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Experiment**

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Abstract

In times of increasing international competition firms demand concessions from employees to carry out necessary restructuring measures, which can partly be resisted 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 these two observations are related. In a two-level gift-exchange experiment it is asked if the managerial compensation influences workers' effort decisions and workers' willingness to accept wage cuts. We compare sessions in which the managerial compensation is public information with private information sessions. Our data suggests that the managerial compensations in public wage sessions are significantly negatively correlated with the workers' effort choices—in particular after wage cuts. The profit-maximizing strategy for the firm is to compress wages when the managerial compensation is public information.

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

JEL classification: C92, J33, M12, M52

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Resumen: En tiempos de creciente competencia internacional las empresas demandan concesiones por parte de los empleados para llevar a cabo medidas de reestructuración necesarias, que en parte puede ser resistida por los trabajadores, cuyo comportamiento en el trabajo no puede ser contratado plenamente. Al mismo tiempo, las compensaciones gerenciales son percibidas como demasiado altas por la mayoría de la población. En nuestro trabajo estudiamos en qué medida estas dos observaciones están relacionadas. En un experimento de intercambio de regalos nos preguntamos si las compensaciones gerenciales influyen en las decisiones de esfuerzo de los trabajadores. Comparamos las sesiones en las que el salario de los gerentes es información pública con sesiones de información privada. Nuestros datos sugieren que los salarios de los gerentes están negativamente correlacionados con el esfuerzo de los trabajadores, en particular, después de la reducción de salarios. La estrategia que maximiza beneficios para la empresa es la de comprimir los salarios cuando éste es información pública

Palabras claves: salarios gerenciales, preferencias sociales, experimento de laboratorio, intercambio de regalos, esfuerzo, recortes de personal

Clasificación JEL: C92, J33, M12, M52

1 Introduction

In times of increasing international competition, firms demand employees to make concessions to carry out necessary restructuring measures. These concessions can partly be resisted by the workers, whose behavior at work can not be fully contracted upon. At the same time, excessive management compensation may cause considerable damage to the willingness to contribute to cost savings on the organizational level. This is particularly true if in times of downsizing, when workers are confronted with wage cuts, 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. In the field, usually shareholders set the manager's wage, while the workers' wages are set by the manager. 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 observation of the managerial compensation, 2) if executive pay is particularly salient during downsizing, and 3) if workers still exert their effort in response to wage offers if the wage-setter (the manager) gets only a small part of the benefits generated by the workers. We contribute to several different strands of the literature. Regarding questions 1 and 2, we analyze the importance of fairness considerations in labor markets in general and their importance for the optimal incentive compensation of managers in particular. We ask if fairness considerations are strong enough to justify consequences such as wage compression and wage secrecy. Regarding question 3, we contribute to the discussion about the driving forces behind gift-exchange 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, comparing the effort decisions of workers in the case when the manager decides their wage (and gets only a small part of the revenue generated by the workers through their effort) with the case where the firm's owner does it (and receives the biggest part of the revenue).

We find that manager's wage influences negatively the effort decision of the workers, the higher the manager's wage the lower the effort of the workers, for a given own wage of the workers. We also find that the effect of the manager's wage is especially important during downsizing. The results are in line

with the results of the exit survey¹ where 65% of the workers states that the managerial compensation had a decisive effect on their effort determination or was even their primary consideration. Regarding question 3, we find that it does not exist significant differences in the effort decision of the workers when the manager sets workers' wage in comparison with the situation when the firm's owner decides it; reciprocal preferences are not directed towards one particular member of the firm, but towards the firm as a whole.

The paper is organized as follows. In the following section we summarize related literature and state our hypotheses. Section 3 presents our experimental design. Results are presented in section 4. Based on the results, the paper concludes with a discussion in section 5.

2 Literature review and hypotheses

The traditional literature dealing with managerial compensation focuses on the problems of the principal-agent relationship between a firm owner and a manager which occurs given that managers bear little financial costs if they pursue their own goals rather than maximize shareholders' wealth. Two typical standpoints can be identified. In the "optimal contracting approach" the aim is 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 part of the agency problem itself, since in many cases it does not provide efficient incentives but rents for the managers (Bebchuck and Fried, 2003).

However, both views focus on the firm's owner - manager relationship without considering the effects on the workers who might have social preferences regarding the managerial compensation.²

Labor relations in general are typically contractually incompletely regulated. In incomplete contracts not all relevant aspects are comprehensively determined, since some important aspects are not

¹A survey distributed when the experiment finishes.

²An 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. See Fehr and Fischbacher (2002).

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, since the tasks of work get more complex.

The following graph shows how we connect the two principal-agent relationships firm-manager and manager-worker, which are traditionally analyzed separately. As described above, the 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' effort. Following the efficiency wage theory managers set the workers' wages to make them work more than the minimum required (which is indicated by the non-contractible part of the workers' effort —NC). Additional to the influence of the own compensation, the dotted line indicates the potential influence of the perception of the managerial compensation on NC.³

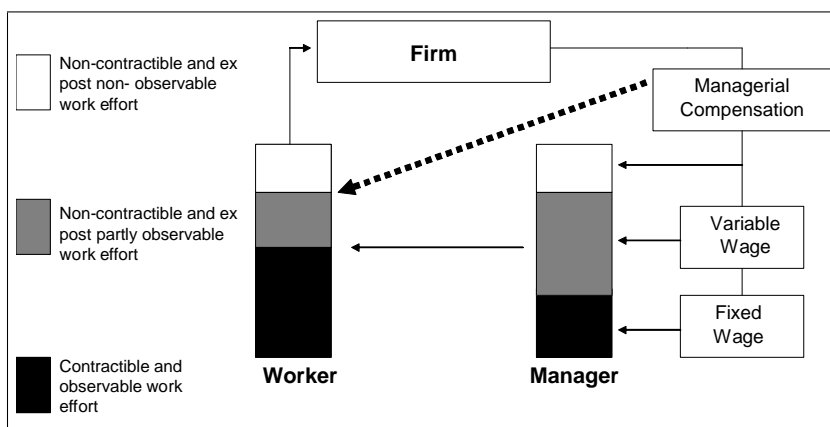


Figure 1: Ppal-agent relations and managerial compensation

³The effort is divided into two parts: the contractible part (C) (e.g. certain duties that can be inspected, working time, etc), and the non-contractible part (NC). Part of NC is ex-post observable (NCO) and part of it is not (NCNO). The latter is, in the case of managers, all forms of works and decisions which have influence on indices such as the share quotation. The consequences of NCNO can not be captured with objective measures and can not be traced back to individual decisions. Since workers' effort can be more easily contracted upon than the managers' effort, C has more weight in the worker's than in the manager's effort bar. The fixed wage affects basically C, while the variable part of the compensation affects NCO, while both —fixed and variable compensations— affect NCNO. The variable compensation consists of e.g. bonus, which is paid when the firm can observe the work ex-post, and also options, which can be used to motivate the manager to work more long term oriented —something not possible to be measured accurately.

It is widely accepted 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; Milgrom and Roberts, 1992; Fehr and Gächter, 2000). In order to motivate 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 it 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 of 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). Therefore our first hypothesis is the following:

Hypothesis 1: The observation of the manager's wage influences 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 2005.⁴ 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 of 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.⁵

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 North America and Germany, fairness ratings of layoffs are very low if the CEO receives a bonus for cost-cutting and

⁴The 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.

⁵Dash (2006). Bloomberg is the leading global provider of data, news and analytics.

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.⁶ Thus, our second hypothesis stresses the importance of the perceptions of the manager's wage in periods of downsizing and financial restrictions.

Hypothesis 2: The effect of managerial compensation on workers' effort is more significant 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 percentage of the workers reward higher wages with higher effort (Fehr et al., 1993). A vast amount of experimental studies of bilateral work relations exists. 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.⁷ However, more complex, multilateral work relations are not deeply studied yet (exceptions are Abeler et al., 2006; Maximiano et al. 2006a, 2006b; 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.

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 sets 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), while in their case they have a firm with one owner and two workers.⁸ Moreover, 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. (2006b). 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 the firm's profits at all. In contrast to our paper, the firm's owner in Maximiano et al. (2006b) cannot decide about the manager's wage and the manager does not contribute to the firm's revenue at all. Thus, fairness

⁶Gerlach et al. (2006). See Charness and Levine (2000) for similar results.

⁷See Maximiano et al. (2006b) for a discussion.

⁸We include vertical considerations while they have horizontal considerations (comparisons among the two workers).

considerations regarding the managerial compensation are not tested for, while they are the focus of our experiment.

Following the results in Maximiano et al. (2006b), our third hypothesis refers to the difference in workers' effort when it is the firm's owner or the manager who decides their wages.⁹

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

3 The experiment

The experiment is programmed and conducted with the software z-Tree (Fischbacher, 2007). Subjects receive the instructions on paper.¹⁰ To ensure that subjects understood the experiment, all subjects have to answer a number of control questions about the instructions, before the experiment starts.

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 session. In each session 30 periods are played under stranger matching, i.e. after each round subjects are re-matched, and the probability of playing with exactly the same partners consecutively is zero.¹¹

Two treatment changes *between* the sessions and one treatment change *within* the sessions are implemented:

1) The information on the managers' wages is changed between private (PrW hereafter) and public (PuW hereafter), with the private information sessions as the reference case to measure the influence of the perception of managerial compensation on workers' effort. In PuW-sessions, workers are informed about the manager's wage, while in the PrW-sessions they are not.

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

⁹The case where the firm's owner and the manager are the same person is observed often in family-owned companies, in which the "main shareholder" and the CEO are the same person, while the case of separation of power —the firm's owner and the manager are different persons— is more frequent in publicly owned companies.

¹⁰Instructions for one of the sessions can be found in Appendix 2.

¹¹The objective of changing partners is to minimize reputation effects.

3) Within a session, an overall cut in endowment is established after round 15.¹² With this change we want to see how firms divide the cut in the endowment —the tokens he has to pay salaries— between the wage of the more decisive manager and the wages of the less decisive workers. Moreover, we want to check if the managerial compensation is more influential for the workers in times of downsizing.

Table 1 summarizes the information on our treatments.¹³

Sessions	Workers' wage set by	Managers' 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

Table 1: Treatment changes

Each period consists of four stages. In the *first stage*, the firm's owner decides which part of the initial endowment (N) will be paid as a fixed wage w_m to the manager, w_m should be integers, $w_m \in \{0, 1, 2, \dots, N\}$. 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 (w_w).¹⁴ 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. In the *fourth stage* the workers are informed about the total profit and their own earnings, and the manager and the firm's owner are informed about the effort of each worker and their own earnings.

In the first stage we have a traditional principal-agent relationship in an incomplete-contract environment, where the manager's effort choice is a reaction to the wage assigned to him by the firm, and the person who chooses the manager's wage is the same person that pays it. In the second stage, the manager's considerations might differ from those of a principal, who receives the total profit

¹²In the instruction subjects are told that: "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".

¹³PuW refers to public information sessions, PrW refers to private information sessions, MD refers to the sessions where the managers decides the workers' wages, FD refers to the sessions where the firm's owner decides the workers' wages, and LE refers to laboratory euros.

¹⁴ w_w should also be integers.

produced by the workers, since the manager does not get the total profit provided by the workers (he gets only 20% as a bonus if the workers generate a positive profit¹⁵) and does not have to bear the costs of the salary.¹⁶

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

Effort level	Costs of the effort	Revenue provided by the worker	Revenue provided by the manager
0	0	0	0
1	0.1	2	6
2	0.3	3.3	10
3	0.6	4	12

Table 2: Revenues and costs of effort in LE

The workers are not aware of the magnitude of the productivity differences between workers and manager, but they are informed that the manager is much more productive than a worker.¹⁷ Workers neither know the initial endowment of the firm’s owner.¹⁸

The payoffs (based on Charness and Kuhn, 2005) are chosen to generate non-zero effort levels from the majority of workers and managers, to embody large productivity differences between workers and the manager, and to allow workers and the manager to impose high costs on firms by choosing effort level 0. The payoffs for each participant are calculated in the following way¹⁹:

$$Firms\ payoff = Initial\ Endowment + Total\ Revenue - Total\ Salaries$$

$$Managers\ payoff = Managers\ Wage + Bonus - Cost\ of\ Effort$$

¹⁵The profit generated by the workers is defined as the sum of the revenue provided by them (from table 2) minus the wages they are paid.

¹⁶In real firms, managers receive part of the revenues of the firms through the variable part of their compensation (e.g. shares or stock options).

¹⁷The reason for this is to approximate real world labor markets in which workers know that the manager is much more decisive for the overall outcome, but can not determine their true relative value to the employer. We followed Charness and Kuhn (2005) ’s idea that workers do not know the exact difference of his own productivity and his co-worker’s productivity.

¹⁸We didn’t give the information about the initial endowment of the firm’s owner, following Charness and Kuhn (2005), to avoid the possibility that the workers can deduce the wage paid to the manager in the PrW-sessions.

¹⁹These formulas are explained below.

$$\text{Worker's payoff} = \text{Worker's Wage} - \text{Cost of Effort}$$

where the *Initial Endowment* is 15 lab euros in the first 15 periods and 10 lab euros in the last 15 periods.²⁰ *Total Revenue* is the sum of the revenue generated by each of the workers and by the manager (see table 2). *Total Salaries* consist of three times the uniform worker's wage (w), plus the fixed salary for the manager (w_m) plus the bonus to the manager. The *Bonus* is 20% of the benefit generated by the workers, which is the revenue provided by the workers minus the wages assigned to them, as long as this difference is positive. Through the bonus, the workers' effort is directly connected to the managerial compensation. If the benefit generated by the workers is zero or negative, then the bonus is 0.

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 —among other questions— "To what extent did you consider the managers' wage when deciding how much effort to supply?"²¹ The firms and the managers were asked for their considerations when they were setting the wages.

4 Results

The experiment was conducted at Universitat Autònoma de Barcelona, from November 2006 to March 2007. Almost all subjects were undergraduate students.²² First of all, we present the number of subjects that participated in the experiment and their average earnings, in table 3. Then, we present the average wages and effort levels by period. Next, we show results related to *Hypotheses 1 and 2*. It includes estimations where the dependent variable is the effort level chosen by workers, and the set of explanatory variables include the manager's wage. Then, the average wages by treatment are presented, followed by the relation between wage and effort. The main results are numbered.

²⁰This change in the endowment tries to simulate a crisis in the firm, and it is presented as "financial problems" to the subjects.

²¹This question was included in the survey only in the PuW-sessions. In formulating it we followed Charness and Kuhn (2005).

²²We had only one participant that was not an undergraduate student, but an employee of the university.

In the following table we have the number of subjects that participated in the 8 sessions of the experiment and the average earnings, in euros, including the show-up fee.

	N	Min	Max	Average
Firm's owners	32	11.01	30.59	22.21
Managers	32	25.04	48.36	34.06
Workers	96	7.28	16.24	12.73
All	160	7.28	48.36	18.89

Table 3: Nr of subjects and avg earnings in €

The average firms' earning is 22.21 €. This number is 25.22 and 19.19 € in the FD- and MD-sessions respectively. These numbers lead us to our first result below. When the managers' wage is public information, the firms' average earning is 21.96 € and when this information is private, their average earning is 22.46 €.

Result 1: The firms' earnings are higher when the firm's owners are the ones who decide the workers' wage, than when the managers decide wages.

In figure 2 we have plott the average wages and effort levels by period.²³ We observe a decrease in efforts and wages over time, for both workers and managers.²⁴ The period effect is particularly observable in the efforts. Nevertheless, the workers' wage exhibit a difference between part I (periods 1-15) and part II (periods 16-30), but not a period effect. Something similar occurs with the managers' wage, it exists a period effect in part I, then a decrease after the endowment cut in period 15 and in

²³Recall that after period 15 we have a cut in the endowment of the firm's owner, that goes from 15 LE to 10 LE.

²⁴This could be caused by the type of matching we have in the experiment: we change partners every period. Gächter and Fehr (2002) compare a one shot-treatment (change partners) with a repeated interactions-treatment (play with the same partners) and they find that efforts are higher (and increasing) when they play with the same partner. The same pattern is found in public good experiments.

part II the wage is stable.

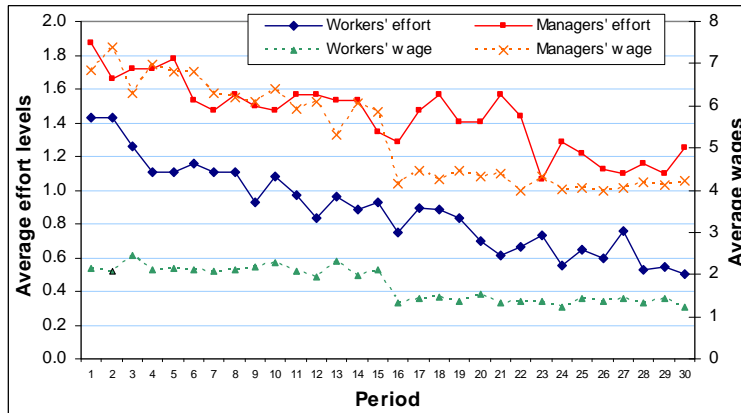


Figure 2: Average wages and effort levels by period

The estimations reported in table 4 give an answer to the key question whether the perception of the managerial compensation has an impact on the workers' effort choices in public sessions (*Hypotheses 1 and 2*). The dependent variable is the workers' effort choice, a variable that takes the value 0, 1, 2, or 3. Since the repetition of observations of the subjects has to be taken into account, we estimated a panel data model and a model clustering on subjects. The first methodology is more powerful and the second one more conservative. With the panel data we reduce the probability of error type II (not rejecting a false null hypothesis) while with the clustering approach we reduce the probability of error type I (rejecting a true null hypothesis). These estimations can be seen as bounds of what is really in the data.

We report the coefficient of the variable *Manager's wage* of the estimations, its standard error, the number of groups or clusters (for the panel data and the clustering method, respectively), and the significance level of the estimation. We control for each worker's wage, for the period, the sex, the age, the field of study, and we use a dummy variable for the person choosing the workers' wages (firm or manager).

For workers' wages equal 2 and 3 LE, two of the three most frequently assigned wages, there is a significant negative impact of the managerial compensation. When the workers are paid a positive but small wage (1 LE) after the cut in the endowment, the managerial compensation is salient, although it

is not significant before this cut. The results —summarized in Result 2— are in line with the results of the exit survey. 65% of the workers in the public sessions stated that the managerial compensation had a decisive effect on their effort determination or was even their primary consideration.

Panel data estimations												
	Periods 1 - 30				Part I (Periods 1 - 15)				Part II (Periods 16 - 30)			
	Coefficient	Std error	Nr groups	Prob>chi2	Coefficient	Std error	Nr groups	Prob>chi2	Coefficient	Std error	Nr groups	Prob>chi2
Worker's wage = 0	0.0008	0.0080	45	0.0350	-0.0064	0.0123	27	0.1813	-0.0041	0.0109	45	0.0224
Worker's wage = 1	-0.0146	0.0135	48	0.0009	-0.0083	0.0199	46	0.0020	-0.0478**	0.0208	48	0.0062
Worker's wage = 2	-0.0703***	0.0165	48	0.0000	-0.0783***	0.0198	48	0.0000	-0.1025**	0.0415	47	0.0000
Worker's wage = 3	-0.1111***	0.0419	48	0.0007	-0.1131***	0.0426	48	0.0005	-0.7094***	0.2291	21	0.0078
Worker's wage = 4	-0.0996	0.1207	40	0.0998	-0.0996	0.1207	40	0.0998				
Worker's wage = 5												

*** significant at 1% level

Prob > chi2 gives the level of significance of the estimation

** significant at 5% level

Clustering estimations												
	Periods 1 - 30				Part I (Periods 1 - 15)				Part II (Periods 16 - 30)			
	Coefficient	Std error	Nr clusters	Prob>F	Coefficient	Std error	Nr clusters	Prob>F	Coefficient	Std error	Nr clusters	Prob>F
Worker's wage = 0	0.0064	0.0080	45	0.7205	-0.0064	0.0106	27	0.3321	0.0060	0.0096	45	0.5184
Worker's wage = 1	-0.0264	0.0241	48	0.0002	-0.0076	0.0218	46	0.0019	-0.0792**	0.0381	48	0.0702
Worker's wage = 2	-0.0933***	0.0261	48	0.0000	-0.0971***	0.0321	48	0.0000	-0.0784	0.0629	47	0.0000
Worker's wage = 3	-0.1612**	0.0673	48	0.0000	-0.1426**	0.0682	48	0.0013	-0.8112***	0.2143	21	0.0109
Worker's wage = 4	-0.0912	0.1279	40	0.0313	-0.0912	0.1279	40	0.0313				
Worker's wage = 5												

*** significant at 1% level

Prob > F gives the level of significance of the estimation

** significant at 5% level

Table 4: Estimations

In most of the estimations we have a significant period effect with decreasing effort through the course of the session. There is also a significant age and gender effect: higher age implies higher levels of effort and women choose higher levels of effort than men.

Result 2: Workers' effort decisions are negatively correlated with the manager's wage, especially after wage cuts.

In the following paragraphs, we present the results related with average wages, the ratio between wages, and its relation with the firm's earnings. In table 5 we show the average workers' and managers' wages and the ratio between them.

In FD-sessions the workers' wage is higher than in MD-sessions (p -value=0.000).²⁵ Probably the workers' wages in MD-sessions would be higher if the managers' scope to pay wages would not

²⁵Either following a t-test or a Mann-Whitney U test. The comparison is done at the firm level, therefore the number of observations is equal to the number of firms.

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 FD-sessions, they did not have such a restriction, and chose higher workers' wages. The difference in the average wage of the workers between the private and the public sessions is not statistically significant.²⁶

	Workers' wage			Managers' wage			Managers' wage / Workers' wage		
	Private	Public	Group Total	Private	Public	Group Total	Private	Public	Group Total
All periods									
FD	2.06	1.99	2.03	4.63	4.41	4.52	2.25	2.22	2.23
MD	1.53	1.45	1.49	6.43	5.65	6.04	4.19	3.90	4.05
Group Total	1.80	1.72	1.76	5.53	5.03	5.28	3.08	2.93	3.00
Part I									
FD	2.44	2.38	2.41	5.56	5.20	5.38	2.28	2.18	2.23
MD	1.83	1.88	1.86	8.02	6.65	7.33	4.37	3.53	3.95
Group Total	2.14	2.13	2.14	6.79	5.93	6.36	3.18	2.78	2.98
Part II									
FD	1.68	1.59	1.64	3.71	3.63	3.67	2.20	2.28	2.24
MD	1.23	1.01	1.12	4.84	4.64	4.74	3.93	4.60	4.23
Group Total	1.46	1.30	1.38	4.28	4.13	4.20	2.93	3.18	3.05

Table 5: Average wages

Managers' wages are higher in PrW- than in PuW-sessions,²⁷ with the exception of part II in FD-sessions. The firm's owners thus seem to anticipate some negative consequences of high managerial wages on the workers' effort. Furthermore, the managers' wages are higher in the MD- than in the FD-sessions.²⁸ There are two possible explanations for that. One is that paying more to the manager, the firm's owner could control the wage of the workers, because the workers' wage can only be one third of the remaining tokens (initial endowment minus manager's wage). The second reason is that the firm's owner wanted to pay higher salaries in this case because managers in the MD-sessions have more responsibility, since they have to choose the salary of the workers.

The managers'/workers' wage ratio is higher in PrW- than in PuW-sessions if we consider the 30 periods together. This pattern is also observed in part I, but not in part II. When the firms have a financial restriction, they decrease the ratio in PrW-sessions, but they increase it in PuW-sessions. The latter is due to the more significant decrease in the workers' wages than in the managers' wage. This is especially notable in the MD-sessions. In these cases, managers received a lower salary and

²⁶Neither following a t-test or a Mann-Whitney U test.

²⁷The p-values for the "All periods" comparison are 0.007 and 0.006 for "Group total", and 0.306 and 0.091 in FD-sessions, and 0.007 and 0.014 in MD-sessions. The first p-values correspond to t-tests and the second values to Mann-Whitney U tests.

²⁸The p-value for the comparison of 4.52 and 6.04 is 0.000 with both methods of comparison.

chose a lower salary also for the three workers, but this decrease was larger than the decrease they have experienced in their own wage. On the other hand, in the FD-sessions, the firm's owners divided the financial problem more equally among the four employees. A possible reason for the significantly lower wage differentials in FD-sessions might be that the firms are more inequity-averse when they feel responsible for the income distribution. Since they did not feel completely responsible for unequal distributions in MD-sessions, they might care more about their own profit than about distribution effects.

Result 3: The manager's wage as well as the ratio managers' wage/workers' wage is higher in PrW- than in PuW-sessions. The ratio is lower in FD- than in MD-sessions.

Although the wage differentials vary considerably between the FD- and MD-treatments, the overall average wage ratio is notable. On average in all eight sessions, the managers are paid three times more than the workers, which equals exactly the productivity ratio between managers and workers.

Regarding the optimal wage ratio, figure 3 shows that with a ratio between 1.5 and 2 the firm obtains the highest profits in both part I and part II.²⁹ For higher wage ratios, the firms' profit gets lower. There may be two reasons for that: the incentive effect on the managers' effort is diminishing and the "fairness effect" is increasing.

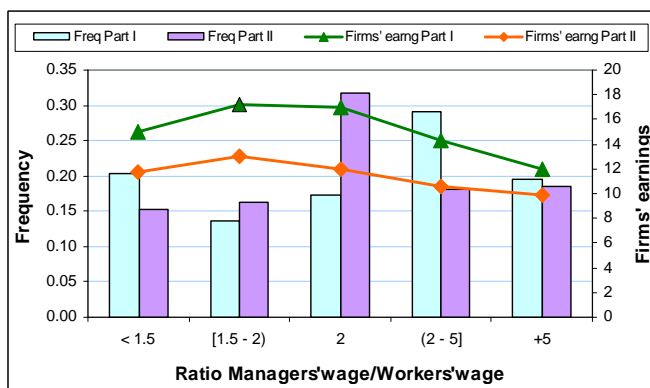


Figure 3: Wage ratio and firm's earnings

²⁹In figure 4 the firms' earnings are measured in LE.

Result 4: The firms' average earnings increases with the managers'/workers' wage ratio up to a ratio equal 2, and then it decreases for higher ratios.

Analyzing if there exists a difference between the workers' effort in private and public sessions, we find that the difference is not statistically significant.³⁰ The same happens with the managerial effort.³¹

Next, we show the relation between wages and effort, and relate it with Hypothesis 3. Figures 4 and 5 indicate that there is a robust positive relation between own wage and effort for workers—with the exception of the one observation when the salary of the workers is 5 LE—and in a weaker manner also for managers.³² This result is consistent with previous research on gift-exchange labor markets.

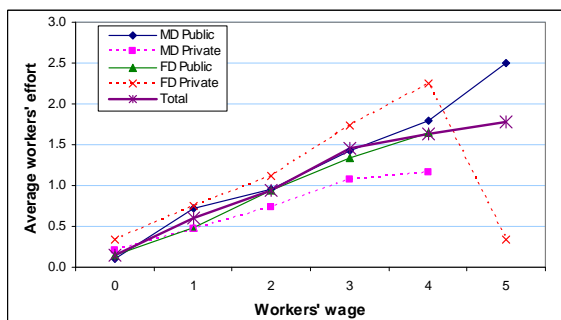


Figure 4: Average workers' effort

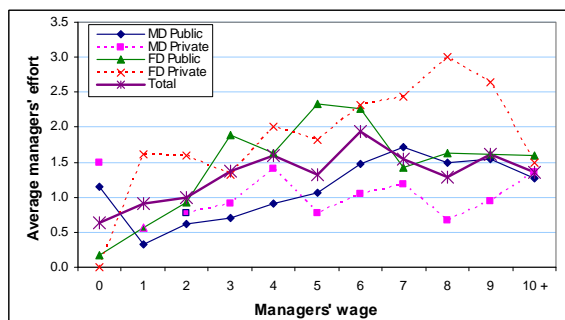


Figure 5: Average managers' effort

Regarding the comparison of workers' effort in MD- and FD-sessions, two observations can be made. In the public sessions, the effort decisions in the MD- and FD-treatment dependent on the own wage are remarkably similar. Thus, with public information the gift-exchange holds even when the wage-setter in MD-sessions does not receive the full revenue provided by the workers (as predicted by *Hypothesis 3*). When comparing the private FD- and MD-sessions, we can find that the effort for the same wage level is higher in FD-sessions. In this case, the gift-exchange is stronger when the

³⁰ p-value=0.666 in the the t-test and p-value=0.676 in the Mann-Whitney U test.

³¹ The corresponding numbers can be observed in table A1 in Appendix 1.

³² The managers' effort reaches a maximum for intermediate compensations (6 LE) and decreases for very high compensations. 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.

wage-setter is also the receiver of the whole gift.³³

Result 5: There exists a strong positive relation between own wage and effort levels for workers, i.e. the higher the own wage the more effort³⁴, while the managers' effort reaches a maximum for middle wages and then decreases for very high wages.³⁵

In the case of managers the gift exchange seems to work only until a certain level of wage. It may be explained by inequity aversion: inequity averse managers know that they will earn much more than the workers and therefore did not feel grateful to the firms and then choose lower levels of effort.

Table 6 shows the ratio between effort and wages for workers and managers. We observe that the ratio for managers increases from part I to part II. Although the level of effort decreased from part I to part II, the wages decrease more, and this yields a higher effort-wage ratio. They know that the firm has 10 LE instead of 15 LE as endowment, and although they wage decrease almost in one third, they effort only decreases 19% (on average). The exact variations are in table 2 in Appendix 1.

All periods	Average workers ratio effort/wage			Average managers ratio effort/wage		
	Private	Public	Group Total	Private	Public	Group Total
Part I						
FD	0.61	0.45	0.53	0.37	0.33	0.35
MD	0.42	0.54	0.48	0.16	0.19	0.17
Group Total	0.53	0.49	0.51	0.25	0.25	0.25
Part II						
FD	0.55	0.48	0.52	0.51	0.39	0.45
MD	0.37	0.56	0.46	0.18	0.22	0.20
Group Total	0.48	0.51	0.49	0.32	0.29	0.31

Table 6: Ratio effort/wage in parts I and II

In the case of the workers the ratio effort/wage decreases in the second part with private information, but increases with public information. Our interpretation is that if workers don't get information about the manager's wage, they cannot be sure about it, and they might guess that the manager's

³³In the exit survey the workers were asked the reason why they chose an effort level higher than 0. In MD-sessions, 37% answered that they wanted to increase the chance that the manager gets a bonus, 27% wanted to increase the profit of the firm's owner, and the remaining 36% stated that they either never chose positive effort levels or did focus neither on the manager, nor on the firm. The fact that the manager sets the workers' wages seems to be more important than the fact that the salary is paid out of the firm's endowment. The percentages in the FD-sessions are 8%, 69%, and 23%.

³⁴The point corresponding to wage=5 LE is due to only one observation.

³⁵Except in the MD/PrW-treatment.

wage was not decreasing. But when there is an open communication policy, there are not such speculations, and the workers can observe in most of the time that the burden of the wage cut was split more or less equally. When the cost of the wage cuts is fairly distributed, the acceptance of wage cuts is higher.

Result 6: The ratio effort/wage for the workers decreases from part I to part II with private information, but increases with public information.

The ratio for workers is higher in PuW than in PrW in the MD-sessions, and the opposite is observed in FD-sessions. When the manager decides workers' wage it has a positive effect to disclose the managerial compensation.

The results of the experiment confirm our first two hypotheses, i.e. the effort decision of the workers is affected by the manager's wage, especially after wage cuts. The firms' profits, the workers' wages, and the workers' and managers' average efforts 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 public FD- and MD-sessions. Thus, with public managerial compensation, the gift-exchange holds even when the wage-setter does not receive the full revenue provided by the workers as predicted by *Hypothesis 3*. With private managers' wages on the other side, the workers' effort is higher in FD-sessions than in MD-sessions (in contrast to *Hypothesis 3*). Regarding the question if the managerial compensation should be disclosed, the results are ambiguous. While the profits are higher with disclosed managerial compensation in MD-sessions, the opposite holds in FD-sessions.

5 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 workers' willingness to accept cost savings on the organizational level. The first objective of this paper was to test if workers' effort is influenced by the observation of the managerial compensation, and if executive pay is particularly important during downsizing. Our first hypothesis was that the observation of the manager's wage influences workers' effort decision, and the second hypothesis was that the managerial compensation is particularly salient after pay cuts. Our experimental results

confirm our first two hypotheses: workers' effort decisions are negatively correlated with the manager's wage, especially after wage cuts (*Result 2*).

Another objective was to check if these effects were strong enough to justify consequences such as wage compression or wage secrecy. We present experimental evidence that wage compression³⁶ is in fact profit maximizing when labor relations are contractually incompletely regulated. 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 these two effects. In particular, in times of downsizing a sensitive managerial wage setting and a good communication strategy seem appropriate. Regardless of the negative effects of high managerial wages, the opportunity to observe the managerial compensation had a positive impact on workers' effort choices, when the managers set the workers' wages. Under these realistic circumstances, it seems that to disclose managerial wages is a profit-maximizing strategy. This is of importance in countries which leave the decision whether 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.

Our last aim was to test if workers still exert their effort in response to wage offers if the wage-setter gets only a small part of the benefits generated by the workers. Our third hypothesis was that workers' effort choices do not differ if the manager or the firm is setting workers' wages. We found evidence that 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.

³⁶Referring to the ratio manager's wage/workers' wage.

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6 Appendix 1

	Average workers effort			Average managers effort		
	Private	Public	Group Total	Private	Public	Group Total
All periods						
FD	1.21	0.92	1.06	1.98	1.57	1.77
MD	0.62	0.79	0.70	1.07	1.15	1.11
Group Total	0.91	0.85	0.88	1.52	1.36	1.44

Table A1: Average effort levels

Evolution of wages from Part I to Part II

	Workers		Managers	
	Private	Public	Private	Public
FD	-31%	-33%	-33%	-30%
MD	-33%	-46%	-40%	-30%
Group Total	-32%	-39%	-37%	-30%

Evolution of effort from Part I to Part II

	Workers		Managers	
	Private	Public	Private	Public
FD	-38%	-29%	-9%	-20%
MD	-40%	-44%	-32%	-19%
Group Total	-39%	-36%	-18%	-19%

Evolution of ratio effort/wage

	Workers		Managers	
	Private	Public	Private	Public
FD	-10%	7%	37%	15%
MD	-11%	5%	13%	16%
Group Total	-10%	5%	31%	16%

Table A2: Evolution of wages, effort and ratio

7 Appendix 2: *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 you earn, which accumulate over the course of the session, converted into euros. At the end of the session you will be privately paid. From now on, no communication is allowed. After reading these instructions carefully, please raise your hand if you have any question. 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 (S_m). 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 observes the wage paid to him/her and the remaining endowment (RE) he/she can use to pay wages to the workers ($RE = N - S_m$). 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 a level of effort from 4 feasible levels. Each effort level has different costs for workers and manager and implies different revenues 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 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 :

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

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 profits: 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 his/her own resulting earnings.
- Managers are informed about each worker's revenue and about his/her total earnings.
- Workers are informed about the total revenue provided (by workers and manager) 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's owner. You will keep this role for the whole experiment. 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 decide what wage to offer to the manager. Wages can not exceed your 15 tokens endowment, and wages are restricted to be in whole tokens, e.g. 0 tokens, 1 token, 2 tokens etc. The manager will be informed about his/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 manager's wage) they will choose a level of effort. The more effort supplied, the more revenues you earn. But effort is costly to the workers and the 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. The manager sees the same table as you, whereas workers only see the column reflecting costs and revenues for them.

Effort level	Costs of the effort	Revenue provided by the worker	Revenue provided by the manager
0	0	0	0
1	0.1	2	6
2	0.3	3.3	10
3	0.6	4	12

- Zero effort level by either worker or the manager, means zero effort cost to both of them and no revenue.

- 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 to 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 to the workers and to 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.

Your earnings will be the sum of the earnings in the 30 periods of the experiment converted into euros plus 3€ for showing up. The conversion rate for your earnings is: 20 tokens = 1€, i.e. each token is worth 0.05€.

Please raise your hand, if you have any question.

Instructions for Managers

Your role in this experiment is: manager. You will keep this role for the whole experiment. You will be matched every period with one firm's owner and three workers.

At the beginning of each period the firm's owner's account will be credited with 15 tokens and he/she should decide your wage (S_m). You will be informed about your wage and the remaining endowment (RE) you can use to pay wages to the workers ($RE = 15 - S_m$). Then, you should decide 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.

Then, you should choose a level of effort. The workers will do the same, after receiving the information about their own and your wage. Each effort level has different costs for you and the workers and implies different revenues. In the following table, you can see the costs of the effort levels and the revenues they provide.

Effort level	Costs of the effort	Revenue provided by the worker	Revenue provided by the manager
0	0	0	0
1	0.1	2	6
2	0.3	3.3	10
3	0.6	4	12

It means, if you choose:

- zero effort level, it implies zero cost to you and no revenue,
- effort level 1, it implies a cost of 0.1 tokens to you and a revenue of 6 tokens,
- effort level 2, it implies a cost of 0.3 tokens to you and it generates a revenues of 10 tokens,

- effort level 3, it implies a cost of 0.6 tokens to you and it generates revenues of 12 tokens.

It means that the higher the level of effort, the higher the revenue for the firm and the higher the cost for you.

The workers will only observe the columns corresponding with their cost and revenue provided by them. If a workers chooses:

- zero effort level, it implies zero cost to him/her and no revenue,
- effort level 1, it implies a cost of 0.1 tokens to him/her and a revenue of 2 tokens,
- effort level 2, it implies a cost of 0.3 tokens to him/her and it generates a revenues of 3.3 tokens,
- effort level 3, it implies a cost of 0.6 tokens to him/her and it generates revenues of 4 tokens.

Your earnings will be the sum of the earnings in the 30 periods of the experiment converted into euros plus 3€ for showing up. The conversion rate for your earnings (and the workers' earnings) is: 5 tokens = 1€, i.e. each token is worth 0.20€.

Please raise your hand, if you have any question.

Instructions for Workers

Your role in this experiment is: worker. You will keep this role for the whole experiment. You will be matched every period with one firm's owner, one manager and two workers.

At the beginning of each period the firm's owner's account will be credited with N tokens and he/she should decide your wage (S_m). The manager will be informed about his/her wage and the remaining endowment (RE) he/she can use to pay wages to the workers ($RE = N - S_m$). Then, the manager should decide 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. The manager is not obliged to choose a wage higher than 0 tokens.

Then, after knowing your wage, you should choose a level of effort. The manager and the other two workers will do the same. Each effort level has different costs for you and implies different revenues. In the following table, you can see the costs of the effort levels and the revenues they provide.

Effort level	Cost of the effort	Revenue provided
0	0	0
1	0.1	2
2	0.3	3.3
3	0.6	4

It means, if you choose:

- zero effort level, it implies zero cost to you and no revenue,
- effort level 1, it implies a cost of 0.1 tokens to you and a revenue of 2 tokens,
- effort level 2, it implies a cost of 0.3 tokens to you and it generates a revenues of 3.3 tokens
- effort level 3, it implies a cost of 0.6 tokens to you and it generates revenues of 4 tokens.

It means that the higher the level of effort, the higher the revenue for the firm, the higher the probability that the manager receives a bonus, and the higher the cost for you.

Your earnings will be the sum of the earnings in the 30 periods of the experiment converted into euros plus 3€ for showing up. The conversion rate for your earnings (and the manager's earnings) is: 5 tokens = 1€, i.e. each token is worth 0.20€.

Please raise your hand, if you have any question.