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# How managerial wage transparency may reduce shareholder returns – Evidence from an experiment\*

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## Abstract

We study the role of transparency in a novel three-person profit sharing game in which managers and board directors decide on how to distribute the revenues of a company among themselves and shareholders, who are the residual claimants of the companies' revenues. We examine two hypotheses. One is that the distribution of revenues is largely determined by an informal quid pro quo among the two decision makers at the expense of shareholders. The second hypothesis is that public transparency attenuates exaggerated manager pay because of increased social pressure. We find strong support for our first hypothesis, but reject the second one: Public transparency actually increases managerial wages as well as board director compensation, further reducing the revenue share that goes to shareholders. Competition to keep managers further magnifies these patterns.

**Key Words:** Transparency, relative wages, executive pay, social ties, reciprocity

**JEL Classification:** C92, G34

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## *Introduction*

This paper investigates the effect of wage transparency in a new three-person profit sharing game that models the interaction between executives and the board of directors in companies. Managers and directors mutually decide on the payments of their counterparts, and shareholders are residual claimants of the company revenues. The game is crafted to examine the effect public wage transparency has on managerial compensation.

Managerial compensation is a constant source of controversy within companies, spilling over into politics and the press. The debate is held on the basis of justice and equity concerns, motivated by the increasing gap between executive pay and the general wage level in society. Referring to a CEO pay survey from the corporate governance group GMI Ratings, the Guardian (14 December, 2011) reports that *“Chief executive pay has roared back after two years of stagnation and decline. America's top bosses enjoyed pay hikes of between 27 and 40% last year, according to the largest survey of US CEO pay. The dramatic bounce back comes as the latest government figures show wages for the majority of Americans are failing to keep up with inflation.”*

Transparent information about manager remunerations is often seen as a potential remedy to mitigate distortions in payment schemes. The idea is that enforced transparency makes it easier to detect unjustified remuneration policies, and that public pressure may limit managerial wages. In the United States, for example, financial reforms after the economic crisis have changed transparency regulations for public corporations that are related to the equity of executive pay. Due to Title IX, Subtitle E of the Dodd–Frank Wall Street Reform and Consumer Protection Act, for instance, companies are now legally required to report not only the annual total compensation of the chief executive officer, but also its ratio to the median of the annual total compensation of all employees to the general public.<sup>1</sup>

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<sup>1</sup> Another example of the political will to increase pay transparency among executives comes from Germany: Companies listed on the stock market are legally required to publish individual data on the compensation paid to each of the board members (manifested in the “Act on the Appropriateness of Management Board Compensation” as of 2009). Yet, many companies strongly oppose this kind of regulation: According to the Wall Street Journal (26 June, 2012), companies argue that “disclosing pay

Research in the field of financial economics has not arrived at clear conclusions about whether the observed general increase in CEO pay merely reflects market equilibrium dynamics,<sup>2</sup> or whether it results from failures in corporate governance. The latter argument is supported by the observation that the link between company performance and executive compensation seems to be weaker than implied by optimal incentives: For instance, as Bertrand and Mullainathan (2001) find, CEO pay is systematically related to luck, i.e. external shocks that are not influenced by managers. They also point out that CEOs have potentially substantial influence over the process that determines their own wage, partly due to social relations to the wage setting committees. In fact, positions in company boards are also very well paid, and CEOs often determine who will be selected for these positions (Bebchuk and Fried, 2003), giving incentives to be treated favorably in turn.<sup>3</sup> Empirical support for the importance of social relations between CEOs and directors, and the associated inefficiencies – for example, higher CEO compensation and lower reactivity of CEO pay to poor company performance – is provided by Hwang and Kim (2009), Fracassi and Tate (2012) and Kramarz and Thesmar (forthcoming). Bebchuk, Grinstein and Peyer (2010) find evidence for manipulative patterns related to the timing of option grants in favor of both executive employees and directors.

All in all, these studies highlight that social relations between managers and directors may lead to governance problems in companies. If this is true, the question arises whether public transparency can mitigate the informal quid pro quo behind managerial remunerations.

Given the difficulties of tracking behavioral patterns ex-post in financial and compensation data, the present study utilizes the controlled environment of the laboratory to analyze the reciprocal relationships of decision makers at the expense of third parties,

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ratios would make them easy targets for CEO-pay critics. "The ratio is not going to be a meaningful way to help investors but will be used as a political tool to attack companies," says David Hirschmann, president of the U.S. Chamber of Commerce's Center for Capital Markets, which opposes the measure."

<sup>2</sup> For example, Gabaix and Landier (2008) find that the upward trend of CEO pay can be largely explained by increases in market capitalizations of firms.

<sup>3</sup> Social interactions might also have a more general impact on the choice of remuneration policies. In a sample of Harvard Business School alumni, Shue (2012) shows that company executive payment schemes are systematically affected by social networks. Bandiera, Barankay and Rasul (2009) provide evidence on how social relations between supervisors and workers affect firm performance in a detrimental way.

and whether third parties can be protected by public transparency. We conduct the test in a three-person profit sharing game in which managers and board directors decide on how to distribute the revenues between themselves and the shareholders of the company. We also examine what effect competition to keep managers has on our findings.

Section 1 presents our experiment design and discusses the related literature. Our results are described in Section 2. Section 3 discusses the findings and concludes.

### *1. Experiment Design, Hypotheses and Related Experimental Literature*

Subjects in our experiment participated in a repeated three-person allocation game. We assigned the role of managers, board directors and shareholders randomly to the participants at the beginning of the experiment. The decision situation proceeds as follows: In each round, the laboratory company produces total revenues of 400 experimental currency units (ECU). First, the board director decides the manager wage  $w$  that is subtracted from the total revenues. Then, the manager chooses the board compensation  $b$  with  $b \leq 400 - w$ . The residual revenue  $400 - w - b$  is then distributed among the three parties so that managers and board directors receive 10% each with 80% transferred to the shareholders (who do not make a decision).

Subjects played 20 rounds of the described game. We conducted a 2x2 experiment design where the manipulated factors are wage transparency and competition to keep managers. The condition *RM-NoInfo* serves as the reference treatment. Here, subjects were randomly matched with new transaction partners before each round. Members of a particular laboratory company were informed about manager wages, board payments and the resulting total payoffs after each round, but were not informed about payments realized in the other nine companies in the laboratory market.

The subgame perfect Nash equilibrium of the stage game is simple: Irrespective of the wage paid, it is optimal for a manager to pay  $b^* = 0$  to the board since every point transferred decreases the share of the residual paid out to her at the end of the period. Foreseeing this, the board director will also choose a manager wage of  $w^* = 0$ . The

resulting period payoffs in equilibrium are (40; 40; 320) for managers, board directors and shareholders, respectively. Hence the subgame perfect Nash equilibrium profit shares for the three subjects are  $\pi_m^* = 0.1$ ,  $\pi_b^* = 0.1$  and  $\pi_s^* = 0.8$ .

The game shares some important features of gift exchange experiments (Fehr, Kirchsteiger and Riedl, 1993; see Fehr, Götte and Zehnder, 2009, and Charness and Kuhn, 2011, for recent surveys of related studies) in the sense that managers and board directors can gain from mutual cooperation. If board directors offer a manager a higher-than-minimum wage, and managers reciprocate by choosing a higher-than-minimum board payment, both players end up with more than the equilibrium payoffs. However, while in gift exchange games mutual cooperation is efficiency enhancing, in our setting any reciprocity between managers and board members just redistributes money away from shareholders. That said, it seems reasonable to expect that board directors pay on average more than the minimum wage and managers reciprocate by choosing higher than minimum board payments.

In *RM-Info* we implemented full transparency about manager wages: participants got to know all wages paid to all ten managers in the last round. As will be described below, we observe higher manager wages under transparency.

Transparency plausibly plays a more important role when managers are scarce and can move between companies, as observed payments for other managers may influence one's decision to leave the company. We test this proposition with two manager competition treatments (*CM*). These introduced excess demand for managers to our setting. In every session, there were twice as many board directors and shareholders as managers so that their probability of being matched in the first round was 50%. Board directors and shareholders who were not matched to a manager and thus inactive received a round payoff of 20 ECU. After each round, participants in the role of managers could decide to stay or to leave the current company. If they decided to stay, they would interact with the same board director and shareholder in the next round.<sup>4</sup> If they chose to leave, they would

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<sup>4</sup> As subjects were potentially rematched with all managers and companies in a particular experimental session, each session is treated as one statistically independent observation.

be matched with a randomly chosen new company. As in the treatments with strangers matching, participants were informed about all managers' wages in *CM-Info* before managers could decide about staying or leaving, whereas no such information was given in *CM-NoInfo*.

Observe that this form of competition does not change the Nash equilibrium of the game, making the competition treatments directly comparable to our treatments with strangers matching.<sup>5</sup> Also, with our random rematching procedure for managers who leave their companies we eliminated reputation building outside the current manager-director relationship as another confounding element of our treatment comparisons.

The most closely related experiment with respect to the effects of competition is the study by Brown, Falk and Fehr (2012) who consider bilateral principal-agent interactions in a circumstance where there is excess demand for workers. Although agents frequently choose to quit a firm when they receive advantageous outside offers, stable relationships between principals and agents emerge which are characterized by high wages and high efforts. At the same time, competition for agents increase their rents compared to the case when there is excess supply of labor (see the complementary study by Brown, Falk and Fehr, 2004).<sup>6</sup> Similarly, Brandts and Charness (2004) investigated the effects of competition on gift exchange and found that workers acted in a reciprocal manner under various degrees of competition. Finally, the study by Bartling, Fehr and Schmidt (2012) showed that two-sided competition (between firms for reliable employees and between workers for good jobs) strongly increased trust and trustworthiness.

Since managers' and board directors' decisions determine the shareholders' payoff, our design is also related to a number of experiments that increase the distance between decision-maker and recipient for example by including dummy players or externalities. In one of the few studies in the field, in an experimental bribery game, Abbink, Irlenbusch and Renner (2002) find positive reciprocal patterns between subjects in the roles of

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<sup>5</sup> A stronger form of competition, one in which managers can accept binding offers of companies, would have changed the equilibrium, with very high manager wages.

<sup>6</sup> In repeated trust games, Bolton et al. (2008) and Huck, Lünser and Tyran (2012) found that introducing competition among trustees strongly increases trustworthy behavior and, subsequently, the frequency of trust interactions.

“bribers” and “officials” that are unaffected if small negative externalities on other subjects are introduced. Moreover, in experimental three-person allocation games, Ellman and Pezanis-Christou (2010) model decision procedures in firms about activities that are detrimental for outsiders and find that the organization structure has a significant impact on the harm caused by the firm. Engel and Rockenbach (2011) provide evidence on how the interaction of payoff externalities and relative endowment positions of bystanders affects contributions in public goods games: when there is the risk that bystanders would receive higher payoffs than actors, contributions decline, whereas in the case that bystanders receives less than actors with certainty, contributions remain similar to a reference case without externalities. Hamman, Loewenstein and Weber (2010) conducted modified dictator games where a dictator could hire an agent to make the allocation choice instead of her and find that the delegation process leads to a substantial drop in transfers. Fershtman and Gneezy (2001), Coffman (2011) and Bartling and Fischbacher (2012) observed in ultimatum and modified dictator games that through delegation to or intermediation by a third player, a dictator was less likely to be punished for unfair outcomes to her favor. However, as those – and related – experimental designs refer to very different economic decisions than the present study, the transferability of their results to our case is rather limited. In particular, to the best of our knowledge there is no study up to now that investigates the effect of transparency and competition on reciprocal interactions that create negative externalities on third parties.

Since there is little empirical guidance about how the existence of a residual claimant may influence decision-making in our game, we refrain from formulating clear-cut alternative hypotheses here. However, in the light of the abundant evidence on the importance of reciprocity, it seems reasonable to expect that board directors pay on average more than the minimum wage and managers reciprocate by choosing higher than minimum board payments. However, the interaction of reciprocity with transparency and competition seems less clear. While competition for managers may plausibly increase the managers' average profit share relative to the strangers treatments with random matching, there is no clear indication in the literature as to whether this comes at a cost to board members or shareholders in our game. Moreover, in two-person interactions, we would expect transparency of manager wages to result in an overall compression of managers'



profit shares. As concerns for relative wages may lead to punitive behaviors by managers with low relative wage positions (see, for example, Gächter and Thöni, 2010; Greiner, Ockenfels and Werner, 2011; Cohn et al., 2012, for experimental evidence along these lines), a board director should be inclined to care more about the perceived fairness of manager payments in both *Info* treatments relative to the *NoInfo* treatments.<sup>7</sup> While this might decrease manager wage dispersion, it is unclear whether average wages are higher or lower compared to the non-transparent case. On the one hand, if directors focus on the highest wages achieved, compression should occur on high levels. At the same time, as shareholders' payments decrease with higher manager wages, this also could have a moderating effect on wage setting.

We conducted 10 sessions of our experimental design (two for the treatments with random matching, three for the treatments with competition for managers) with altogether 297 subjects in the Cologne Laboratory for Economic Research from June to August 2012. Subjects were recruited online with ORSEE (Greiner, 2004); the computerized experiment was implemented with z-Tree (Fischbacher, 2007). When subjects arrived at the laboratory, they were randomly seated and received written instructions. Instructions were formulated in a neutral way to avoid the framing of the decision situation as a labor market problem.<sup>8</sup> After the experiment was over, payoffs from the experiments were converted into Euros at the rate of 250 ECUs = 1 Euro. Subjects privately received their payoffs (mean: 10.97 Euros; standard deviation: 4.79 Euros) and left the laboratory. Each session lasted approximately 60 minutes.

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<sup>7</sup> Theories of inequality aversion (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000) and reciprocity (Rabin, 1993; Dufwenberg and Kirchsteiger, 2004; Falk and Fischbacher, 2006) provide a rationale for why managers might react negatively to low wages.

<sup>8</sup> Sample instructions can be found in the Appendix. In particular, managers, board directors and shareholder were labeled as Alpha, Beta and Gamma player, respectively. Manager wages and board payments were described as "lump sum payments" to Alpha and Beta.

## 2. Results

We first present results on the aggregate level and in the next step take a closer look at the determinants of the profit shares for each player type. We then focus on the role of relative wages on directors' profits, managers' decisions to stay at or to leave a particular company in the treatments with competition and, subsequently, on wage dynamics.

### *Profit Distribution*

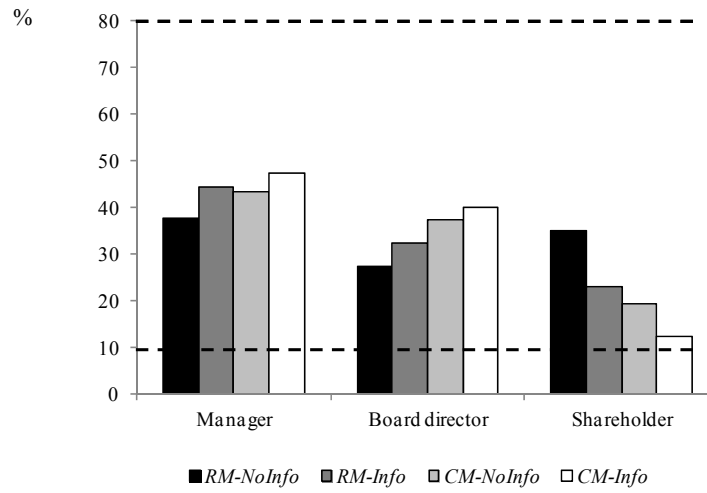
Figure 1 plots average profit shares for each role and treatment. It can be immediately seen that average profit shares (i.e. the percentage of total company revenues allocated to a particular player) differ strongly from equilibrium shares, with managers and board directors receiving substantially more (43.2% and 34.1% on average across all treatments) and shareholders receiving substantially less (22.7%). In fact, although equilibrium predicts that shareholders should receive eight times larger shares than each decision maker, they earn 41.3% less than the average of the managers' and directors' earnings.

With respect to the role of transparency, managers' profit shares increase substantially. Introducing information about manager wages in the random matching (*RM*) treatments leads to a rise of 17.7% in their profit shares (44.5% in *RM-Info* compared to 37.8% in *RM-NoInfo*). The corresponding increase in the competition treatments (*CM*) accounts for 9.4% (the corresponding profit shares are 47.5% in *CM-Info* and 43.4% in *CM-NoInfo*). Also, holding wage information fixed and comparing treatments with and without competition indicates that managers profit from competition, as their profit shares increase by 14.8% (6.7%) in the *NoInfo* (*Info*) conditions. The increase due to competition is smaller under wage transparency, probably because the average manager wage is already rather high in *RM-Info*.

Although their bargaining position becomes weaker in the treatment variations, board directors clearly gain in all treatments relative to the baseline condition: their revenue shares account for 32.3%, 37.3% and 40.3% in treatments *RM-Info*, *CM-NoInfo* and *CM-Info*, respectively. As a result, the financial burden arising from transparency and

competition is carried exclusively by the shareholders. Compared to *RM-NoInfo*, their profit shares decline from 35.0% to 23.2%, 19.4% and 12.5% (*RM-Info*, *CM-NoInfo* and *CM-Info*). Thus, shareholders experience a loss of up to 64.3% of their profit shares compared to the baseline condition. As we will see in the following, the strong extraction of revenues from shareholders is mainly caused by reciprocal interactions between managers and board directors.

Figure 1. Percentage share of revenues per role an treatment



The figure displays average percentage shares of total revenues (400 points) calculated over all 20 rounds of the game, separately for experimental treatments and roles. The dashed lines indicate the equilibrium profit shares  $\pi_m^*$ ,  $\pi_b^*$  (10% respectively) and  $\pi_{sh}^*$  (80%) of the stage game.

In the next step, we investigate the determinants of profit shares in regression analyses. Model 1 in Table 1 uses managers' profit shares (in % of total revenues) as the dependent variable and includes dummies for treatments (*RM-NoInfo* is the reference condition), the number of rounds, and its interaction terms with the treatment dummies. To account for individual heterogeneity of the decision-makers, we calculate the model with random effects on the level of board directors. Except for *RM-Info*, the coefficients of treatment dummies are insignificant, suggesting no initial difference in manager profits across treatments. However, considering time dynamics, we observe that managers' profits successively increase in treatments *RM-Info*, *CM-NoInfo* and *CM-Info*, as all interaction terms with the number of rounds are positive and significant. Moreover, these upwards dynamics are strongest in *CM-Info*: Comparing the coefficient for the interaction term

*Round X CM-Info* pairwise with the other interaction terms indicates significant differences (both  $p = 0.002$  for *Round X CM-NoInfo* and *Round X RM-Info*, two-sided Wald tests).<sup>9</sup> In our baseline condition, however, there is no upward trend in the profit shares for managers, as the coefficient of *Round* is insignificant. In sum, with transparency, manager wages tend to increase under both *RM* and *CM* matching procedures.

Models 2 and 3 analyze the determinants of the directors' profit share (allowing for random effects on the level of managers who decide about the directors' payments). Model 2 uses the same set of explanatory variables as Model 1 but additionally includes the manager's wage in points (divided by 100) as an additional control. Similar to typical findings from gift exchange games, we observe a robust positive effect of manager wages, indicating that managers reciprocate higher wages with higher profit shares for board directors. Moreover, board directors earn more in all treatment variations compared to *RM-NoInfo*, as the respective dummies are positive and significant (but not significantly different from one another,  $p$ -values of all two-sided Wald tests exceed  $p > 0.1$ ). Finally, we observe a downward trend in the profit share for board directors that is stronger pronounced in *RM-Info* – its interaction term with *Round* is negative and significant – but not in the other treatments.

In Model 3 we additionally include interactions of the treatment dummies with the manager's absolute wages. In this specification, the dummy variables lose their significance, whereas the interaction terms are all positive and at least marginally significant.<sup>10</sup> This indicates that in our treatment variations, a manager's responsiveness to a given wage is stronger than in the baseline condition. At the same time, in addition to a negative time trend in *RM-NoInfo*, the interactions of *RM-Info* and *CM-Info* with the number of rounds are both negative and significant, suggesting a stronger decrease of board directors' shares in the transparency treatments over the rounds of the game.

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<sup>9</sup> The coefficients of *Round X CM-NoInfo* and *Round X RM-Info* do not differ from each other ( $p = 0.784$ ).

<sup>10</sup> The coefficient of *(Wage manager/100) X CM-Info* is significantly larger than *(Wage manager/100) X CM-NoInfo* ( $p = 0.035$ , two-sided Wald test), highlighting the importance of reciprocal relationships in competitive environments where wage comparisons are possible.

Overall, directors also benefit from manager wage transparency although the gains diminish somewhat with repeated play.

Table 1. Determinants of profit shares per role

Model No.	1	2	3	4
Role	Manager	Board director	Board director	Shareholder
Dependent Variable	$\pi_M$	$\pi_B$	$\pi_B$	$\pi_S$
<i>Round</i>	0.000 [0.001]	-0.002** [0.001]	-0.002** [0.001]	0.002 [0.002]
<i>CM-NoInfo</i>	0.016 [0.024]	0.054** [0.026]	0.020 [0.034]	-0.097*** [0.036]
<i>CM-Info</i>	0.023 [0.024]	0.095*** [0.026]	0.000 [0.037]	-0.155*** [0.039]
<i>RM-Info</i>	0.045* [0.026]	0.056** [0.026]	0.007 [0.035]	-0.126*** [0.030]
<i>Round X CM-NoInfo</i>	0.002** [0.001]	0.001 [0.001]	0.001 [0.001]	-0.006** [0.003]
<i>Round X CM-Info</i>	0.005*** [0.001]	-0.002 [0.001]	-0.003** [0.001]	-0.007** [0.003]
<i>Round X RM-Info</i>	0.002** [0.001]	-0.004*** [0.001]	-0.004*** [0.001]	0.001 [0.002]
<i>Wage manager/100</i>		0.105*** [0.006]	0.079*** [0.010]	
<i>(Wage manager/100) X CM-NoInfo</i>			0.025* [0.015]	
<i>(Wage manager/100) X CM-Info</i>			0.064*** [0.018]	
<i>(Wage manager/100) X RM-Info</i>			0.035** [0.016]	
Constant	0.378*** [0.019]	0.152*** [0.020]	0.186*** [0.023]	0.329*** [0.020]
Observations	1500	1500	1500	1500
Chi <sup>2</sup> -value	84.61	396.2	412.9	
R <sup>2</sup> -value				0.182

Models 1 to 3 are linear models calculated with random effects on the level of board directors (Model 1) and managers (Models 2 and 3). Model 4 is an OLS model with robust standard errors clustered on the level of an experimental company. \*, \*\* and \*\*\* denominate significance on the 10%-, 5%- and 1%-level, respectively.

Model 4 analyses the correlates of shareholder profits with the same dependent variables as in Models 1 and 2. As shareholder profits depend on the decisions of both manager and board director, we use a linear specification with robust standard errors clustered on the level of an experimental company. The distinct negative impact of all treatment variations on average profit shares of the shareholders is corroborated by the negative and

significant treatment dummies in the regression model.<sup>11</sup> An additional decline is observed in treatments *CM-NoInfo* and *CM-Info*. Both interaction terms of these treatments with the number of rounds are negative and significant, which is in line with the observation from the descriptive statistics that competition for managers successively leads to the extraction of profits from the shareholders.

#### *Transparency, manager fluctuation and wage dynamics*

Next, we consider the determinants of company changes in the treatments with competition. In general, manager – company matchings are rather stable: Calculated over rounds 1 – 19, managers chose to leave the experimental company in only 17.8% (18.7%) of all cases in *CM-Info* (*CM-NoInfo*). In the first 5 periods of the game, the share of company changes peaks in both treatments (23.3% and 30.0 % in *CM-Info* and *CM-NoInfo*). In subsequent 5-period time intervals, these shares drop first and remain roughly constant in *CM-NoInfo* while slightly increasing towards their original level in the last time interval.

To investigate the determinants of the decision to leave the company, we calculate probit models with a binary variable “company change” (taking the value of one if the manager chooses to leave after a particular round) as the dependent variable and random effects to account for manager-specific heterogeneity (see Table 2).

In Model 1, we include the number of rounds, a treatment dummy for *CM-Info* and the manager wage as dependent variables. In addition, we control for a possible interaction between *CM-Info* and the number of rounds and wages. Not surprisingly, remuneration has a strong and significant impact on managers’ decisions, with higher pay reducing the probability of quits. The number of rounds has no effect per se, but its significant interaction with the treatment dummy suggests an increasing trend of manager changes over time in the *CM-Info* treatment, mirroring the trend observed in the descriptive statistics.

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<sup>11</sup> There are no differences in the magnitude of the negative effect found across treatments *CM-NoInfo*, *CM-Info* and *RM-Info* ( $p > 0.1$ , two-sided Wald tests).

Table 2. Determinants of the decision to leave the company

Model	1	2	3
Dependent Variable	<i>Prob(leave)</i>	<i>Prob(leave)</i>	<i>Prob(leave)</i>
Sample	<i>All</i>	<i>CM-Info</i>	<i>CM-Info</i>
<i>Round</i>	-0.023 [0.018]	0.044** [0.018]	-0.011 [0.016]
<i>CM-Info</i>	0.249 [0.580]		
<i>Round X CM-Info</i>	0.065** [0.026]		
<i>Wage manager/100</i>	-1.194*** [0.219]	-1.510*** [0.237]	
<i>(Wage manager/100) X CM-Info</i>	-0.322 [0.337]		
<i>Positive deviation from median wage (%)</i>			-1.258 [0.875]
<i>Negative deviation from median wage (%)</i>			2.345*** [0.608]
Observations	684	342	342
Chi <sup>2</sup> -value	70.1	41.0	20.4

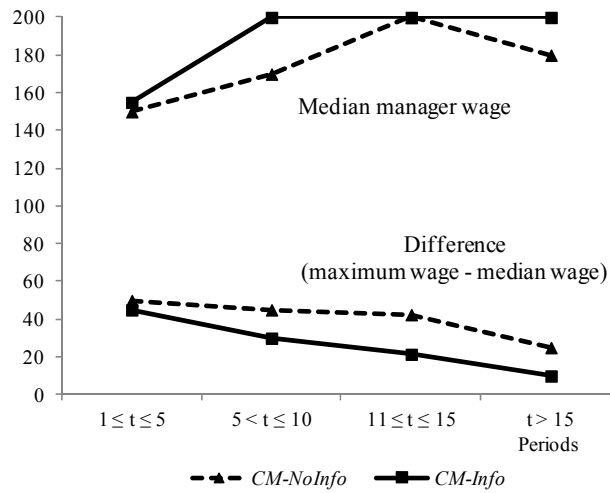
Models 1 to 3 are profit models with random effects calculated on the level of experimental managers. Model 1 utilizes data from both competition treatments, whereas Models 2 and 3 refer only to the *CM-Info* treatment. The dependent variable is a dummy equal to 1 if the manager decides to leave the current company after a particular round. \*\* and \*\*\* denominate significance on the 5%- and 1%-level, respectively.

Model 2 concentrates on the subsample of *CM-Info* managers and includes only the manager's profit share and the number of rounds, leading to similar conclusions as Model 1. In Model 3, we replace the absolute wage level by the positive and negative deviations from the median wage (measured in percent) in a particular round and session to account for relative concerns of managers. It turns out that relative positions seem to affect the decision to leave in an asymmetric way: A manager is significantly more likely to leave the company if she earns less than the median wage. On the contrary, we do not observe a significant drop in the probability to quit among managers who earn more than the median wage, although the coefficient has the correct negative sign.<sup>12</sup>

<sup>12</sup> Note that we can measure the direct effect of relative wages only on the manager decision to leave but not on the manager decision how to remunerate the director, because at the time of deciding about director payment, the manager does not know her relative standing and therefore cannot punish the director for an "unfair" wage.

In the final step, we consider the implications of manager quit behavior for the wage setting process. Figure 3 displays rather distinct patterns between the treatments. The upper two lines of the figure display the evolution of median manager wages over 5-period intervals in treatments *CM-NoInfo* (dotted line) and *CM-Info* (solid line).

Figure 3. Evolution of manager wages in treatments with competition (in ECUs)



Median wages tend to be higher when relative wage information is provided to managers and boards. Moreover, we observe that in treatment *CM-Info*, boards and managers coordinate on high wages while this pattern is weaker in *CM-NoInfo*: The lower two lines depict median values of the difference between the maximum manager wage and the median wage in a particular round and session. These values are substantially lower in the *CM-Info* treatment (solid line).<sup>13</sup> All in all, the figure shows that transparency about managers' relative standings leads to higher and less dispersed manager wages compared to a situation in which each manager only knows her own wage. This suggests that the reactions of managers to relative wage information lead to additional pressure on directors to increase manager wages, in line with previous research on the impact of

<sup>13</sup> This compression of wages at high levels is also observed in the strangers treatment with relative wage information: time patterns of *RM-NoInfo* and *RM-Info* are qualitatively similar to *CM-NoInfo* and *CM-Info*. median manager wages are somewhat smaller, reflecting the absence of competition for managers. However, the difference in median wages between *RM-NoInfo* and *RM-Info* is larger here than for the competition treatments.



relative wages (see Section 1). Together with the observation that company changes in *CM-Info* seem to be influenced by wage comparisons, this explains why board directors coordinate on high manager wages over time.

### 3. Discussion and Conclusion

We have conducted a novel three-person allocation game in which managers and board directors mutually decide on the payoffs of their interaction partners. The remaining profits are transferred to a shareholder who cannot influence decisions. This design enables us to analyze how reciprocal patterns are affected when trust and trustworthiness in a manager-director relationship creates substantial negative externalities for third parties, namely the shareholders. We find that Nash equilibrium behavior is strongly rejected. More importantly, our experimental study provides a coherent picture of the impact of wage transparency on revenue distribution. Managers' profit shares increase substantially compared to the case of private wage information irrespective of the degree of competition for managers. Even if relative wage information is non-instrumental for managers (as in our treatment *RM-Info* where interaction partners randomly change in every period), it gives rise to substantial increases in manager pay compared to the baseline condition. It appears that wage transparency triggers comparison processes between managers that in turn put board directors under pressure to increase wages.<sup>14</sup> Moreover, board directors always gain relative to the baseline setting: In particular, profit shares for board directors even increase in the competition treatments where managers can leave the firm if they are dissatisfied with their remuneration. The reason for this pay increase is that stable reciprocal relationships evolve between managers and directors,

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<sup>14</sup> Card et al. (2012) and Ockenfels, Sliwka and Werner (2012) provide field evidence for unwanted effects of social comparisons on employee satisfaction and performance resulting from wage transparency. Moreover, relative wage comparisons significantly influence decisions about CEO wages. For example, Bizjak, Lemmon and Naveen (2008) report that benchmarking is a common practice in companies. Here, CEO pay is found to react in an asymmetric way to deviations from the median wage, with CEOs below the median receiving higher subsequent pay rises than CEOs above the median. Yet, whether benchmarking is used for manipulative purposes remains an open question (see, for example, Faulkender and Yang, 2010, and Bizjak, Lemmon and Nguyen, 2011).

which imply that managers' and directors' earnings are positively correlated. As a result, a substantial part of the revenues is extracted from the shareholders.

Complementary to the field evidence for the detrimental effects of entrenchments in companies, our study provides behavioral evidence that patterns of gift exchange may lead to exploitation of shareholders. In the behavioral personnel economics literature, reciprocal patterns are typically interpreted as positive as they relax the moral hazard problem inherent in principal-agent settings. However, our setting indicates that gift exchange may also give rise to new agency problems if decisions of the involved parties pose negative externalities.

Obviously, our study provides only a simplistic model of manager – director interactions. Managers and directors are free to implement their desired allocation, whereas shareholders have no say about manager and board remuneration and are also unable to react ex post to the division of company revenues. In the field, shareholders may have the possibility to influence the wage setting process for executives, for example by launching campaigns. However, the success of mechanisms used by shareholders to express concerns about pay is disputed and appears to be limited in the field (see Ertimur, Ferri and Muslow, 2011, and the references therein). At the very least, our study provides evidence that transparency of manager pay comes at a cost that must be weighted against the supposed benefits.

Other characteristics of the governance structure in firms might be more suited to mitigate agency problems arising from entrenchments: Among other things, an increase in share of socially and legally independent directors and the presence of a large institutional shareholder in the board are considered as factors associated with lower degrees of excess pay (compare Bebchuk and Fried 2003). In line with these arguments, a possible implication of our experimental study is that any change in the company environment that hinders the evolution of stable reciprocal relationships between executives and directors should be beneficial from a shareholder perspective. A controlled analysis of the behavioral implications of such remedies would be a promising avenue for further research.

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*Appendix (For online publication only).*

### **Experimental Instructions (Translation from German)**

*Below you find the instructions for the CM-Info treatment. Instructions for the other treatments were formulated in a very similar way.*

#### **General Information.**

The purpose of this session is to study how people make decisions. If at any time you have questions, feel free to raise your hand and a monitor will assist you. From now until the end of the session, unauthorized communication of any nature with other participants is prohibited.

Each session consists of 20 periods. In each period, you will be given the opportunity to earn points. The sum of all points that you earned in the session will be converted in US-Dollars and paid out. The exchange rate is

**250 points = 1 Euro.**

Payments are confidential: no other participant will be told the amount you earn.

#### **Role assignment for the session**

Each participant in the room (but not the monitors) will be assigned one of three roles. Some participants will be given the role of **alpha**, some the role of **beta**, and some the role of **gamma**.

Roles are **assigned randomly before the session** and remain **constant for all periods**. You will be informed prior to the start of the session, which role was assigned to you.

#### **The decision task for each period**

At the beginning of the each period, participants are randomly matched into groups of three. Each group consists of one Alpha, one Beta and one Gamma. Neither during nor after the session will any participant be informed about who was grouped with whom.

The group has a **total earning of 400 points**. How the points are distributed among the group members is determined by the following two-step procedure:

First, Beta decides on a lump sum payment to be given to Alpha. Both Alpha and Gamma are informed of the decision.

Second, Alpha decides on a lump sum payment to be given to Beta. Both Beta and Gamma are informed of the decision.

The Residual is the amount left after the lump sum payments to Alpha and Beta are subtracted from the group's total earnings; that is

$$\text{Residual} = 400 \text{ points} - \text{Lump sum to Alpha} - \text{Lump sum to Beta}$$

The Residual is then distributed among the three participants according to the following rule:

- **Alpha** receives **10%** of the Residual.
- **Beta** receives **10%** of the Residual.
- **Gamma** receives **80%** of the Residual.

The total points for each member of the group in the respective period is then calculated as follows:

Points to **Alpha** = Lump sum to Alpha + 10% of the Residual

Points to **Beta** = Lump sum to Beta + 10% of the Residual

Points to **Gamma** = 80% of the Residual

At the end of the period, total payoff to each group member is reported to all group members.

In addition, participants are informed about the wages paid to all Alphas in the respective period.

### **Matching**

In this experiment, **there twice as many Betas and Gammas than Alphas**.

Thus, in the first period of the experiment there will be Beta and Gammas who are not matched with an Alpha. However, these Betas and Gammas may be matched with an Alpha in later periods.

After each period, an Alpha can decide **whether he or she wants to stay with the current group or to move to a new group**. The **current group** consists of the Beta and Gamma the Alpha interacted with in the previous period. The **new group** consists of

randomly chosen Betas and Gammas the Alpha was not matched with in the previous period.

Betas and Gammas that are **not matched to an Alpha in a given period are inactive** and both receive a payoff of 20 points for this period.

This is the end of the instructions. Do you have any questions? If you have questions please raise your hand. If there are no (more) questions the experiment will start shortly.