. That is, unless managers care for fairness and subordinates trust managers. Several authors have studied the impact fairness concerns can have on contract design (e.g., Bartling and von Siemens, 2010; Bartling, 2011; Fehr and Schmidt, 2000; Fehr and Schmidt, 2004; Rey-Biel, 2008). The studies most closely related to ours are Fehr and Schmidt (2007), and Fehr et al. (2007). Using lab experiments they show that contracts that rely on fairness and trust can be more efficient and profitable than explicit contracts asking workers to exert a certain level of effort in exchange for a pre-specified payment. Our focus is different. We do not consider explicit contracts, but compare instead different kinds of bonuses. We also endow managers with the power to coerce subordinates – a common feature in manager-subordinate relationships.[5] Similar to these studies, we find that contracts that rely on fairness perform well,

[4] There are other important differences. For example, bonuses in Bandiera et al. (2007, 2009) are paid on a daily basis and not only once as in our experiment. Further, managers' and subordinates' effort are complements (Bandiera et al., 2007, p. 730), and not substitutes.

[5] There are several other distinguishing features to our experiment. First, managers and subordinates interact repeatedly although the bonus is paid only once. This alleviates strategic concerns for sharing the

despite the fact that pooled bonuses require considerable levels of trust on behalf of the subordinates, as we will see next.

3 The experiment

We first present in detail the basic game used in the experiment and proceed to discuss the different experimental treatments. After a brief discussion of the experimental procedures, we offer a theoretical analysis of the impact of managerial bonuses in our game, and a set of behavioral hypotheses to guide the data analysis.

3.1 The game

We use a two-player, three-stage game. In stage one, the manager (M) makes a *non–binding* suggestion, s, regarding the effort level that he would like his subordinate (S) to choose in stage 2. In stage two, the subordinate is informed about the level of effort suggested by the manager. Since the suggestion is non–binding, the subordinate may choose any effort level $e \in \{0, 1, ..., 10\}$. The earnings of the manager are an increasing function of e while the earnings of the subordinate are a decreasing function of e. Table 1 shows the earnings of both players at the end of stage 2, $\hat{\pi}_i$, $i \in \{M, S\}$, as a function of the subordinate's effort.

Table 1: Players' earnings as a function of effort chosen by the Subordinate

e	0	1	2	3	4	5	6	7	8	9	10
$\hat{\pi}_M$	12	14	16	18	20	22	24	26	28	30	32
$\hat{\pi}_S$	24	22	20	18	16	14	12	10	8	6	4

In stage three, the manager learns about the level of effort chosen by the subordinate and can assign "punishment" points $p \in \mathbb{N}$ to reduce the subordinate's earnings.[6] Assigning points is costly for the manager who must sacrifice 0.2 units for every 1 unit he wishes to

bonus, but maintains the realistic aspect that manager-subordinate relationships tend to involve repeated interactions at least over a certain period. We also consider bonuses which are very large, in keeping with our interest in managerial bonuses.

[6] Neutral language was used throughout the experiment. There was no reference to "punishment", while manager and subordinate were referred to as "Player A" and "Player B" respectively.

reduce the subordinate's earnings, i.e., we employ a 1:5 fee-to-fine ratio.[7] The manager cannot reduce the subordinate's earnings below 0, i.e., $p \leq \hat{\pi}_S$. Thus, the earnings of both players at the end of a stage three are given by

$$\pi_M = 12 + 2e - 0.2p \quad (1)$$

$$\pi_S = 24 - 2e - p. \quad (2)$$

Note that, without punishment, the game is a constant-sum game and efficiency concerns play no role. This was done to control for subjects' concerns for efficiency and simplify the analysis of the data. Note also that an effort level of 3 equates the earnings of managers and subordinates. Given the saliency of equality in previous laboratory experiments and the fact that players are randomly assigned their roles in the experiment, $e = 3$ could be regarded as the "fair level of effort." In line with Wertheimer's (1996, 2008) definition we will say that a manager *coerces* their subordinate if the latter disobeys the manager by choosing a lower level of effort than what was suggested by the manager (i.e., $s > e$) and the manager punishes her.[8]

3.2 Experimental treatments

There were three treatments in the experiment reported here. In all of them, participants play the constituent game over 10 periods with the same partner. After each period, players are informed of their own earnings and how they were determined (i.e., e, p, but also s). The final payoff was the sum of payoffs from all 10 periods. The use of a fixed-matching protocol makes it possible for the manager to "invest" profitably in punishment in early periods in order to obtain the desired effort level.

In treatment *Control (C)* subjects simply played 10 times the game described in the preceding section. In treatment *Individual Bonus (IB)* all subjects were told that, in addition to the sum of payoffs from all periods, managers could win one of two large bonuses. In particular, there were 10 managers in each session. Among them, the manager

[7] The fee-to-fine ratio was chosen so that punishment poses a non-negligable threat to the subordinate. In most experiments, the fee-to-fine ratio tends to be 1:3 (see e.g., Nikiforakis and Normann, 2008).

[8] This definition is consistent with that of Wertheimer (1996, p. 26) who states: "In general, A coerces B to do X only if A proposes (threatens) to make B worse off with reference to some baseline condition if B chooses not to do X, although specifying the appropriate baseline against which to measure the proposal can be a complicated matter." We take the suggestion of the manager as the baseline.

with the highest total payoff at the end of the experiment would receive a bonus of 900 EMU. The manager with the second highest payoff in a given session would receive 720 EMU.[9] Managers were privately informed whether they won one of the bonuses at the very end of the experiment. The subordinates had no opportunity to win a bonus but were aware of the bonus for managers.

As with managerial bonuses, these bonuses are substantial by all experimental standards. If a manager obtained the fair level of effort ($e = 3$) from the subordinate in each period – a plausible benchmark as we will see in section 4 – and refrained from punishing, he would be making 180 EMU. Also, the exchange rate used between EMU and Australian Dollar was 9 EMU = 1 AUD. Therefore, the two bonuses corresponded to 100 and 80 AUD.[10] At the time of the experiment, the minimum hourly wage in Australia was 14.31 AUD. Thus, the highest bonus is nearly 7 times higher than the minimum hourly wage, and 5 times higher than the earnings associated with the fair level of effort. The second highest bonus is about 5.5 times higher than the minimum hourly wage, and 4 times higher than the earnings associated with the fair level of effort.

Treatment *Pooled Bonus (PB)* was the same as treatment IB except that managers had the option of sharing their bonus with their subordinates. To obtain a sufficient number of observations, at the end of the 10 periods, *before* being informed about who won the prize, every manager had to indicate the percentage of the bonus that they would share with their subordinate in case they won a bonus (ranging from 0 to 100%). At the end of the experiment, both subjects of a manager-subordinate team were informed whether the manager in their team won a bonus and the percentage they shared.

3.3 Experimental procedures

Participants were invited from a database of approximately 2500 registered volunteer students using ORSEE (Greiner, 2004). The experiment was conducted in the Experimental Economics Laboratory at the University of Melbourne, using z-Tree (Fischbacher, 2007). For each of the three treatments, we have 20 independent observations of manager-subordinate teams. In total 120 subjects participated in this experiment. On average,

[9] In case two or more managers tied for one of the bonuses, there was a random draw to determine who would receive the bonus. If two managers tied for the prize of 900 EMU, one was randomly selected to receive 900 EMU and the other received 720 EMU. If two managers tied for the prize of 720 EMU, one was randomly selected to receive 720 EMU and the other did not receive a bonus.

[10] At the time of the experiment, the exchange rate between the Australian and the US Dollar was approximately 1.

subjects took less than an hour to complete the 10 periods.[11] Average earnings from the experiment amounted to approximately 40 AUD (or 22.85 AUD per hour).

Prior to entering the laboratory, each participant drew randomly a number from a hat. The number determined the participants' seat in the laboratory, their role in the experiment and their partner – the identity of whom was not revealed at any time before or after the experiment. Participants were then asked to read the instructions. After reading the instructions, subjects had to answer a series of test questions.

To minimize possible experimenter-demand effects, we used a double-blind protocol. A participant was randomly assigned the role of the "monitor" based on the hat draw. The job of the monitor was to pay the participants at the end of the experiment. The experimenter was not present during the payment. The monitor only read a general set of instructions which was also given to the other participants who were informed that the monitor would not read the game-specific instructions. Monitors were thus completely unaware about the nature of the game and could not infer participants' actions from their earnings. Monitors received a fixed payment of 30 AUD for assistance.

3.4 Behavioral hypotheses

We solve the repeated game by backward induction for two different behavioral assumptions. Assume first that it is common knowledge that players are only interested in their own material payoffs. Managers will never share their bonus in treatment *Pooled Bonus.* At the third stage, since punishment is costly for the manager, it will never be used (i.e., $p = 0$). Hence, at the second stage, the subordinate will choose the minimal effort of $e = 0$. In the first stage, the manager may make any suggestion regarding the desired effort level since this is only cheap talk. The resulting earnings per period are $\pi_M = 12$ and $\pi_S = 24$. Since this is the unique subgame perfect equilibrium (SPE) of the constituent game, a well-known result (see Oechssler, 2013) implies that the 10-period game has a unique SPE and consists of playing the unique SPE of the constituent game in every period. Thus, the theoretical prediction in this case is the same for all treatments.

As mentioned in the previous section, concerns for inequality can play an important role in organizations. The theoretical predictions for the three treatments differ markedly if

[11] After the 10 periods were completed, there were two further tasks which (along with the data for the *Control* treatment) are partly reported in Nikiforakis et al. (2014). These included 10 more rounds of the constituent game with reversed roles and a social values survey. The entire sessions lasted approximately one hour forty-five minutes.

players dislike sufficiently inequality in earnings. To show this, let us assume Fehr-Schmidt preferences (Fehr and Schmidt, 1999) and that players care only about the other player in their (fixed) match and not about other subjects in their session.[12] This model is a natural choice for our purposes as it assumes that players may dislike being treated unfairly, but also because it was able to account for many of the findings in Nikiforakis et al. (2014) who used a similar game.

As pointed out by Oechssler (2013), when a constituent game is repeated a finite number of times with Fehr and Schmidt preferences, one can in general not rely on the above result since preferences are interdependent across periods. This is why instead of the period earnings, π_i, $i \in \{M, S\}$, we have to use the sum of (expected) payoffs Π_i.[13] The utility of player i is then given by

$$u_i = \Pi_i - \alpha_i \max\left[\Pi_j - \Pi_i, 0\right] - \beta_i \max\left[\Pi_i - \Pi_j, 0\right], \tag{3}$$

with $0 \leq \beta_i < 1$ and $\beta_i \leq \alpha_i$.

We start by deriving the equilibrium effort levels in the *Control* treatment. For inequality aversion to matter, it needs to be sufficiently strong. In particular, we need to assume that managers care sufficiently strongly about disadvantageous inequality so that they will use punishment to reduce inequality whenever $\Pi_M < \Pi_S$. Thus, in the following we shall assume that $\alpha_M > 1/4$ and that this is commonly known.

Proposition 1 *In treatment Control, all subgame perfect equilibria (SPE) with inequality aversion imply that average effort level* $e^* := \sum_t e^t/10 = 3$.

Proof We solve the repeated game by backward induction. Consider the last stage of the last period. Note that there will be no punishment if payoffs are (weakly) in favor of the manager and $\beta_M \geq 0$ because punishment would only increase the payoff difference between the manager and the subordinate. Consider now the case when the manager's payoff is lower than that of the subordinate. Given that 5 units of punishment reduce Π_S by 5 and Π_M by 1, the payoff difference is being reduced by 4. Hence, if $\alpha_M > 1/4$, the manager will use punishment to reduce as much as possible the inequality in material

[12] This seems a plausible assumption given that subjects have no information about effort and punishment, and thus individual earnings in other groups.

[13] By using expected payoffs, we implicitly employ a notion of fairness that corresponds to *procedural* fairness (Saito, 2013). Experimental data seem to favor this notion over an outcome based extension of Fehr-Schmidt preferences (Trautmann, 2009).

payoffs. Assuming the subordinate knows this, her best response at stage 2 is to choose an e such that payoffs are as equal as possible. Intuitively, it is better for the subordinate to equalize payoffs herself rather than wait for the manager to equalize payoffs through punishment.[14] In particular, if earnings so far have been equal, the subordinate will choose $e = 3$ in the last period.

Given this behavior, one can check that there is a unique set of subgame-perfect equilibria which has the properties that (i) punishment is not used on the equilibrium path and (ii) both players receive the same payoff on the equilibrium path. The resulting earnings in the constituent game are $\pi_M = 18$ and $\pi_S = 18$. One of those equilibrium paths is focal as it involves a constant effort of $e = 3$ in each period, but there are also SPE in which, for example, the subordinate chooses $e = 2$ in one period and makes up for this with $e = 4$ in another period. However, the average effort over all 10 periods must be 3. □

Let us now consider the impact of bonuses on equilibrium effort levels. Recall that if two or more managers tie for a bonus, the bonus is allocated randomly. Let $\hat{b}$ denote the expected bonus. Payoffs including the bonus (but before sharing) are thus $\Pi_M = \sum_t \pi^t_M + \hat{b}$ and $\Pi_S = \sum_t \pi^t_S$.

Proposition 2 *In treatment Individual Bonus, all SPE with inequality aversion imply that average effort levels e^* are such that* $0 \leq e^* \leq 3$.

Proof Suppose there were a SPE in which a subordinate chose an average effort of $e^* > 3$. By deviating to $e^* = 3$, the subordinate would increase Π_S and simultaneously reduce inequality in earnings without receiving any punishment as the manager would still earn weakly more than the subordinate. Thus, an average effort of $e^* > 3$ cannot be part of a SPE. □

In contrast to treatment Control, in treatment IB, a SPE with $e^* = 0$ for all subordinates is possible for all parameter values. If all subordinates choose the same effort, the chance of winning one of the bonuses is 1/10. In this case, $\hat{b} = \frac{1}{10}(900 + 720) = 162$. Thus, for $e^* = 0$, we have that $\Pi_M = 12 \times 10 + 162 = 282$, while $\Pi_S = 24 \times 10 = 240$. Since $\Pi_M > \Pi_S$, there will be no punishment for all α_M. Deviation to higher efforts is unprofitable as it would reduce Π_S and simultaneously increase inequality. Thus, $e^* = 0$ for all subordinates is a SPE.

[14] If the subordinate is sufficiently concerned about inequality in her favor ($\beta_S > 1/2$), she would choose an effort to equalize payoffs without the threat of punishment (i.e. even if $\alpha_M < 1/4$).

Propositions (1) and (2) imply a counter-intuitive effect for individual managerial bonuses. In particular, they suggest that the introduction of such bonuses will not increase effort levels; in fact, it may lower them. The intuition is that bonuses benefit only managers; to reduce the resulting inequality in earnings, subordinates exert low effort levels.

Finally, we consider equilibrium effort levels when managers compete for pooled bonuses. The key feature of pooled bonuses is that fair-minded managers can share them with their subordinates and eliminate any ex post inequalities in earnings between them. The following proposition shows that even strongly inequality averse subordinates may be willing to exert maximal effort levels to help their managers obtain a pooled bonus.

Proposition 3 *The following SPE exist in treatment Pooled Bonus.*

(1) If $\beta_M < 1/2$, managers will not share the bonus. Thus, the SPE are the same as in Proposition 2.

(2) If $\beta_M \geq 1/2$, managers will share the bonus. All SPE with inequality aversion are of the form that $n > 5$ subordinates exert $e = 10$ and $10 - n$ exert an average effort of $e^* = 3$.

Proof (1) If $\beta_M < 1/2$, sharing the bonus lowers the manager's utility (3). Thus, ex post managers have no incentive to share their bonus. Anticipating this, subordinates will behave as in treatment IB (see Proposition 2).

(2) If $\beta_M \geq 1/2$, sharing the bonus up to the point where payoffs are equal increases the manager's utility (3). Thus managers will make a voluntary transfer of

$$\min\{\max\{0, (\Pi_M - \Pi_S)/2\}, \hat{b}\}.$$

For a given SPE, let $\bar{e}$ and $\underline{e}$ be the highest and lowest average effort of the 10 teams in a session. Let us suppose that $\bar{e} < 10$. The ex post payoff (after sharing) for the subordinate whose manager currently has the lowest probability of receiving the high bonus (which must be less than $\frac{1}{10}$) is at most $24 \times 10 + (900 + 720)/10 = 402$. This maximal payoff would arise when all subordinates chose $e^* = 0$ and all subordinates nevertheless received the entire bonus from their managers. A deviation to $e > \bar{e}$ by this subordinate will assure the high bonus of 900 with certainty. This yields ex post payoffs (after sharing) of $(36 \times 10 + 900)/2 = 630$ for the subordinate and thus a profitable deviation. Thus, $\bar{e} = 10$ in any SPE.

Suppose next that exactly one subordinate chooses $e = 10$. Hence, her manager will receive the high bonus. The maximal payoff of a subordinate whose manager currently has the lowest probability of receiving the other bonus, is $24 \times 10 + 720/9 = 320$. A deviation by this agent to $e = 10$ by will ensure an expected bonus of $(900 + 720)/2 = 810$. This yields ex post payoffs (after sharing) of $(36 \times 10 + 810)/2 = 585$ for the subordinate and is thus a profitable deviation. Thus, at least $n \geq 2$ subordinates choose $e = 10$ in any SPE.

Suppose next that any subordinate chooses an average effort $e^* < 3$. Given that $n > 2$ other subordinates choose $e = 10$, the manager of this subordinate will not receive a bonus. Hence, his payoff is lower than that of his subordinate and he would punish her until payoffs are equalized. Thus, there is no SPE in which a subordinate will choose an effort $e^* < 3$. Consider any e^* with $3 < e^* < 10$. Given that there is no bonus, a subordinate will be better off choosing $e^* = 3$ since she is not punished and obtains $\Pi_S = 180$. Thus $\underline{e} = 3$ and no average effort levels $3 < e^* < 10$ are chosen in a SPE.

Finally, suppose that $2 < n \leq 5$. For $n \leq 5$, the expected bonus is at least $\hat{b} \geq (900 + 720)/5 = 324$. Thus any subordinate of a manager who does not receive a bonus could deviate to $e = 10$. This deviation from $e^* = 3$ would be profitable as it guarantees a payoff of at least $(4 \times 10 + 32 \times 10 + 324)/2 = 342 > 180$ for both the subordinate and her manager. □

For $n > 5$, the expected bonus is not large enough to equalize the payoff of the manager and the subordinate. Thus, there exist $\alpha_S > 0$ such that the utility (3) of the subordinate is lower than 180, i.e., the utility resulting from choosing $e^* = 3$. Thus, SPE with $n > 5$ exist only for sufficiently small α_S.

Based on the three propositions above, we offer the following behavioral hypotheses as a guide for our data analysis.

Hypothesis 1 (Control): *Average effort levels will be equal to 3 – the fair level of effort, which equalizes the pre-punishment earnings of managers and their subordinates.*

Hypothesis 2 (Individual bonuses): *The introduction of individual bonuses for managers will not increase average effort levels relative to the Control treatment, and may even decrease them.*

Hypothesis 3 (Pooled bonuses): *The introduction of pooled bonuses for managers will lead to higher average effort levels relative to the Control treatment.*

4 Results

4.1 Managerial bonuses and subordinates' effort

Figure 1 shows the average effort levels across periods for the different treatments. It is easy to see that the hypotheses obtained using the Fehr-Schmidt (1999) model are nicely borne out in our data. First, in line with Hypothesis 1, average effort levels in the *Control* treatment (C) appear to be very close to the fair level of effort ($e = 3$). Second, in line with Hypothesis 2, average effort levels in treatment *Individual Bonus* (IB) are slightly lower than those in treatment C, whereas in line with Hypothesis 3, those in *Pooled Bonus* (PB) are almost twice as high than those in C. Across all periods, average efforts are 2.71 in IB, 3.03 in C, and 5.80 in PB. Average effort in C and IB is significantly lower than in PB according to MWU-tests ($p < .01$).[15] Average effort in C and IB is not significantly different from each other (MWU-test, $p = .70$) nor is it different from the 'fair' effort level of 3 (Wilcoxon-test, $p > .32$).

Figure 2 shows a histogram of the relative frequencies of effort choices for the three treatments. As predicted by the theory in the previous section, effort choices in treatments C and IB are concentrated on and around $e = 3$. In contrast, in line with Proposition 3, effort choices in treatment PB are concentrated on $e = 10$ and, to a lesser extent, on $e = 0$ and $e = 3$.

Result 1 *Effort is substantially and significantly higher with pooled bonuses. In the Individual Bonus treatment, effort is similar to that in the Control treatment and not significantly different from the fair effort level.*

The fact that average effort levels are in line with our behavioral hypotheses provides indirect support for the assumption that some participants are concerned about inequalities in earnings. Next we investigate how the different types of bonuses affected managers' suggestions and the reaction of their subordinates.

4.2 Managerial demands and subordinates' disobedience

Figure 3 shows the average suggestions across periods for the different treatments. Note first that suggestions are significantly higher than the 'fair' effort level of 3 in all treatments

[15] All non-parametric tests reported in this paper take averages from each team as one observation and use two-sided test statistics.

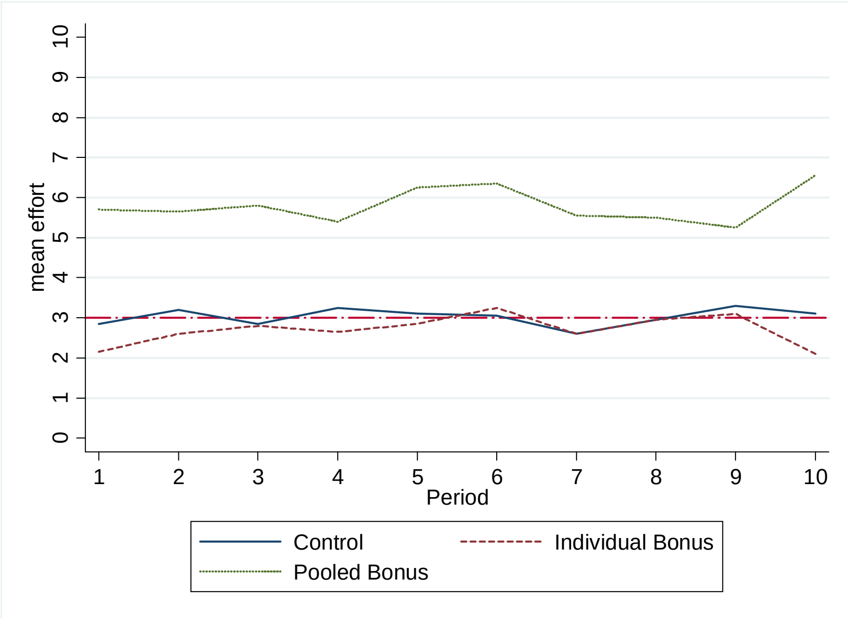

Figure 1: Average effort across periods ("Fair" effort level of 3 shown for comparision).

(Wilcoxon-test, $p < .01$). Across all periods, average suggestions are 4.66 in C, 5.14 in IB, and 7.49 in PB. Average suggestions in C and IB are significantly lower than in PB (MWU-test, $p < .01$), but not significantly different from each other (MWU-test, $p = .24$). Interestingly, in the first period, suggestions in IB *are* significantly higher than in C (MWU-test, $p = .02$). However, thereafter they appear to decline over time. Random-effects regressions (see Table 8 in the online appendix) show the decline is statistically significant in both IB and PB ($p < .01$), but not in C.

Result 2 *Managers' suggestions exceed the fair effort level in all treatments, but managers are far more demanding throughout the experiment when they can earn pooled bonuses. With individual bonuses, managers' suggestions are initially higher than in the Control treatment, but decline over time.*

Next we turn our attention to how subordinates react to the suggestions by their managers. We measure *disobedience* by the difference between the manager's suggestion and subordinate's effort (i.e. $s - e$). Figure 4 shows the frequency of disobedience for the different treatments, i.e., how often effort is lower than what was suggested. Although as

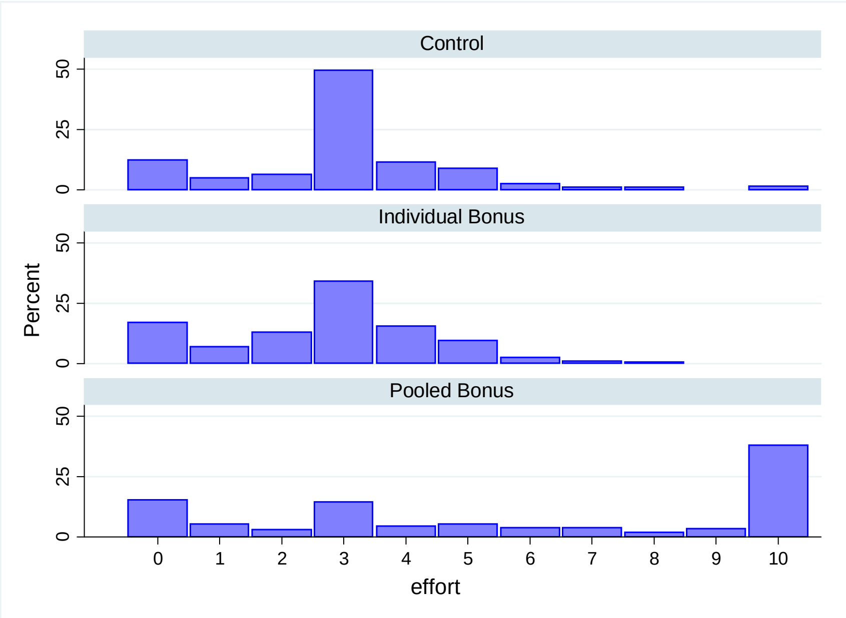

Figure 2: Relative frequencies of effort choices

seen in Figure 3 above, managers seem to anticipate disobedience in IB and ask for less than in PB, still there is significantly more disobedience in IB relative to C (MWU-tests, $p = .026$) and PB ($p = .048$). This indicates that individual bonuses for managers create tension with their subordinates. Disobedience is not significantly different in PB relative to C ($p = .93$), which suggests that the opportunity to share pooled bonuses alleviates fully the tension caused by the bonuses. Random-effects regressions (see Table 9 in the online appendix) show that disobedience declines over time in both IB ($p < .01$) and PB ($p < .05$), but not in C.

Result 3 *There is more disobedience with individual bonuses relative to pooled bonuses and no bonuses. The frequency of disobedience in Pooled Bonus and Control is not significantly different.*

4.3 Managerial bonuses and coercion

Managers can address disobedience either by coercion (i.e., by punishing disobedient subordinates) or by reducing demands in future periods. Disobedience in our experiment is

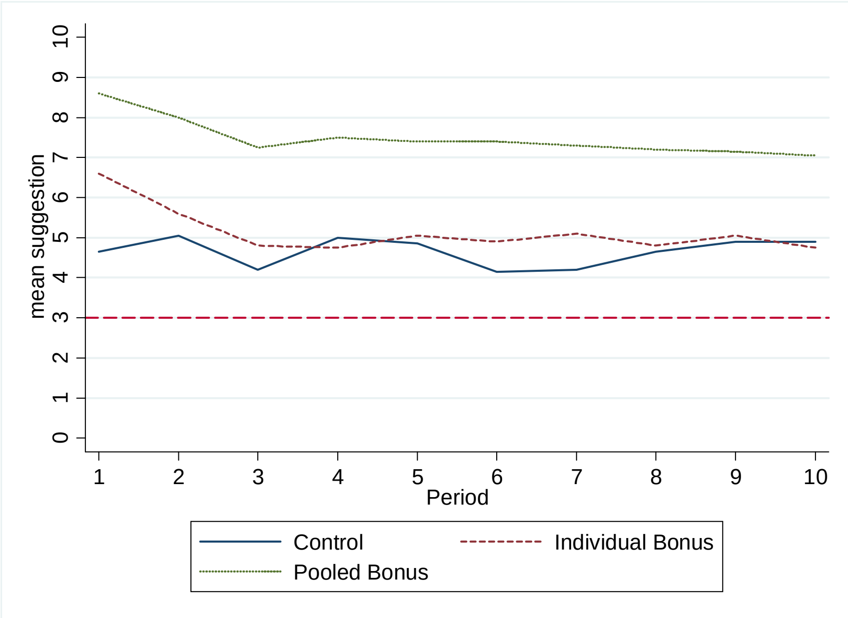

Figure 3: Average suggestions across periods

the main reason for reducing a subordinate's income in the third stage: in 98.2% of the cases punishment is meted out it is in response to subordinates' disobedience. That is, income reduction, punishment and coercion are all synonymous in our experiment.

Figure 5 shows the frequency of punishment across periods. Across all periods, the relative frequency of punishment in IB is 52.5% – almost twice as high as in the other two treatments (28% in both cases).[16] The frequency of punishment in C and IB is significantly lower than in PB (Fisher's exact test, $p < .01$) and not significantly different from each other (Fisher's exact test, $p = 1$). The average number of punishment points in IB is 4.82, which is significantly higher than that in C at 2.49 points (MWU-test, $p = .029$). Average punishment in PB is at the intermediate level of 3.62, which is not significantly different from the other two treatments (MWU-test, $p > .9$). Given the lower frequency of coercion in PB, this suggests that *if* managers decide to punish in PB, they punish more harshly than in the other treatments.

To better distinguish between the frequency and severity of punishment, the appropriate

[16] There seems to be a time trend in the propensity to punish in treatment IB. However, once we control for effort levels and disobedience we find that it is not significant (see Table 10 in the online appendix).

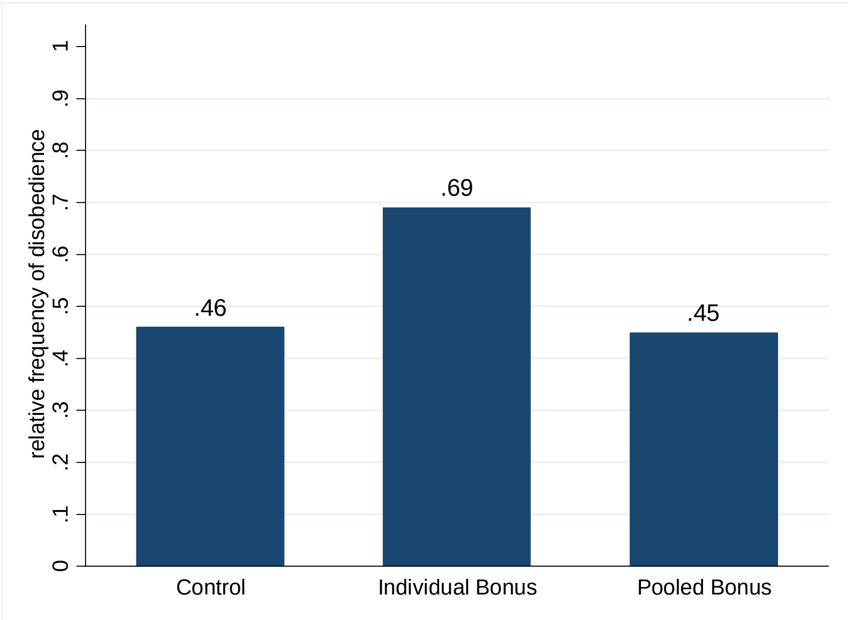

Figure 4: Relative frequencies of disobedience (i.e. instances in which $e < s$)

specification for a regression is a hurdle-model (Nikiforakis, 2008). The hurdle-model is a parametric generalization of the Tobit model in which the decision to punish and the level of punishment are determined by two separate stochastic processes. The hurdle is crossed if an individual decides to punish. The likelihood function for the hurdle model is given by the product of two separate likelihoods. First, the likelihood that a subject will punish, which is captured by a standard Probit model, and second, the conditional likelihood of an individual assigning a certain number of punishment points, which is estimated by using a truncated linear regression. The two parts of the hurdle-model are estimated separately (McDowell, 2003).

Table 2 shows the results for the hurdle model for three different specifications. The probit regression of model (1) shows that subordinates are almost 30 percentage points more likely to be punished in IB relative to C, a large difference, confirming the impression from Figure 5. This is remarkable given that managers in IB noticeably reduce their demands over time (see Figure 3), and highlights the tension between managers and subordinates caused by individual bonuses. Managers in PB are as likely to coerce subordinates as in C. However, the linear random effect regression for $p > 0$ (Severity) shows that *if* managers

Table 2: What determines punishment? A hurdle model

	(1)		(2)		(3)	
	Frequency	Severity	Frequency	Severity	Frequency	Severity
IB	.29**	.31	.19	0.05	−.00	.20
	(.12)	(1.30)	(.13)	(1.85)	(.20)	(2.71)
PB	−.03	4.02***	−.09	−1.54	−.12	−1.42
	(.11)	(1.49)	(.11)	(2.34)	(.19)	(3.28)
$(s-e)$			.11***	1.25***	.08***	.15
			(.02)	(0.34)	(.02)	(.34)
$(s-e)*IB$			.02	−.06	.01	.02
			(.03)	(.41)	(.03)	(.43)
$(s-e)*PB$			−.00	.68	−.01	.83*
			(.03)	(.46)	(.03)	(.48)
e					−.13***	−2.97***
					(.03)	(0.52)
$e*IB$					.07	.29
					(.05)	(.67)
$e*PB$					.07	1.30**
					(.04)	(.64)
constant		8.80***		4.59***		13.86***
		(1.03)		(1.45)		(2.05)
Log likelihood	−331.0		−259.0		−245.5	
R^2		.05		.29		.51

Note: "Frequency" reports estimates from a probit random effects regression modelling the decision whether to punish or not. Entries are average marginal effects of the independent variables (Bartus, 2005). "Severity" stands for a truncated linear random effects regression modelling the amount of point assigned if $p > 0$. IB and PB are treatment dummies. e indicates subordinate's effort, and s indicates a manager's suggestion. Standard errors in parentheses. ***,** ,* significant at 1%, 5%, 10% level; $N = 600$ (Frequency), 217 (Severity).

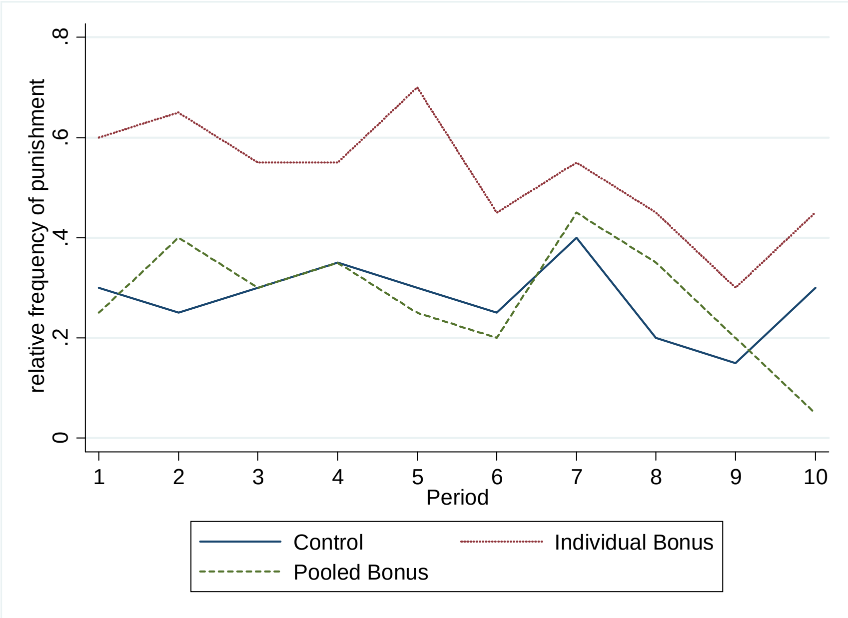

Figure 5: Relative frequencies of punishment ($p > 0$) across periods

choose to punish in PB, then punishment is more severe. Further, as seen in models (2) and (3), all treatment differences can be explained by different levels of disobedience ($s-e$) and different effort levels.

Result 4 *Managers are nearly twice as likely to coerce subordinates when competing for individual bonuses than they are in the Control treatment, but not when they compete for pooled bonuses. Coercion is determined by the level of disobedience and of effort. Although more rare, disobedience is punished more severely in the presence of pooled bonuses.*

Is coercion successful in raising subordinates' effort levels? Table 3 shows the results of random effects regressions with effort as the dependent variable. The key independent variables are *Suggestion in* t, *Punishment in* $t-1$, i.e., the income reduction experienced in the previous period, and *Period*. All variables are used as first differences. The results indicate that subordinates respond strongly to the suggestions made by managers in treatments C and PB. Remarkably, there is a *zero effect* in treatment IB. Coercion is successful at raising effort levels in all treatments, but the effect is fairly small. As indicated by the coefficient of *Points in t-1,* a manager that reduced the subordinate's earnings by 10 points

Table 3: What determines effort? Random effects regression

dependent variable: effort in t	C	IB	PB	All
Suggestion in t	0.38^{***}	0.03	0.43^{**}	0.38^{***}
	(0.06)	(0.06)	(0.17)	(0.07)
Points in $t-1$	0.06^{***}	0.07^{***}	0.11^{***}	0.06^{**}
	(0.02)	(0.02)	(0.03)	(0.03)
Period	0.00	-0.02	0.15	0.00
	(0.15)	(0.13)	(0.24)	(0.18)
Individual Bonus (IB)				-0.02
				(0.26)
Pooled Bonus (PB)				0.15
				(0.26)
IB * suggestion in t				-0.35^{***}
				(0.11)
PB * suggestion in t				0.05
				(0.14)
IB * points in $t-1$				0.00
				(0.04)
PB * points in $t-1$				0.05
				(0.04)

Note: Standard errors in parentheses. All variables in the regression were used as first differences. ***,**,* significant at 1%, 5%, 10% level; $N = 160$ (C, IB, PB), 480 (pooled).

on average can expect to see an increase at the effort of his subordinate of 0.6 units in C, 0.7 units in IB and 1.1 units in PB. Given this, we conclude that coercion does not pay off in monetary terms.

Result 5 *Although coercion has a positive effect on effort in all treatments, the increase in effort is not sufficient to offset the cost of coercion for the manager. Managers' suggestions influence the effort of their subordinate in the Control and Pooled Bonus treatments, but not in Individual Bonus.*

4.4 Bonus sharing and earnings

In the previous sections we saw that many subordinates in the *Pooled Bonus* (PB) treatment are willing to follow their managers suggestions and repeatedly exert high (even maximal) levels of effort. This is a risky strategy as they will earn little money from the experiment lest their manager repays their efforts by sharing part of the bonus, *if* he wins one of the bonuses. A subordinate that willingly chooses $e^* = 10$ without being coerced, for example, has earnings of 40 EMU, which correspond to 4.40 Euros. This is considerably lower than the 180 EMU she would earn for choosing the fair level of effort $e^* = 3$ if not coerced.

Does trusting managers pay off? Let us first focus on the five of the 20 managers whose subordinates consistently chose very high effort levels (i.e., $e^* > 9.5$) and are therefore the ones most likely to obtain a bonus. These managers share on average 45% of the bonus. In contrast, managers of subordinates who exert lower levels of effort (i.e., $e^* \leq 9.5$) are willing to share only 20% of the bonus.[17] Figure 6 shows that the final profit of subordinates is decreasing in effort except for efforts above 9.5, which yield by far the highest payoff (including shared bonuses). Consequently, it is optimal to provide full effort or no effort. Note that this is not too far from the prediction of the asymmetric SPE with inequality aversion, where $n > 5$ subordinates are supposed to exert an effort of 10 and the remaining an effort of 3 (see also Figure 2).

Result 6 *Subordinates exerting near maximal effort throughout the experiment, on average receive 45% of the bonus from their managers. Their earnings exceed those from any other effort level, including the 'fair level of effort' of 3, by a large margin.*

The sharing behavior of managers has interesting implications for the final payoffs of subordinates. Table 4 lists the final payoffs of subordinates (right side columns) for all treatments. Despite the fact that subordinates in PB exert much higher efforts on average than in the other two treatments, their final payoffs are not significantly lower. In fact, average subordinates' payoffs are highest in PB, although these differences are not significant as the standard deviations of payoffs in PB are much higher than in the other two treatments due to the small number of bonuses in the experiment. In contrast, final payoffs in IB are (weakly) significantly lower than those in C (MWU-test, $p = .068$). As efforts in IB are similar to those in C, this difference must be caused by increased coercion in IB.

Result 7 *Despite the fact that subordinates exert much higher efforts with pooled bonuses than in the other two treatments, their final payoffs are not significantly lower. Earnings of subordinates whose managers compete for individual bonuses are (weakly) significantly lower than in the Control.*

[17] For team-by-team averages of effort, suggestions, punishment, and bonus sharing, see Tables 5 - 7 in the online appendix.

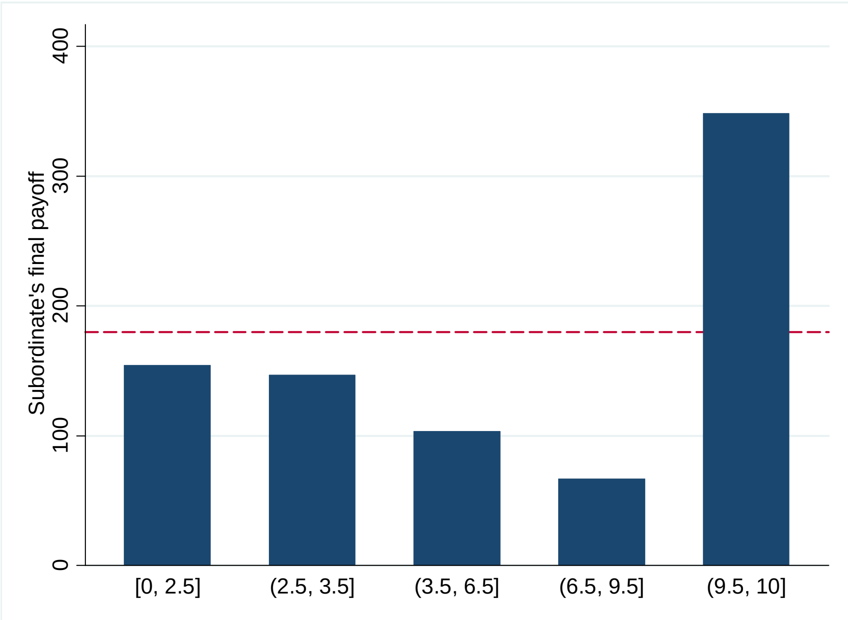

Figure 6: Subordinates' final payoff (including shared bonuses) in treatment PB depending on their chosen effort levels

Note: The payoff of 180 associated with the fair effort level of 3 is shown for comparison.

Table 4: Final total payoffs of Managers and Subordinates

treatment	Managers		Subordinates	
	mean	std. dev.	mean	std. dev.
C	175.5	23.9	154.6	26.0
IB	326.5	343.5	137.7	32.5
PB	312.8	213.9	164.8	155.9

Table 4 also lists the final payoffs of managers (left side columns). What is most interesting is that final payoffs of managers in PB (after sharing the bonus) are not significantly lower than in IB. In fact, despite the fact that managers in PB often give away substantial fractions of their bonus as we saw their earnings are significantly higher than in C (MWU-test, $p = .028$). In contrast, although slightly greater on average, managers' earnings in IB are not significantly larger than in C (MWU-test, $p = 0.63$).

Result 8 *Despite the fact that managers give away a substantial fraction of their bonus, they are not worse off with pooled bonuses than they are with individual bonuses. Relative to the Control, managers competing for pooled bonuses earn significantly more money than managers competing for individual bonuses.*

5 Concluding remarks

The first insight from our study is that managerial bonuses have the potential of generating conflict between managers and their subordinates. Managerial bonuses can be a disincentive for subordinates who dislike inequality. As managers' performance depends on that of their subordinates, managers may be inclined to exert pressure on them, even coerce them. In our experiment we saw that large managerial bonuses increased considerably the levels of subordinates' disobedience and nearly doubled manager's propensity to engage in coercion. The tension between managers and subordinates persisted until the end of the experiment with negative consequences for subordinates.

The tension between managers and their subordinates documented in our study suggests firms should exercise caution when using high-powered incentives for managers. The benefits from managers' increased motivation (e.g., Bandiera et al., 2007, 2009) need to be weighed carefully against the adverse effects for other employees. Holmström and Milgrom (1990) write that "it has been somewhat of a mystery to organizational observers, why there is so much less reliance on high-powered incentives than basic agency theory would suggest" (p. 93). Our study provides a novel explanation for this "mystery" which stands together with the well-known arguments related to sabotage and reduced incentives for cooperation (e.g., Lazear, 1989; Itoh, 1991).

The second main insight from our study is that firms may be able to alleviate tensions by awarding "pooled bonuses" instead of individual bonuses to managers. The efficacy of pooled bonuses relies critically on subordinates' willingness to trust their managers and the latter's trustworthiness. In our set up, which resembles most closely fixed-term employment contracts, managers have no strategic incentive to share bonuses. Despite this, we found that pooled bonuses did not create tension between managers and subordinates. Moreover, most managers did not betray their subordinates' trust. It seems therefore plausible that pooled bonuses will work at least as well in employment contracts of indefinite length as managers will have incentives to maintain a good working relationship with their subordinates.

Like with all empirical studies, more evidence will help determine the extent our findings generalize to different environments and populations. To that end, there are many interesting ways our study can be extended. First, in our study we consider only relative-performance bonuses. Although the tension between managers and subordinates may persist when bonuses are awarded based on absolute-performance targets, the extent of the tension may depend on the level of the targets managers have to meet. Second, similar to Bandiera et al. (2007, 2009), we studied finitely repeated interactions as this simplifies the analysis and interpretation of the data. Several work relations however are of indefinite length. It will be interesting to explore the impact of managerial bonuses in indefinitely repeated interactions. Do pooled bonuses continue to outperform individual bonuses? The key feature of pooled bonuses is that they allow managers to share the reward with high-performing subordinates, so it seems plausible our results may apply to long-term contracts.

A third interesting question for future research is whether the tension created by managerial bonuses can be alleviated if managers are willing to compensate subordinates in a non-pecuniary form, e.g., by expressing their appreciation, writing positive reference letters. Since this option will exist for all managers, pooled bonuses may still perform better given managers' ability to reward subordinates (also) in monetary terms, but subordinates may exhibit less disobedience than in our experiment when managers who compete for individual bonuses can reward them in a different (non-pecuniary) way that may be of value to them. Finally, it would be interesting to explore the extent to which withholding information about bonuses from subordinates alleviates the latter's resistance. The evidence in Nikiforakis et al. (2014) suggests that subordinates disobey managers even under asymmetric information concerning payoffs, as they seem to anticipate the managers' intention to exploit their informational advantage. Whether pooled bonuses for managers will perform better than individual bonuses in this case (or any of the other cases mentioned above), however, is an empirical question for future research.

References

[1] Balafoutas, L., Lindner, F., Sutter, M. (2012). Sabotage in Tournaments: Evidence from a Natural Experiment. *Kyklos* 65, 425-441.

[2] Bandiera, O., Barankay, I., Rasul, I. (2007). Incentives for Managers and Inequality among Workers: Evidence from a Firm-Level Experiment. *Quarterly Journal of Economics,* 729-773.

[3] Bandiera, O., Barankay, I., Rasul, I. (2009). Social Connections and Incentives in the Workplace: Evidence from Personnel Data. *Econometrica* 77 (4), 1047–1094.

[4] Bartling, B. (2011). Relative Performance or Team Evaluation? Optimal Contracts for Other-Regarding Agents. *Journal of Economic Behavior and Organization* 79 (3), 183-193.

[5] Bartling, B., von Siemens, F. A. (2010). The Intensity of Incentives in Firms and Markets: Moral Hazard with Envious Agents. *Labour Economics* 17 (3), 598-607.

[6] Brandts, J., Cooper, D. (2006). A Change Would Do You Good: An Experimental Study of How to Overcome Coordination Failure in Organzations, *American Economic Review* 96, 669-693.

[7] Bolle, F., Breitmoser, Y., Schlächter, S. (2011). Extortion in the Laboratory. *Journal of Economic Behavior & Organization* 78(3), 207-218.

[8] Carpenter, J., Matthews, P. H., Schrim, J. (2010). Tournaments and Office Politics: Evidence from a Real Effort Experiment. *American Economic Review* 100(1), 504-517.

[9] Chevalier, J., Ellison, G. (1997). Risk Taking by Mutual Funds as a Response to Incentives. *Journal of Political Economy* CV, 1167–1200.

[10] Coleman, J. (1990). *Foundations of Social Theory.* Cambridge MA: Harvard University Press.

[11] Day J. (1963). Authority. *Political Studies* 11, 257–271.

[12] Del Corral, J., Prieto-Rodriguez, J., Simmons, R. (2010). The Effect of Incentives on Sabotage: The Case of Spanish Football. *Journal of Sports Economics* 11(3), 243-260.

[13] Drago, R., Garvey, G. T. (1998). Incentives for Helping on the Job: Theory and Evidence. *Journal of Labor Economics* 16 (1), 1-25.

[14] Drago, R., Turnbull, G.K. (1991). Competition and Cooperation in the Workplace. *Journal of Economic Behavior & Organization* 15 (3), 347-364.

[15] Ederhof, M., Rajan, M.V., Reichelstein, S. (2011). Discretion in Managerial Bonus Pools. *Foundations and Trends® in Accounting* 5 (4), 243-316.

[16] Falk, A., Kosfeld, M. (2006). The Hidden Cost of Control. *American Economic Review* 96 (5), 1611-1630.

[17] Fehr, E., Kirchsteiger, G., Riedl, A. (1993). Does Fairness Prevent Market Clearing? An Experimental Investigation. *Quarterly Journal of Economics* 108 (2), 437-459.

[18] Fehr, E., Schmidt, K. (1999). A Theory of Fairness, Competition and Cooperation. *Quarterly Journal of Economics* 114, 817–868.

[19] Fehr, E., Schmidt, K. (2000). Fairness, Incentives, and Contractual Choices. *European Economic Review* 44 (4), 1057-1068.

[20] Fehr, E., Schmidt, K. (2004). Fairness and Incentives in a Multi-task Principal–Agent Model. *The Scandinavian Journal of Economics* 106 (3), 453-474.

[21] Fehr, E., Klein, A., Schmidt, K. (2007). Fairness and Contract Design. *Econometrica* 75 (1), 121-154.

[22] Fischbacher, U. (2007). z-Tree: Zurich Toolbox for Ready-Made Economic Experiments. *Experimental Economics* 10 (2), 171–178.

[23] Garicano, L., Palacios-Huerta, I. (2005). Sabotage in Tournaments: Making the Beautiful Game A Bit Less Beautiful. CEPR Discussion Paper no. 5231.

[24] Goette, L., Huffman, D., Meier, S., Sutter, M. (2012). Competition between Organizational Groups: Its Impact on Altruistic and Anti-Social Motivations. *Management Science* 58, 948-960.

[25] Groves, T., Hong, Y., McMillan, J., Naughton, B. (1994). Autonomy and Incentives in Chinese State Enterprises. *Quarterly Journal of Economics* CIX, 183–209.

[26] Hall, B. J., Liebman, J.B. (1998). Are CEOs Really Paid Like Bureaucrats? *Quarterly Journal of Economics* CXIII, 653–691.

[27] Hall, B. J., Murphy, K. J. (2003). The Trouble with Stock Options. *Journal of Economic Perspectives* XVII, 49–70.

[28] Harbring, C., Irlenbusch, B. (2008). How Many Winners are Good to Have on Tournaments with Sabotage. *Journal of Economic Behavior & Organization* 65(3-4), 682-702.

[29] Hamman, J., Loewenstein, G., Weber, R.A. (2010). Self-interest through Delegation: An Additional Rationale for the Principal-Agent Relationship. *American Economic Review* 100(4), 1826-1846.

[30] Lazear, E. P., (1989). Pay Equality and Industrial Politics. *Journal of Political Economy* LXLVII, 561–580.

[31] Lazear, E. P., Shaw, K. L. (2007). Personnel Economics: The Economist's View of Human Resources. *Journal of Economic Perspectives* 21(4), 91-114.

[32] McDowell, A., (2003). From the Help Desk: Hurdle Models, The Stata Journal 3(2), 178-184.

[33] Murphy, K., Oyer, P. (2001). Discretion in Executive Incentive Contracts: Theory and Evidence. Available at SSRN 294829.

[34] Nikiforakis, N. (2008). Punishment and Counter-Punishment in Public Good Games: Can We Really Govern Ourselves? *Journal of Public Economics* 92, 91-112.

[35] Nikiforakis, N., Normann, H.T. (2008). A Comparative Statics Analysis of Punishment in Public Good Experiments. *Experimental Economics* 11, 358-369.

[36] Nikiforakis, N., Oechssler, J., and Shah, A. (2014). Hierarchy, Coercion, and Exploitation: An Experimental Analysis. *Journal of Economic Behavior and Organization* 97, 155-168.

[37] Oechssler, J. (2013). Finitely repeated games with social preferences, *Experimental Economics,* 16(2), 222-231.

[38] Oyer, P., (1998). Fiscal Year Ends and Nonlinear Incentive Contracts: The Effect on Business Seasonality. *Quarterly Journal of Economics* CXIII, 149–185.

[39] Oyer, P., Schaefer, S. (2004). Why Do Some Firms Give Stock Options to All Employees? An Empirical Examination of Alternative Theories. *Journal of Financial Economics* LXXVI, 99–133.

[40] Prendergast, C. (1999). The Provision of Incentives in Firms. *Journal of Economic Literature* XXXVII, 7–63.

[41] Rey-Biel, P. (2008). Inequity Aversion and Team Incentives. *The Scandinavian Journal of Economics* 110 (2), 297-320.

[42] Saito, K. (2013) Social Preferences under Risk: Equality of Opportunity versus Equality of Outcome. *American Economic Review* 103 (7), 3084-3101.

[43] Trautmann, S. T. (2009). A tractable model of process fairness under risk. *Journal of Economic Psychology* 30(5), 803-813.

[44] Vafaï, K. (2002). Preventing Abuse of Authority in Hierarchies. *International Journal of Industrial Organization* 20(8), 1143–1166.

[45] Weber, R.A. (2006). Managing Growth to Achieve Efficient Coordination in Large Groups. *American Economic Review* 96(1), 114-126.

[46] Wertheimer, A. (1987) *Coercion*. Princeton: Princeton University Press.

[47] Wertheimer, A. (1996). *Exploitation*. Chichester, West Sussex, UK: Princeton University Press.

[48] Wertheimer, A. (2008) Exploitation. Published in *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta. Available online at: http://plato.stanford.edu/archives/fall2008/entries/exploitation/.

Appendix 1: Additional tables (for online publication only)

Table 5: Average team effort, suggestion, punishment, Treatment C

team	effort	suggestion	punishment
101	3.10	6.50	5.00
102	2.10	5.50	3.50
103	1.90	3.00	4.40
104	6.60	7.00	0.00
105	1.40	5.30	3.70
106	3.30	4.00	0.00
107	3.30	4.10	5.10
108	3.00	3.00	0.00
109	3.00	3.00	0.00
110	2.70	8.90	1.30
111	2.40	3.40	2.40
112	2.70	3.30	2.20
113	4.80	6.30	3.00
114	2.70	4.20	2.50
115	3.00	3.20	0.30
116	3.00	3.00	0.00
117	2.80	5.80	8.60
118	3.00	5.70	2.00
119	3.80	3.90	0.10
120	1.90	4.00	5.70
treatment avg.	3.03	4.66	2.49

Table 6: Average team effort, suggestion, punishment, Treatment IB

team	effort	suggestion	punishment
401	3.40	7.00	2.50
402	1.30	6.70	2.90
403	4.00	5.40	8.70
404	0.60	6.70	8.80
405	3.90	4.20	0.50
406	2.10	3.60	8.00
407	2.40	3.80	4.40
408	3.40	7.20	6.00
409	1.70	6.70	6.90
410	2.70	4.60	3.80
411	4.90	5.70	1.00
412	1.00	3.20	14.00
413	3.00	3.00	0.00
414	3.60	5.50	4.90
415	3.00	4.20	1.50
416	2.30	2.70	0.00
417	2.60	6.40	9.50
418	3.10	4.60	3.50
419	1.60	3.50	5.10
420	3.50	8.10	4.40
treatment avg.	2.71	5.14	4.82

Table 7: Average team effort, suggestion, punishment, percent shared, Treatment PB

team	effort	suggestion	punishment	% bonus shared
501	10.00	2.80	0.00	45.00
502	2.70	4.40	2.00	0.00
503	3.10	4.80	1.50	30.00
504	10.00	10.00	0.00	65.00
505	0.40	1.00	0.00	75.00
506	10.00	10.00	0.00	0.00
507	8.80	9.00	0.00	50.00
508	4.40	6.80	5.90	20.00
509	5.50	9.80	8.60	25.00
510	4.40	10.00	13.60	35.00
511	4.70	9.80	7.80	20.00
512	2.20	3.70	3.50	0.00
513	9.90	9.70	0.00	50.00
514	1.70	4.60	6.50	0.00
515	9.10	9.60	1.00	0.00
516	3.50	8.10	13.60	0.00
517	2.20	5.90	7.60	30.00
518	10.00	10.00	0.00	65.00
519	9.30	10.00	0.70	0.00
520	4.10	9.70	0.00	10.00
treatment avg.	5.80	7.49	3.62	26.00

Table 8: Time trends in suggestions? Random effects regressions

dependent variable: suggestion	C	IB	PB
period	0.00	$-.12^{***}$	-0.13^{***}
	(0.04)	(0.04)	(0.04)
constant	4.64^{***}	5.79^{***}	8.18^{***}
	(0.44)	(0.42)	(0.69)

Note: Standard errors in parentheses. ***,**,* significant at 1%, 5%, 10% level; $N = 200$ in all regressions.

Table 9: Time trends in disobedience? Random effects regressions

dependent variable: $(s-e)$	C	IB	PB
period	-0.01	$-.14^{***}$	-0.15^{**}
	(0.05)	(0.05)	(0.06)
constant	1.67^{***}	3.22^{***}	2.51^{***}
	(0.45)	(0.50)	(0.74)

Note: Standard errors in parentheses. ***,**,* significant at 1%, 5%, 10% level; $N = 200$ in all regressions.

Table 10: Time trends in punishment? Random effects regressions

dependent variable: probability of punishment	C	IB	PB
$(s-e)$	0.26^{***}	0.28^{***}	0.20^{**}
	(0.07)	(0.08)	(0.09)
e	-0.38^{***}	-0.20	-0.28^{**}
	(0.10)	(0.11)	(0.12)
period	-0.02	-0.06	-0.02
	(0.04)	(0.04)	(0.06)
constant	-0.01	0.30	-0.13
	(0.44)	(0.55)	(0.86)

Note: Standard errors in parentheses. ***,**,* significant at 1%, 5%, 10% level; $N = 200$ in all regressions.