Managerial Compensation in a Two-Level Gift-Exchange Experiment*

Nils Hesse[1] and Fernanda Rivas[2]

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Abstract:

In times of increasing international competition, firms demand employees' concessions to carry out necessary restructuring measures, which can partly be refused by workers, whose behavior at work can not be fully contracted upon. At the same time, management compensations are perceived as too high by the majority of the population. In our paper, we explore to what extent the two observations are correlated. In a two-level gift-exchange experiment, it is asked if the managerial compensation influences workers' effort decisions and workers' acceptability of wage cuts. We compare sessions in which the managerial compensation is public information with private-information sessions. Our data suggests that workers choose higher effort levels in sessions with public managerial compensation but that the managerial compensations in public wage sessions are significantly negatively correlated with the workers' effort choices- in particular after wage cuts. The disclosure of managerial wages in combination with wage compression seems to be a profit-maximizing strategy.

Keywords: managerial compensation, social preferences, laboratory experiment, gift-exchange, effort, downsizing.

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[1] Albert-Ludwigs Universität Freiburg, Abteilung für Wirtschaftspolitik, Platz der Alten Synagoge 1, 79085 Freiburg, Germany. Email: nils.hesse@vwl.uni-freiburg.de

[2] Universitat Autònoma de Barcelona and Department of Economics, Universidad de la República, Uruguay. Email: mfrivas@idea.uab.es

1. Introduction

In times of increasing international competition, firms demand employees' concessions to carry out necessary restructuring measures. These concessions can partly be refused by the workers whose behavior at work can not be fully contracted upon. At the same time, excessive management compensation causes considerable damage to the willingness to contribute to cost savings on the organizational level. This is particularly true in times of downsizing, when workers are confronted with wage cuts, while the managerial compensation is rising. We analyze in a two-level gift-exchange experiment if these two observations are interconnected.

In our experimental design we distinguish between a firm's owner and a manager. Thus, we extend gift-exchange labor-market models to a more realistic hierarchical structure. Usually shareholders set the manager's wage, while the workers' wages are set by the manager. In one treatment, this leads to a two-level principal-agent relationship between the firm and the manager on the first level and between the manager and the workers on the second level.

We want to test, 1) if the workers' effort is influenced by the perception of managerial compensation, 2) if executive pay is particularly salient during downsizing, 3) if these effects are strong enough to justify consequences such as wage compression or wage secrecy, and 4) if workers still expand their effort in response to wage offers if the wage-setter gets only a small part of the benefits generated by the workers. We contribute to several different strands of the literature. Regarding questions 1-3, we analyze the importance of fairness considerations in labor markets in general and their importance for the incentive optimal compensation of managers in particular. Regarding question 4, we contribute to the discussion which the driving forces behind gift-exchange are and how robust the results of bilateral one-level gift-exchange experiments are when the labor relationship is placed in a more complex and more realistic organizational hierarchy.

From a theoretical viewpoint there has been a lively discussion about how social preferences do shape behavior, how to model social preferences, and how to incorporate them into a microfounded model. An individual exhibits social preferences if he cares not only about the resources allocated to him but also about the resources allocated to relevant reference agents.[3]

[3] See Fehr and Fischbacher (2002).

In particular, social preferences can take various forms such as envy, inequity aversion, efficiency preferences and intention-based reciprocal behavior. Efficiency preferences and the positive forms of reciprocity and inequity aversion are usually called for the explanation of gift-exchange behavior (above-minimum effort) in response to above-minimum wages.[4] Influence on the gift-exchange through the perception of the managerial compensation can be explained by the existence of envy and the negative forms of reciprocity and inequity aversion.[5]

Traditional literature dealing with managerial compensation focuses on the problems in the principal-agent relationship between a firm owner and a manager which occur since managers bear little financial costs if they pursue their own goals rather than maximize shareholder wealth. Two typical standpoints can be identified. The "optimal contracting approach" tries to optimize the compensation in regard to the incentive effects. The managerial compensation is seen as an instrument to solve the moral hazard problem (Murphy 1997). An alternative view on managerial compensation is taken by the "managerial power approach", which seeks to reduce the moral hazard problem through an effective corporate governance mechanism such as effective boards. Managerial compensation is not only seen as an instrument to solve the principal-agent problem, but as a problem by itself (Bebchuck and Fried 2003).
However, both views focus on the firm owner - manager relationship without considering the effects on the workers who might have social preferences regarding the managerial compensation.

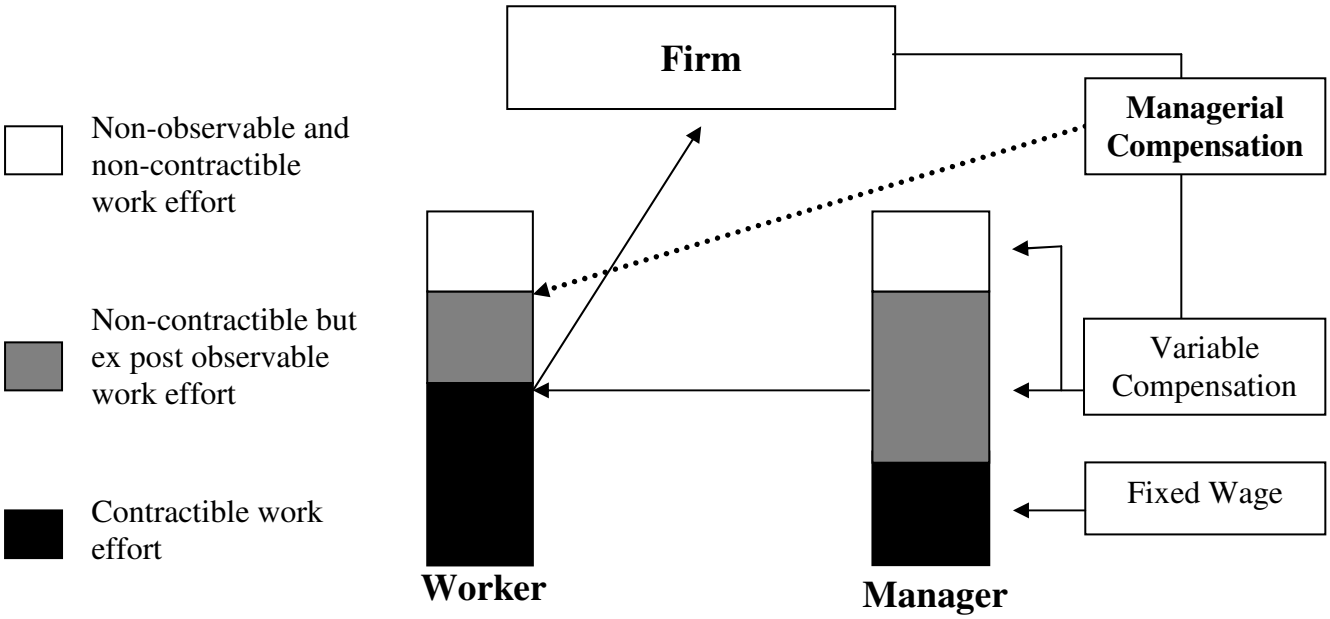
Labor relations in general are typically contractually incompletely regulated. In incomplete contracts not all relevant aspects are comprehensively determined, since important aspects are not enforceable or not observable (see Milgrom and Roberts 1992). This is true for the contracts of workers and managers, while the importance of the incomplete part is typically increasing with the hierarchy level of an employee.
In the following graph it is shown how we connect the two principal-agent relationships firm/manager and manager/worker, which are traditionally analyzed separately. As described above, managerial compensation is usually seen only as an instrument to solve the incentive and moral hazard problem in regard to the managers' work (in particular the variable compensation). One of the responsibilities of the managers is to ensure high workers' work effort. Following the efficiency wage theory, managers set the workers' wages to make them

[4] See Maximiano et al. (2006) for a discussion.

[5] Preferences are called negative when a reduction of the referent agents' income is wanted.

work more than the minimum required (which is indicated by the non-contractible part of the workers' work effort). Additional to the influence of the own compensation, the dotted line indicates the potential influence of the perception of the managerial compensation on the non-contractible workers' effort.

Figure 1: Principal-Agent Relations and Managerial Compensation



Widely accepted is the fact that although effort at work is at least to some degree non-contractible, workers are more likely to perform above any minimum requirements if they feel fairly treated and have been paid a fair wage (Akerlof and Yellen 1990). In order to motivate the employees to put forward an efficiency-enhancing effort level the own compensation is seen as the most important instrument.

However, as recognized by theories of distributive and procedural justice, employees' motivation is not only a simple function of financial inducement but is also influenced by social comparisons and by the perception of causes and processes. As theories of social comparisons suggest, perceived pay inequities could lead to unfavorable reactions such as lower productivity and product quality, decreased employee morale, and increased turnover. Moreover, the expectation that undesirable organizational outcomes will occur with greater vertical inequity has received empirical support (Cowherd and Levine 1992). Furthermore, the research on social comparison theory offers strong support for the tendency for individuals in organizations to engage in upward social comparisons with senior managers in order to understand how well they are doing, whether their compensation package is fair, and how equitably they are being treated (O'Reilly, Wade and Pollock 2006).

Hypothesis 1: The perception of the manager's wage will influence the workers' effort decision.

It is commonly accepted that the broader public dislikes high managerial compensations. Data for the fairness perceptions in Germany is available through the Socio-Economic Panel (SOEP) conducted in 2005.[6] While 54% of the population think that their personal income is fair, only 25% think that way about the income of managers and 29% about the income level for the lowest-level employees. Accordingly, managers earn too much and lowest-level employees earn too little in the eyes of the majority.

According to a Bloomberg's survey done in February 2006, about 81% of Americans say they think that the chief executives of large companies are overpaid, a percentage that changes little with income level or political party affiliation.[7]

Gerlach et al. (2006) analyze the perceived fairness of layoffs and pay cuts in North America and Germany when the CEO receives a bonus and when the CEO refuses to get a bonus. In all regions, fairness ratings of layoffs are very low if the CEO receives a bonus for cost-cutting and the acceptance of layoffs increases significantly if the bonus is refused. Surprisingly, the refusal of the bonus payment improves fairness ratings twice as much in the United States as in Germany.[8]

Hypothesis 2: Managerial compensation is particularly salient after pay cuts.

One of the main findings of bilateral gift-exchange experiments is that in an incomplete contracts environment (effort is not contractible and not observable) usually a high percent of the workers reward higher wages with higher effort (Fehr et al. 1993). A vast amount of experimental studies of bilateral work relations exists. However, more complex, multilateral work relations are not well studied yet (exceptions are Abeler et al. 2006; Maximiano et al. 2004, 2006; Charness and Kuhn 2005). While Abeler et al. (2006) and Charness and Kuhn (2005) focus on horizontal fairness considerations between workers on the same hierarchy level, there exists to our best knowledge no experimental study which considers fairness effects in regard to managerial compensations.

[6] The SOEP is a representative panel survey of the resident population of Germany. The 2005 wave of the survey includes 21.105 individuals from 11.453 households.

[7] Dash (2006). Bloomberg is the leading global provider of data, news and analytics.

[8] Gerlach et al. (2006). See Charness and Levine (2000) for similar results.

Most closely related to our experiment is the one in Charness and Kuhn (2005), although there are several departures. Most importantly, we introduce a manager, who is setting the workers' wages in half of the sessions and who is much more decisive for the firm's outcome than a single worker. Furthermore, our firm employs in total four employees (three workers and one manager) and we test for the effect of wage cuts, since we believe that concerns about managerial compensation are more salient in times of downsizing.

An experimental study which distinguishes explicitly between a manager and a firm's owner is Maximiano et al. (2006). They report that the workers still reward higher wages with higher effort levels, even when the manager who is responsible for setting the wage does not share in the firm's profits at all. In contrast to our paper, the firm's owner in Maximiano et al. (2006) cannot decide about the manager's wage and the manager does not contribute to the firm's revenue at all. Thus, fairness considerations regarding the managerial compensation are not tested for in Maximiano et al. (2006), while they are the focus of our experiment.

Hypothesis 3: The workers' effort choices do not differ when the manager or the firm is setting the workers' wages.

The paper is organized as follows. Section 2 presents our experimental design. Preliminary results will be presented in section 3. Based on the results, the paper concludes with a discussion in section 4.

2. The experiment

We are planning to conduct 8 sessions with 20 participants in each session at the Universitat Autònoma de Barcelona. Currently we have run the first 6 sessions, on which the following results are based. The 120 subjects who participated were mostly undergraduate students in Social Sciences. Participants earned on average 18,42 € (including a show-up fee of 3 €) in approximately 1½ hours. Earnings varied substantially, with the minimum earnings of 7,30 € and a maximum of 48 €. The average earning of a worker was 12,23 €, of a manager 35,48 € and of a firm's owner 18,27 €.

The experiment was programmed and conducted with the software z-Tree (Fischbacher 1999). Subjects received the instructions on paper. To ensure that subjects understood the experiment, all subjects had to answer a number of control questions before the experiment started.

At the beginning of each session, students are randomly divided into three groups: workers, firm's owners, and managers. Each subject stays in the assigned role for the duration of the 30 rounds in the session. After each round subjects are re-matched.

One treatment change within the sessions and two treatment changes between the sessions are implemented:

1) The information on the managers' wages is changed between private (PrW) and public (PuW), with the private information sessions as the reference case to measure the influence of the perception of managerial compensation on workers' effort.

2) In half of the sessions, the firm determines the workers' wages (FD), in the other half is the manager responsible for the workers' wage setting (MD). We test for differences between the wage setting of firm's owners and managers, and for the effects on workers' effort decisions.

3) Within a session, an overall cut in endowment is established after round 15. Hereby it is tested how firms divide the pain between the more decisive manager and the less decisive workers, and if the managerial compensation is more salient in times of downsizing.

Table 1: Treatment Changes

Session	Wage set by	Manager wage	Endowment
1-2 PuW/MD	Manager	Public	15 LE / 10 LE
3-4 PrW/MD	Manager	Private	15 LE / 10 LE
5-6 PuW/FD	Firm's Owner	Public	15 LE / 10 LE
7-8 PrW/FD	Firm's Owner	Private	15 LE / 10 LE

Each period consists of three stages:

1) In the first stage, the firm's owner decides which part of the initial endowment will be paid as a fixed wage to the manager. The salaries s should be integers numbers s Є {0, 1, 2, ..., N}. Since the manager's effort choice is a reaction to the wage assigned to him by the firm, the firm-manager relationship is in theory a classical principal-agent relationship in an incomplete-contract environment.

2) In the second stage, the manager in MD-sessions and the firm in FD-sessions decides how much of the remaining endowment will be used to pay uniform wages to the three workers. Since the manager does not get the total revenue provided by the worker (only 20% as a bonus if the workers generate a positive profit) and does not have to bear the costs of the

salary (the wage setting might only reduce his bonus), his considerations might differ from those of a principal, who claims the total residuals.

3) In the third stage, managers and workers decide how hard they will work for the firm. The workers and managers receive no direct benefit from providing costly effort, while the firm's profit depends critically on the effort levels chosen.

The revenue (depending on different levels of responsibility and productivity) provided by the workers and the manager and the cost of effort is given by the following table.

Table 2: Revenues and Costs of Effort

Effort level	Costs of the effort	Revenue provided by the worker	Revenue provided by the manager
0	0	0	0
1	0.10	2	6
2	0.30	3.3	10
3	0.60	4	12

Our workers are not aware of the magnitude of the productivity differences between workers and manager, but are informed that the manager is much more productive than a worker.

The payoffs (based on Charness and Kuhn 2005) are chosen (a) to generate non-zero effort levels from the majority of workers and managers, (b) to embody large productivity differences between a worker and the manager which lead to large wage differences, and (c) to allow both workers and the manager to impose high costs on firms choosing effort level 0.

The payoffs for each participant are calculated in the following way:

Firm's payoff = Initial Endowment + Total Revenue – Total Salaries
Manager's payoff = Manager's Wage + Bonus – Cost of Effort
Worker's payoff = Worker's Wage – Cost of Effort

The initial endowment is 15 lab euros in the first 15 periods and 10 lab euros in the last 15 periods. The total revenue is the sum of the revenue generated by each of the workers and by the manager. The total salary consists of three times the uniform worker's wage, plus the fixed salary for the manager plus the bonus to the manager. The bonus is 20% of the revenue provided by the workers minus the wages assigned to the workers, as long as this difference is positive. Through the bonus, the workers' effort is directly connected to the managerial compensation.

Rational choice (following the standard subgame-perfect equilibrium prediction) for workers and manager is to choose effort level "0", while the effort level that maximizes total surplus measured in lab euros is "3" for workers and manager. Anticipating "0" effort by workers and manager, it is rational choice for the firms in the FD-sessions to pay zero wages. In the MD-sessions, the standard predictions are less straightforward. Since the manager does not expect any bonus, he should be indifferent to the workers' wages. If the manager has social preferences like an inequity aversion, he should pay positive wages. If the firm's owner anticipates positive workers' wages set by the manager, he can only ensure 2 LE by setting a manager's wage of 13, 10, 7, 4 or 1 LE with an endowment of 15 LE and by setting 8, 5 or 2 LE with 10 LE endowment.

At the end of a session, all participants are paid privately. Earnings accumulate over the course of the session, and are then converted from lab euros to real euros with a conversion rate of 5 LE = 1 € for the workers and the managers and 20 LE = 1 € for the firm's owners. Additionally, at the end of the 30 rounds, we administered a survey to the participants. In the survey, workers were asked: "*In the periods where you saw the wage the firm offered to the manager, to what extent did you consider the managers' wage when deciding how much effort to supply*?"[9] Furthermore, the firms and the managers were asked for their considerations when they were setting the wages.

3. Results

Although the following results are preliminary since the PrW/FD-sessions are not played yet, figures 2 and 3 already indicate that there is a robust positive relation between own wage and effort for workers and in a limited manner also for managers. This result is consistent with previous research on gift-exchange labor markets. Two more observations regarding the workers' effort can be made: First, the workers effort is higher in the PuW-sessions than in the PrW-sessions. Second, the gift-exchange holds even when the wage-setter in MD-sessions does not receive the full revenue provided by the workers. In line with Hypothesis 3, the workers' effort decisions dependent on the own wage are remarkably similar in the FD- and the MD-sessions.

[9] See Charness, Kuhn (2005).

Figure 2: Workers' Effort

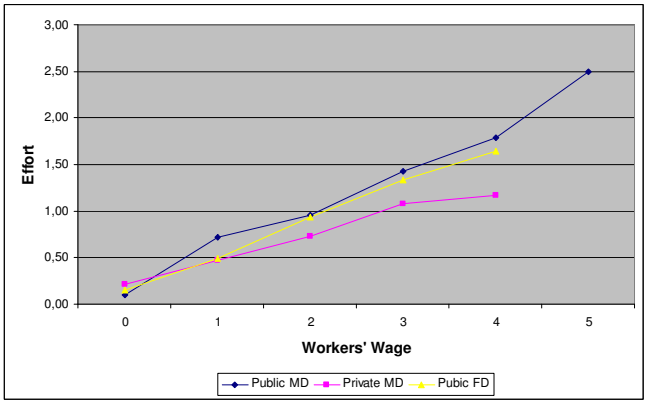
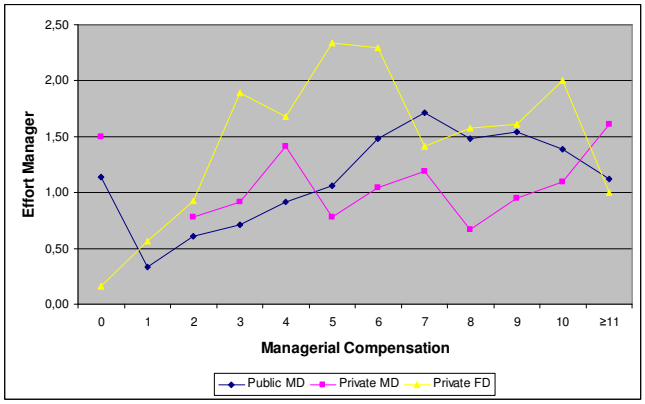


Figure 3: Managers' Effort



The correlation between own wages and effort is less obvious for managers. Since the managers' effort reaches a maximum for intermediate compensations (4 LE in PrW/MD; 5 LE in PuW/FD; 7 LE in PuW/MD) and decreases for very high compensations in all three treatments, the managerial compensation has only for half of the wage-scale a positive incentive effect. It seems that the managers prefer a reasonable relation between their wages and the workers' wages. When the income inequality goes beyond a certain level, the managers choose lower effort levels. The comparison of the workers' and the managers' efforts shows that workers and managers choose on average relatively similar effort levels for the same wages.

That the managers and firm owners are inequity averse is also supported by the observation that the workers' wages are higher than the firms' profit (and bonus) maximizing wage.[10] Probably the workers' wages in MD-sessions would be higher if the managers' scope to pay wages would not be restricted by partly very high managerial compensations. Since the firms are free to divide the endowment between the manager and the workers in the PuW/FD-sessions, they did not have such a restriction, and chose even higher workers' wages.

Table 3 shows the average numbers of the managers' and the workers' effort and wages and of the average benefit (wage-revenue) provided by each worker.[11] Two observations are striking: First, although the managerial wages are high in all sessions, the managerial wage is almost 1 LE higher in PrW/MD-sessions than in PuW/MD-sessions. The firms' owners thus

[10] While the firms in the experiment maximized their profit with a workers' wage of 1 LE in PuW-sessions and 0 LE in PrW-sessions, managers choose on average a worker's wage of 1,45 LE (PuW/MD) and 1,53 LE (PrW/MD), and firms of 1,99 LE (PuW/FD) (see table 3).

[11] "Profit Firm" = N + R – S and "Profit by Worker" = $(r_{w1}+r_{w2}+r_{w3})-(s_{w1}+s_{w2}+s_{w3})$. Thus, the firms spend on average more on salaries than the revenue they get which equals an operative loss. "Wage Differential" = Wage Manager/Wage Worker.

seem to anticipate some negative consequences of high managerial wages on the workers' effort. A possible explanation for the overall high managerial compensations in MD-sessions is the desire of the firms' owner to diminish the scope for managers to pay high workers' wages. That the managerial compensation and the wage differential are significantly lower in the two FD-sessions can also be explained with the different responsibilities in MD- and FD-sessions. Since firms feel more responsible for unequal distribution when they have to decide about both wages, they might care more about distribution effects.

Table 3: Average Numbers

	Average Periods 1-30			Average Periods 16-30		
	PuW/MD	**PrW/MD**	**PuW/FD**	**PuW/MD**	**PrW/MD**	**PuW/FD**
Wage Manager	5,64	6,43	4,41	4,64	4,84	3,63
Effort Manager	1,15	1,07	1,57	1,03	0,89	1,40
Wage Worker	1,45	1,53	1,99	1,01	1,22	1,59
Effort Worker	0,79	0,62	0,92	0,57	0,47	0,76
Wage Differential	3,89	4,20	2,22	4,59	3,97	2,28
Profit Firm	11,84	9,76	13,44	10,23	8,13	11,37
Profit by Worker	-0,36	-1,57	-1,46	-0,08	-1,33	-0,99

Second, the workers' effort is significantly higher in PuW/MD-sessions than in PrW/MD-sessions, although the wage is smaller than in PrW/MD-sessions. As a consequence, the firms' profits are higher in PuW-sessions. In the PuW/FD-sessions, the high average effort of workers is due to higher workers' wages, whereas the high manager effort can not be explained by high manager wages. Somehow surprisingly, when the managers have to choose the workers' wage, they exert lower effort than in sessions, in which they have no influence on the wage determination.

The estimations reported in table 4 and 5 give answers to the key question if the perception of the managerial compensation has an impact on the workers' effort choices. The independent variable, the workers' effort choices, is explained by the managerial compensation for each worker's wage. We control for the period, the sex, the age and a dummy for the part (before or after the wage cut) for each worker's wage. Since the repetition of observations of the subjects has to be taken into account, we cluster the observations by subject.

For the PuW/MD-sessions, we find support for both Hypothesis 1 and 2. For the most frequently assigned workers' wages Sw=1 LE and Sw= 2 LE, there is a robust significant negative impact of the managerial compensation.[12] In particular when the workers are paid a

[12] The results are in line with the results of the exit survey. 66% of the workers stated that the managerial compensation had a decisive effect on their effort determination or even was their primary consideration.

positive but small wage (1 LE) after the cut in endowment, the managerial compensation is indeed more salient.

Table 4: Estimation of the impact of managerial compensation on the workers' effort in PuW/MD-Sessions

	Periods 1-30			Periods 1-15			Periods 16-30		
	Manager Wage	**N**	**Cl.**	**Manager Wage**	**N**	**Cl.**	**Manager Wage**	**N**	**Cl.**
Salary Worker = 0	-.0024 (.0025)	153	24	-.0048 (.0034)	36	15	-.0063* (.0031)	117	24
Salary Worker = 1	-.0377*** (.0109)	240	24	-.0239* (.0125)	108	23	-.0860*** (.0214)	132	24
Salary Worker = 2	-.0487** (.0227)	216	24	-.0529** (.0240)	114	24	-.0328 (.0614)	102	23
Salary Worker = 3	-.1030 (.0746)	81	24	-.0856 (.0769)	72	24			
Salary Worker = 4	-.2680 (.2043)	24	21	-.2680 (.2043)	24	21			

N: Number of Observations; Cl: Number of Cluster; Significant at * 10%, ** 5%, *** 1% level, standard errors in parenthesis; Linear Regression with Cluster-robust standard errors (Cluster-variable: Subjects).

In the PuW/FD-sessions, Hypothesis 1 is supported since the managerial compensation has a strongly significant negative impact on the workers' effort for Sw=2 LE and a weakly negative impact for Sw=3 LE. However, the managerial compensation is, against Hypothesis 2, less salient for Sw=2 LE in the second part than in the first part, but more salient for Sw=1 LE and Sw=3 LE in the last part. In both treatments, the negative influence of the managerial compensation on the workers effort is strongly significant for the most frequently assigned wages (Sw=1 LE in MD-sessions and Sw=2 LE in FD-sessions).

Table 5: Estimation of the impact of managerial compensation on the workers' effort in PuW/FD-Sessions

	Periods 1-30			Periods 1-15			Periods 16-30		
	Manager Wage	**N**	**Cl.**	**Manager Wage**	**N**	**Cl.**	**Manager Wage**	**N**	**Cl.**
Salary Worker = 0	.01690 (.0122)	60	21				.0338 (.0224)	42	21
Salary Worker = 1	-.02346 (.0215)	147	24	-.0008 (.0181)	42	23	-.0725* (.0422)	105	24
Salary Worker = 2	-.1312*** (.0265)	303	24	-.1409*** (.0277)	132	24	-.0869* (.0475)	171	24
Salary Worker = 3	-.1765*** (.0584)	162	24	-.1575** (.0615)	102	24	-.5362*** (.1028)	42	12
Salary Worker = 4	-.0465 (.1146)	48	19	-.0465 (.1146)	48	19			

N: Number of Observations; Cl: Number of Cluster; Significant at * 10%, ** 5%, *** 1% level; standard errors in parenthesis; Linear Regression with Cluster-robust standard errors (Cluster-variable: Subjects).

To sum up, the managerial compensations in PuW-sessions are significantly negatively correlated with the workers' effort, as predicted by **Hypothesis 1**.

The influence of the managerial compensation on workers' effort varies before and after the cut in endowment. Although there is no clear pattern for relatively high workers' wages, the managerial compensation has a more negative impact on the firm's profit after the wage cut for low workers' wages (Sw=1 LE) (**Hypothesis 2**).

The firms' profit, the workers' wages and the workers' and managers' average effort are higher in FD-sessions, while the average managerial wage is lower. For the same workers' wages, the average workers' effort is remarkably similar in the FD- and MD sessions. Thus, as predicted by **Hypothesis 3**, the workers' effort choices do not differ if the manager or the firm is setting the workers' wages. The gift-exchange holds even when the wage-setter does not receive the full revenue provided by the workers.

Our preliminary experimental data out of the six sessions furthermore indicates two interesting results: First, in PuW/MD-sessions the managerial compensations are lower but the firms' profits and the workers' effort choices are higher than in PrW/MD-sessions. Second, the workers' wages set by managers and firms do not maximize the firms' profit and indicate a inequity aversion for both managers and firms.

4. Discussion

Anecdotal evidence and data from opinion polls suggest that excessive management compensation not only contradicts the fairness preferences of a majority of the population but also causes considerable damage to the workers' willingness to accept cost savings on the organizational level. In this paper, we present experimental evidence that wage compression combined with the disclosure of the managerial compensation is in fact profit maximizing in an efficiency-wage context (when labor relations are contractually incompletely regulated). After playing six out of eight sessions, it seems that beside the positive incentive effect of high managerial compensations regarding the effort of the manager, a rising inequality can cause opposed effects because of workers' fairness considerations. Knowledge about the interplay of the two effects is very important when creating an efficient compensation policy in firms. A beneficial pay policy will always depend on the relative relevance of the two effects. In particular, in times of downsizing a sensitive managerial wage setting and communication seem appropriate.

Regardless of the negative effects of high managerial wages, the opportunity to observe the managerial compensation had a positive impact on the workers' effort choices. Thus, it seems that to disclose managerial wages individually is a profit-maximizing strategy. This is of importance in countries which leave the decision to disclose the managerial compensation to the shareholders. To ensure the positive effects, the disclosure should be integrated in a pro-active strategy, in which also the reasoning behind the compensation decision is communicated to the staff.

Finally, workers' motivation to reciprocate does not vanish in firms with diffuse ownership stock. It seems that gift-exchange cannot be explained fully with intention-based reciprocal preferences towards the firm's owner, but with social norms which require some kind of effort in response to positive wage offers. To put this differently, reciprocal preferences are not directed towards one particular member of the firm, but towards the firm as a whole.

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Instructions PuW/MD - Sessions

Instructions for all Participants:

Thank you for coming to this experiment. You will be paid 3 euros for participating in this experiment, plus the tokens which accumulate for all participants over the course of the session converted into real euros. At the end of the session, you will be paid privately and according to your decisions. From now on, **no communication is allowed**. After reading this instructions carefully, please raise your hand, if you have any questions.

There are three types of participants in this experiment: Firm's owner (which we call simply firm), worker, and manager. You have been randomly assigned a type corresponding to the card you received at the entrance. **You will have that same type for the whole experiment**.

The experiment consists of 30 periods. In each period, each firm's owner will be grouped with three workers and one manager. Firm, manager and workers are randomly re-matched every period. Each period consists of four steps, which will be described in the following:

Step 1: The account of the firm's owner will be credited with a certain amount N of tokens. The firm's owner decides individually how much to pay to the manager (Sm). Wages can not exceed the total amount assigned to the firm; wages are restricted to be in whole tokens, e.g. 0 tokens, 1 token, 2 tokens etc.

Step 2: The manager observers the wage paid to him/her and the remaining endowment (RE) he/she can use to pay wages to the workers (RE= N – Sm). Then the manager decides how much to pay to the workers. The three workers get the same wage; wages are restricted to be in whole tokens, e.g. 0 tokens, 1 token, 2 tokens etc; wages can not exceed the remaining endowment RE.

Step 3: After the workers observe the wage assigned, workers and managers choose effort from one of 4 feasible levels. Each effort level has different costs for workers and manager and implies different revenue for the firm. Workers and manager have the same cost of effort, while the revenue provided by the manager is much higher than the revenue provided by the workers. The three workers are equally productive.

The payoffs for each participant are calculated in the following way:

The firm's profit is equal to the initial endowment (N) plus the profit generated by the manager plus 80% of the profit generated by the workers as long as this is positive. The profit generated by the manager is equal to the revenue provided by him minus the salary paid to him. The profit generated by the workers is the sum of the revenues generated by them minus the salaries which are paid to them. When the profit generated by the workers is negative, the firm has to bear 100% of these costs.

Thus, if the workers' profit is ≥ 0 ➔

$$\textit{Firm's payoff} = N + \textit{Profit Manager} + 0.8*\textit{Profit Workers}$$

And if the workers' profit is < 0 ➔

Firm's payoff = N + Profit Manager + (negative) Profit Workers

Each manager receives the wage assigned and the bonus (20% of the revenue provided by the workers minus the wages assigned to the workers, as long as this difference is positive), less the cost of the effort level chosen. When the workers' profit is ≥ 0 ➔

*Manager's payoff = Manager's Wage + 0.2*Profit Workers – Cost of Effort*

When the workers' profit is < 0 ➔ *Manager's payoff = Manager's Wage – Cost of Effort*

Each worker receives the wage assigned, less the cost of the effort level chosen.

Worker's payoff = Worker's Wage – Cost of Effort

Step 4: The participants are informed about the decisions in the following way:

- Firms are informed about the wage paid to the workers, about each worker's and manager's choice of effort, the corresponding revenues and about the resulting earnings for the firm.
- Managers are informed about each worker's revenue and about his/her total earnings.
- Workers are informed about the total revenue provided and about their individual total earnings.

After step 4, the period is over. At the end of period 30, you will be paid 3 euros for participating in this experiment, plus the tokens in your account at that time converted into euros.

Over the course of the session, changes in the economic situation (indicated by the initial endowment) of the firm might occur, which will be communicated to you when they occur.

Instructions for Firms:

Your role in this experiment is firm owner. You will be matched every period with one manager and three workers. At the beginning of each period, your account will be credited with 15 tokens. You then decide what wages to offer to the manager. Wages can not exceed your 15 tokens endowment; wages are restricted to be in whole tokens, e.g. 0 tokens, 1 token, 2 tokens etc. The manager will be informed about his or her wage and will then decide what wages to offer to the workers out of the remaining endowment. After the manager and the workers have been informed about their wages, **(and after the workers are informed also about the managers wage)** they will choose how hard to work for you. The more "effort" supplied, the more revenues you earn. But effort is costly to both workers and manager.

In the following table, you can see the costs of the effort levels that the workers and the manager can choose, and the revenues they provide to the firm. Managers see the same table as you, whereas workers only see the column reflecting costs and revenues for them.

Effort level	Costs for the worker	Revenue provided by each worker	Costs for the manager	Revenue provided by the manager
0	0	0	0	0
1	0.10	2	0.10	6
2	0.30	3.3	0.30	10
3	0.60	4	0.60	12

- Zero effort level by either worker or the manager means zero effort cost to both of them and no revenue for the firm.
- Effort level 1 by a worker generates revenues of 2 tokens, while effort level 1 by a manager generates revenues of 6 tokens. It costs 0.1 tokens for the workers and the manager.
- Effort level 2 by a worker generates revenues of 3.3 tokens, while effort level 2 by a manager generates revenues of 10 tokens. It costs 0.3 tokens for the workers and for the manager.
- Effort level 3 by a worker generates revenues of 4 tokens, while effort level 3 by a manager generates revenues of 12 tokens. It costs 0.6 tokens for the workers and for the manager.

Please raise your hand, if you have any questions.