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The Additional Costs of CEO Compensation: The Effect of Relative Wealth Concerns of Employees

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August 2020

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Keywords: CEO compensation, relative wealth concerns, employee wages, inequality aversion, pay inequality

JEL Classifications: D63, G02, G34, J31

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The additional costs of CEO compensation: The effect of relative wealth concerns of employees*

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June 24, 2020

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1. Introduction

Some of the strongest opposition against high and increasing CEO pay comes from rank and file employees, in particular from employees within the same firm. It is difficult to explain this phenomenon with normative preferences, because formally CEOs are employees and paid by shareholders, so regular employees should, in principle, not object to them being overpaid. A potential explanation is that workers envy CEOs their higher pay, i.e., workers suffer disutility from the gap between their own pay and the CEO's pay. Formally, such preferences are called inequality aversion or relative wealth concerns (see Garcia and Strobl (2011), Liu and Sun (2016), and DeMarzo and Kaniel (2017)).[1]

We picture a principal-agent model where the principal designs a contract with two agents: the CEO and the employee who is subject to relative wealth concerns. The employee represents all employees in the firm. In such a model, the wage of the employee is an increasing function of the wage of the CEO. The reason is that employees experience an additional disutility when the CEO pay is raised, so that the firm raises the employees' pay to compensate them for this disutility and to prevent them from leaving the firm. We take this prediction to the data and ask whether an employee truly compares himself to the CEO.

The main challenge in studying the effect of high CEO compensation on workers' pay is the availability of data. We construct a matched CEO-employee panel data set for German firms by combining a data set on CEO compensation with a data set on employee wages. Data on CEO compensation is hand-collected from firms' annual reports. Data on employee wages comes from the Research Data Center (FDZ) of the German Federal Employment agency (BA). This agency has established a complete record of employee wages in German establishments since 1975 (for East Germany since 1992). The matched panel data set contains more than 200,000 establishment-year observations, and is available from 2000 to 2011. This unique data set enables us to test several hypotheses on the relationship of CEO compensation and employee wages.

[1] It is widely accepted that the feeling of happiness does not only rely on someone's own material payoff, but also on the payoff of others. Schmitt and Marwell (1972) show that subjects withdraw from profitable experiments if they receive inequitable payoffs. Using data on British workers, Clark and Oswald (1996) show that the satisfaction levels of workers are negatively related to their comparison wage rates. Akerlof and Yellen (1990) show that the fair wage of workers is not only determined by the market clearing wage, but also by the comparison with salient others. Besides, Fehr and Schmidt (1999) and Bolton and Ockenfels (2000) find that a simple model where someone's true payoff consists of her own pay and own relative payoff to other members in her group can explain many laboratory experiments.

We find evidence that higher CEO compensation is positively related to employee wages across firms and across time. When CEO compensation increases by 1%, the median employee wage increases by 0.06%. To alleviate potential endogeneity concerns, we implement a triple-difference approach where we find that a higher CEO-management-board wage gap results in a higher increase in employees' pay upon disclosure of individual executive compensation. Moreover, we find that CEOs who feel compassionately about the rank-and-file employees cannot explain our results. This raises the question of what is the precise mechanism for employee envy. We find that the envious behavior is geared to CEOs themselves rather than to the management team. In addition, we use a standard model to separate CEO pay in expected and abnormal pay, and find that the expected pay doesn't explain the envious behavior. These findings are in line with public attention playing the key role of inciting envy among employees. We also analyze turnover of employees and find that the employee turnover probability decreases in CEO pay. This finding implies that employees are, on average, overcompensated for their relative wealth concerns.

These findings have far reaching consequences for executive compensation. Relative wealth concerns drive up the costs of executive compensation by increasing employee wages. Any additional dollar paid to the CEO for providing incentives also leads to higher employee wages to compensate employees for their (perceived) losses from envy. The average CEO in our sample receives €2.7 million a year. If a firm increases her pay by 1% (=€27,000 for the average CEO), then the firm will pay an additional compensation of €19.5 to the median employee with an average annual salary of €36,200.[2] For the average firm in our sample with 48,000 employees, this sums up to €938,000 per year, increasing the total wage bill by €965,000 per year. If the firm takes the costs of employee envy into account, a 1 percentage point raise in CEO compensation increases the total wage bill by approximately 35% of average CEO compensation.

We show that regular employee wages rise with lagged CEO compensation. This could also be explained by productivity dynamics and rent-extraction: In phases where productivity is high, the pressure on wages decreases and all wages are increasing. We do several tests in the paper to reduce this concern: First, we include ROA and market-to-book ratio as control variables which help capture changes in productivity. Second, we introduce industry × year and state × year fixed effects into the regression which filter out industry and state shocks. Third, changes in productivity

[2] We use the pay increase of the median employee in this calculation because we can only observe the median but not the mean salary in our establishment data.

cannot explain our differences-in-difference results.

The differences-in-difference setup uses a law that demands that listed firms disclose individual executive compensation in their annual reports, and therefore turning a voluntary disclosure rule mandatory. Before most employees only could observe the total compensation a management board receives but not the individual components. We assume that employees have rational expectations about executive pay in the firms which had not disclosed their individual executive compensation. This means that they are surprised how low CEO compensation is compared to their management peers for some firms, rendering the law change alone ineffective to test the relative-wealth-concerns hypothesis. For this reason, we propose a triple-difference approach that tests whether employees' envy is increasing in the wage gap between CEO and other management board members. We find that the coefficient on this triple-interaction is indeed positive and significant at the 5% level.

An alternative explanation for our findings is that CEOs feel compassionate about rank-and-file employees and therefore their compensation increases together with the CEOs compensation. We have to distinguish between two different "types" of compassion of CEOs: First, true compassion, which means CEOs feel bad about a large pay gap independent of the fact that employees can observe the exact gap or not. If that would be the case we should not observe any significant effect in our triple-difference analysis because the disclosure of individual CEO compensation should not make any difference. The fact that we find a significant effect indicates that relative wealth concerns among employees have a relevant effect on their compensation. At the same time, we do not see a way to formally rule out true compassion by CEOs; it could be part of the full story. Second, CEO's feel compassionate *because* the firm discloses their compensation and they feel bad about the wage gap becoming public. To analyze this possibility, we use the identification strategy from Cronqvist et al. (2009) that argues that CEOs feel more compassionate about employees who are geographical nearer to them. Therefore, we insert a cross-effect of the state variable where the headquarter is situated with CEO pay and find insignificant but positive result for this coefficient. So there could be an effect of CEO compassion but it does not seem to be very strong. We conclude that employee envy is best capable of explaining our set of results.

There can be direct and indirect channels through which CEO compensation affects employee wages. Through the direct channel, workers observe the compensation of CEOs either from published reports or via the press. They derive disutility directly from comparison. Another channel

is indirect, which can also be referred to as a trickle-down effect. Top managers compare their wages to the CEO, and their disutility is compensated. Regular managers compare their wages to top managers, lower managers to regular managers, and regular employees compare their wages to lower managers. The effect of high CEO compensation gradually passes down to regular employees. If this trickle-down hypothesis holds, employee envy should be equally strong or even stronger towards managers below the CEO. We test this hypothesis and do not find such a result for non-CEO board managers and therefore conclude that indirect channel is less important.

Press reports have an important influence on public opinion and could be a main cause of envy among employees. The press mainly focuses on CEOs who receive an abnormally high compensation as compared to similar peers. Therefore, we use a model by Gillan et al. (2009) that separates CEO pay in its expected and abnormal component. We find a clear difference between the two components of CEO pay: the coefficient of expected pay is not significant and the coefficient of abnormal pay is highly significant to explain employee wages. Therefore, we believe the press and public opinion play a major role when it comes to relative wealth concerns of employees for CEO pay.

Wade et al. (2006) show that CEO overpayment is related to a higher turnover for other managers (see also Bloom and Michel (2002)). What does the relation look like for rank-and-file employees? Our results imply that increased wages for the employees overcompensate their envy and the employee turnover probability decreases in CEO pay. One important task of the CEO is to keep the employee turnover low because excessive turnover can result in shareholder value losses. Therefore, it is not surprising that highly paid CEOs by paying higher employee wages might be able to drive down employee turnover.

There exist a few empirical studies which examine the relation between CEO compensation and employee wages. Cronqvist et al. (2009) work with Swedish data and relate managerial entrenchment to the wages of regular employees. They find that CEOs with more control pay higher employee wages, especially for employees close to the CEO (geographically and hierarchically). They argue that CEOs derive private benefits from treating colleagues in their vicinity nicely. Wade et al. (2006) regress CEO compensation on CEO's personal traits and firm variables, and use the residuals as a proxy for CEO over- or underpayment. They show that CEO overpayment is related to higher pay for other managers (see also Bloom and Michel (2002)).

We focus on the level of pay, i.e., the participation constraint. However, there is a sizable

literature on the incentives of employees, i.e., the incentive compatibility constraint. Cullen and Perez-Truglia (2019) show in a real world experiment that vertical differences in compensation are motivating. Mueller et al. (2017) finds that higher inequality between top- and bottom-level jobs improves productivity for British firms. For U.S. firms, Faleye et al. (2013) fail to find any significant effect of an increased pay gap on employee productivity except for firms where the tournament incentives are high. In the group of U.S. top managers, Kale et al. (2009) finds that the pay gap between CEO and senior managers increases firm performance. Note that these findings are no contradiction to our results: We show evidence that envy from employees drives up employees' wage, but it does not necessarily change the ordinal rank of the wage gaps across firms. The literature just discussed uses some kind of proxy for incentives to see whether employees are depressed or incentivized by a large wage gap. Both outcomes are consistent with relative wealth concerns just as Grund and Sliwka (2005) and Neilson and Stowe (2010) argue.

Lin et al. (2016) investigate how employee representation on corporate boards of German firms affects executive compensation. They find that more employee representation increases executive compensation and employment protection of workers. However, they do not investigate employee wages. Last but not least this paper adds another behavioral bias to Edmans et al. (2017), who survey executive compensation.

The paper is organized as follows: Section 2 presents the data. Section 3 documents the relation between CEO compensation and employee wages consistent with our hypothesis that the employees are subject to relative wealth concerns. We also present evidence for the causality of CEO compensation on employee wages in Section 3. Section 4 considers the exact mechanism of employee relative wealth concerns. Section 5 contains our employee turnover results, Section 6 summarizes several robustness checks, and Section 7 concludes the paper.

2. Data

The sample contains all companies included in the two main German stock market indices, DAX and MDAX, between 2000 and 2011. We hand collect data on executive compensation and corporate governance from annual reports and Hoppenstedt company profiles. We do not include non-listed firms, because information on executive compensation is usually unavailable. Stock market data

comes from *Datastream* and balance sheet and accounting data from *Worldscope*.

2.1 Workers' compensation

Employment and wage data at the establishment level is obtained from the Institute of Employment Research (IAB). The IAB is the research organization of the German federal employment agency, the Bundesagentur für Arbeit (BA). The BA collects worker and employer contributions to unemployment insurance and distributes unemployment benefits. All German businesses are required to report detailed information on employment and wages to the BA. Individual-level data is aggregated at the establishment level, made anonymous, and offered for scientific use by the IAB (the Establishment History Panel). An establishment is any facility having a separate physical address, such as a factory, service station, restaurant, or office building. The IAB offers detailed establishment level data on industry, location, employment, employee education, age, nationality, and wages, and provides this data in the form of establishment-level statistics, such as sums, medians, and quartiles on wages and employment according to different classifications and breakdowns.

IAB does not have a firm identifier, which is why manual matching is necessary. At our request, the IAB matched our sample of listed firms with their establishment-level database using an automatic procedure, based on company name and address information (city, zip code, street, and house number). Additionally, we provided the IAB with names of major subsidiaries listed in the annual reports of our sample firms in 2006. All cases not unambiguously matched by the automatic matching procedure are checked by hand to avoid mismatching. The matching was performed for 2004, 2005, and 2006. Firms are dropped if they do not exist during the period 2004 through 2006. All establishments are matched only once to our sample firms. This matching procedure does not allow us to identify changes in establishment ownership after 2006.[3] Thus, if an establishment is acquired before 2004 or sold to another firm after 2006, it will be treated as if it belonged to the matched firm after the acquisition or before the sale. This will blur the match between firms and establishments and potentially lead to an attenuation bias working against finding significant results. Table 1 provides an overview of our sample of firms and establishments over time.

[Insert Table 1 here]

[3] At the time of matching establishments to firms, establishment data was not available for 2007 and subsequent years.

German establishments are required to report salaries of their employees up to an upper earnings limit (social security contribution ceiling) that is annually adjusted (West German states: €52,800 in 2000 up to €66,000 in 2011. East German states: €43,600 in 2000 up to €57,600 in 2011). When this limit has been reached, establishments are only required to report the ceiling. In our data set, the median average wage for the establishment is equal to the ceiling value for the respective year for 5.12% of the observations (for the quartile wages the corresponding amounts are 2.12% (Q1 wage) and 14.34% (Q3 wage)).

While fiscal years of German firms are mostly from January to December, establishment years for IAB data are from July to June. Therefore, we lead all variables from *Worldscope* by six months relative to IAB years. Effectively, we assign year-end values from *Worldscope* to June 30 information on employment and wages of the same year.

2.2 CEO compensation

We hand-collected data on compensation for CEOs and other members of the management board from firms' annual reports. Before 2006, most firms only disclose the total compensation of the management board as a whole. Only a subset of firms reported the individual compensation. From 2006, the German Corporate Governance Code required firms to disclose the individual compensation of members of the management board in their annual reports.[4] Hence, data on individual compensation for the management board is available for most firms after 2006. If a firm discloses the individual compensation, we record the payment for each executive, while for all other firms the total compensation for the management board is recorded.

Managerial compensation consists of several components: fixed salary, remuneration in kind, annual bonus, and compensation from long-term incentive programs. The long-term incentive programs include stock options, stock appreciation rights, and other stock based instruments. All these separate components of compensation are recorded if available. Our principle variable *CEO total* is

[4]The German Corporate Governance Code (2006), Clause 4.2.4, requires that "The total compensation of each member of the Management Board is to be disclosed by name, divided into non-performance-related, performance-related, and long-term incentive components, unless decided otherwise by the General Meeting by three quarters majority." This means that the disclosure of the compensation of each member of the management board is mandatory from 2006 as long as the general annual meeting has not decided otherwise with three quarters majority. Compare that to the German Corporate Governance Code (2005), Clause 4.2.4, "Compensation of the members of the Management Board shall be reported in the Notes of the Consolidated Financial Statements subdivided according to fixed, performance related and long-term incentive components." According to the Code, the word "shall" is used as a recommendation but not a regulation.

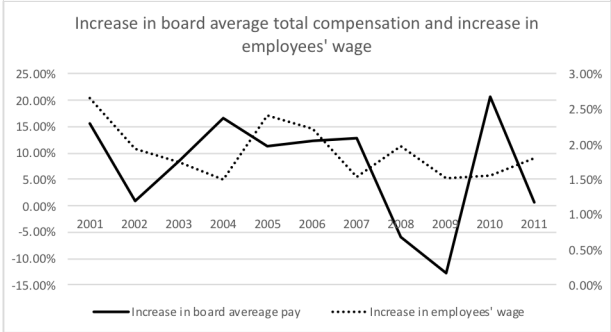

Figure 1: Yearly changes in average board compensation (solid line, left y-axis) and yearly changes in average employee wage (broken line, right y-axis).

the aggregate compensation that is mentioned in the Table "Board of Management Compensation - Aggregate Compensation" in the annual report. This is the aggregate value of the realized cash and bonus payments and the promised long-term compensation. It seems natural that the employees focus on this value because this is also usually reported in the press. Some executives in our panel data set join or leave the management board during the year. Their remuneration is then adjusted for the period in office to make them comparable to the standard annual compensation.

[Insert Table 2 here]

Table 2 presents summary statistics and variable definitions for firm-level variables (Panel A) and establishment-level variables (Panel B). The average firm year in our sample has sales of €13.1 billion (median: 2.1 billion), which shows that our sample mostly consists of large firms. The average CEO has a total annual compensation of €2.5 million and is 54 years old. The average median annual gross wage of full-time employees for our sample is €34,482.

Figure 1 contains a graphical representation of the yearly growth rate of average board compensation and the yearly growth rate of average employee wage over the years. The reason why we have board compensation instead of CEO compensation is that board compensation is available for all firms. The correlation between management board compensation and employee wages is 0.21.

2.3 Institutional setting

Historically, wages in German firms were mostly set through collective bargaining agreements between trade unions and employers' associations. However, in the last three decades, a major shift away from industry-level agreements has taken place. Hassel (1999) reports that in 1995, 53.4%

of the plants were covered by industry-level wage agreements, 8.2% by firm-level agreements, and 38.4% were not covered at all. Although their sample may not be fully comparable to that of Hassel (1999), Addison et al. (2010) report that only 47.3% of the German plants had industry-level agreements in 2000, a number that drops to 35.4% by 2008. Firm-level agreements were almost stable with 2.5% in 2000 and 2.7% in 2008, whereas the plants not covered by any collective bargaining agreement increased from 50.1% in 2000 to 61.9% in 2008. Over the same period, unionization also decreased considerably in Germany. Based on survey data, Schnabel and Wagner (2007) estimate it to be about 33% in 1992, declining to around 20% in 2004. If industry- or firm-level agreements exist, these agreements are binding for all workers as German law forbids discriminatory wage policies that disadvantage non-union members.

As a reaction to the declining popularity of collective bargaining agreements, trade unions and employers' associations are allowed so-called opening-clauses. Since the mid-1980s, labor regulation (including wage setting) has become increasingly flexible even for firms covered by collective bargaining agreements. Many areas of regulation are no longer determined at the industry level. Instead, works councils at the establishment level directly negotiate agreements with employers (Ellguth et al. (2012)). In particular, large firms (as in our sample) make use of these opening-clauses. Hassel and Rehder (2001) show that 55 of the 120 biggest companies in Germany negotiated a firm-level pact that deviates from the industry-level agreement during the 1990s.

However, even if firms do not use an opening-clause, they are free to deviate from the collective bargaining agreement as long as they pay wages above the level stipulated in the agreement. Collective bargaining agreements only determine minimum standards. Jung and Schnabel (2011) show that more than 43% of the establishments covered by a collective agreement pay wages above the level stipulated in the collective agreement. For these 43% of the establishments, average actual wages exceed wages that were stipulated by the collective bargaining agreement by about 10%. Both numbers increase with the size of an establishment, i.e. positive deviations are more likely for the large firms in our data set. Taken together, these studies show that wage setting is rather flexible (in both directions) at the firm level in Germany.

3. The relation between CEO compensation and employee wages

3.1 Baseline results

We hypothesis that employees who have relative wealth concerns experience an additional disutility when CEO pay increases. Therefore, the firm might raise the employees' salary to compensate them for this disutility and to prevent them from leaving the firm. This mechanism predicts a positive relationship between CEO compensation and employee's salary. We start by analyzing the relation between CEO compensation and employee wages using the following baseline Tobit regression model because 5.12% of the observation are censored (see Subsection **2.1**):

$$ln(Wage)_{i,j,t} = \alpha_t + \alpha_k + \alpha_s + \beta ln(CEO\ total)_{j,t-1} + \gamma X_{i,j,t-1} + \varepsilon_{i,j,t} \quad (1)$$

The dependent variable, $ln(Wage)_{i,j,t}$, is the logarithm of the median annual wage in establishment i and year t, where j indexes firms. $ln(CEO\ total)_{j,t-1}$ is the logarithm of the CEO's total compensation over the prior year $t-1$.[5] In our benchmark regressions, we control for year fixed effects, α_t, industry fixed effects of the establishment, α_k, and state fixed effects, α_s. $X_{i,j,t-1}$ is a vector of control variables, which include establishment-level variables such as number of employees, median age, qualifications, and the nationality of employees, and firm-level variables such as profitability, size, leverage, CEO ownership, and tenure. All explanatory variables are lagged by one year. We run fixed effects regressions and use White (1980) robust standard errors that allow for clustering at the firm level.

[Insert Table 3 here]

Table 3 presents our results. Specification (1) only includes *ln(CEO total)* and industry, state, and year fixed effects. The following specifications slowly build the full model. First, adding establishment level controls in specification (2) and then stepwise firm-level controls (specifications (3) to (5)). Across all specifications, we observe that firms that pay their CEOs more also pay significantly higher wages to their other employees. In specifications (3) to (5), we also include ROA and market-to-book ratio which control for firm profitability. Specifications (1) to (5) span two disclosure regimes: before 2006 disclosure was voluntary and since 2006 disclose has been mandatory.

[5] We use the pay increase of the median employee in this regression because we can only observe the median but not the mean salary in our establishment data.

Because we are worried that those firms disclosed individually where the wage gap between CEO and employee is not too large, we present specification (6) which includes observations after 2005 and the full set of control variables.

In specification (6) the coefficient for *ln(CEO total)* is 0.054 ($t = 3.50$). This result means that if CEO compensation increases by 1%, the median employee's wage increases by 0.054%. This effect is economically sizable. The average CEO in our sample receives €2.7 million a year after 2005. If a firm increases its pay by 1% (=€27,000) for the average CEO, then the firm will pay an additional compensation of €19.5 to the median employee with an average annual salary of €36,200. For the average firm in our sample with 48,000 employees that sums up to €938,000 per year, this increases the total wage bill by €965,000 per year. When we take the ratio between expected additional labor cost and average CEO compensation, the value is 0.35. This means that increasing CEO compensation by 1% effectively raises it by 35% if the indirect costs of relative wealth concerns by employees are taken into account.[6]

These results are obtained after controlling for observable characteristics known to influence employee wages. In particular, we control for establishment and firm size, employee characteristics, profitability, leverage, and union presence. As expected, employee wages are higher when employees are better educated, older, German, male, work in larger establishments, a union member has a supervisory board seat, the establishment is close to the headquarter, and the CEO has higher tenure (see, for example, Cronqvist et al. (2009), Brown and Medoff (1989)). In an untabulated robustness check, we adjust all nominal variables for inflation and find very similar results. We also split CEO total compensation in cash compensation and long-term compensation, and find that all the results are driven by the cash compensation alone; the long-term compensation is insignificant (tables not reported).

So far we have only looked at the median employee's wage, however, it could be that higher or lower income employees have a different sensitivity to CEO compensation. Since the IAB offers two more quartiles of employee wages at the establishment level, we first delete observations with less than 8 establishment employees and then rerun our specification (4) to (6) from Table 3 using the logarithm of the first and third quartile of annual wage in an establishment as a dependent variable. The result are shown in Table A1. Overall we find similar results across all three quartiles. For

[6]The calculations in this paragraph are based on the averages for the 2006-2011 sub-sample rather than the unconditional sample averages shown in Table 2.

our benchmark specification, with all controls and only observations after 2005, we find a that the coefficient of *ln(CEO total)* is 0.045 for Q1 employee's wage, and 0.052 for Q3 employee's wage. The results are highly significant.

3.2 Difference-in-difference analysis

The main endogeneity concern with our baseline regression is omitted variable bias. If there is an unobserved characteristic (e.g., firm quality) which causes both CEOs and employees to be paid well, our OLS estimates would be biased. In order to overcome this concern, we will use a law change that is - in our opinion - uncorrelated with any performance-related characteristic, like firm quality, but allows employees to observe CEO wages more accurately and more saliently.

Since 2002 the German Corporate Governance Code (GCGC) suggested to report individual compensation of management board members of listed firms. However, the majority of firms did not follow this suggestion and only reported the required aggregate compensation for all management board members together. Companies frequently explained they do not see how their shareholders can benefit from individual disclosure since the management board is collectively responsible for managing the company. After it became apparent in 2003 and 2004 that most firms were not complying with the GCGC a public debate started about making disclosure mandatory. Finally, in 2005 the federal parliament enacted a law that required firms to disclose individual compensation. It became effective in 2006. The GCGC from 2006 required firms to disclose the individual compensation of members of the management board in their annual reports (see footnote 4).

The law was motivated by the argument that it is necessary for shareholders to know the individual remuneration. Only detailed knowledge of compensation practices would allow shareholders to decide whether compensation is adequate with respect to the duties of the individual management board member and the situation of the company. In the proponents' view individual disclosure is a shareholder protection device. This view is exemplified by the justice minister arguing: "When you're forced to disclose these things, it acts as a sort of self-control."[7] This regulation does not directly affect employee wages, but it changes the channel through which the employees observe their firm's CEO compensation. Before the regulation came into effect, the employees could generally only observe the aggregate remuneration of all members on the management board. After the

[7] see Deutsche Welle from May 18, 2005: https://p.dw.com/p/6f1t. For the draft bill see Deutscher Bundestag printed matter 15/5577: http://dip21.bundestag.de/dip21/btd/15/055/1505577.pdf

regulation was adopted by the firms, the employees have been able to directly observe CEO compensation, which is on average 44% more than the compensation of an average management board member in 2006. Some firms in our sample have their shares cross-listed on American exchanges with stricter disclosure requirements. However for international cross-listings, the U.S. Securities and Exchange Commission allows "to disclose executive compensation on an aggregate basis and need not supply a Compensation Discussion & Analysis, as is required for domestic companies."[8] This means cross-listed firms were only required to publish individual compensation data starting 2006.

2.2.1 Setting up the differences-in-differences

We select the firms that disclose their CEO compensation before 2005 (i.e., {2000, 2001, 2002, 2003, 2004}) as the control group. And we regard those firms that do not disclose their wage before 2005 but do disclose it in the year 2006 as the treatment group.[9] In Table 4, we test whether there are any significant differences between disclosing and non-disclosing firms.

[Insert Table 4 here]

Generally we find rather few significant differences in means (and medians) between treatment and control firms. Out of 51 variables only nine t-tests are rejecting the hypothesis of equal means at a 10% significance level. We find that the treatment firms have higher logarithmic CEO long-term incentives (*ln(CEO LTI)*) compared to the control firms (p-value of t-test 0.049, median test 0.009). Also the CEO pay ratio is significantly higher for the treatment than for the control group

[8] See https://www.sec.gov/divisions/corpfin/internatl/foreign-private-issuers-overview.shtml .

[9] The *treatment* group consist of 32 firms: AIXTRON AG, Aareal Bank AG, Adidas AG, BASF AG, Beiersdorf AG, Beru, AG Daimler Chrysler AG, Deutz AG, Drägerwerke AG, Dyckerhoff AG, Fielmann AG, Fresenius AG, GEA Group AG, Gerry Weber International AG, Gildemeister AG, Henkel KgaA, IDS Scheer, Infineon Technologies AG, Jenoptik AG, K+S AG, Klöckner-Werke AG, LEONI AG, Linde AG, Loewe AG, Medion AG, Münchener Rück AG, Pfeiffer Vacuum, Puma AG, Rheinmetall AG, Salzgitter AG, Vossloh AG, and Zapf Creation AG.

The *control* group consist of 49 firms: AWD Holding AG, AXA Konzern AG, Allianz AG, Altana AG, Bayer AG, Beate Uhse AG, Bilfinger Berger AG, Commerzbank AG, Continental AG, DIS Deutscher Industrie Service AG, Deutsche Bank AG, Deutsche Börse AG, Deutsche Lufthansa AG, Deutsche Post AG, Deutsche Telekom AG, Douglas Holding AG, E.ON AG, EPCOS AG, Evotec Fraport AG, GPC Biotech, Gfk AG, Heidelberger Druckmaschinen AG, Hochtief AG, IKB Deutsche Industriebank AG, IVG Holding AG, Kontron, MAN AG, METRO AG, MLP AG, MediGene, REpower Systems AG, RWE AG, Rhön-Klinikum AG, SAP AG, SGL Carbon AG, Schering AG, Schwarz Pharma AG, Siemens AG, Singulus, Software AG, Stada Arzneimittel AG, TUI AG, Techem AG, ThyssenKrupp AG, United Internet, Varta AG, Volkswagen AG, and WCM Beteiligungs- und Grundbesitz-AG.

These 19 firms have *opted out* of the regulation: AMB Generali Holding AG, Baader Wertpapierhandelsbank AG, Celesio AG, Dürr AG, ELMOS Semiconductor, Hannover Rückversicherungs-AG, Heidelberger Zement AG, Hornbach Holding AG, Hugo Boss AG, INDUS Holding AG, Jungheinrich AG, Koenig & Bauer AG, Krones AG, Merck KGaA, Nordex, ProSiebenSat.1 Media AG, Sixt AG, Südzucker AG, and Villeroy & Boch AG.

(p-value of t-test 0.045, median test 0.154). We also find some adjustment to the new disclosure rule: The difference in the change of the individual management board compensation (*Board total change*) is lower for the treatment group than for the control group (p-value of t-test 0.007, median test 0.084). Moreover, the likelihood for the treatment firms to report R&D expenses (*Dummy missing R&D*) is lower than the likelihood of the control firms (p-value of t-test 0.084, median test 0.070). On the establishment level, less employees are female (p-value of t-test 0.065, median test 0.084), more employees are low qualified (p-value of t-test 0.039, median test 0.018), and less employees are white-collar (t-test 0.005, median test 0.008) in the treatment firm relative to the control firms. Somewhat surprisingly, the employee turnover (*Outflow*) is lower for the treatment firms compared to the control firms (p-value of t-test 0.032, median test 0.084), in particular for white-collar employees (*Outflow white-collar*) we observe lower turnover (p-value of t-test 0.000, median test 0.008). We offer an explanation of this fact in Section 5.

We acknowledge that firms self-select before the law and can take advantage of the opt-out clause that the law provides. However, we need to argue from the employee perspective rather than the firm perspective. The turnover of a typical employee in the treatment group is 0.10, or 10 years. Hence, the typical employee started way before any self-selection of firms took place. We therefore argue that for a typical employee the law change was random. Moreover, the main endogeneity concern is performance related. We have three performance related variables in our sample: *ROA*, *ROE*, and *Market to book ratio*. However, neither of these shows any significance (p-value 0.413 and higher).

2.2.2 Triple differences

We assume that employees have rational expectations about executive pay in the firms which had not disclosed their individual executive compensation in 2004. Under the relative-wealth-concern hypothesis, the law change itself has no influence on the employee wage, because employees in some firms are surprised how low executive pay is and there is no need to raise wages for them. However, employees' envy should be increasing in the wage gap between CEO and other management board members. We expect that the increase in employees' wage is positively related to the CEO-board wage ratio upon disclosure of CEO compensation. This hypothesis is based on the following reasoning: If only board compensation can be observed, as is the case before the new disclosure regulation,

employees infer CEO compensation by rational expectations from average board compensation. As soon as CEO compensation becomes available, they revise their expectation. Therefore, the more CEO compensation exceeds average board compensation the larger is the disutility employees suffer from relative wealth concerns.

[Insert Table 5 here]

To test this presumption, we adopt a difference-in-difference-in-difference (triple-difference) approach. *CEO-board ratio* is the percentage by which CEO compensation exceeds the average management board compensation for a given year. Table 5 presents the results.[10] In specifications (1) and (2), we consider a sample that excludes all the firms that opted out (i.e., more than 75% of the General Meeting voted for the non-disclosure) and call it normal sample. In specifications (3) and (4), we include these firms in the sample (augmented sample).[11] The coefficients on *Treatment* × *Post-2006* × *CEO-board ratio* are statistically significant at the 5% level in all specifications. So we find that, after the new disclosure regulation has become effective, employee wages increase more in firms with a relatively higher CEO pay. The results are also economically significant. When firms start disclosing their CEO compensation publicly after the regulation change, they pay 0.28% higher wages to their employees if the *CEO-board ratio* increases by one percentage point. This translates for an average employee wage of €36,200 in a rise of €101.

3.3 Alternative explanation: CEO compassion

It might be that the CEOs feel compassionate about rank-and-file employees. We have to distinguish between two stories of compassion from CEOs: First, true compassion where the observation of their compensation is not important. If true compassion alone had driven our results, then the effects in our triple-difference analysis would have been insignificant. They are not and indicate there are significant relative wealth concerns among employees. We do not see a way that true compassion can be formally ruled out; it can be part of the full story.

[10] The differences-in-differences methodology considers changes (i.e., differences) in employee wage. If the number of employees at the establishment level changes a lot from one year to another, changes in wage become less informative. In order to rule out the possibility that the increase in employees' wages is driven by fast growing (or fast shrinking) establishments, we drop the observations where the absolute yearly growth rate of the number of employees in an establishment is above the 95% percentile.

[11] We are constrained to opt-out firms that eventually disclose their CEO compensation during our sample period as the CEO-board ratio is necessary for our triple differences methodology .

[Insert Table 6 here]

Second, CEO's feel compassionate *because* the firm discloses their compensation and they feel bad about this. To analyze this, we use a identification strategy used by Cronqvist et al. (2009) that argues that CEOs feel more compassionate about employees who are geographical nearer to them. Therefore, we insert a cross-effect of the state variable where the headquarter is situated (*Close to head*) with $ln(CEO\ total)$ as an additional variable in our baseline regressions. Table 6 shows the results for six models. In specification (1) which doesn't control for employee characteristics, the coefficient of the interaction term is positive and highly significant. However in all other specifications, the effect is positive but not statistically significant and the total compensation ($ln(CEO\ total)$) is highly significant. So there could be an effect of compassion but it is not very strong. We conclude that you need employee envy to explain all of our results.

4. How does CEO compensation affect employee wages?

There can be direct and indirect channels through which CEO compensation affects employee wages. Through the direct channel, workers observe the compensation of CEOs either from published reports or via the press. They derive disutility directly from comparison. Another channel is indirect, which can also be referred to as a trickle-down effect. Top managers compare their wages to the CEO, and their disutility is compensated. Regular managers compare their wages to top managers, lower managers to regular managers, and regular employees compare their wages to lower managers. The effect of high CEO compensation gradually passes down to regular employees. We can only indirectly test these two hypotheses.

4.1 Envy towards the management team

This subsection presents evidence that employees have relative wealth concerns to the CEO rather than the whole management team. Before 2006, firms were not required to publish management board compensation individually. Even today, the German Corporate Governance Code still allows that management board compensation is not disclosed at the individual level, if the annual general meeting approves the non-publication with a three-quarter majority. This means that employees cannot observe the CEO's compensation for many German firms before 2006 and for some after

2006. To test our hypothesis, we expect two effects from the regulatory change in 2006: (1) for firms that do not disclose management compensation individually before and after 2006, the individual compensation for all board members, *ln(Board total)*, significantly affects employee wages; (2) for firms that disclose management compensation the individual compensation for all other board members except the CEO, *ln(Other total)*, becomes insignificant, while the compensation for the CEO becomes significant.

[Insert Table 7 here]

This is exactly what we observe in our subsample analysis in Table 7. Only looking at firms that do not disclose management compensation individually (column (1)), we find a positive and significant coefficient on *ln(Board total)*. If we look at the sample of firms disclosing management compensation individually (column (2)), *ln(Board total)* is still significant. However, a split-up in compensation for other management board members (*ln(Other total)*) and the CEO (*ln(CEO total)*) (column (3) and (4)) reveals that the employee envy is concentrated only on the CEO rather than on the other members of the management team. *ln(Other total)* in column (3) is insignificant. This result is also confirmed when we use both measures *ln(other total)* and *ln(CEO total)* in a horse race in the same regression (columns (5)). The negative coefficients for *ln(other total)* are most likely caused by collinearity with *ln(CEO total)*. The correlation between both variables is 0.83.

These findings suggest that employees benchmark their own salaries towards the most salient management compensation figure available. If compensation is disclosed individually, employees seem to mainly compare their wage to the CEO's compensation but not to that of other executives. If CEO compensation is not available, the closest proxy, average management board compensation, is used as a benchmark. In sum, these empirical patterns lend strong support to the direct channel, i.e., the hypothesis that workers observe the compensation of CEOs either from published reports or via the press and compare their wage to this number.

4.2 Abnormal CEO compensation

Press articles may be an important source to cause envy among employees. The press mainly focuses on CEOs who receive an abnormally high compensation as compared to similar peers. Therefore, we split *ln(CEO total)* in *ln(CEO expected total)* and *ln(CEO abnormal total)* as an explanatory

variable. *ln(CEO abnormal total)* is defined as the difference between actual and expected CEO compensation. Our hypothesis is: Employees have relative wealth concerns for their CEOs that is concentrated in the abnormal CEO pay rather than the expected CEO pay. The analysis takes three steps. In the first step, we calculate the log of CEO expected compensation. We adopt the model used by Gillan et al. (2009): The CEO expected total compensation is predicted by regressing the log CEO total compensation on the total shareholder return (TSR), log firms' total assets, the ratio of assets to firm value, CEO tenure, as well as year and industry (2-digit SIC) fixed effects. Note that Gillan et al. (2009) use ratio of EBIT to assets (ROA) instead of total shareholder return. Abnormal pay is versus how the CEO has performed, and, in our view, TSR is a better measure than ROA (particularly since earnings are less relevant for modern firms). In the second step, we calculate *ln(CEO abnormal total)* as the difference between *ln(CEO total)* and *ln(CEO expected total)*.[12] In the third step, we estimate two regressions: in the first specification, we regress log workers' median wage (*ln(Wage)*) on *ln(CEO expected total)* and our standard set of control variables. In the second specification, we replace *ln(CEO expected total)* with *ln(CEO abnormal total).*

[Insert Table 8 here]

Table 8 shows CEO expected total pay in specifications (1) to (3) and CEO abnormal total pay in specifications (4) to (6). While the significance for CEO expected pay decreases the more explanatory variables are accounted for, it increases for CEO abnormal pay. For the most complete model (3) and (6), workers' pay doesn't significantly depend on CEO expected pay, but highly significant on CEO abnormal pay. *CEO tenure,* which is one measure of CEO entrenchment, becomes significant once we turn from expected pay (specifications (3)) to abnormal pay (specifications (6)). An 1% increase of *CEO abnormal total* results in a 0.04% increase in the median employee's wage. The results when we use *ROA* instead of *TSR* for the calculation of abnormal pay are almost exactly the same (see Table A2).

We interpret the results of the past two subsections as follows. The employee envy is directed to the CEO rather than to the management team as a whole (Section **4.1**). On top of that, abnormal

[12]The descriptives of these variables are as follows. For *ln(CEO expected total)*, the mean is 14.33, the median is 14.28, the standard deviation is 0.761, and the number of observations is 552. For *ln(CEO abnormal total)*, the mean is 0, the median is 0.0186, the standard deviation is 0.557, and the number of observations is 551. For Table A2 (when we replace TSR with ROA) these variables are as follows: For *ln(CEO expected total)*, the mean is 14.33, the median is 14.28, the standard deviation is 0.764, and the number of observations is 551. For *ln(CEO abnormal total)*, the mean is 0, the median is 0.0127, the standard deviation is 0.554, and the number of observations is 550.

CEO compensation seems to play a primary role for envious behavior.

5. Employee turnover

Wade et al. (2006) show that CEO overpayment is related to a higher turnover for other managers (see also Bloom and Michel (2002)). What does the relation look like for rank-and-file workers? One important task of the CEO is to keep the employee turnover low because excessive turnover can result in shareholder value losses. We test this hypothesis using the employee inflow/outflow data provided by the IAB. We define two employee turnover variables: (1) *Outflow* as *Outflow of employees*$_t$/*#Employees*$_{t-1}$ and (2) *Inflow* as *Inflow of employees*$_t$/*#Employees*$_{t-1}$. Note that these variables do not distinguish between forced and voluntary turnover on the one hand, and between employees with fixed-term contract and employees with permanent contract which are difficult to fire on the other. In order to rule out the possibility that the increase in employee turnover is driven by fast growing (or fast shrinking) establishments, we drop the observations where the absolute yearly growth rate of the number of employees in an establishment is above the 95% percentile.

[Insert Table 9 here]

Table 9 presents the results. We observe that *Outflow* and *Inflow* are negatively correlated with CEO compensation. This result holds for all employees and for the subsample of white-collar employees. However, it is only significant for *Outflow* at the 5% level and *Inflow* for the sample of white-collar workers at the 10% level. This finding implies that employees are, on average, overcompensated for their relative wealth concerns, thus leading to a reduction in turnover because the outside options are relatively less attractive.

6. Robustness Checks

6.1 Additional controls

While we control for a number of variables in the regressions in Table 3, other, potentially unobservable, variables may be driving our results. To minimize any such concerns, we report further results with additional firm-level controls in Table 10.

[Insert Table 10 here]

First in column (1), we add the firm's annual *Stock return* as an alternative measure of firm performance. The results show that employees' wages are hardly influenced by stock returns above and beyond what is already captured in our other control variables. The statistical and economic significance of the coefficient on *ln(CEO total)* is not affected. Second, we add *Board size*, defined as the number of members on the management board. Once more, we do not observe any significant effect on employees' wages or the coefficient on *ln(CEO total)*. Third, we add additional CEO characteristics: (1) *CEO switch* equals one if a new CEO is appointed in t-1; (2) *CEO age* in years; (3) *CEO out-hiring* equals one if the CEO is recruited from outside the firm. None of these CEO characteristics has a significant influence on employee pay. Fourth, we add *R&D to sales* which interprets missing values as zero and a dummy for missing R&D observations. The results in Table 10 show that the variable *R&D to sales* is utterly insignificant but the dummy for missing R&D observation is highly significant. Those firms which do not report the R&D expenditures pay their employees less and the coefficient on *ln(CEO total)* increases from 0.056 to 0.064. Fifth, we split up the dummy variable *Union* into four dummy variables to control separately for the influence of the four largest German unions (IG Metall, ver.di, IG BCE, and IG BAU). We find that there are significant differences between trade unions but the coefficient for *ln(CEO total)* stays the same. Finally, we delete any establishment where the number of full-time employees is less than 10. We loose 58% of observations, and the coefficient on *ln(CEO total)* stays highly significant and changes little.

6.2 Unobservables and fixed effects

A specific concern might be that the relationship between CEO compensation and employee wages is driven by firm-level or establishment-level unobservables. We address this concern using three approaches in Table 11. First, we include firm fixed effects instead of industry fixed effects. Second, we include both firm and industry fixed effects, which is possible since the industry differs across establishments. Finally, we control for establishment fixed effects. Note that we are using OLS rather than Tobit regressions in this case because including too many fixed effects in a Tobit model can lead to incidental parameter problems of the maximum likelihood estimator. The effect is that the maximum likelihood estimator converges more slowly and sometimes not at all. Already these

OLS tests are demanding on the data because the wages of both the CEO and the workers are rather sticky. The results are nevertheless reassuring. While we lose economic significance, coefficients of *ln(CEO total)* are, on average, about 70% smaller than in the unreported OLS baseline regression; however, the statistical significance remains intact.

[Insert Table 11 here]

Another concern may be that there are CEO-level unobservables. We investigate this possibility by adding CEO and CEO-firm fixed effects. Once more, we observe a reduction in economic significance but the statistical significance is largely unaffected.

Finally, we might be concerned that the reason why CEO compensation affects employees' wages might be driven by unobservable time-varying factors at the industry level or the state level. We include industry × year fixed effects and state × year fixed effects. We find that neither economic nor statistical significance is materially affected. This analysis suggests that time-varying industry level and state level unobservables are not inducing our results.

6.3 Wage changes

To further alleviate concerns that unobservables are driving our results, we ask whether the increases in employee wages are associated with the increases in CEO pay. The regression of changes on changes removes the effect of time-invariant unobservables at the establishment level. The change of the independent variable *ln(CEO total)* is the annual growth rate in CEO total compensation, and the change of the explanatory variable *ln(Wage)* is the annual growth rate in employees' wages. This analysis places strong requirements on our data because wages are generally very sticky. This becomes more complicated in light of a yearly turnover of 0.22 (see Table 2, Panel B) and wage adjustments over the year. As the censoring problem of our wage variable is less of a problem when analyzing growth rates, we run OLS regressions in this case. In order to rule out the possibility that the increase in employees' wages is driven by fast growing (or fast shrinking) establishments, we drop the observations where the absolute yearly growth rate of the number of employees in an establishment is above the 95% percentile. Specifications (3) to (5) in Table 12 show that the coefficients on *CEO total change* are statistically significant at the 10% level. The coefficient can be interpreted as: when the annual growth rate of the CEO total compensation is increased by

1 percentage point, then the annual growth rate of the employees' wages will increase by 0.005 percentage points.

[Insert Table 12 here]

6.4 Timing and alternative measures of CEO compensation

In order to better understand the relationship between CEO and employee compensation, we analyze different time lags of CEO total compensation. The most salient measure of CEO compensation for employees should be the total compensation from the last fiscal year, because that number is published during year t. The hypothesis is: If the firm anticipates relative wealth concerns of its employees and therefore offers them an increased wage proactively, $ln(CEO\ total)_{t-1}$ will have the largest impact. If instead lengthy negotiations between employees and the firm take place, then a higher order lag of CEO compensation may be more relevant. Employee wage and also CEO compensation are quite sticky, so most lags or leads in the regressions of employee wage on CEO compensation are likely to have a significant coefficient on CEO compensation. Therefore, we look at the value of the CEO pay coefficients and the differences in significances across different specifications.

[Insert Table 13 here]

Table 13 Panel A shows our baseline specification in model (2) with one-year lags for all independent variables. In model (1) we report the same specification with contemporaneous variables. The coefficient is highly significant because employee wage and also CEO compensation are quite sticky. Notably, the difference in the coefficient of CEO pay between model (1) and (2) is 0.017 or 45%, and the t-values differ by 1.3. A comparison of model (2) with model (3) which contains the regressions with two-year lags for all independent variables yield the following results: the coefficient is only 0.001 or 2% higher than in our baseline specification and the t-values differ by 0.5. Nevertheless, we take model (2) as our baseline specification as it has 16% more observations that model (3) and the highest pseudo R^2 for all specifications shown in the table.

Moreover, we analyze the impact of different measures of executive compensation. The total compensation consists of shares, options, and bonus that are performance based. Our variable for CEO compensation is promised pay rather than realized pay. Nevertheless CEOs may have discre-

tion over his own pay by shifting components from fixed to variable if they expect the performance to be high. Therefore, we provide the baseline regression where we replace CEO total compensation with CEO cash compensation and separately with CEO fixed compensation. The result from Table 13 Panel B, are reassuring. The coefficients of both, *ln(CEO cash)* and *ln(CEO fixed)*, are highly significantly positive. The explanatory power (based on R^2) even increases if we use the *CEO premium* (i.e., *ln(CEO total - Other total)*) and the *CEO pay ratio* (i.e., *CEO total / Other total*).

7. Conclusion

We document a positive effect of CEO compensation on the wages of rank-and-file employees. This pattern is not explained by established determinants of employee wages and is unlikely to be caused by unobservables at the industry, firm, CEO, establishment, or state level. Our triple-difference analysis suggests a causal interpretation of our findings. The evidence is most consistent with firms paying higher wages to their employees in order to compensate them for the disutility caused by the pay gap to the CEO. The most likely driver underlying this phenomenon are relative wealth concerns of employees.

What is the precise mechanism for the relative wealth concerns of employees? We add the following observations: First, the envious behavior is geared to CEOs themselves rather than to the management team. Second, we use a standard model to separate CEO pay in expected and abnormal pay, and find that the expected pay doesn't explain the envious behavior. And third, employees gain very little from having relative wealth concerns. These observation are consistent with the press and public attention playing the key role of inciting envy among employees. This paper also shows that employee turnover decreases with higher CEO pay, which implies that employees, on average, are overcompensated for their relative wealth concerns.

An obvious open question is whether we can generalize results obtained for Germany to other countries, for example, the US. The US is known to have larger wage gaps between CEOs and rank-and-file employees as well as more social tolerance for inequality. Therefore, we would expect that the effect of envious behavior is dampened in the US compared to Germany. Consistent with this conjecture we find that CEOs in the Germany are compensated less than in the US. Therefore an

interesting extension of our work would be a cross-country comparison. In countries that experience higher inequality aversion the executive pay (all else equal) should be lower. Gabaix and Landier (2008) test this hypothesis using the World Value Survey. However, they have only 17 observations and find insignificant results. A promising research project might be to have a larger data set that allows to sufficiently control for all known effects on pay levels, e.g., firm size.

Our evidence of relative wealth concerns of employees implies that managerial compensation incurs additional "inequality costs", which need to be taken into consideration when determining the optimal contracts for both CEOs and employees. Any additional dollar paid to the CEO for providing incentives also leads to higher employee wages to compensate employees for their (perceived) utility losses from relative wealth concerns. These costs must be taken into account by boards and shareholders when determining the optimal level of CEO compensation.

Appendix A: Extra tables

[Insert Table A1 here]

[Insert Table A2 here]

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TABLE 1

Sample

This table displays the number of firms and establishments in the sample for each year between 2000 and 2011.

Year	Firms	Establishments
2000	35	3,486
2001	47	7,261
2002	59	8,329
2003	66	16,471
2004	98	20,814
2005	100	23,783
2006	99	25,767
2007	97	24,436
2008	95	21,310
2009	83	19,246
2010	84	16,924
2011	84	15,607

TABLE 2

Summary statistics

Panel A displays definitions and descriptive statistics for the main firm-level variables used in our analysis. Panel B displays definitions and descriptive statistics for the main establishment-level variables used in our analysis.

Panel A: Summary statistics for main firm-level variables

Variable name	Definition	Mean	Median	Std.	Obs.
Compensation					
CEO total (thousands)	Annual total compensation of the CEO	2,481	1,810	2,374	553
CEO cash (thousands)	Annual cash income of the CEO	1,945	1,472	1,650	553
CEO LTI (thousands)	Annual long-run incentive income of the CEO	571	161	1,056	519
Board total (thousands)	Average annual compensation for all management board members: total compensation for the board / board size	1,305	976	1,080	1141
Other total (thousands)	Average annual total compensation for management board members excluding the CEO	1,347	1,056	1,037	546
CEO premium	ln(CEO total - Other total)	13.41	13.53	1.19	525
CEO pay ratio	CEO total / Other total	1.82	1.60	0.99	546
CEO-board ratio	CEO total / Board total - 1	0.48	0.40	0.63	553
CEO characteristics					
CEO tenure	Time since first appointed as the CEO (year)	6.26	5.00	5.71	766
CEO ownership	=1 if the CEO holds more than 1% of the firm outstanding shares	0.05	0.00	0.14	766
CEO switch	=1 if another person takes over the CEO position	0.09	0.00	0.28	547
CEO age	Age of CEO (in years)	53.91	55.00	6.77	542
CEO out-hiring	=1 if the CEO is hired from outside the firm	0.35	0.00	0.48	552
Firm-level characteristics					
ROA	Return on assets	5.09	4.31	39.12	1148
ROE	Return on equity	8.82	11.14	23.54	1150
Market to book ratio	Market to book ratio	2.33	1.73	6.42	1151
Market capitalization (millions)	Market capitalization	7,732	1,511	14,500	1151
Size (millions)	Total sales of the firm	13,100	2,133	24,800	1140
Leverage	Total debt / total asset	0.21	0.19	0.17	1157
# Firm employees	Number of employees working for the firm in Germany	44,760	9,922	87,299	1156
Employee risk	Standard deviation of change in number of employees at firm level	0.17	0.12	0.21	1200
Union	=1 if one of the major German labor unions has representatives in the firms supervisory board	0.59	1.00	0.49	1200
Disclosure	=1 if the compensation of CEO is disclosed in annual reports	0.53	1.00	0.50	1143
Stock return	Total annual stock return calculated using the return index provided by Datastream	0.11	0.06	0.50	1181
Board size	Number of members in the executive board	4.70	4.00	2.08	1143
R&D to sales	R&D to sales ratio	6.22	0.75	33.51	1200

Panel B: Summary statistics for main establishment-level variables

Variable name	Definition	Mean	Median	Std.	Obs.
Wage structure					
Wage	Median gross average daily wage for full-time employees × 365	34,482	34,369	13,046	186,016
Q1 wage	First quartile gross average daily wage for full- time employees × 365	31,033	30,712	12,213	191,899
Q3 wage	Third quartile gross average daily wage for full- time employees × 365	36,647	36,967	13,520	167,951
Employee structure					
# Establishment Employees	Total number of full-time employees at the establishment	64.45	5.00	660.96	234,171
Female %	Proportion of full-time female employees	0.45	0.40	0.35	196,059
Low qualified %	Proportion of full-time low-qualified employees	0.04	0.00	0.12	196,059
Qualified %	Proportion of full-time median-qualified employees	0.74	0.87	0.32	196,059
Highly qualified %	Proportion of full-time high-qualified employees	0.08	0.00	0.18	196,059
German %	Proportion of German employees	0.97	1.00	0.10	196,059
Manager %	Proportion of managers	0.03	0.00	0.13	196,059
White-collar %	Proportion of white-collar workers	0.59	0.80	0.47	196,059
Employees age	0	41.00	41.00	8.27	234,171
Other variables					
Close to head	=1 if the establishment is located in the same federal state as the firm's headquarter	0.18	0.00	0.38	234,171
Outflow	Outflow of employees$_t$ / # Branch Employees$_{t-1}$	0.22	0.15	0.22	95,546
Outflow white-collar	Outflow of white-collar employees$_t$ / # Branch Employees$_{t-1}$	0.14	0.06	0.21	95,546
Inflow	Inflow of employees$_t$ / # Branch Employees$_{t-1}$	0.47	0.13	15.32	99,505
Inflow of white-collar	Inflow of white-collar employees$_t$ / # Branch Employees$_{t-1}$	0.30	0.04	9.77	99,505
Industry	2-digit NACE code (economic division) of the the establishment (edition: 2003)				
State	Federal state where the establishment is located				

TABLE 3

CEO compensation and employee wages: Regression results

This table presents results for Tobit regressions with the log median annual wage of full-time employees as the dependent variable. All independent variables are lagged by one year. See Table 2 for a detailed overview of variable definitions. In specification (6), we consider the observations after 2005 only. We use the White (1980) robust standard errors clustered at the firm level. The t-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Dependent variable:	ln(Wage)					
	(1)	(2)	(3)	(4)	(5)	(6)
ln(CEO total)	0.066***	0.058***	0.061***	0.058***	0.056***	0.054***
	2.72	2.82	4.19	4.33	4.12	3.50
ROA			-0.072	-0.092	-0.048	-0.132
			-0.57	-0.66	-0.33	-1.13
Market to book ratio			-0.023**	-0.021**	-0.024**	-0.026***
			-2.49	-2.29	-2.25	-2.95
ln(Size)			-0.005	-0.044	-0.036	-0.051*
			-0.28	-1.60	-1.30	-1.79
Leverage			-0.033	0.013	0.031	0.015
			-0.44	0.16	0.40	0.19
Union				0.164*	0.153*	0.191**
				1.84	1.74	2.04
ln(# Firm employees)				0.027	0.02	0.037
				1.06	0.76	1.27
Employee risk				0.232	0.198	0.36
				1.12	1.00	1.63
CEO ownership					0.019	0.048
					0.29	0.82
CEO tenure					0.002*	0.002*
					1.66	1.70
ln(# Estab. Employees)		0.041***	0.041***	0.042***	0.042***	0.049***
		3.57	3.57	3.60	3.63	4.25
Female %		-0.304***	-0.300***	-0.315***	-0.317***	-0.325***
		-3.86	-3.71	-3.85	-3.84	-3.90
low qualified %		-0.026	-0.033	-0.032	-0.03	-0.041
		-0.43	-0.60	-0.59	-0.55	-0.71
Qualified %		0.219***	0.216***	0.207***	0.207***	0.208***
		5.04	5.13	5.25	5.29	4.81
Highly qualified %		0.662***	0.666***	0.657***	0.657***	0.660***
		12.17	12.53	13.41	13.47	13.74
German %		0.252***	0.258***	0.260***	0.261***	0.256***
		5.08	5.30	5.51	5.42	5.02
Manager %		0.115***	0.120***	0.131***	0.131***	0.136***
		3.08	3.32	3.76	3.79	3.67
White collar %		0.192***	0.183***	0.198***	0.202***	0.219***
		8.54	7.44	8.34	8.17	7.90
Employee age		0.005***	0.005**	0.005***	0.005***	0.005***
		2.72	2.56	2.75	2.73	2.58
Close to head		0.049***	0.048***	0.049***	0.049***	0.048***
		3.24	3.14	3.16	3.26	3.61
Industry, state, year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.447	0.634	0.634	0.638	0.638	0.609
Number of observations	107,478	105,593	104,555	104,555	104,555	64,718

TABLE 4

Summary statistics for the treatment group and the control group at the disclosure

This table presents the summary statistics for the treatment group and the control group at the year of disclosure. We take the value for the treatment group when they disclose. We take the average of 2005 and 2006 for the control group. We also perform the t-test and the median test between the treatment and the control groups, which is presented in the last columns. For establishment-level variables, observations are first aggregated at the firm level by taking the average weighted by the number of employees who work in the establishment, and then the t-test and the median test are performed.

	Treatment group			Control group			t-test	Median test
	N	Mean	Median	N	Mean	Median	p-value	p-value
Firm level								
CEO total (millions)	28	2.46	1.71	49	2.41	1.81	0.928	0.931
CEO cash (millions)	28	1.91	1.37	49	1.84	1.55	0.834	0.698
CEO LTI (millions)	26	0.59	0.16	46	0.61	0.23	0.923	1.000
Board total (millions)	32	1.31	1.08	49	1.59	1.24	0.286	0.715
Other total (millions)	28	1.08	1.00	48	1.43	1.05	0.129	0.634
ln(CEO total)	28	14.24	14.35	49	14.25	14.41	0.978	0.931
ln(CEO cash)	28	14.09	14.13	49	14.06	14.25	0.906	0.698
ln(CEO LTI)	14	13.53	13.58	37	12.78	12.86	0.049	0.009
ln(Board total)	32	13.82	13.90	49	13.99	14.03	0.354	0.715
ln(Other total)	28	13.68	13.82	48	13.88	13.84	0.277	0.634
Board total change	32	0.01	0.03	49	0.19	0.14	0.007	0.084
CEO pay ratio	28	2.15	1.76	48	1.64	1.58	0.045	0.154
CEO-board ratio	28	0.53	0.47	49	0.39	0.39	0.137	0.301
CEO tenure	29	5.97	3.00	49	6.46	4.50	0.709	0.995
CEO ownership	29	0.14	0.00	49	0.10	0.00	0.637	0.632
CEO switch	28	0.11	0.00	48	0.04	0.00	0.216	0.729
CEO age	28	53.36	52.50	48	53.78	55.00	0.796	0.438
CEO out-hiring	28	0.36	0.00	49	0.37	0.00	0.930	0.929
ROA	32	0.05	0.05	49	0.04	0.05	0.730	0.928
ROE	32	0.07	0.12	49	0.11	0.15	0.480	0.715
Market to book ratio	32	2.92	2.28	49	3.02	2.38	0.880	0.413
Size (millions)	32	10,700	1,865	49	17,300	2,283	0.294	0.413
ln(Size)	32	14.59	14.44	49	14.93	14.57	0.474	0.715
Leverage	32	0.18	0.15	49	0.21	0.17	0.452	0.715
# Firm employees (millions)	32	29.64	8.85	49	65.03	17.02	0.120	0.413
ln(# Firm employees)	32	9.06	9.08	49	9.48	9.74	0.336	0.413
Employee risk	32	0.17	0.13	49	0.19	0.12	0.683	0.928
Total shareholder return	32	0.34	0.21	49	0.35	0.31	0.965	0.203
Board size	32	4.18	3.82	49	4.82	4.33	0.203	0.045
R&D to sales	32	3.06	1.89	49	13.80	0.16	0.342	0.146
Dummy missing R&D	32	0.25	0.00	49	0.44	0.00	0.084	0.070
Establishment level								
Median wage (thousands)	32	42.15	43.35	49	43.33	45.01	0.507	0.715
Q1 wage (thousands)	32	36.48	36.11	49	38.02	38.79	0.368	0.084
Q3 wage (thousands)	32	48.13	48.61	47	48.73	51.21	0.739	0.410
ln(Median Wage)	32	10.61	10.65	49	10.63	10.69	0.704	0.413
ln(Q1 wage)	32	10.47	10.48	49	10.50	10.55	0.559	0.084
ln(Q3 wage)	32	10.75	10.74	47	10.75	10.82	0.881	0.410
# Establishment Employees	32	10,097	3,341	49	19,654	3,067	0.228	0.928
Female %	32	0.26	0.22	49	0.33	0.34	0.065	0.084
Low qualified %	32	0.08	0.06	49	0.06	0.04	0.039	0.018
Qualified %	32	0.64	0.65	49	0.63	0.65	0.756	0.928
Highly qualified %	32	0.22	0.18	49	0.24	0.22	0.570	0.413
German %	32	0.93	0.94	49	0.94	0.94	0.422	0.928
Manager %	32	0.05	0.04	49	0.06	0.04	0.420	0.715
White-collar %	32	0.62	0.62	49	0.77	0.80	0.005	0.008
Employees age	32	40.24	40.95	49	39.54	40.29	0.329	0.318
Close to head	32	0.56	0.56	49	0.50	0.41	0.398	0.318
Outflow	32	0.10	0.09	49	0.13	0.12	0.032	0.084
Outflow white-collar	32	0.06	0.05	49	0.11	0.09	0.000	0.008
Inflow	32	0.19	0.11	49	0.36	0.16	0.303	0.029
Inflow of white-collar	32	0.13	0.07	49	0.30	0.13	0.289	0.008

TABLE 5

Triple-difference regressions

This table presents results for regressions in a triple-difference setting with the log median annual wage of full-time employees as the dependent variable. All independent variables are lagged by one year. See Table 2 for a detailed overview of variable definitions. The control group contains the firms which disclose the compensation of the CEO before 2005 (i.e., {2000, 2001, 2002, 2003, 2004}). The treatment group contains the firms which do not disclose the compensation of the CEO before 2005, but do disclose it in the year 2006. They may disclose in the year 2005. The independent variable *Treatment* equals 1 when an observation is in the treatment group. *Post*-2006 equals 1 when the year is in or after 2006. *CEO-board ratio* is the percentage of the CEO total compensation over the board average compensation. We exclude observations where the absolute yearly changes of the numbers of employees at the establishment level are above the 95% percentile. We use the White (1980) robust standard errors clustered at the firm level. The *t*-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Dependent variable:	Normal sample		Augmented sample	
ln(Wage)	(1)	(2)	(3)	(4)
Treatment × Post-2006 × CEO-board ratio	0.276**	0.264**	0.292**	0.277**
	2.44	2.34	2.59	2.41
Treatment × Post-2006	-0.107*	-0.102*	-0.111*	-0.106*
	-1.71	-1.70	-1.89	-1.83
Treatment × CEO-board ratio	-0.235**	-0.213**	-0.260**	-0.234**
	-2.24	-2.11	-2.48	-2.32
Post-2006 × CEO-board ratio	0.056	0.060	0.056	0.060
	1.29	1.41	1.28	1.40
Treatment	0.103*	0.095	0.120**	0.111**
	1.67	1.58	2.25	2.10
CEO-board ratio	0.039	0.034	0.040	0.034
	0.98	0.86	1.00	0.87
ROA	-0.083	-0.013	-0.079	-0.007
	-0.70	-0.11	-0.67	-0.06
Market to book ratio	-0.023***	-0.023**	-0.023***	-0.023**
	-3.18	-2.55	-3.19	-2.57
ln(Size)	-0.023	-0.02	-0.023	-0.020
	-0.89	-0.75	-0.88	-0.75
Leverage	0.012	0.019	0.020	0.028
	0.16	0.28	0.28	0.39
Union	0.129	0.129	0.120	0.120
	1.62	1.60	1.53	1.51
ln(#Firm Employees)	0.026	0.021	0.027	0.022
	0.98	0.79	1.01	0.81
Employee risk	0.301*	0.290*	0.290	0.280
	1.69	1.69	1.66	1.66
CEO ownership		-0.035		-0.036
		-0.59		-0.61
CEO tenure		0.002		0.002
		1.43		1.44
ln(# Estab. Employees)	0.044***	0.044***	0.044***	0.044***
	3.77	3.79	3.79	3.81
Female %	-0.276***	-0.278***	-0.275***	-0.277***
	-3.44	-3.43	-3.43	-3.42
low qualified %	-0.031	-0.031	-0.031	-0.031
	-0.59	-0.59	-0.58	-0.58
Qualified %	0.202***	0.203***	0.203***	0.204***
	5.08	5.10	5.06	5.08
Highly qualified %	0.250***	0.252***	0.249***	0.252***
	5.08	5.04	5.06	5.02
German %	0.493***	0.493***	0.495***	0.495***
	10.65	10.71	10.66	10.71
Manager %	0.034	0.034	0.036	0.036
	1.20	1.19	1.25	1.24
White collar %	0.179***	0.180***	0.179***	0.180***
	7.35	7.44	7.32	7.40
Employee age	0.004**	0.004**	0.004**	0.004**
	2.24	2.20	2.23	2.19
Close to head	0.030**	0.030**	0.030**	0.030**
	2.27	2.26	2.31	2.29
Industry, state, year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.628	0.628	0.628	0.628
Number of observations	89,382	89,382	89,467	89,467

TABLE 6

CEO compassion

This table presents results for Tobit regressions with the interaction term between ln(CEO total) and close-to-headquarter. All independent variables are lagged by one year. See Table 2 for a detailed overview of the variable definitions. In specification (6), we consider the observations after 2005 only. We use the White (1980) robust standard errors clustered at the firm level. The t-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Dependent variable:	ln(Wage)					
	(1)	(2)	(3)	(4)	(5)	(6)
ln(CEO total)	0.066***	0.056***	0.057***	0.055***	0.052***	0.051***
	2.76	2.68	4.09	4.14	4.14	3.33
Close to head × ln(CEO total)	0.007***	0.013	0.018	0.017	0.018	0.015
	5.43	0.84	1.14	1.11	1.11	0.93
ROA			-0.077	-0.098	-0.054	-0.135
			-0.61	-0.69	-0.69	-1.15
Market to book ratio			-0.023**	-0.021**	-0.024**	-0.026***
			-2.52	-2.32	-2.32	-2.99
ln(Size)			-0.005	-0.044	-0.036	-0.051*
			-0.30	-1.61	-1.61	-1.79
Leverage			-0.035	0.012	0.03	0.016
			-0.46	0.15	0.15	0.20
Union				0.164*	0.153*	0.191**
				1.84	1.84	2.04
ln(# Firm employees)				0.027	0.02	0.037
				1.05	1.05	1.26
Employee risk				0.232	0.198	0.36
				1.12	1.12	1.64
CEO ownership					0.019	0.048
					0.00	0.82
CEO tenure					0.002*	0.002*
					0.00	1.71
ln(# Estab. Employees)		0.041***	0.041***	0.042***	0.042***	0.049***
		3.57	3.56	3.60	3.60	4.25
Female %		-0.303***	-0.299***	-0.314***	-0.317***	-0.325***
		-3.86	-3.71	-3.85	-3.85	-3.90
low qualified %		-0.026	-0.034	-0.033	-0.031	-0.042
		-0.43	-0.61	-0.60	-0.60	-0.72
Qualified %		0.219***	0.217***	0.207***	0.207***	0.208***
		5.04	5.13	5.25	5.25	4.81
Highly qualified %		0.662***	0.667***	0.657***	0.657***	0.660***
		12.19	12.54	13.42	13.42	13.74
German %		0.251***	0.258***	0.260***	0.261***	0.256***
		5.08	5.32	5.53	5.53	5.03
Manager %		0.116***	0.121***	0.132***	0.132***	0.136***
		3.08	3.34	3.78	3.78	3.68
White collar %		0.192***	0.183***	0.198***	0.202***	0.219***
		8.54	7.44	8.33	8.33	7.90
Employee age		0.005***	0.005**	0.005***	0.005***	0.005***
		2.72	2.56	2.76	2.76	2.59
Close to head		-0.14	-0.217	-0.213	-0.22	-0.178
		-0.64	-0.96	-0.93	-0.93	-0.74
Industry, state, year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.452	0.634	0.634	0.638	0.639	0.609
Number of observations	107,478	105,593	104,555	104,555	104,555	64,718

TABLE 7

Envy towards the management team

This table presents results for Tobit regressions with the log median annual wage of full-time employees as the dependent variable. The "No disclosure" sample includes all establishment-year observations of firms not disclosing the individual CEO compensation in a given year, i.e., the sample consists of firms that only disclose the aggregated compensation of all members in the management board in a given year. The "Disclosure" sample includes all establishment-year observations of firms disclosing the individual CEO compensation in a given year. All independent variables are lagged by one year. The firm variables and establishment variables are the same as in specification (4) of Table 3. See Table 2 for a detailed overview of variable definitions. We use the White (1980) robust standard errors clustered at the firm level. The t-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Dep. variable:	ln(Wage)				
Sample:	No disclosure	Disclosure	Disclosure	Disclosure	Disclosure
	all	all	all	all	all
	(1)	(2)	(3)	(4)	(5)
ln(board total)	0.036**	0.033**			
	2.39	2.19			
ln(CEO total)			0.058***		0.149***
			4.33		5.05
ln(other total)				0.019	-0.121***
				1.15	-3.68
Firm variables	Yes	Yes	Yes	Yes	Yes
Estblishment variables	Yes	Yes	Yes	Yes	Yes
Industry, state, year FE	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.654	0.647	0.638	0.636	0.641
Number of obs.	52,879	113,895	104,555	104,532	104,526

TABLE 8

CEO expected and abnormal total compensation

This table presents results for Tobit regressions with the log median annual wage of full-time employees as the dependent variable. In specifications (1) - (3), the independent variable is logarithmic CEO expected total compensation, and in specifications (4) - (6), the independent variable is logarithmic CEO abnormal total compensation. Logarithmic CEO abnormal total compensation is the difference between CEO actual logarithmic compensation and expected logarithmic total compensation. We measure CEO expected total compensation using the method inspired by Gillan et al. (2009). Expected logarithmic total compensation is calculated by regressing logarithmic CEO total compensation on total shareholder return (TSR), logarithmic firms' total assets, the ratio of assets to firm value (book-to-market ratio), CEO tenure, the two-digit SIC of the firm, and the year of the observation. All independent variables are lagged by one year. The establishment variables are the same as in specification (5) of Table 3. See Table 2 for a detailed overview of variable definitions. We use the White (1980) robust standard errors clustered at the firm level. The t-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Dependent variable:	ln(Wage)					
	(1)	(2)	(3)	(4)	(5)	(6)
CEO expected total	0.078**	0.070*	0.060			
	2.31	1.90	1.12			
CEO abnormal total				0.032***	0.034***	0.043***
				2.73	3.21	5.26
ROA	0.199	0.124	0.088	-0.026	-0.059	-0.021
	1.29	0.84	0.61	-0.18	-0.44	-0.15
Market to book ratio	-0.023**	-0.021**	-0.024**	-0.020**	-0.018*	-0.022**
	-2.42	-2.24	-2.24	-1.98	-1.92	-2.06
ln(Size)	-0.011	-0.043	-0.035	0.015	-0.026	-0.016
	-0.49	-1.45	-1.10	0.89	-0.91	-0.56
Leverage		-0.033	-0.017		0.031	0.063
		-0.40	-0.19		0.39	0.81
Union		0.159*	0.147		0.169*	0.156*
		1.72	1.60		1.90	1.76
ln(# Firm employees)		0.023	0.021		0.028	0.018
		0.85	0.74		1.07	0.68
Employee risk		0.215	0.201		0.304	0.252
		0.97	0.92		1.50	1.32
CEO ownership			0.050			0.015
			0.76			0.23
CEO tenure			0.001			0.003**
			0.39			2.39
ln(# Establishment Employees)	0.041***	0.041***	0.042***	0.041***	0.042***	0.042***
	3.52	3.55	3.58	3.54	3.60	3.63
Female %	-0.297***	-0.313***	-0.314***	-0.296***	-0.313***	-0.317***
	-3.75	-3.88	-3.83	-3.69	-3.83	-3.85
low qualified %	-0.029	-0.029	-0.028	-0.038	-0.036	-0.034
	-0.52	-0.53	-0.50	-0.69	-0.66	-0.61
Qualified %	0.219***	0.210***	0.209***	0.217***	0.208***	0.207***
	5.08	5.23	5.27	5.14	5.30	5.32
Highly qualified %	0.669***	0.659***	0.660***	0.673***	0.662***	0.662***
	12.18	13.07	13.20	12.29	13.17	13.25
German %	0.259***	0.262***	0.261***	0.259***	0.261***	0.262***
	5.40	5.61	5.38	5.43	5.58	5.51
Manager %	0.123***	0.131***	0.132***	0.120***	0.131***	0.132***
	3.37	3.71	3.76	3.22	3.71	3.76
White collar %	0.179***	0.195***	0.198***	0.178***	0.194***	0.200***
	7.01	8.02	7.91	6.90	8.09	8.11
Employee age	0.005**	0.005***	0.005***	0.005**	0.005***	0.005***
	2.49	2.70	2.73	2.54	2.75	2.73
Close to head	0.046***	0.047***	0.048***	0.046***	0.048***	0.049***
	2.96	3.02	3.14	3.05	3.10	3.23
Industry, state, and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.632	0.636	0.636	0.631	0.636	0.637
Number of observations	104,481	104,481	104,481	104,475	104,475	104,475

TABLE 9

Employee turnover

This table presents results for regressions with different employee turnover variables as dependent variables. All independent variables are lagged by one year. See Table 2 for a detailed overview of the variable definitions. We exclude observations where the yearly changes of the numbers of employees at the establishment level is above the 95% percentile. We use the White (1980) robust standard errors clustered at the firm level. The *t*-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Dependent variable:	Outflow	Outflow white-collar	Inflow	Inflow white-collar
	(1)	(2)	(3)	(4)
ln(CEO total)	-0.022**	-0.015**	-0.024	-0.026*
	-2.35	-2.29	-1.65	-1.88
ROA	0.025	0.018	0.284**	0.210**
	0.29	0.26	2.37	2.22
Market to book ratio	0.007	0.004	0.005	0.002
	1.14	1.06	0.72	0.45
ln(Size)	0.008	-0.003	-0.008	0
	0.73	-0.43	-0.67	-0.03
Leverage	0.061	0.018	-0.003	0.006
	1.54	0.59	-0.13	0.31
Union	0.051	0.036	0.058*	0.037
	1.44	1.37	1.67	1.56
ln(# Firm employees)	0.006	0.017**	0.014	0.006
	0.81	2.47	1.32	0.73
Employee risk	0.039	0.109**	0.083	0.079
	0.55	2.01	1.08	1.00
CEO ownership	0.049	0.061*	-0.051	-0.041
	1.01	1.87	-1.29	-1.66
CEO tenure	-0.002	-0.001	-0.002***	-0.001
	-1.09	-1.51	-3.93	-1.51
ln(# Estab. Employees)	-0.038***	-0.028***	-0.045***	-0.031***
	-19.63	-10.15	-15.49	-6.03
Female %	-0.045*	-0.007	-0.004	0.01
	-1.67	-1.00	-0.74	1.41
low qualified %	0.024	0.034**	-0.004	-0.019
	0.86	2.35	-0.19	-1.33
Qualified %	-0.027**	-0.007	-0.036**	-0.022*
	-2.27	-0.53	-2.26	-1.67
Highly qualified %	-0.008	-0.049***	0.047***	0.017
	-0.42	-2.65	2.98	1.10
German %	-0.154***	-0.073***	-0.072***	-0.056***
	-3.63	-4.71	-3.82	-2.69
Manager %	-0.004	-0.01	0.002	-0.002
	-0.16	-0.55	0.08	-0.11
White collar %	0.05	0.312***	0.015*	0.183***
	1.49	18.11	1.75	13.46
Employee age	-0.003***	-0.001**	-0.003***	-0.002***
	-3.33	-2.01	-4.42	-4.28
Close to head	0.006*	0.006*	0.008	0.009*
	1.68	1.83	1.24	1.73
Industry, state, year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.126	0.394	0.138	0.285
Number of observations	52,725	52,725	49,713	49,713

TABLE 10

Robustness checks with additional controls

This table presents results for Tobit regressions with the log median annual wage of full-time employees as the dependent variable using additional control variables: (1) Stock return, (2) board size, (3) additional CEO characteristics, (4) R&D to sales, and (5) union variables. We count missing values as zeros for R&D to sales and augment regression (4) with a dummy that becomes one if the R&D variable is missing. In specification (6), we delete any establishment where the number of full-time employees is less than 10. All independent variables are lagged by one year. See Table 2 for a detailed overview of the variable definitions. We use the White (1980) robust standard errors clustered at the firm level. The t-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Dependent variable:	ln(Wage)					
	(1)	(2)	(3)	(4)	(5)	(6)
ln(CEO total)	0.056***	0.056***	0.054***	0.064***	0.055***	0.053***
	4.19	3.97	3.77	4.63	4.17	4.33
Stock return	0.000					
	0.01					
Board size		0.000				
		0.04				
CEO switch			0.001			
			0.04			
CEO age			0.001			
			0.32			
CEO out-hiring			0.007			
			0.29			
R&D to sales				0.000		
				-0.30		
Dummy missing R&D				-0.108***		
				-3.62		
IGBAU					0.171*	
					1.94	
IGBCE					0.162*	
					1.76	
IGMetall					0.168	
					1.57	
Verdi					0.150*	
					1.65	
Firm variables	Yes	Yes	Yes	Yes	Yes	Yes
Establishment variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry, state, and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.638	0.638	0.639	0.644	0.639	1.551
Number of observations	104,475	104,555	104,526	104,555	104,555	44,276

TABLE 11

Different sets of fixed effects

This table presents results for regressions with the log median annual wage of full-time employees as the dependent variable. All independent variables are lagged by one year. See Table 2 for a detailed overview of variable definitions. The table displays results for regressions with different sets of fixed effects. The unreported control variables are the same as in specifications (1), (2), (3), (4), and (5) of Table 3. We use the White (1980) robust standard errors clustered at the firm level. The t-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Dependent variable:	ln(Wage)				
	(1)	(2)	(3)	(4)	(5)
Firm, year and state fixed effects					
ln(CEO total)	0.019**	0.017**	0.014**	0.016**	0.016**
	2.29	2.39	2.30	2.37	2.46
Adjusted R^2	0.404	0.556	0.552	0.552	0.552
Number of observations	101,833	99,936	98,925	98,925	98,925
Firm, industry, year and state fixed effects					
ln(CEO total)	0.028*	0.021**	0.018**	0.018**	0.018**
	1.91	2.13	2.00	2.24	2.18
Adjusted R^2	0.573	0.652	0.649	0.649	0.649
Number of observations	101,632	99,762	98,751	98,751	98,751
Establishment and year fixed effects					
ln(CEO total)	0.013**	0.013**	0.010*	0.010*	0.010*
	2.29	2.38	1.74	1.76	1.81
Adjusted R^2	0.923	0.927	0.927	0.927	0.927
Number of observations	101,833	99,936	98,925	98,925	98,925
CEO, year and state fixed effects					
ln(CEO total)	0.017**	0.017**	0.017***	0.017***	0.017***
	2.24	2.42	2.70	2.64	2.64
Adjusted R^2	0.405	0.556	0.553	0.553	0.553
Number of observations	101,833	99,936	98,925	98,925	98,925
CEO × firm, year and state fixed effects					
ln(CEO total)	0.017**	0.017**	0.017***	0.017***	0.017***
	2.24	2.42	2.71	2.64	2.64
Adjusted R^2	0.405	0.556	0.553	0.553	0.553
Number of observations	101,833	99,936	98,925	98,925	98,925
Industry × year and state fixed effects					
ln(CEO total)	0.052**	0.048**	0.046***	0.043***	0.040***
	2.01	2.07	3.08	2.97	2.72
Adjusted R^2	0.525	0.622	0.622	0.625	0.625
Number of observations	101,632	99,762	98,751	98,751	98,751
State × year and firm fixed effects					
ln(CEO total)	0.017*	0.015**	0.012**	0.015**	0.015**
	1.89	2.03	2.04	2.27	2.35
Adjusted R^2	0.407	0.557	0.554	0.554	0.554
Number of observations	101,833	99,936	98,925	98,925	98,925

TABLE 12

Change in CEO compensation and change in employee wages

This table presents results for regressions with the adjusted annual change in the median annual wage of full-time employees, defined by the formula $Change_t = \frac{Wage_t - Wage_{t-1}}{0.5(Wage_t + Wage_{t-1})}$, as the dependent variable. All independent variables are lagged by one year. See Table 2 for a detailed overview of variable definitions. The variable *CEO total change* is the annual change in CEO total compensation. We exclude observations where the absolute yearly changes of the numbers of employees at the establishment level are above the 95% percentile. We use the White (1980) robust standard errors clustered at the firm level. The t-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Dependent variable:	Wage change				
	(1)	(2)	(3)	(4)	(5)
CEO total change	0.005	0.005	0.005*	0.005*	0.005*
	1.55	1.57	1.69	1.72	1.71
ROA			-0.009	-0.016	-0.012
			-0.28	-0.59	-0.38
Market to book ratio			-0.002*	-0.001	-0.001
			-1.74	-1.45	-1.19
ln(Size)			0	-0.002	-0.002
			-0.22	-0.72	-0.60
Leverage			0.029**	0.033***	0.034***
			2.47	2.82	2.86
Union				0.017**	0.017*
				2.07	1.90
ln(# Firm employees)				0.000	0.000
				0.09	0.00
Employee risk				0.011	0.011
				0.44	0.40
CEO ownership					-0.001
					-0.09
CEO tenure					0.000
					0.32
ln(# Establishment Employees)		0.002***	0.002***	0.002***	0.002***
		3.34	3.39	3.45	3.42
Female %		0.020*	0.022*	0.021*	0.021*
		1.71	1.84	1.67	1.66
low qualified %		0.011**	0.009*	0.009*	0.009*
		2.09	1.87	1.85	1.86
Qualified %		-0.010***	-0.010***	-0.011***	-0.011***
		-3.53	-3.97	-4.32	-4.30
Highly qualified %		-0.021***	-0.020***	-0.021***	-0.021***
		-5.01	-4.43	-4.89	-4.85
German %		-0.018*	-0.018*	-0.018*	-0.018*
		-1.78	-1.73	-1.72	-1.71
Manager %		-0.019***	-0.018***	-0.017***	-0.017***
		-3.67	-3.33	-3.30	-3.26
White collar %		-0.005***	-0.007***	-0.006***	-0.006***
		-2.85	-4.67	-3.13	-3.51
Employee age		-0.000*	-0.000*	-0.000*	-0.000*
		-1.82	-1.92	-1.89	-1.86
Close to head		-0.003***	-0.004***	-0.004***	-0.004***
		-3.25	-4.45	-4.34	-4.25
Industry, state, and year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.002	0.006	0.007	0.007	0.007
Number of observations	70,751	70,751	69,884	69,884	69,884

TABLE 13

Timing and alternative measures of CEO compensation

This table presents results for Tobit regressions with the log median annual wage of full-time employees as the dependent variable. Panel A displays results for Tobit regressions with different time lags for independent variables: (1) no lag, (2) all independent variables are lagged by 1 year (baseline specification), (3) all independent variables are lagged by 2 years, (4) all independent variables are lagged by 3 years, (5) only *ln(CEO total)* is lagged by 1 year, (6) only *ln(CEO total)* is lagged by 2 years. Panel B displays results for Tobit regressions when alternative measures of executive compensation are used as independent variables. All independent variables are lagged by one year if not noted otherwise. The firm variables and establishment variables are the same as in specification (5) of Table 3. See Table 2 for a detailed overview of variable definitions. We use the White (1980) robust standard errors clustered at firm level. The *t*-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Panel A: Different time lags

Dependent variable:	ln(Wage)					
	(1)	(2)	(3)	(4)	(5)	(6)
ln(CEO total)	0.039***					
	2.82					
ln(CEO total) (t-1 for all)		0.056***				
		4.12				
ln(CEO total) (t-2 for all)			0.057***			
			4.62			
ln(CEO total) (t-3 for all)				0.055***		
				4.17		
ln(CEO total) (t-1)					0.044***	
					3.41	
ln(CEO total) (t-2)						0.047***
						4.4
Firm variables	Yes	Yes	Yes	Yes	Yes	Yes
Establishment variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry, state, and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.625	0.638	0.636	0.629	0.618	0.627
Number of observations	125,813	104,555	87,814	69,663	96,160	80,512

Panel B: Alternative measurements of top executives' compensation

Dependent variable:	ln(Wage)			
	(1)	(2)	(3)	(4)
ln(CEO cash)	0.065***			
	3.83			
ln(CEO fixed)		0.155***		
		5.20		
CEO premium			0.059***	
			5.94	
CEO pay ratio				0.067***
				4.50
Firm variables	Yes	Yes	Yes	Yes
Establishment variables	Yes	Yes	Yes	Yes
Industry, state, and year FE	Yes	Yes	Yes	Yes
Pseudo R^2	0.639	0.643	0.643	0.641
Number of observations	104,555	104,388	103,661	104,532

TABLE A1

Robustness check: Regression with other quartiles of employees' wages

Specification (1) to (3) presents results for Tobit regressions with the log Q1 annual wage of full-time employees as the dependent variables. Specification (4) to (6) presents results for Tobit regressions with the log Q3 annual wage of full-time employees as the dependent variables. In specification (3) and (6), we consider the observations after 2005 only. The calculations are based on the data set that deletes observations with less than 8 establishment employees. All independent variables are lagged by one year. See Table 2 for a detailed overview of variable definitions. We use the White (1980) robust standard errors clustered at the firm level. The t-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Dependent variable:	ln(Q1 Wage)			ln(Q3 Wage)		
	(1)	(2)	(3)	(4)	(5)	(6)
ln(CEO total)	0.048***	0.045***	0.045***	0.056***	0.052***	0.052***
	3.64	3.91	3.55	3.78	4.09	3.54
ROA	-0.139	-0.187*	-0.142*	-0.189*	-0.242**	-0.133
	-1.42	-1.83	-1.69	-1.77	-2.16	-1.54
Market to book ratio	-0.013	-0.018	-0.024**	-0.021*	-0.027**	-0.031***
	-1.31	-1.64	-2.57	-1.94	-2.38	-3.03
ln(Size)	0.011	0.017	0.001	-0.002	0.006	-0.005
	0.50	0.83	0.06	-0.09	0.22	-0.21
Leverage	0.003	0.012	0.009	-0.122*	-0.109*	-0.094
	0.04	0.19	0.13	-1.89	-1.76	-1.37
Union	0.062	0.044	0.03	0.053	0.033	0.049
	1.13	0.85	0.62	0.87	0.60	0.88
ln(# Firm employees)	-0.025	-0.026	-0.011	-0.02	-0.021	-0.015
	-1.33	-1.35	-0.50	-0.91	-1.01	-0.60
Employee risk	0.137*	0.130*	0.112	0.234**	0.227**	0.179*
	1.82	1.76	1.37	2.44	2.48	1.75
CEO ownership		0.100**	0.123***		0.113**	0.122***
		2.10	2.95		2.39	3.23
CEO tenure		0.001	0.001		0.001	0.001
		0.66	0.96		0.83	0.92
ln(# Estab. Employees)	0.009*	0.010*	0.012*	0.017**	0.018***	0.022***
	1.74	1.82	1.94	2.52	2.61	3.15
Female %	-0.200**	-0.201**	-0.216**	-0.170**	-0.171**	-0.194*
	-2.38	-2.37	-2.15	-2.10	-2.05	-1.86
low qualified %	-0.176***	-0.166***	-0.192***	-0.191***	-0.179***	-0.205***
	-4.08	-3.97	-4.13	-3.42	-3.38	-3.43
Qualified %	0.234***	0.232***	0.235***	0.160***	0.158***	0.167***
	9.71	9.52	8.12	5.95	5.80	5.36
Highly qualified %	0.725***	0.720***	0.725***	0.747***	0.741***	0.755***
	16.32	16.42	15.00	10.73	10.92	10.67
German %	0.206***	0.199***	0.159***	0.171***	0.166***	0.165***
	3.95	3.78	2.82	2.92	2.78	2.63
Manager %	0.118***	0.122***	0.136***	0.278***	0.284***	0.280***
	2.81	3.02	3.28	4.19	4.45	3.58
White collar %	0.141***	0.153***	0.169***	0.243***	0.258***	0.274***
	5.18	5.21	5.36	8.31	7.94	7.20
Employee age	0.012***	0.013***	0.014***	0.007***	0.008***	0.008***
	12.50	13.68	14.18	5.71	6.21	7.66
Close to head	0.028**	0.029**	0.026**	0.019	0.021	0.015
	2.03	2.13	1.97	1.30	1.40	1.06
Industry, state, year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	1.517	1.524	1.32	1.189	1.195	1.082
Number of observations	50,673	50,673	31,202	50,673	50,673	31,202

TABLE A2

CEO expected and abnormal total compensation (for ROA instead of TSR)

This table presents results for Tobit regressions with the log median annual wage of full-time employees as the dependent variable. In specifications (1) - (3), the independent variable is logarithmic CEO expected total compensation, and in specifications (4) - (6), the independent variable is logarithmic CEO abnormal total compensation. Logarithmic CEO abnormal total compensation is the difference between CEO actual logarithmic compensation and expected logarithmic total compensation. We measure CEO expected total compensation using the method adopted by Gillan et al. (2009). Expected logarithmic total compensation is calculated by regressing logarithmic CEO total compensation on return on assets (ROA), logarithmic firms' total assets, the ratio of assets to firm value (book-to-market ratio), CEO tenure, the two-digit SIC of the firm, and the year of the observation. All independent variables are lagged by one year. The establishment variables are the same as in specification (5) of Table 3. See Table 2 for a detailed overview of variable definitions. We use the White (1980) robust standard errors clustered at the firm level. The t-statistics are reported below the estimates. ***, ** and * indicate that the value is significantly different from zero at the 1%, 5% and 10% levels.

Dependent variable:	ln(Wage)					
	(1)	(2)	(3)	(4)	(5)	(6)
CEO expected total	0.080**	0.076*	0.065			
	2.28	1.94	1.16			
CEO abnormal total				0.034***	0.036***	0.044***
				2.94	3.31	5.34
ROA	0.172	0.098	0.067	-0.021	-0.049	-0.007
	1.13	0.67	0.46	-0.15	-0.36	-0.05
Market to book ratio	-0.023**	-0.021**	-0.024**	-0.020**	-0.018*	-0.022**
	-2.39	-2.23	-2.21	-2.02	-1.95	-2.10
ln(Size)	-0.011	-0.045	-0.038	0.015	-0.026	-0.015
	-0.52	-1.49	-1.13	0.89	-0.91	-0.55
Leverage		-0.039	-0.022		0.033	0.065
		-0.46	-0.25		0.41	0.83
Union		0.161*	0.149		0.167*	0.154*
		1.75	1.64		1.88	1.74
ln(# Firm employees)		0.023	0.021		0.028	0.018
		0.85	0.74		1.08	0.68
Employee risk		0.206	0.194		0.305	0.254
		0.91	0.87		1.51	1.33
CEO ownership			0.048			0.017
			0.74			0.26
CEO tenure			0.001			0.003**
			0.38			2.37
ln(# Establishment Employees)	0.041***	0.041***	0.042***	0.041***	0.042***	0.042***
	3.53	3.55	3.59	3.54	3.60	3.63
Female %	-0.296***	-0.313***	-0.313***	-0.296***	-0.313***	-0.317***
	-3.74	-3.88	-3.83	-3.69	-3.83	-3.85
low qualified %	-0.029	-0.029	-0.028	-0.038	-0.036	-0.033
	-0.53	-0.54	-0.51	-0.69	-0.66	-0.61
Qualified %	0.218***	0.210***	0.209***	0.217***	0.208***	0.207***
	5.08	5.23	5.28	5.15	5.30	5.33
Highly qualified %	0.669***	0.659***	0.659***	0.672***	0.661***	0.661***
	12.19	13.11	13.21	12.34	13.20	13.27
German %	0.258***	0.262***	0.261***	0.259***	0.261***	0.263***
	5.38	5.61	5.38	5.44	5.58	5.51
Manager %	0.123***	0.132***	0.132***	0.119***	0.131***	0.131***
	3.39	3.73	3.78	3.22	3.71	3.76
White collar %	0.179***	0.195***	0.198***	0.178***	0.195***	0.200***
	6.98	8.06	7.93	6.94	8.09	8.10
Employee age	0.005**	0.005***	0.005***	0.005**	0.005***	0.005***
	2.49	2.70	2.72	2.55	2.76	2.74
Close to head	0.046***	0.048***	0.048***	0.047***	0.048***	0.049***
	2.96	3.03	3.14	3.06	3.11	3.24
Industry, state, and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.633	0.636	0.637	0.632	0.636	0.637
Number of observations	104,561	104,561	104,561	104,555	104,555	104,555

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