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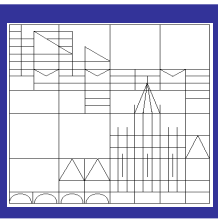

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Abstract

In this paper we analyze executive compensation in Germany for the period 2005-2009. We use a self-collected dataset on compensation arrangements in German corporations to estimate the impact of firm performance and firm risk on executive pay. To be in line with earlier studies in this literature, we first measure firm performance and firm risk based on stock market returns. Our findings support the prediction from agency theory that incentive pay decreases with firm risk. We find, however, that stock market returns have no explanatory power in the presence of accounting based performance measures. Based on accounting data we also find a positive impact of firm performance on executive pay and a negative relationship between firm risk and incentive pay for our sample period. We conclude that shareholders use accounting measures rather than stock market data to evaluate and pay for manager performance. We also find that with accounting data we can explain short-term bonus payments but not long-term oriented compensation in German corporations.

JEL Classification: G30, J33, M12

Keywords: Pay for Performance, Executive Compensation, Incentives

1 Introduction

The financial crisis has brought much attention to executive compensation. In many compensation contracts managers face incentives that link part of their pay to performance. With high compensation even in years of economic downturn these remuneration arrangements came under scrutiny. In particular, it was questioned whether managers face any downside risk in their compensation schemes with bonus payments.

In this work we study the relationship between firm performance, firm risk and executive compensation in Germany. Based on a self-collected dataset on compensation arrangements in German corporations for the period 2005-2009, we analyze the impact of firm risk on the sensitivity of executive pay to firm performance. We first follow the previous literature in that we measure firm performance and risk based on stock market data. Specifically we use stock returns as a measure for firm performance and the variance of stock returns as a measure for firm risk.

Based on stock market data we find empirical evidence for pay-performance sensitivity decreasing in the riskiness of the firm. The pay-performance sensitivities that are implied by our estimation results are of similar magnitude as the ones that previous studies estimated for other countries. However, the estimation results with stock market data turn out to be not very robust. We find that stock returns lose their explanatory power when we control for firm performance measured with accounting data.

Following this result, we repeat our analysis and measure both firm performance and risk with accounting data. We argue that shareholders ultimately care about stock returns but may still base executive pay on accounting numbers and not solely on stock market performance. The reason could be that executives do not accept too much dependence of their remuneration on stock market performance which they cannot influence as much as accounting figures. Our estimation results are supportive to this hypothesis. We find that changes in firm earnings have an economically significant effect on executive compensation and that the pay-performance sensitivity decreases with firm risk.

Hence our first contribution is to present a new dataset on executive compensation in Germany and to estimate pay-performance sensitivities of managers in German corporations. For the years 2005-2009, we confirm the negative relationship between incentive pay and firm risk that is predicted by theoretical literature on executive compensation and was previously documented in empirical literature based on U.S. data. Unlike previous studies we also estimate pay-performance sensitivities

based on accounting data. Hence our second contribution is to estimate the relationship between firm performance, risk and executive pay by matching compensation data with accounting data. Indeed, we find that the negative relationship between firm risk and incentive pay also holds for the period 2005-2009. Finally, the structure of our data allows us to identify which component of variable compensation drives pay-performance sensitivity. We find that firm performance measured by both stock market data and accounting data explains cash bonus payments quite well. However, only stock market data can explain long-term oriented compensation in German corporations.

The remainder of this work is structured as follows. In the next section we briefly review the findings of previous literature related to our study. We describe our self-collected dataset and present some summary statistics in section 3. In section 4 we introduce our estimation methodology and present our results. Section 5 presents some robustness checks. In section 6 we show some regression results testing for reverse causality. We conclude and give a brief outlook on future work in Section 7.

2 Literature Review

In the literature the relation between executive compensation and firm performance is typically modeled in an agency theory framework. The model setup is such that shareholders design compensation schemes to align their interests with those of agents employed to run the firm. One issue in such a framework is how manager compensation interacts with firm risk. There is a two-sided relationship between firm risk and executive pay. Firm risk may determine if and how the firm's shareholders link management compensation to firm performance. However, the structure of compensation may have an impact on the executive's risk-taking decisions as well.

Because of the two-sided relationship between firm risk and manager pay, the theoretical literature on firm performance, risk and executive compensation can be divided into two different strands. First, there are theoretical predictions for the impact of firm risk on executive pay. Second, there is theoretical literature on the impact of the structure of executive compensation on firm risk. Similarly, because of this two-sided relationship, empirical studies on this subject have to account for the issue of reverse causality.

The theoretical literature about the impact of firm characteristics on the structure of executive compensation contracts centers around the question how the riskiness of the firm determines the sensitivity of manager pay to firm performance. Holmstrom & Milgrom (1987, 1991) argue that

this relationship between firm risk and incentive pay should be negative. They show that riskier firms or firms in a more volatile environment should link the compensation of risk-averse managers less to firm performance. The intuition behind is that it is costly for (diversified) shareholders to compensate risk-averse managers for any risk transfer.

The empirical evidence on the impact of firm risk on incentive pay is mixed. There is some support for Holmstrom & Milgrom's (1987, 1991) hypothesis that incentive pay is lower at firms with higher risk. One study with supportive evidence is Aggarwal & Samwick (1999). They investigate the impact of firm risk measured by stock return variance on the sensitivity of executive compensation to firm performance (pay-performance sensitivity). They refine the methodology of Jensen & Murphy (1990) who estimate pay-performance sensitivities as well but do not explicitly account for firm risk. In their sample of executives of U.S. corporations during 1993-1996, Aggarwal & Samwick find strong support that the elasticity of compensation is positive in stock returns, but decreases, for a given return, in firm risk.

Aggarwal & Samwick (1999) find the same result when they measure firm performance not with stock market returns but with absolute changes in market value. Cichello (2005) refines this approach. He argues that one has to explicitly account for firm size when using the variance in market value changes as a measure for firm risk. For CEOs of U.S. corporations during 1993-2000, he finds that the negative relationship between firm risk and pay-performance sensitivity still holds but that the latter is smaller for CEOs at larger firms[1].

On the other hand, Core & Guay (1999) find a positive impact of firm risk on incentive pay measured by the extent to which executives are given equity grants. They argue that monitoring costs rise with uncertainty of the firm environment (and thus with firm risk) and therefore executives at riskier firms are given more incentive pay. A similar argument is made by Prendergast (2002). He surveys the empirical literature on the relationship between risk and incentives and concludes that empirical evidence in support of Holmstrom & Milgrom's (1987, 1991) prediction of a negative relationship between firm risk and incentive pay is limited at best. His explanation for a positive relationship is that shareholders of firms operating in environments with a lot of uncertainty (risky firms) give managers more discretion over the choice of activities. The idea behind is that because

[1]We note that Aggarwal & Samwick's (1999) results were further challenged in a working paper by Core & Guay (2001). They also argue that Aggarwal & Samwick did not explicitly account for firm size. When they do so they find a *positive* relationship between incentive pay and firm risk. There was some debate about this issue in unpublished work by Aggarwal & Samwick (2002) and Core & Guay (2002). Cichello (2005) argues, however, that Core & Guay's (2001, 2002) finding of a *positive* relationship between firm risk and incentive pay was simply driven by multicollinearity.

of this uncertainty shareholders are less confident to know how the management should operate the daily business of the firm and therefore delegate responsibility. This delegation of responsibility then is accompanied by output-based incentive pay and hence a positive relationship between firm risk and incentive pay.

The second branch of theoretical literature on firm performance, risk and manager compensation analyzes the reverse causality, namely the impact of compensation on the risk-taking behavior of managers and thus indirectly on the firm's overall risk exposure. Many contributions to this literature center around the question whether executive stock options or option-like compensation components induce more managerial risk taking. For example, Hodder & Jackwerth (2007) analyze the impact of option-like compensation contracts on the behavior of a hedge fund manager. They conclude that if the fund manager has a contract including a high-water mark she will increase the risk of the fund dramatically when the value of the fund is just below its high-water mark[2]. However, Ross (2004) shows that granting options does not induce all risk averse managers to take more risk. He finds that there is no compensation scheme that makes all utility maximizers behave less risk averse. Hence, the effect of the compensation structure on risk taking is not easily predictable and strongly depends on the manager's preferences.

There is an extensive empirical literature that tests the impact of manager compensation on firm risk. Cohen, Hall & Viceira (2000) test whether firm risk is driven by compensation characteristics. They hypothesize that stock return volatility is driven by the manager's elasticity of wealth to stock returns. Their empirical approach delivers evidence that firm risk is indeed driven by manager compensation. Instead of evaluating the behavior of the manager indirectly through stock characteristics, Coles, Daniel & Naveen (2006) use more direct proxies for the manager's actions. For example, they analyze the impact of the manager's sensitivity of wealth to changes in firm volatility (vega) on R&D expenditures and on investments in property, plant and equipment to approximate risky or rather conservative investment decisions, respectively. They find that there is a strong relation between incentives and the riskiness of the firm policy and that more option holdings of managers lead to riskier firm strategies. Contrary to this, Lewellen (2006) finds that option holdings may discourage risk taking. Instead of using compensation in monetary units she measures CEO welfare as the certainty equivalent of wealth. She finds that manager compensation has an economically meaningful effect on financing decisions and that executive options tend to

[2]Since the manager will gain heavily, if the fund value passes the high-water mark, but does not incur a loss when it stays below, excessive risk-taking is the optimal strategy for the manager. The intuition behind this result is the same as for a simple stock option, where increasing the volatility of the underlying also increases the option value.

discourage risk taking and leverage.

In a recent study Fahlenbrach & Stulz (2011) investigate whether managerial incentives influenced performance of banks during the financial crisis. They test whether banks with better aligned incentives, approximated by higher managerial ownership in shares or higher wealth sensitivity to stock returns, outperformed their peers in terms of stock returns during the crisis year 2008. Using a sample of U.S. banks they find no evidence that better incentive alignment led to better performance in the financial crisis.

Most empirical studies on executive compensation focus on managers in the United States. One exemption is Kaplan (1994) who compares incentives of Japanese and U.S. executives. He estimates pay-performance sensitivities based on stock returns and accounting data, but does not control for firm risk, like most earlier studies on executive compensation. Another study based on non-U.S. data is Becker (2006) who exploits tax filings of Swedish executives to explore the relation between incentives and risk aversion. Based on the assumption that wealthier individuals are less risk averse he finds that less risk averse managers face stronger incentives in their compensation arrangements. Finally, a recent study is Firth, Leung & Rui (2010) who investigate executive pay in Chinese companies between 2000 and 2005. They find a significantly positive impact of firm performance, measured by either stock returns or return on assets, on executive pay. They also find some evidence for a negative impact of firm risk, measured by the standard deviation of the performance measures, on compensation. They do not, however, account for firm risk when calculating pay-performance sensitivities.

3 Data Description

Most if not all empirical studies on executive compensation use Standard&Poor's ExecuComp database which is restricted to U.S. data. In this study we present empirical evidence on compensation in German firms. We assembled a database that contains information on executive compensation of corporations that are currently part of the Prime Standard market segment of the Frankfurt Stock Exchange[3]. As of February 2011, the Prime Standard segment contains 361 corporations. Our sample includes the 108 largest firms by market capitalization. To make our findings comparable to those from studies based on ExecuComp data, we have hand-picked the respective data

[3]To be part of the Prime Standard segment, firms have to fulfill certain obligations concerning publication of quarterly reports, ad-hoc disclosure rules and accounting standards.

for German firms from annual reports. Our dataset covers the years 2005 to 2009 and contains information on compensation of the management board members including the CEO.

Compensation Data

German law requires corporations listed in Germany to provide information on the compensation structure of their board members for fiscal years starting after August 15, 2005[4]. Some companies released compensation data already for the fiscal year 2005. The dataset is almost complete for the years 2006 to 2009. A small number of companies opted not to publish remuneration data[5].

The collected sample contains a wide cross section of firms across industries and firm size and provides information for all executives on the respective management boards. We eliminate an observation from our initial sample whenever a manager is not on the board for the whole fiscal year. For such observations our compensation data may contain payments that are associated with the job change (e.g. severance payments). Often these payments cannot be identified in the data and thus we remove such observations.

Moreover, some observations drop out when we match our compensation data with measures of firm performance. For our basic specification we calculate firm performance volatility measures based on a stock price history of three years. Hence we need stock price data starting in 2002 and we cannot use compensation data from firms that went public after that year and thus have an insufficiently long stock price history. Finally, to make sure our regression results are not driven by outliers we exclude the observations in the top and bottom 2 percent of the stock return distribution. We are left with a final sample of 1,652 data points for a total of 607 individual executives in 108 corporations. We have 79 executives with a complete time series of five years, 136 with four subsequent years, 103 with three years, 115 with two years and the remaining 174 with only one year on board[6].

Table 1 in the appendix summarizes our data on the compensation structure of CEOs and non-CEOs for the whole sample period. Total compensation is the sum of all compensation components

[4]This is governed in paragraph 4.2.4 of the German Corporate Governance Code.

[5]Before 2006 firms had to explicitly state why they did not follow this recommendation. In June 2006, the recommendation was substituted by the ruling that firms are required to publish this information unless it is decided otherwise at the general meeting by three-quarters majority. This explains why for most firms individualized compensation data is available since the fiscal year 2005 but not before.

[6]For a second specification with firm performance measured by accounting data some additional firms drop out. The summary tables in this section are based on the final sample we use for the first specification that requires stock market data.

an executive receives in a given year. We have information which compensation components are short- and long-term. In particular we distinguish three different types of remuneration. First we identify payments that are not performance related, such as the base salary, the value of company cars and insurance payments. Our second compensation type, short-term compensation, are annual cash bonuses that are paid out at the end of the fiscal year. Third, long-term compensation is the value of shares and stock options granted as well as compensation based on long-term incentive plans.

For the valuation of long-term components we rely on the numbers given in the annual reports. Law requires firms to publish the value of long-term incentives at the time they are granted. Long-term incentives can be stocks, options or grants from firm-specific long-term incentive programs. The variety of such programs is quite large and may include non-standard payout structures with grants in cash, deferred cash, equity, restricted or time vesting stock, stock appreciation rights or similar types of awards. Since we do not have detailed information about these incentive programs, we cannot calculate the value of such grants and have to rely on the numbers given in the annual reports.

We only have information on shares and options granted in a single year, but not on the executives' total holdings at the end of the fiscal year. This means that we cannot investigate the sensitivity of the managers' total firm-related wealth to firm performance. However, the available information enables us to analyze the sensitivity of annual compensation to changes in firm performance. Therefore we do not include in our compensation measures any payments that are related to previous years. For example, compensation from long-term incentive plans is often paid out with a time lag of some years. Such remuneration is included in our compensation measure when it is granted, not when lagged payouts are actually made. This way we make sure that we only capture compensation that is directly related to performance during the respective fiscal year. Our data does not include any payments to benefit plans. Information on such payments is not available in a standardized form. We share this deficiency with empirical studies based on ExecuComp data.

Table 1 shows that during our sample period total compensation for CEOs was in the range of 21,000 to 13 million Euro with a mean (median) value of 2.2 (1.5) million Euro[7]. Board members other than CEOs received 1.5 million Euro on average. The average fixed part of CEO compensation was 687,000 Euro or 43 percent of total compensation, which is slightly more than the 41

[7]The wide range of CEO compensation reflects the diversity of firm size in our sample. The minimum of 21,000 Euro for a CEO of a young firm from the technology sector is clearly exceptional.

percentage share for non-CEOs. With 42 percent for both CEOs and non-CEOs, the yearly cash bonus accounted for the biggest share of total compensation. Long-term compensation appears to play a much smaller role in executive remuneration schemes. The average share of such components is 15 percent for CEOs and 18 percent for non-CEOs. However, there are many executives who receive no long-term compensation at all[8].

Tables 2 to 6 present summary statistics for each year separately. Whereas average CEO compensation increased from 2005 to 2007, there was a sharp decline of 14 percent in 2008 and another decline of 6 percent in 2009. With 19 percent in 2008 and 9 percent in 2009, this decline in total compensation was even more pronounced for non-CEOs.

There was some change in compensation structure as well. The average cash bonus share of CEOs increased from 42 percent in 2005 to 47 percent in 2007. In the two subsequent years this share declined and was only 36 percent in 2009. A similar development was observed for non-CEOs. Finally, the average share of long-term compensation changed little over time.

From Table 4 we see that in 2007 CEOs received on average almost half of their total compensation as a cash bonus. The maximum share of this short-term incentive component is more than 80 percent for some executives throughout the years. This also implies that the minimum share of fixed compensation for some executives was as low as 6-9 percent in 2005-2007 and still no more than 10-14 percent in 2008 and 2009. The importance of cash bonus payments in executive compensation is also visible in the fact that only a small fraction of executives receives no cash bonus. This fraction was between 3 and 7 percent during 2005-2009. In 2008 and 2009 a drop in performance-related pay should not be surprising given that many firms performed poorly during the financial crisis. However, it is noteworthy that only 18 out of 347 and 27 out of 388 executives had to forgo bonus payments during the crisis years 2008 and 2009, respectively. Moreover, there were firms with negative stock market returns in previous years, too. Despite the reduction in shareholder value in such firms almost all executives received a cash bonus in all years 2005-2007. This indicates that short-term bonus payments are not driven by the change in shareholder value alone.

Tables 7 to 9 describe executive compensation in firms of different size measured by total assets. On average, CEOs and other executive board members at small firms[9] earn only 23-24 percent of

[8]Excluding these observations increases the long-term compensation shares to 27 percent and 28 percent, respectively.

[9]We call a firm "small" whenever its total assets in a given fiscal year are below 1,000,000,000 Euro. Firms around the threshold of 1,000,000,000 Euro may thus belong to different size categories over time.

what their peers at large firms[10] earn. CEOs of small firms receive on average 55 percent of their compensation as fixed pay, whereas this number is 41 percent and only 33 percent for CEOs of mid-size firms[11] and large firms, respectively. Cash bonuses account for 35 (44) [47] percent of total CEO compensation at small (mid-size) [large] firms. The average share of long-term oriented compensation components is only 9 percent for CEOs of small firms but 20 percent for CEOs of large firms. In sum, larger firms tend to pay more in total, a higher share as variable compensation and more as long-term oriented compensation compared to smaller firms.

Finally, Table 10 shows how executive compensation at financial and non-financial firms differs within our sample. We define financial firms as firms in banking, insurance and real estate. With an average total of 2.1 million Euro executives of financial firms earn more than their peers at non-financial firms (1.5 million Euro). Relative to their peers at non-financial firms, executives at financial firms receive a lower share of their compensation as a cash bonus (38 versus 42 percent) and a higher share as stocks, options and long-term incentive pay (24 versus 16 percent). Hence contrary to what one may expect from the political debate about bonus payments in the financial industry, our data does not indicate a more pronounced focus on short-term oriented compensation in financial firms compared to other firms. This finding in our data is also contrary to Houston & James (1995) who find that banking CEOs in the U.S. during 1982-1988 received a smaller percentage of their total compensation in the form of options and stock compared to CEOs in other industries. Similarly, Adams & Mehran (2003) find for the period 1986-1996 less reliance on stock options in U.S. bank CEO compensation contracts compared to CEO compensation in other industries.

The summary statistics suggest that there are no substantial differences in the compensation structure of CEOs and non-CEOs. This holds throughout the years and across firms of different size and industry. However, there are differences in compensation levels between CEOs and non-CEOs. Therefore we will include a CEO dummy in our regressions. Also there are differences in compensation level and structure over time and for firms of different size. Thus in our regressions we have to account for time effects and firm size[12].

[10] Firms with total assets above 10,000,000,000 Euro.

[11] Firms with total assets between 1,000,000,000 Euro and 10,000,000,000 Euro.

[12] However, since we estimate a model with executive fixed effects and no executive in our sample moves from one firm to another firm, we expect that any variable measuring firm size will be absorbed by the fixed effects whenever firm size does not vary much over the sample period of five years.

Firm Performance Data

For estimating pay-performance sensitivities we match our compensation dataset with measures for performance and risk of the companies. We use the stock return and earnings before interest and taxes (EBIT) in the respective year as measures for firm performance. Since we hypothesize that pay-performance sensitivity varies with firm risk, we also calculate the volatilities of these performance measures.

We extract stock prices from Thomson Reuters' Datastream database. These prices are adjusted for stock splits and dividend payments. We further adjust stock prices for inflation and calculate annual real stock returns based on 2005 price levels. Column 1 of Table 11 shows percentiles of the return distribution for our sample period 2005-2009[13]. Annual returns in the sample period range from a loss of 74.5 percent to a gain of 144.9 percent. With 8.8 percent the mean is about the same size as the median with 8.4 percent.

In order to compute the variances of stock returns we use monthly data. This firm risk measure is based on the three-year period preceding the fiscal year for which the manager was paid. For example, we match executive compensation data from 2008 with firm risk measured by volatility of monthly stock returns from January 2005 to December 2007[14]. We chose to base our firm volatility measure on a three-year period because we think what matters for compensation contracts is not firm risk in the year of compensation but rather the general riskiness of the firm's operational environment or the industry it belongs to. Moreover, excluding the year when the manager is paid from the calculation of our measure for firm risk mitigates the reverse-causality problem of managerial risk taking in the same year. We calculate real monthly returns and variances of the real monthly returns and annualize our estimates. The distribution of the standard deviation of stock returns is given in column 2 of Table 11. The standard deviation of returns ranges from 7.6 percent to 57.8 percent. Mean and median standard deviations are 18.9 and 17.3 percent, respectively.

We use earnings before interest and taxes (EBIT) as an alternative firm performance measure. The data for this variable is also taken from Thomson Reuters' Datastream database. Again we standardize all values to 2005 price levels. Specifically, our performance measure is the difference between EBIT of the current year and the previous year. The distribution of this performance

[13]Table 11 shows our final sample we later use for estimating pay-performance sensitivities. The top and bottom 2 percent of the original stock return distribution are excluded to account for outliers. Moreover, this sample contains only companies with a sufficiently long stock price history to estimate the variance of returns.

[14]This applies for companies whose fiscal year is the calendar year. If the fiscal year deviates from the calendar year, we adjust the period for the variance calculation.

measure is characterized in column 3 of Table 11[15]. The annual change in EBIT reaches from a decrease of 3.5 billion Euro to an increase of 1.4 billion Euro. The difference between mean and median annual change in EBIT is substantial. Whereas the median annual change in EBIT is 3.6 million Euro during 2005-2009, the mean annual EBIT change is -59.8 million Euro which reflects the skewness to the left of the EBIT distribution.

Computing a risk measure based on EBIT is not as straight forward as with stock returns. One issue is that EBIT is an annual variable which makes it difficult to get a sufficient amount of data to estimate the variance. Using a very long history of EBIT data is also problematic. Since we want to measure the firm risk at the time the manager is employed in the firm we should only use more recent data. We try to balance this trade-off by using ten years of EBIT data to compute our risk measure. Column 4 of Table 11 shows the percentiles of the distribution of this risk measure.

Comparing columns 1 and 3 of Table 11 reveals that over the sample period 2005-2009 more than 40 percent (but less than 50 percent) of firm-year observations exhibit negative firm performance measured by either stock returns or annual changes in EBIT. However, when we compare the two firm performance measures year by year we find some distributional differences. In 2005 and 2006 only about 10 percent of our sample firms exhibited negative stock market performance. The fraction of firms with negative stock returns increased to 40 percent in 2007 and soared to 90 percent in the crisis year 2008. In 2009 it was back at about 20 percent. Based on accounting data, about 20 percent of firms generated negative earning changes in 2005 and 2006. This number increased to 30 percent in 2007, 50 percent in 2008 and 60 percent in 2009. Thus when we measure firm performance with accounting data we do not observe a deterioration in firm performance as severe as the one in the crisis year 2008 observed in the stock market.

4 Estimation Methodology and Results

We estimate the relationship between firm performance and executive pay. Agency theory predicts that this relationship is also influenced by firm risk. In the classical agency problem a principal employs an agent to manage a project with an uncertain payoff. The agent can influence the project payoff by exerting effort. Since the principal cannot observe the effort choice, he designs an incen-

[15] Again Table 11 shows our final sample we later use for estimating pay-performance sensitivities. Here the top and bottom 2 percent of the original distribution of annual changes in EBIT are excluded to make sure that our results are not driven by the tails of this distribution. Moreover, the smaller sample size is due to (1) the longer EBIT history we require for our risk measure based on EBIT data, and (2) the exclusion of financial firms to account for the difficulties in comparing accounting figures between the financial industry and other industries.

tive scheme to induce the desired effort. This can be achieved by linking the agent's compensation to the success of the project. In the basic principal-agent model developed by Holmstrom & Milgrom (1987, 1991) the principal is risk neutral while the agent is not. Therefore the agent demands compensation for any risk she has to bear. This leads to the key prediction that the sensitivity of compensation to the project's performance is decreasing in the volatility of the project. In the context of executive compensation this implies that a manager's remuneration is less sensitive to firm performance in riskier firms.

We first test this theoretical prediction based on stock market data. We test whether compensation is positively related to shareholder returns, and whether compensation is less sensitive to returns in companies with higher return volatility. Unlike Aggarwal & Samwick (1999) and following Core & Guay (2002) and Cichello (2005) we explicitly account for the impact of firm size on this relationship. We then repeat our analysis with accounting data where we replace stock returns with firm earnings as an alternative measure for firm performance.

Estimating Pay-Performance Sensitivities with Stock Market Data

Our analysis is based on Aggarwal & Samwick's (1999) methodology to estimate the sensitivity of manager compensation with respect to firm performance. In particular, we estimate pay-performance sensitivities with a panel regression model of executive pay on firm performance and firm risk. In this specification, executive pay is the total compensation of executive i at firm j in year t and denoted by w_{ijt}. Our firm performance measure is the annual percentage return to shareholders in year t, denoted by π_{jt}. We use the volatility of shareholder returns as a measure for firm risk and follow Aggarwal & Samwick in that we standardize this volatility measure by using the cumulative distribution function (CDF) of the variance of returns, $F(\sigma^2_{jt})$. The CDF is calculated as the rank of σ^2_{jt} divided by the number of observations in our sample. We specify the following linear fixed effects model:

$$w_{ijt} = \gamma_1 \pi_{jt} + \gamma_2 F(\sigma^2_{jt})\pi_{jt} + \gamma_3 F(\sigma^2_{jt}) + \lambda_i + \mu_t + \epsilon_{it}, \tag{1}$$

where λ_i is an executive fixed effect, μ_t is a year dummy, and ϵ_{it} is the error term[16]. Note that by using the CDF of return variance we ensure that our estimates of γ_2 are not affected by a possible relationship between stock return variance and the level of compensation. The estimated

[16]In this basic specification we do not explicitly control for firm size. However, executive fixed effects should capture firm size to some extent since no executive moves from one firm to another during our sample period.

values γ_1 and γ_2 can be transformed into pay-performance sensitivities at any percentile of the distribution. The pay-performance sensitivity for a manager employed by a firm with a given stock return variance is $\gamma_1 + \gamma_2 F(\sigma^2_{jt})$. Thus the pay-performance sensitivity at a firm with the median variance of stock returns is $\gamma_1 + \gamma_2 0.5$, and the pay-performance sensitivities at firms with the minimum and maximum observed variances (CDF values of zero and one) are γ_1 and $\gamma_1 + \gamma_2$, respectively.

We hypothesize that compensation levels are positively related to firm performance and pay-performance sensitivity is decreasing in firm risk. Thus we expect $\gamma_1 > 0$ and $\gamma_2 < 0$. The positive effect of higher returns on compensation should be smaller at firms with more volatile stock prices, everything else equal. We do not have a prediction for γ_3 since the impact of firm risk on the level of total compensation is not clear. For example, Lewellen (2006) shows that the impact of firm volatility on compensation depends on the structure of the manager's portfolio. Whereas in-the-money options make the manager more averse to firm risk, out-of-the-money options have the opposite effect. It thus depends on the structure of the compensation package whether the impact of firm volatility on total compensation is positive or negative. Ultimately this is an empirical question.

We first estimate equation (1) with stock market data for the period 2005-2009. The estimation results are given in column 1 of Table 12. In addition to equation (1) we include a dummy for CEOs. As expected, the effect of being CEO on total compensation is positive and highly significant. The coefficient of stock return, γ_1, is highly significant and has the expected positive sign. The interaction term of return and volatility is also significant, with a negative coefficient γ_2.

The estimation results in column 1 support our first hypothesis. Our results indicate that managers participate from positive stock performance, but this participation is lower in firms with higher volatility. Hence we find support for the prediction from the Holmstrom & Milgrom (1987, 1991) model and confirm the findings of Aggarwal & Samwick (1999) in our dataset. In the lower part of Table 12 we report the median pay-performance sensitivity calculated as $\gamma_1 + 0.5\gamma_2$. Based on the first specification we calculate a median pay-performance sensitivity of 31.59. This means that for a 1 percent increase in firm value a manager at the firm with median variance in our sample receives an additional 32,000 Euro[17]

[17]The maximum pay-performance sensitivity is 428.04 which implies that the manager at the firm with the lowest variance in our sample receives an additional 428,000 Euro. Based on the estimated coefficients we calculate a negative minimum pay-performance sensitivity. This, however, implies that we estimate for a manager employed at the firm with maximum variance (risk) in our sample a *reduction* in compensation for an increase in firm value. Obviously this

Next we account for the criticism raised by Core & Guay (2002) and Cichello (2005). They find that it is essential to explicitly control for firm size when looking at the relationship between incentive pay and firm risk because of the observed negative relationship between incentive pay and firm size. This empirical finding is already documented by Jensen & Murphy (1990) who find that executives at larger firms have lower pay-performance sensitivities. To account for this concern we add a measure for firm size to the right side of equation (1).

Columns 2 and 3 of Table 12 show the results. We add to equation (1) two alternative measures for firm size. Total assets (column 2) is significant[18]. The coefficients of stock return and the cross term remain significant but change in value. This makes pay-performance sensitivities smaller and we end up with a negative estimate even for the firm with median risk in our sample. The number of employees (column 3) turns out to be insignificant. Hence we find that our results are not driven by a firm-size effect but pay-performance sensitivities based on stock market data are severely overestimated when we do not account for firm size.

We found the proposed relationship between executive pay, firm risk and firm performance measured by stock market returns. However, the estimated pay-performance sensitivities turned out to be not very robust to changes in the specification. Moreover, our findings do not necessarily imply that shareholders indeed use stock market performance to judge and pay executive performance. They may use other measures such as accounting figures that are likely to be correlated with stock market performance and may truly drive our results. To test for this we add to the right side of equation (1) earnings before interest and taxes (EBIT) as another measure for firm performance. Specifically, we add the yearly absolute change in EBIT at firm j in year t (measured in thousands of 2005 Euros at the end of the fiscal year).

Column 4 of Table 12 shows the impact on our previous results. The change in yearly EBIT turns out to be a highly significant explanatory variable for executive compensation whereas stock market returns no longer have explanatory power[19]. Therefore in the next section we reestimate the link between firm performance and executive pay by measuring firm performance and risk based on accounting data.

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is rather a technical result and we will focus on median pay-performance sensitivities. In fact, Aggarwal & Samwick (1999) and some other empirical studies come up with negative estimates for minimum pay-performance sensitivities as well.

[18]The negative sign of the firm size coefficient is surprising. However, as we argued above, firm size should be captured already by the fixed effects. When we leave out executive fixed effects the coefficient turns positive.

[19]Note that we still control for firm size in this specification. The impact of EBIT on total pay is not simply a firm size effect.

Estimating Pay-Performance Sensitivities with Accounting Data

Ultimately we expect shareholders to be most concerned about returns from their investment in stock. Hence it is straightforward to argue that shareholders remunerate managers based on stock return performance. However, executive compensation contracts may be based on other performance measures as well. One reason for such contracts could be that managers do not accept to be paid based on stock market returns which are not as directly influenced by manager performance as accounting results. Shareholders may agree to such contracts because it is reasonable to expect firm performance measured by accounting numbers to be eventually reflected in stock market performance. Not only our final result from nthe previous section but also Kaplan (1994) is empirical evidence for this reasoning. In his comparative study on executive compensation in Japan and the United States, he finds that in the presence of firm performance measures from accounting (such as pretax income), stock returns lose much of their explanatory power for executive compensation.

Instead of stock market returns we now use earnings before interest and taxes (EBIT) as a measure for firm performance. Specifically, we redefine π_{jt} in equation (1) as the yearly absolute change in EBIT at firm j in year t (measured in thousands of 2005 Euros at the end of the fiscal year)[20]. Accordingly we measure firm risk by the CDF of EBIT volatility measured by the variation of changes in EBIT. In this specification we exclude firms in the financial industry (banking, insurance, real estate) since EBIT is not comparable between financial and non-financial firms[21].

Column 1 of Table 13 shows the regression results based on 1188 observations from the whole sample period 2005-2009[22]. The coefficients of firm performance (absolute change in EBIT) and the cross term of firm performance and firm risk have the expected signs. Hence, we find the predicted relationship between firm performance, risk and compensation when we measure firm performance and firm risk based on accounting data. In columns 2 and 3 of Table 13 we control for firm size and add to our regression total assets and the number of employees, respectively. None of these control variables is significant. Median pay-performance sensitivities are again shown in the lower part of the table. Based on accounting data, we estimate that an executive board member at the firm with median risk receives an additional 312 Euro for a 1,000,000 Euro increase in firm

[20]Theoretically the market value of a firm is the present value of future cash flows. We tried the absolute value of yearly EBIT as a firm performance measure but did not find a significant impact on compensation. Therefore we use the yearly change in EBIT instead. We find that shareholders measure and reward executive performance based on EBIT increases and not on the absolute value of EBIT itself.

[21]Our previous finding in column 4 of Table 12 does not change when we exclude financial firms.

[22]We require 10 years of observations to calculate a meaningful measure for the variation in yearly EBIT. This restriction, however, combined with the exclusion of financial firms reduces our sample size from 1652 to 1188 observations.

EBIT.

It is not straightforward to compare our pay-performance sensitivity estimate based on accounting data with those based on stock market data. But how do our pay-performance sensitivity estimates compare with previous results in the literature? In fact, pay-performance sensitivities estimated in other studies differ widely as well. Obviously estimates are very sensitive to the definition of executive pay or wealth. Jensen & Murphy (1990) estimate an average $0.30 increase in CEO pay (salary plus bonus) and a total increase of $3.25 in CEO wealth for a $1,000 increase in shareholder value in their sample of U.S. executives during 1974-1986. When they split their sample by market value, they estimate for a $1,000 increase in shareholder value an average increase of $1.85 and $8.05 in CEO wealth at firms in the top and bottom half of the sample, respectively. Kaplan (1994) finds even smaller pay-performance sensitivities. For U.S. (Japanese) CEOs in 1981-1989 he estimates a $0.015 (¥0.007) increase in salary and bonus for a $1,000 (¥1,000) increase in shareholder value[23].

Aggarwal & Samwick (1999) find higher pay-performance sensitivities. Based on a least-squares regression with executive fixed effects they estimate a change in wealth of $69.41 for CEOs and only $8.74 for non-CEOs per $1,000 increase in market value at the firm with median risk in their sample of U.S. companies during 1993-1996. The median pay-performance sensitivity of CEOs (non-CEOs) is only slightly lower at $58.61 ($5.78) per $1,000 when option holdings are excluded. Estimates drop much more when only flow compensation is considered and not the ownership of stock and stock options. In particular, Aggarwal & Samwick find that pay-performance sensitivity resulting only from flow compensation is about 5 percent of the overall estimates. Cichello (2005) estimates for CEOs of U.S. corporations during 1993-2000 pay-performance sensitivities at median risk firms in the range from a $6.36 (large firms) to a $26.31 (small firms) change in CEO wealth for a $1,000 increase in firm value[24]. When he excludes option holdings, these numbers drop to the range $3.84-$9.15.

It is difficult to finally compare our estimates with previous findings, since these are usually based on U.S. data and from earlier periods. In our first specification based on stock market data we followed Aggarwal & Samwick (1999) and did not explicitly control for firm size. We estimated a pay-performance sensitivity of 32,000 Euro for a 1 percent increase in shareholder value at the

[23] These (low) estimates do not include incentives from stock and option grants and holdings though.

[24] When applying median regression analysis instead of least squares with executive fixed effects, Aggarwal & Samwick (1999) estimate with a change in wealth of $14.52 per $1,000 increase in market value pay-performance sensitivities of similar economic magnitude.

median risk firm in our sample. This 1 percent increase in shareholder value at the median risk firm corresponds to roughly 17 million Euro. Hence we can translate our estimate into a 1.9 Euro increase in CEO pay per 1,000 Euro increase in shareholder value. Since our measures of executive compensation correspond to what Aggarwal & Samwick (1999) call flow compensation excluding executive wealth and option holdings, this estimate is of a similar order of magnitude as their estimates. When we explicitly account for firm size as Cichello (2005) does, our estimated pay-performance sensitivities become very small and even at the median risk firm we calculate a negative value which cannot be reasonably interpreted. When we control for earnings as an alternative measure for firm performance we cannot calculate any pay-performance sensitivity since our coefficient estimates based on stock market data were no longer significant.

Based on accounting data, our estimate for pay-performance sensitivity was 312 Euro for a 1 million Euro increase in firm EBIT. We are aware of only one study that explicitly uses accounting data to estimate pay-performance sensitivities. Jensen & Murphy (1990) estimate that CEOs receive \$0.18 for each \$1,000 increase in annual accounting income. This is of a similar economic magnitude as our estimate of 0.312 Euro per 1,000 Euro increase in EBIT. However, these estimates in the literature result from U.S. data from the 1980s. We can conclude, however, that we find the same relationship between firm performance, firm risk and executive pay as previous studies did.

To sum up, we find a positive impact of a firm's stock market performance on executive compensation and a negative impact of firm risk measured by stock market volatility on incentive pay. These results disappear after controlling for EBIT as an alternative firm performance measure. We can reestablish our previous results when we measure firm performance and firm risk based on accounting data and find support for the hypothesized relationship between executive compensation, firm performance and firm risk in German corporations during 2005-2009.

Estimating Performance Sensitivities for Compensation Components

So far the dependent variable in our regressions was total compensation of executive i at firm j in year t. Based on total compensation we estimated pay-performance sensitivities. Actually our dataset allows us to look in more detail at the individual components of total compensation. We may differentiate between various compensation components to find out which (variable) compensation type drives pay-performance sensitivity. In this subsection we estimate the sensitivities of

different compensation components to firm performance. This is also a first robustness check for the overall pay-performance sensitivities calculated above.

In a first step, we replace total compensation, w_{ijt}, in equation (1) with variable compensation (total compensation minus fixed salary and other non-variable compensation). This specification is truly a robustness check for our previous findings. Only the variable part of total compensation can be sensitive to firm performance anyway. Thus choosing variable pay instead of total compensation should yield very similar results in terms of pay-performance sensitivities. In a second step, we split variable compensation and replace it first with short-term variable pay (cash bonus) and second with long-term oriented variable pay (stock, options, incentive plans).

Estimation results based on stock market data show that stock returns and the cross term of returns and firm risk are significant and have the expected signs in all three specifications (not presented). However, once we control again for our accounting-based performance measure EBIT, stock returns are no longer capable of explaining neither total variable pay, nor cash bonuses or long-term compensation. Estimation results based on accounting data as the explanatory input are summarized in Table 14. Column 1 shows the results for equation (1) specified with variable compensation as the dependent variable and firm size as an additional control variable. As expected the coefficients of EBIT and the cross term are of comparable size as the ones estimated in the regression with total compensation in Table 13. This not surprising given that the variable part of total compensation is designed to be determined by firm performance. With 286 Euro for a 1,000,000 Euro increase in EBIT, the median pay-performance sensitivity is of similar economic magnitude as the 312 Euro calculated from Table 13.

Column 2 of Table 14 shows estimation results for the cash bonus as the dependent variable. EBIT and cross term are again significant and have the expected sign. The size of the coefficient estimates are about half as large as the ones in the estimation of total variable pay (column 1). The median pay-performance sensitivity suggests that a manager receives as a cash bonus an additional 215 Euro for a 1,000,000 Euro increase in EBIT.

Column 3 of Table 14 shows that we cannot explain long-term compensation based on accounting data from the immediately preceding year[25]. We conclude that short-term variable pay (cash bonus) but not long-term variable compensation determines the sensitivity of manager compensation to

[25]There are several executives who do not receive any long-term compensation at all. Excluding these observations reduces our sample to 713 observations but does not help to explain long-term pay for those who receive a positive payment.

accounting figures. It is left for future research to find out what determines long-term compensation in German corporations.

5 Robustness

We perform several robustness checks. The first test considers alternative fixed effects. In our basic specification we use individual fixed effects for each executive because of the selective sample we collected. We expect much of the variation in compensation within our sample of executives to be due to individual characteristics. These could be age or work experience (observable but not part of our dataset) and also factors such as bargaining power (not observable). Executive fixed effects should capture such individual characteristics we cannot explicitly account for.

Columns 1 and 2 of Table 15 show regression results for our specification based on stock market data with firm-level and industry-level fixed effects, respectively. In both specifications we include total assets as a measure for firm size. The coefficients of stock return and the cross term remain significant. Note that the coefficient of total assets has the expected positive sign in the industry fixed effects specification (column 2) but is significant and negative in the specification with firm-level fixed effects (column 1). We rather expected firm size to be insignificant in a specification with firm-level fixed effects since firm size should not vary much over the short period of five years. Nonetheless, firm-level fixed effects should capture firm size to a large extent and we are not too concerned about the negative coefficient sign of total assets. Hence our basic result with executive fixed effects can be confirmed with alternative fixed effects.

Our next robustness tests concern the risk measure. In our first specification based on stock market data we compute the variance of monthly stock returns over a three-year horizon and standardize it by use of the CDF. To test the robustness of our results we modify this procedure by (1) calculating the variance based on weekly instead of monthly stock market data, (2) calculate the variance over a four- instead of a three-year horizon, and (3) use the variance of stock returns instead of the CDF thereof. All our results remain valid with one of the first two modifications (not reported). When we do not standardize the variation in firm risk by the CDF, however, the explanatory variables that we use to calculate pay-performance sensitivities, stock return and the cross term of stock return and firm risk, are no longer significant at 10 percent (not reported). Thus we conclude that we need the CDF to reduce the huge variation across our sample in the variance term .

Finally, we test whether our results hold when we measure stock market performance relative to a peer group. Often manager compensation contracts include firm performance evaluation relative to a firm's peer group. The obvious goal of applying peer-group related performance measures is to make sure managers are not paid for running the company during good times (pay for luck) but for truly outperforming the market.

We lack the information whether firms in our sample pay managers for outperforming a peer group. Hence we also lack information how such peer groups are defined. Anecdotal evidence from annual reports suggests that peer groups consist of other firms that are of similar size and/or belong to the same industry. On top of being Prime Standard firms, the majority of firms in our sample also belongs to either the DAX, MDAX, SDAX or TecDAX indices of the Frankfurt Stock Exchange. Within the DAX, MDAX and SDAX indices firms are from different industries but similar in terms of firm size measured by market capitalization[26]. TecDAX firms belong to the technology sector[27]. As a proxy for peer group returns we use these index returns and compute a firm's relative stock market return as the difference between its stock return and the corresponding index return.

We do not report our estimation results here because benchmark returns relative to index returns have no explanatory power for executive compensation in our sample. This suggests either that executives are mainly paid for absolute and not for relative performance or that companies define peer groups differently. Indeed we know from annual reports that some large firms define a relevant peer group of only a few close national and international competitors which do not belong to our sample. Thus more work on relative performance pay in German firms is required.

In Table 16 we present robustness checks for our second specification based on accounting data. In columns 1 and 2 of Table 16 we present estimation results based on specifications with alternative fixed effects. The coefficients of EBIT and the cross term of EBIT and the risk measure (CDF) are significant with the expected signs for both types of fixed-effects specifications. As expected total assets as a measure for firm size is significant only in the industry-level fixed-effects estimation and not in the specification with firm-level fixed effects.

We further replaced the CDF with the variance itself. Again we find that our results change. We believe we need the CDF to account for the huge variation in firm size within our sample which is

[26]The DAX index includes the 30 largest German companies in terms of order book volume and market capitalization. The MDAX contains 50 companies that rank immediately below the DAX, excluding the technology sector. The SDAX contains the next 50 below the MDAX shares.

[27]The TecDAX consists of the 30 largest technology firms below those included in the DAX.

reflected in the variance in EBIT changes.

In sum, apart from replacing the CDF with the variance itself, our robustness tests yield support for the identified positive relationship between firm performance and executive compensation and the negative impact of firm risk on pay-performance sensitivity.

6 Reverse Causality?

Within the literature on the interaction between firm performance, risk and executive compensation, our study belongs to the literature that analyzes the impact of firm risk on the structure of executive compensation contracts. We noted above that there is truly a two-sided relationship. Not only may firm risk determine how executives are paid. There is theoretical work and empirical evidence that causality runs in the other direction as well. How managers are paid may determine how much and what risk they take and this is likely to impact the riskiness of the firm. This raises the concern that our results are driven by reverse causality.

We found a negative impact of firm risk on the use of incentive pay in German corporations. We took this as support for the theoretical prediction that risk averse managers need to be paid for any risk transfer and thus wage costs of incentive schemes are more expensive in riskier firms. However, the negative relationship between firm risk and incentive pay could also be driven by incentives inducing lower managerial risk taking. Risk averse managers with a high share of variable pay that is closely linked to firm performance may be less willing to take risks and thus lower the firm's overall risk exposure. We want to test for this concern by regressing firm risk on the manager's lagged exposure to variable pay. Since risk is defined on the firm level, our explanatory variables have to be firm-year observations. Hence we specify the following equation:

$$\sigma_{jt} = \delta_1 pps_{jt-1} + \delta_2 w_{jt-1} + \delta_3 s_{jt} + \lambda_j + \mu_t + \epsilon_{jt}. \tag{2}$$

In this specification σ_{jt} is the variance of weekly stock market returns during year t which we use as our measure for firm risk. As explanatory variables we use the pay-performance sensitivity, pps_{jt-1}, at firm j in year $t-1$ that we calculated from our basic estimation results in column 1 of Table 12[28]. We add the average of total compensation of board members at firm j, w_{jt-1}, to control for any effect of the size of total compensation on risk taking and control for firm size by adding

[28]Note that pps_{jt-1} itself was estimated based on data from the three years preceding year $t-1$.

total assets s_{jt}. We further include λ_j as a firm fixed effect and μ_t as a year dummy.

If our previous finding of a negative impact of firm risk on the use of incentive pay was driven by reverse causality, we would expect a negative coefficient δ_1 in equation (2). Our estimation results in column 1 of Table 17 show that this is not the case. The coefficient of pay-performance sensitivity in $t-1$ is positive and significant at 5 percent. Thus if at all this result argues in favor of a *positive* impact of pay-performance sensitivity on firm risk in the subsequent year but certainly does not hint to a reverse causality problem in our original specification.

Thus we find a (weakly) significant positive impact of incentive pay on firm risk. Next we examine whether there is an impact on stock returns. We replace firm risk, σ_{jt}, in equation (2) with stock returns of firm j in year t and run the corresponding regression. Column 2 Table 17 shows that there is no significant impact. Hence we find some evidence for a positive impact of incentive pay in year $t-1$ on firm risk in year t but we find no evidence for any effect of incentive pay in year $t-1$ on stock returns in year t.

Unfortunately, we cannot repeat this reverse causality check for our results based on accounting data since we cannot construct our risk measure for one year based on EBIT data. However, we replace σ_{jt} in equation (2) with the increase in EBIT of firm j in year t as an alternative measure for firm performance. We find no significant impact of incentive pay on firm performance when the latter is measured with accounting data (results not reported).

Note that in all specifications in Table 17 we control for the average of total compensation of board members at firm j. Interestingly, we find (albeit only weakly significant) evidence for the compensation level having a *negative* impact on firm performance measured by either stock returns (Table 17, column 2) or with accounting data (results not reported).

7 Concluding Remarks

This paper analyzes the impact of firm performance and risk on executive compensation in German corporations. We use a self-collected dataset to estimate incentives measured by the sensitivity of executive pay to firm performance. Based on stock market returns as a measure for firm performance we estimate pay-performance sensitivities for the period 2005-2009. When we control for firm earnings as an alternative performance measure, however, stock return lose their explanatory power for executive compensation. We then measure firm performance and risk based on accounting data and reestimate pay-performance sensitivities. We find that firm performance has

an economically significant positive impact on executive pay and that pay-performance sensitivity is decreasing in firm risk.

We do not find a significant relationship between executive compensation and firm performance measured by stock returns when we control for firm earnings. Hence we doubt that stock returns are the actual measure shareholders use to evaluate and compensate manager performance. Based on accounting data we estimate that a manager at the firm with median risk in our sample receives an additional 312 Euro for an increase in firm earnings of 1,000,000 Euro. In fact, matching compensation data with accounting data is not new. For example, Lambert & Larcker (1987) employ different accounting measures to explain executive compensation. Jensen & Murphy (1990) use accounting measures to estimate pay-performance estimates but do not account for firm risk. However, to our best knowledge this study is the first to identify the relationship between firm performance, firm risk and executive pay based on accounting data. We argue that accounting data may deliver more reliable estimates of pay-performance sensitivities than stock market data.

The structure of our dataset allows us to analyze the relationship between firm performance and the various components of total compensation. Based on accounting data we can explain cash bonus payments but not long-term oriented compensation in German corporations. Finally, to control for reverse causality that may result from the two-sided relationship between manager compensation and firm risk, we estimate the impact of (lagged) pay-performance sensitivity on firm risk and performance. We are not concerned that our results are driven by reverse causality.

This work calls for future research. First, we take away from our analysis the fragility of the relationship between executive pay and firm performance measured by stock market data. Controlling for firm earnings changes results dramatically. Hence empirical findings based on stock market data should be treated with caution.

Second, we do not know what determines long-term oriented compensation in German corporations. We found no impact of firm performance on long-term pay. One reason could be that our sample period from 2005 to 2009 is rather short. Maybe long-term oriented compensation can be better explained with firm performance measured over several years. We expect additional insights as a longer period of German compensation data becomes gradually available.

Third, our robustness check for reverse causality is only a first step to investigate the impact of compensation on firm risk. Stock market volatility is only a very indirect measure for firm risk and so far we have no corresponding measure based on accounting data. Conditional on data

availability we may use risk measures such as leverage or follow the approach of Coles et al. (2006) who use more direct measures such as R&D expenditures as a measure for managerial risk taking.

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Table 1: Compensation Components 2005-2009, CEOs vs. Other Executives

	Chief Executive Officers [N=393]				Other Executives [N=1259]			
	Mean	**Median**	**Minimum**	**Maximum**	**Mean**	**Median**	**Minimum**	**Maximum**
Total	2,152	1,531	21	13,278	1,457	1,164	55	5,927
Fixed	687	542	21	3,096	460	413	38	2,329
Short Term	988	590	0	7,944	648	508	0	3,251
Long Term	478	73	0	6,230	348	156	0	3,665
Share Fixed	0.43	0.38	0.06	1	0.41	0.35	0.07	1
Share Short Term	0.42	0.42	0	0.94	0.42	0.43	0	0.94
Share Long Term	0.15	0.07	0	0.81	0.18	0.14	0	0.90

Other executives are members of the executive board other than the CEO. All numbers in the first four lines are in thousands of 2005 Euros. Fixed compensation is not performance related, e.g. base salary, company cars, etc. Short-term compensation are annual cash bonuses. Long-term compensation is the value of shares, options and compensation based on incentive plans. The values of long-term compensation components are taken from the respective annual reports. The last three lines show the respective shares with respect to total compensation.

Table 2: Compensation Components 2005

	Chief Executive Officers [N=47]				Other Executives [N=148]			
	Mean	**Median**	**Minimum**	**Maximum**	**Mean**	**Median**	**Minimum**	**Maximum**
Total	2,174	1,435	21	11,817	1,667	1,499	115	5,611
Fixed	633	483	21	1,623	484	473	109	1,018
Short Term	1,034	627	0	7,183	789	746	0	3,251
Long Term	506	120	0	3,972	394	180	0	3,390
Share Fixed	0.45	0.39	0.06	1	0.39	0.33	0.07	1
Share Short Term	0.42	0.46	0	0.90	0.45	0.47	0	0.79
Share Long Term	0.14	0.09	0	0.81	0.16	0.12	0	0.90

All numbers in the first four lines are in thousands of 2005 Euros. Fixed compensation is not performance related, e.g. base salary, company cars, etc. Short-term compensation are annual cash bonuses. Long-term compensation is the value of shares, options and compensation based on incentive plans. The values of long-term compensation components are taken from the respective annual reports. The last three lines show the respective shares with respect to total compensation.

Table 3: Compensation Components 2006

	Chief Executive Officers [N=82]				Other Executives [N=273]			
	Mean	**Median**	**Minimum**	**Maximum**	**Mean**	**Median**	**Minimum**	**Maximum**
Total	2,319	1,714	21	12,902	1,583	1,412	64	5,927
Fixed	694	545	21	3,096	474	433	63	1,347
Short Term	1,033	612	0	7,944	715	644	0	2,817
Long Term	592	79	0	5,497	394	178	0	3,665
Share Fixed	0.43	0.37	0.08	1	0.38	0.32	0.08	1
Share Short Term	0.42	0.42	0	0.81	0.44	0.42	0	0.84
Share Long Term	0.15	0.08	0	0.73	0.18	0.15	0	0.77

All numbers in the first four lines are in thousands of 2005 Euros. Fixed compensation is not performance related, e.g. base salary, company cars, etc. Short-term compensation are annual cash bonuses. Long-term compensation is the value of shares, options and compensation based on incentive plans. The values of long-term compensation components are taken from the respective annual reports. The last three lines show the respective shares with respect to total compensation.

Table 4: Compensation Components 2007

	Chief Executive Officers [N=88]				Other Executives [N=279]			
	Mean	**Median**	**Minimum**	**Maximum**	**Mean**	**Median**	**Minimum**	**Maximum**
Total	2,368	1,801	272	13,278	1,625	1,439	55	5,389
Fixed	671	524	161	3,039	448	389	38	1,552
Short Term	1,179	853	0	7,739	765	632	0	2,672
Long Term	517	107	0	4,303	412	206	0	3,231
Share Fixed	0.37	0.32	0.09	1	0.35	0.30	0.09	1
Share Short Term	0.47	0.49	0	0.84	0.45	0.46	0	0.84
Share Long Term	0.16	0.07	0	0.81	0.20	0.16	0	0.87

All numbers in the first four lines are in thousands of 2005 Euros. Fixed compensation is not performance related, e.g. base salary, company cars, etc. Short-term compensation are annual cash bonuses. Long-term compensation is the value of shares, options and compensation based on incentive plans. The values of long-term compensation components are taken from the respective annual reports. The last three lines show the respective shares with respect to total compensation.

Table 5: Compensation Components 2008

	Chief Executive Officers [N=83]				Other Executives [N=264]			
	Mean	**Median**	**Minimum**	**Maximum**	**Mean**	**Median**	**Minimum**	**Maximum**
Total	2,026	1,554	202	9,195	1,319	1,052	95	4,687
Fixed	698	544	135	3,066	457	392	95	2,329
Short Term	962	540	0	4,411	564	446	0	1,881
Long Term	372	44	0	4,286	299	120	0	2,243
Share Fixed	0.43	0.38	0.15	1	0.41	0.37	0.10	1
Share Short Term	0.43	0.43	0	0.94	0.41	0.43	0	0.94
Share Long Term	0.14	0.04	0	0.63	0.18	0.14	0	0.83

All numbers in the first four lines are in thousands of 2005 Euros. Fixed compensation is not performance related, e.g. base salary, company cars, etc. Short-term compensation are annual cash bonuses. Long-term compensation is the value of shares, options and compensation based on incentive plans. The values of long-term compensation components are taken from the respective annual reports. The last three lines show the respective shares with respect to total compensation.

Table 6: Compensation Components 2009

	Chief Executive Officers [N=93]				Other Executives [N=295]			
	Mean	**Median**	**Minimum**	**Maximum**	**Mean**	**Median**	**Minimum**	**Maximum**
Total	1,899	1,190	321	8,918	1,199	839	94	4,127
Fixed	713	557	163	2,543	451	413	95	1,662
Short Term	767	420	0	4,575	482	299	0	2,755
Long Term	419	37	0	6,230	267	78	0	1,798
Share Fixed	0.49	0.47	0.13	1	0.48	0.42	0.12	1
Share Short Term	0.36	0.36	0	0.84	0.36	0.35	0	0.86
Share Long Term	0.15	0.05	0	0.80	0.17	0.10	0	0.74

All numbers in the first four lines are in thousands of 2005 Euros. Fixed compensation is not performance related, e.g. base salary, company cars, etc. Short-term compensation are annual cash bonuses. Long-term compensation is the value of shares, options and compensation based on incentive plans. The values of long-term compensation components are taken from the respective annual reports. The last three lines show the respective shares with respect to total compensation.

Table 7: Compensation Components in Small Firms, 2005-2009

	Chief Executive Officers [N=128]				Other Executives [N=280]			
	Mean	**Median**	**Minimum**	**Maximum**	**Mean**	**Median**	**Minimum**	**Maximum**
Total	891	670	21	5,007	536	436	55	3,705
Fixed	422	318	21	2,281	250	219	38	1,552
Short Term	345	231	0	2,254	189	137	0	1,309
Long Term	124	0	0	4,057	97	0	0	3,231
Share Fixed	0.55	0.53	0.12	1	0.54	0.53	0.09	1
Share Short Term	0.35	0.33	0	0.84	0.34	0.32	0	0.78
Share Long Term	0.09	0	0	0.81	0.12	0	0	0.87

Small firms are defined as firms with total assets below 1,000,000,000 Euro in a given fiscal year. All numbers in the first four lines are in thousands of 2005 Euros. Fixed compensation is not performance related, e.g. base salary, company cars, etc. Short-term compensation are annual cash bonuses. Long-term compensation is the value of shares, options and compensation based on incentive plans. The values of long-term compensation components are taken from the respective annual reports. The last three lines show the respective shares with respect to total compensation.

Table 8: Compensation Components in Mid-Size Firms, 2005-2009

	Chief Executive Officers [N=145]				Other Executives [N=418]			
	Mean	**Median**	**Minimum**	**Maximum**	**Mean**	**Median**	**Minimum**	**Maximum**
Total	1,811	1,391	262	12,057	1,089	909	59	5,927
Fixed	604	497	139	3,096	350	331	59	1,208
Short Term	792	627	0	4,075	498	389	0	2,717
Long Term	416	76	0	5,497	242	73	0	3,665
Share Fixed	0.41	0.39	0.08	1	0.41	0.38	0.07	1
Share Short Term	0.44	0.43	0	0.94	0.44	0.45	0	0.94
Share Long Term	0.15	0.07	0	0.81	0.15	0.09	0	0.90

Mid-size firms are defined as firms with total assets above 1,000,000,000 Euro and below 10,000,000,000 Euro in a given fiscal year. All numbers in the first four lines are in thousands of 2005 Euros. Fixed compensation is not performance related, e.g. base salary, company cars, etc. Short-term compensation are annual cash bonuses. Long-term compensation is the value of shares, options and compensation based on incentive plans. The values of long-term compensation components are taken from the respective annual reports. The last three lines show the respective shares with respect to total compensation.

Table 9: Compensation Components in Large Firms, 2005-2009

	Chief Executive Officers [N=120]				Other Executives [N=561]			
	Mean	**Median**	**Minimum**	**Maximum**	**Mean**	**Median**	**Minimum**	**Maximum**
Total	3,910	3,340	421	13,278	2,190	2,110	398	5,611
Fixed	1,070	1,003	421	3,066	647	612	165	2,329
Short Term	1,910	1,613	0	7,944	990	964	0	3,251
Long Term	929	620	0	6,230	553	454	0	3,390
Share Fixed	0.33	0.29	0.06	1	0.33	0.29	0.12	1
Share Short Term	0.47	0.50	0	0.84	0.44	0.46	0	0.83
Share Long Term	0.20	0.19	0	0.70	0.22	0.22	0	0.66

Large firms are defined as firms with total assets above 10,000,000,000 Euro in a given fiscal year. All numbers in the first four lines are in thousands of 2005 Euros. Fixed compensation is not performance related, e.g. base salary, company cars, etc. Short-term compensation are annual cash bonuses. Long-term compensation is the value of shares, options and compensation based on incentive plans. The values of long-term compensation components are taken from the respective annual reports. The last three lines show the respective shares with respect to total compensation.

Table 10: Compensation Components 2005-2009, Financial vs. Non-Financial Firms

	Financial Firms [N=255]				Non-Financial Firms [N=1397]			
	Mean	**Median**	**Minimum**	**Maximum**	**Mean**	**Median**	**Minimum**	**Maximum**
Total	2,061	1,779	184	13,278	1,542	1,151	21	12,057
Fixed	540	512	127	1,307	509	420	21	3,096
Short Term	875	727	0	7,944	703	506	0	5,123
Long Term	645	413	0	6,230	331	117	0	5,497
Share Fixed	0.38	0.29	0.09	1	0.42	0.37	0.06	1
Share Short Term	0.38	0.38	0	0.78	0.42	0.44	0	0.94
Share Long Term	0.24	0.28	0	0.70	0.16	0.10	0	0.90

Financial Firms are firms in banking, insurance and real estate. All numbers in the first four lines are in thousands of 2005 Euros. Fixed compensation is not performance related, e.g. base salary, company cars, etc. Short-term compensation are annual cash bonuses. Long-term compensation is the value of shares, options and compensation based on incentive plans. The values of long-term compensation components are taken from the respective annual reports. The last three lines show the respective shares with respect to total compensation.

Table 11: Distribution of Performance and Risk Measures, 2005-2009

Percentile	Stock Return	Standard Deviation of Stock Return	EBIT	Standard Deviation of EBIT
0	-0.7446	0.0763	-3,515,723	3,035
10	-0.4669	0.1047	-389,746	7,329
20	-0.2634	0.1199	-84,823	11,052
30	-0.1048	0.1379	-20,980	23,273
40	-0.0098	0.1539	-5,179	38,737
50	0.0835	0.1726	3,575	63,231
60	0.1570	0.1898	10,995	131,481
70	0.2844	0.2129	31,506	211,388
80	0.4120	0.2408	86,108	457,612
90	0.5742	0.2839	271,789	1,324,873
100	1.4485	0.5781	1,413,279	13,100,000
Mean	0.0883	0.1891	-59,815	509,238
N	422	422	315	315

Annual stock returns and annual EBIT are taken from Thomson Reuters' Datastream database and adjusted for inflation. EBIT is the difference in annual EBIT denominated in thousand Euro. The standard deviation of stock returns is calculated based on weekly returns over the three years preceding the year of the corresponding executive compensation data. The standard deviation of EBIT is calculated over ten years preceding the year of the corresponding executive compensation data.

Table 12: Regression Results based on Stock Market Data, 2005-2009

Stock return	428.0428***	292.2801**	426.8576***	-42.2592
	(3.37)	(2.33)	(3.30)	(-0.35)
Stock return x CDF	-792.9117***	-646.2160***	-791.7487***	-255.715
	(-4.26)	(-3.53)	(-4.21)	(-1.47)
CDF	105.8291	40.4996	105.4413	-159.1781
	(0.79)	(0.31)	(0.78)	(-1.29)
EBIT	-	-	-	0.00013***
				(12.54)
2006	132.613**	159.0344**	132.8271**	132.0510**
	(2.01)	(2.47)	(2.01)	(2.20)
2007	219.4758***	242.3266***	219.6214***	180.4540**
	(2.75)	(3.10)	(2.74)	(2.47)
2008	29.8919	9.2416	29.8679	14.8492
	(0.33)	(0.10)	(0.33)	(0.18)
2009	-83.7888	-88.1236	-83.4612	-24.8149
	(-1.18)	(-1.27)	(-1.17)	(-0.38)
CEO	759.2219***	768.7842***	759.2065***	691.8889***
	(5.74)	(5.96)	(5.74)	(5.75)
Total Assets	-	-0.000002***	-	-0.000002***
		(-7.24)		(-5.34)
Number of	-	-	-0.0000856	-
Employees			(-0.05)	
R^2:				
within	0.0844	0.1285	0.0844	0.2435
overall	0.0477	0.0350	0.0427	0.0033
Observations	1652	1652	1652	1652
Pay-Performance Sensitivities (in thousand EURO)				
Median	31.5869	-30.8279	30.9833	-

Estimates are based on a panel regression with executive fixed effects and year dummies. The dependent variable is total compensation and measured in thousands of 2005 Euros. Stock returns are annual returns adjusted for inflation. CDF is the cumulative distribution function of return variances. EBIT is the absolute change in annual firm EBIT. Total Assets and the Number of Employees are measured at the end of the respective fiscal year. CEO is a dummy variable for all board members that are chief executive officer of their firm. For each estimate t-values are given in parentheses. Significance levels of 1, 5 and 10 percent are indicated by ***, ** and *, respectively. A Median Pay-Performance Sensitivity of 31.5869 indicates that a 1% rise in value of the frim with median variance in our sample induces an increase in the executive's income of roughly 32,000 Euro.

Table 13: Regression Results based on Accounting Data, 2005-2009

	All Executives	All Executives	All Executives
EBIT	0.0006***	0.0006***	0.0007***
	(3.16)	(3.17)	(3.19)
EBIT x CDF	-0.0007***	-0.0007***	-0.0007***
	(-2.73)	(-2.71)	(-2.75)
CDF	295.9396	250.4238	286.4512
	(0.60)	(0.50)	(0.58)
2006	226.8426***	214.6460***	221.8353***
	(3.42)	(3.20)	(3.29)
2007	385.2464***	362.9872***	381.1714***
	(5.56)	(5.08)	(5.45)
2008	322.0082***	301.7046***	316.5883***
	(4.37)	(4.01)	(4.24)
2009	268.1467***	243.3778***	262.6725***
	(3.43)	(3.02)	(3.31)
CEO	752.7459***	741.6155***	750.9882***
	(5.73)	(5.64)	(5.72)
Total Assets	-	0.000005	-
		(1.26)	
Number of Employees	-	-	0.0006
			(0.44)
R^2:			
within	0.1082	0.1102	0.1084
overall	0.1371	0.2640	0.1929
Observations	1188	1188	1188
Pay-Performance Sensitivities (in EURO)			
Median	0.3121	0.3158	0.3188

Estimates are based on a panel regression with executive fixed effects and year dummies. The dependent variable is total compensation and measured in thousands of 2005 Euros. EBIT is the difference in firm EBIT in two subsequent years adjusted for inflation. CDF is the cumulative distribution function of EBIT volatility measured by the variance over ten years. CEO is a dummy variable for all board members that are chief executive officer of their firm. Total Assets and the Number of Employees are measured at the end of the respective fiscal year. For each estimate t-values are given in parentheses. Significance levels of 1, 5 and 10 percent are indicated by ***, ** and *, respectively.
A Median Pay-Performance Sensitivity of 0.3121 indicates that a 1,000 Euro rise in EBIT at the firm with median variance in our sample induces an increase in the executive's income of roughly 0.31 Euro.

Table 14: Regression Results for Compensation Components, Accounting Data, 2005-2009

	Variable Pay	Cash Bonus	Long-Term
EBIT	0.0005***	0.0003***	0.0002
	(2.80)	(2.91)	(1.22)
EBIT x CDF	-0.0005**	-0.0003*	-0.0003
	(-2.20)	(-1.82)	(-1.30)
CDF	266.6614	217.1760	49.4854
	(0.57)	(0.75)	(0.13)
2006	170.2035***	49.6338	120.5697**
	(2.68)	(1.28)	(2.27)
2007	336.1388***	203.5059***	132.6329**
	(4.96)	(4.91)	(2.34)
2008	252.9329***	157.9087***	95.0242
	(3.55)	(3.62)	(1.59)
2009	179.0745**	114.6817**	64.3928
	(2.35)	(2.45)	(1.01)
CEO	530.5063***	416.2276***	114.2787
	(4.26)	(5.46)	(1.10)
Total Assets	1.23e-06	-4.90e-06**	6.13e-06**
	(0.36)	(-2.30)	(2.11)
R^2:			
within	0.0922	0.1483	0.0260
overall	0.1638	0.0016	0.0835
Observations	1188	1188	1188
Pay-Performance Sensitivities (in EURO)			
Median	0.2859	0.2148	-

Estimates are based on a panel regression with executive fixed effects and year dummies. The dependent variables are different compensation components in thousands of 2005 Euros and are given in the first line of the table. EBIT is the difference in firm EBIT in two subsequent years adjusted for inflation. CDF is the cumulative distribution function of EBIT volatility measured by the variance over ten years. CEO is a dummy variable for all board members that are chief executive officer of their firm. Total Assets are measured at the end of the respective fiscal year. For each estimate t-values are given in parentheses. Significance levels of 1, 5 and 10 percent are indicated by ***, ** and *, respectively.
A Median Pay-Performance Sensitivity of 0.2859 indicates that a 1,000 Euro rise in EBIT at the firm with median variance in our sample induces an increase in the executive's income of roughly 0.29 Euro.

Table 15: Robustness Check with Stock Market Data, 2005-2009

	Individual FE	Firm FE	Industry FE
Stock return	436.0116***	268.7151*	444.8468**
	(4.22)	(1.81)	(2.23)
Stock return x Variance	-3846.7830**	-	-
	(-2.35)		
Variance	1855.9620	-	-
	(1.36)		
Stock return x CDF	-	-604.45***	-772.9727***
		(-2.81)	(-2.72)
CDF	-	24.1635	-1345.558***
		(0.17)	(-10.83)
2006	210.7262***	149.7875**	-213.7624**
	(4.09)	(2.02)	(-2.11)
2007	394.8226***	234.9747***	-422.6764***
	(7.09)	(2.68)	(-3.88)
2008	210.7262***	-13.4891	-659.3406***
	(4.09)	(-0.13)	(-5.14)
2009	394.8226***	-134.1637*	-473.3100***
	(7.09)	(-1.81)	(-4.74)
CEO	818.5794***	1041.3110***	856.5778***
	(4.87)	(23.09)	(13.37)
Total Assets	-	-0.000002***	0.000003***
		(-6.04)	(13.57)
Observations	1652	1652	1652
R^2:			
within	0.1828	0.2922	0.2523
overall	0.0294	0.0109	0.3103
Pay-Performance Sensitivities (in thousand EURO)			
Median		-33.5099	58.3605

Estimates are based on a panel regression with fixed effects and year dummies. The dependent variable is total compensation and measured in thousands of 2005 Euros. Stock returns are annual returns adjusted for inflation. Variance is the variance of stock returns measured over 36 monthly observations of stock returns. CDF is the cumulative distribution function of return variances. Total Assets are measured at the end of the respective fiscal year. CEO is a dummy variable for all board members that are chief executive officer of their firm. Total Assets is measured at the end of the respective fiscal year. For each estimate t-values are given in parentheses. Significance levels of 1, 5 and 10 percent are indicated by ***, ** and *, respectively.
The Minimum and Maximum Pay-Performance Sensitivities correspond to the observation with the highest and lowest variance, respectively. A Median Pay-Performance Sensitivity of 58.3605 indicates that a 1% rise in firm value induces an increase in the executive's income of roughly 58,000 Euro.

Table 16: Robustness Check with Accounting Data, 2005-2009

	Individual FE	Firm FE	Industry FE
EBIT	0.000006	0.0007***	0.0007**
	(0.07)	(2.74)	(2.12)
EBIT x Variation	-0.000002	-	-
	(0.41)		
Variation	-0.1801	-	-
	(-0.43)		
EBIT x CDF	-	-0.0007**	-0.0008**
		(-2.39)	(-2.00)
CDF	-	55.8459	2119.0520***
		(0.10)	(15.00)
2006	203.312***	203.8864**	152.9426
	(2.71)	(2.47)	(1.47)
2007	301.6108***	333.3375***	211.0191**
	(3.76)	(3.98)	(2.07)
2008	180.8803**	231.6710***	-7.525
	(2.13)	(2.70)	(-0.07)
2009	152.9226***	152.9226**	-148.0141
	(2.71)	(1.72)	(-1.44)
CEO	886.2917***	1070.4590***	957.3628***
	(4.87)	(21.49)	(15.16)
Total Assets	0.00002**	0.000003	0.000006***
	(1.55)	(0.10)	(6.77)
Observations	790	1188	1188
R^2:			
within	0.1051	0.3079	0.4024
overall	0.2057	0.1502	0.3770
Pay-Performance Sensitivities (in EURO)			
Median	-	0.3307	0.2923

Estimates are based on a panel regression with fixed effects and year dummies. The dependent variable is total compensation and measured in thousands of 2005 Euros. EBIT is the difference in firm EBIT in two subsequent years adjusted for inflation. Variation is EBIT volatility measured by the coefficient of variation over 10 years. CDF is the cumulative distribution function of EBIT volatility measured by the coefficient of variation. CEO is a dummy variable for all board members that are chief executive officer of their firm. Total Assets is measured at the end of the respective fiscal year. For each estimate t-values are given in parentheses. Significance levels of 1, 5 and 10 percent are indicated by ***, ** and *, respectively.
The Minimum and Maximum Pay-Performance Sensitivities correspond to the observation with the highest and lowest variation, respectively. A Median Pay-Performance Sensitivity of 0.3307 indicates that a 1,000 Euro rise in EBIT induces an increase in the executive's income of roughly 0.33 Euro.

Table 17: Reverse Causality, 2006-2009

	Variance of Stock Return	Stock Return
Pay-Performance	0.000042**	-0.0003
Sensitivity	(2.51)	(-0.72)
Total Pay	0.000003	-0.0001*
	(-1.26)	(-1.95)
2007	-0.0019	0.0208
	(-0.36)	(0.15)
2008	0.0095	-0.447***
	(1.46)	(-2.63)
2009	0.0274***	0.2090
	(4.20)	(1.23)
Total Assets	1.47e-11	4.70e-10
	(0.46)	(-0.57)
Observations	314	314
R^2:		
within	0.3508	0.2167
overall	0.0307	0.1245

Estimates are based on a panel regression with firm fixed effects and year dummies. The dependent variables are the variance of stock returns and stock returns of the respective firms. Stock returns are calculated as the stock price at the end of the fiscal year divided by the stock price at the beginning of the fiscal year. The variance is estimated with weekly data over one year. Pay-Performance Sensitivity is the estimated Euro amount an executive receives for a one percent increase in firm value. Total Pay is the average amount board members of the respective firms earn in a given year. Pay-Performance Sensitivity and Total Pay are lagged one period. For each estimate t-values are given in parentheses. Significance levels of 1, 5 and 10 percent are indicated by ***, ** and *, respectively.