Essays on Behavioral Aspects of the Design and Disclosure of Compensation Contracts

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CONTENTS

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PREFACE

This thesis consists of four essays on the design and disclosure of compensation contracts. Essays 1, 2 and 3 focus on behavioral aspects of mandatory compensation disclosure rules and of contract negotiations in agency relationships. The three experimental studies develop psychology-based theory and present results that deviate from standard economic predictions. Furthermore, the results of Essay 1 and 2 also have implications for firms' discretion in how to communicate their top management's incentives to the capital market. Essay 4 analyzes the role of fairness perceptions for the evaluation of executive compensation. For this purpose, two surveys targeting representative eligible voters as well as investment professionals were conducted.

Essay 1 investigates the role of the detailed 'Compensation Discussion and Analysis', which is part of the Security and Exchange Commission's 2006 regulation, on investors' evaluations of executive performance. Compensation disclosure complying with this regulation clarifies the relationship between realized reported compensation and the underlying performance measures and their target achievement levels. The experimental findings suggest that the salient presentation of executives' incentives inherent in the 'Compensation Discussion and Analysis' makes investors' performance evaluations less outcome dependent. Therefore, investors' judgment and investment decisions might be less affected by noisy environmental factors that drive financial performance. The results also suggest that fairness perceptions of compensation contracts are essential for investors' performance evaluations in that more transparent disclosure increases the perceived fairness of compensation and the performance evaluation of managers who are not responsible for a bad financial performance. These results have important practical implications as firms might choose to communicate their top management's incentive compensation more transparently in order to benefit from less volatile expectations about their future performance.

Similar to the first experiment, the experiment described in Essay 2 addresses the question of more transparent compensation disclosure. However, other than the first experiment, the second experiment does not analyze the effect of a more salient presentation of contract information but the informational effect of contract information itself. For this purpose, the experiment tests two conditions in which the assessment of the compensation contracts' incentive compatibility, which determines executive effort, is either possible or not. On the one hand, the results suggest that the quality of investors' expectations about executive effort is improved, but on the other hand investors might over-adjust their prior expectations about executive effort if being confronted with an unexpected financial performance and under-adjust if the financial performance confirms their prior expectations. Therefore, in the experiment, more transparent compensation disclosure does not lead to more correct overall judgments of executive effort and to even lower processing quality of outcome information. These results add to the literature on disclosure which predominantly advocates more transparency. The findings of the experiment however, identify decreased information processing quality as a relevant disclosure cost category. Firms might therefore carefully evaluate the additional costs and benefits of more transparent compensation disclosure. Together with the results from the

experiment in Essay 1, the two experiments on compensation disclosure imply that firms should rather focus on their discretion *how* to present their compensation disclosure to benefit from investors' improved fairness perceptions and their spill-over on performance evaluation.

Essay 3 studies the behavioral effects of contextual factors in recruitment processes that do not affect the employer's or the applicant's bargaining power from a standard economic perspective. In particular, the experiment studies two common characteristics of recruitment processes: Pre-contractual competition among job applicants and job applicants' non-binding effort announcements as they might be made during job interviews. Despite the standard economic irrelevance of these factors, the experiment develops theory regarding the behavioral effects on employees' subsequent effort provision and the employers' contract design choices. The experimental findings largely support the predictions. More specifically, the results suggest that firms can benefit from increased effort and, therefore, may generate higher profits. Further, firms may seize a larger share of the employment relationship's profit by highlighting the competitive aspects of the recruitment process and by requiring applicants to make announcements about their future effort.

Finally, Essay 4 studies the role of fairness perceptions for the public evaluation of executive compensation. Although economic criteria for the design of incentive compensation generally do not make restrictive recommendations with regard to the amount of compensation, fairness perceptions might be relevant from the perspective of firms and standard setters. This is because behavioral theory has identified fairness as an important determinant of individuals' judgment and decisions. However, although fairness concerns about executive compensation are often stated in the popular media and even in the literature, evidence on the meaning of fairness in the context of executive compensation is scarce and ambiguous. In order to inform practitioners and standard setters whether fairness concerns are exclusive to non-professionals or relevant for investment professionals as well, the two surveys presented in Essay 4 aim to find commonalities in the opinions of representative eligible voters and investments professionals. The results suggest that fairness is an important criterion for both groups. Especially, exposure to risk in the form of the variable compensation share is an important criterion shared by both groups. The higher the assumed variable share, the higher is the compensation amount to be perceived as fair. However, to a large extent, opinions on executive compensation depend on personality characteristics, and to some extent, investment professionals' perceptions deviate systematically from those of non-professionals. The findings imply that firms might benefit from emphasizing the riskiness of their managers' variable pay components and, therefore, the findings are also in line with those of Essay 1.

ESSAY 1

An Experimental Investigation of the Outcome Bias in Financial Statement Users' Executive Performance Evaluation: The Influence of Compensation Discussion and Analysis (CD&A)

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Abstract

This study analyzes the outcome bias in executive performance evaluation, when investors base their evaluation on financial performance data included in financial statements. In particular, the experiment investigates whether a detailed "Compensation Discussion and Analysis" (CD&A) mitigates the outcome bias in executive performance evaluation. Making less biased performance evaluations is beneficial for investment decisions because a manager's performance is important for firm's future performance. Based on attribution theory, I predict that the outcome bias results from investors' biased perception of the manager's outcome responsibility. This means that holding the manager more responsible than (s)he actually is might result in an overrating (underrating) of the manager's individual performance when financial performance is good (bad). I propose that CD&A increases the salience of the compensation contract parameters facilitating investors' assessment of the contract's incentive compatibility. As knowledge about the manager's incentives makes past financial performance less informative for the manager's individual performance, the manager's performance should be evaluated less outcome-dependent. In line with the predictions, the experimental results indicate that biased perceptions of the manager's outcome responsibility are a driver of the outcome bias. Further, the outcome bias is mitigated by a more salient presentation of the manager's compensation contract parameters in that the performance is evaluated higher when the outcome is bad but equally high when the outcome is good.

Keywords: Compensation disclosure, attribution theory, outcome bias.

1 Introduction

Disclosure of executive compensation has received increasing attention from standard setters in recent years. Along with the adoption of SEC's Executive Compensation and Related Person Disclosure (SEC 2006), which was the first federal regulation on compensation for 15 years (Dalton and Dalton 2008), there has been a worldwide trend towards stricter disclosure rules (e.g. Dodd-Frank Act Section 953a/b 2010, VorstOG 2005). In the United States, public firms are required to file a proxy statement with the SEC (DEF-14) in order to inform shareholders about the compensation policy before they vote on the approval of executive compensation at the annual meeting. According to SEC's 2006 regulation, the proxy statement needs to include a "Summary Compensation Table" of top management's realized compensation from all pay components for the current and the two preceding fiscal years for five named executives including the CEO and the CFO.[1]

In addition to that, the narrative "Compensation Discussion and Analysis" (CD&A) includes a precise explanation of the realized compensation in the Summary Compensation Table "in plain English". The general intention of this rule is that firms disclose to which performance measures compensation was tied and in how far the realized compensation results from a target achievement of the performance measures.[2] However, firms enjoy discretion in organizing their CD&A, and it is not fully understood in which way firms comply with the regulation as evidence suggests that most firms' CD&A are difficult to read, and that management tries to hide compensation not tied to performance (Laksmana et al. 2012).

Although it is not clear yet whether CD&A reality can keep up with SEC's objective to facilitate more informed investment and voting decisions, CD&A's detailed discussion of performance measures and target achievements may have an unintended but beneficial effect

[1] Similar legislation has been passed in Germany (VorstOG 2005).

[2] No disclosure of performance targets is required if firms expect competitive harm. However, a study by Watson Wyatt Worldwide (2007) finds that more than half of the analyzed firms reported performance targets. Moreover, Internal Revenue Code Section 162(m) requires periodic shareholder approvals of targets in order to qualify for tax deductibility of compensation in excess of $1million. In practice, many firms report the realized compensation compared to targets like, e.g., the 2013 proxy statements of Ford (p. 50) or General Motors (p. 40).

for investors. Since investment decisions generally include expectations about a firm's future performance, investors have a demand for indicators predicting future performance. However, expectations of future firm performance based on past financial performance are problematic as past financial performance contains noise. Instead, a manager's individual performance is largely determined by his/her compensation contract, and a manager's performance is likely to have a significant influence on his/her firms' future financial performance. Therefore, executive performance evaluation may constitute an important part of the investment decision process. However, manager's incentives are hard to assess based on realized compensation data. In comparison, CD&A increases the salience of compensation contract parameters and may highlight the incentive compatibility of managers' compensation. Therefore, investors might better infer that the manager either had an incentive to provide effort and to make decisions in the firm's best interest or not. Thus, CD&A may help investors to evaluate the manager's performance.

However, owing to the unobservability of managers' performance, and due to the fact that firms' financial performance is partly indicative of managers' individual performance, using outcome information to evaluate managers' performance is often practiced and even warranted from a normative perspective (Brown and Solomon 1987; Hershey and Baron 1992, 1995; Tan and Lipe 1997). Yet, literature shows that individuals tend to make stronger use of outcome information than justified by its actual informativeness (Baron and Hershey 1988; Marshall and Mowen 1993). As a consequence, investors' executive performance evaluations might be biased, especially when the assessment of managers' incentives is difficult. Therefore, this study investigates whether the provision of CD&A can facilitate the assessment of compensations contracts' incentive compatibility, and whether the outcome bias in executive performance evaluation is mitigated.

The effect of CD&A's increased salience of compensation contract parameters on the outcome bias in performance evaluation is expected to be mediated by the perception of the

manager's outcome responsibility. This is because attribution theory suggests that the outcome bias is caused by biased perceptions of outcome responsibility (e.g. Gilbert and Malone 1995; Miller and Ross 1975; Ross 1977). More specifically, managers might be held more responsible for an outcome than they actually are and, therefore, be evaluated better (worse) for a good (bad) financial performance than they should. Yet, when assessing the incentive compatibility of the manager's compensation contract, investors' are expected to perceive the manager as less responsible for outcomes that (s)he is in fact not responsible for because investors know about his/her incentives to perform well or not. Therefore, outcome information has to be considered less informative for the manager's performance and the outcome bias should be mitigated.

In the experiment, participants take on the role as potential investors and evaluate the performance of a hypothetical manager. The experiment manipulates the outcome of the firm's financial performance (good/bad) as a between-subject factor, while the manager's actual performance is identical in both conditions. Further, the salience of compensation contract parameters (high/low) is manipulated by either including a stylized CD&A in the experimental materials or not. In case that the information presented in the materials is processed rationally, evaluators should arrive at identical performance evaluations between treatments.

The results of the laboratory experiment indicate an outcome bias that can be attributed to biased perceptions of the manager's outcome responsibility. Further, higher salience of compensation contract parameters mitigates the outcome bias in performance evaluation asymmetrically through higher performance evaluations in the bad outcome condition. However, although higher salience also improves the assessment of the compensation contract's incentive compatibility, results indicate no effect on the perceived outcome responsibility of the manager. Instead, the mitigation of the outcome bias is mediated by another effect, i.e., the fairness perception of the compensation contract. Specifically, the contract is evaluated fairer

in the high salience condition and participants' fairness perceptions apparently interact with their performance evaluations.

This study makes two contributions to the literature. First, it adds to the literature on outcome biases by clarifying the relationship between biased responsibility perceptions and biased performance evaluations (Brown and Solomon 1987; Mastilak et al. 2012; Tan and Lipe 1997). Second, the study adds to the stream of experimental research on disclosure formats (e.g. Belzile et al. 2006; Hirst and Hopkins 1998; Maines and McDaniel 2000). These studies find that alternative presentation formats have behavioral effects on investors' judgment, and that these effects can translate into individual firm valuations.

The findings also have important practical implications for firms. As firms enjoy discretion in organizing their CD&A, especially firms with a bad financial performance might make strategic use of the results by emphasizing the high incentivizing quality of their compensation contracts. Therefore, standard setter might consider specifying the rules on CD&A to prevent strategic disclosure. Further, standard setters may find support for demanding more detailed compensation disclosure because investors who make less biased executive performance evaluations might be enabled to form better expectations about future firm performance and to make investment decisions that are less biased by noisy outcome information.

The remainder of this paper is organized as follows. Section 2 explains the theoretical background of outcome biases and attribution theory and develops the hypotheses. Section 3 describes the experiment, and section 4 presents the results. Section 5 concludes the paper.

2 Background and Hypotheses

Background

This study is related to the literature studying the influence of outcome information on judgment. Related to the hindsight bias, i.e., individuals' tendency to unconsciously use outcome information for estimating the ex-ante likelihood of an event (Fischhoff 1975), numer-

ous studies on outcome effects in decision and performance evaluation evolved (e.g., Baron and Hershey 1988; Bol and Smith 2011; Brown and Solomon 1987; Lipshitz 1989; Peecher and Piercey 2008; Tan and Lipe 1997). Studies on decision evaluation show that judgments about a person's decision quality depend on the decision's outcome, meaning that the decision is judged better when the outcome is favorable (Baron and Hershey 1988; Lipshitz 1989). Yet, given that evaluators and decision makers have exactly the same ex-ante information about outcome probabilities evaluators should not consider their outcome knowledge. In this situation, outcome effects, i.e. the outcome-dependency of evaluations, reflect an outcome bias (Baron and Hershey 1988).

In contrast, situations in which investors evaluate the performance of managers are characterized by information asymmetry because managerial decision processes and managers' effort are not observable for investors. Instead, investors may evaluate executive performance using financial disclosure which mostly presents realized outcomes and very little ex-ante information about outcome probabilities of alternative decisions. However, knowledge of ex-ante probabilities and managers' effort is highly relevant for evaluating managers' actual performance. Therefore, investors lack knowledge in the sense of Baron and Hershey's (1988) study, and information about realized outcomes may serve as a substitute for this lacking knowledge because a firm's financial performance is a (noisy) indicator for managers' individual performance (Brown and Solomon 1987; Peecher and Piercey 2008; Tan and Lipe 1997).

However, outcome information is not always informative from a normative perspective. For instance, it should not be used at all, if a firm's financial performance is exclusively driven by unforeseeable and uncontrollable factors (Hershey and Baron 1992, 1995). Furthermore, studies investigating the effect of outcome controllability on the use of outcome information suggest that the informativeness of outcomes is an increasing function in the manag-

er's controllability of the outcome (Brown and Solomon 1987; Tan and Lipe 1997).[3] These experimental studies find that manipulation of the outcome controllability interacts with the use of outcome information in that good (bad) outcomes which are controllable for the manager result in higher (lower) performance evaluations than outcomes which are uncontrollable. However, these studies rather demonstrate a moderation of the outcome effect because individuals recognize that uncontrollable outcomes are less informative instead of providing evidence of how the outcome *bias* is affected. Even though, in an executive performance evaluation context, the manager's actual outcome controllability is not known to investors, and the actual informativeness of outcome information remains unclear to them, these results are highly relevant for this study. Instead of considering the actual outcome controllability, investors' performance evaluations rather use their *perceived responsibility* of the manager. Therefore, I expect that the perceived outcome responsibility moderates the outcome bias similarly to the moderation of outcome effects by the actual outcome controllability.

Attribution theory suggests important behavioral aspects regarding the perceived outcome responsibility. Generally, causal attributions describe individuals' search for plausible causes of success and failure, e.g. ability and effort of the actor, difficulty of the task or luck (Heider 1958; Weiner 1979, 1992; Weiner et al. 1972). In short, causal attributions can be classified as "dispositional" (being related to the actor) or as "situational" (being related to the environment).[4] As Kelley and Michela (1980) show that dispositional attributions lead to greater perceived outcome responsibility of the actor, I propose that findings on behavioral aspects in attribution theory also apply to an executive performance evaluation context. Specifically, cognitive biases in causal attributions (Miller and Ross 1975; Ross 1977) will be

[3] The accounting literature has acknowledged this principle by proposing that executives should only be evaluated based on what they can control (Antle and Demski 1988), but that many performance measures are not only affected by managers' actions but also by events beyond their control (Feltham and Xie 1994).

[4] Originally, attribution theory has identified two causal dimensions: "locus" (internal vs. external) and "controllability" (controllable vs. uncontrollable) (e.g. Weiner 1979). For the purpose of this study, both dimensions are aggregated to the concept of dispositional vs. situational attributions (e.g. Coletti et al. 2005).

considered in the hypotheses development as they may provide an explanation for the discrepancy between *perceived* responsibility and the *actual* controllability.

A study of Mastilak et al. (2012) suggests that the use of outcome information may not only be moderated by the degree of actual outcome controllability (Brown and Solomon 1987; Tan and Lipe 1997), but also by contextual information that have an impact on the perceived responsibility of the manager. In particular, Mastilak et al. (2012) study the effect of a strategy map—which clarifies the relationship between driver measures and outcome measures—on performance evaluations when the manager performed well on driver measures but the outcome was poor. They find that when a strategy map is present even those participants who think that the outcome was controllable do *not* blame the manager for the bad outcome. This finding suggests that the strategy map highlights that the manager's responsibility for the bad outcome was in fact limited. Further, participants might have considered this information about the low responsibility for their evaluation although they originally assessed the outcome controllability as high. Other studies show that even the way of presenting information, i.e., making relevant information more salient or increasing the clarity of accounting numbers, can influence information users' judgments (e.g. Belzile et al. 2006; Hirst and Hopkins 1998; Maines and McDaniel 2000). These findings are in line with judgment heuristics after which evaluators rather use the most salient piece of information instead of weighting the entire available information rationally (Kanouse 1972; Tversky and Kahneman 1974).

Hypotheses

Supposed that there are two scenarios in which a firm's financial performance is affected by environmental factors, and that these factors are either positive or negative, no responsibility for the difference in financial performance should be attached to the manager if certain conditions apply. First, the difference in financial performance between both scenarios is exclusively due to the realization of the environmental factors (positive or negative). Second, the

environmental factors are equally foreseeable in both scenarios and actions taken after their occurrence are equally suitable to cope with the consequences. And third, the evaluator knows about the first and the second condition. Thus, an evaluator should not hold the manager responsible for the difference in financial performance, and, therefore, the performance evaluation would have to be identical in both scenarios.

However, individuals' perceived outcome responsibility may be biased in at least two ways. First, the fundamental attribution error describes the tendency of over-attribution to dispositional factors (Ross 1977),[5] especially for making causal attributions for outcomes achieved by others compared to own outcomes (Jones and Nisbett 1972; Ruble 1973). Therefore, attribution theory suggests that managers' outcome responsibility is rather overestimated by investors compared to the responsibility of environmental factors. Second, attributions can be outcome dependent as well. Similar to the self-serving attribution bias, i.e., being self-enhancing towards own success (Libby and Rennekamp 2011; Miller and Ross 1975), individuals tend to hold others even more responsible for success than for failure (e.g. Frieze and Weiner 1971; Ruble 1973).[6] Hence, the outcome dependency of attributions implies that investors hold a manager more responsible for a good than for a bad financial performance.

Both attribution biases—the fundamental attribution error and the outcome dependency of attributions—imply an outcome bias in performance evaluation. In order to predict this effect, I relate the implications to the two scenarios where a firm's financial performance differs only due to environmental factors. First, according to the fundamental attribution error, investors would hold the manager responsible for the difference in financial performance, although they should not, and this would bias performance evaluations towards the outcome. And second, due to the outcome dependency of attributions, investors would hold the manag-

[5] Gilbert and Malone (1995) refer to a similar observation as correspondence bias.

[6] See Kelley and Michela (1980), p. 468 et seq., for an overview of studies in which success is predominantly attributed to dispositional causes, while the actors are not even known to evaluators.

er even more responsible in case of the good financial performance, so that, consequently, his/her performance would be evaluated even higher. H1 formally predicts the outcome bias:

> **H1:** Given constant executive performance, investors evaluate a manager's performance higher, when the firm's financial performance is good than when it is bad.

Regarding a possible mitigation of the outcome bias, compensation disclosure offers ways to highlight the limited responsibility of the manager and, therefore, to mitigate the effects of biased attributions. In particular, I propose a three step process. (1) Higher salience of compensation contract parameters enables investors to better assess the incentive compatibility of the manager's compensation contract. (2) As contracts (usually) remain unchanged over time, investors assume stable incentives of the manager to provide effort (or not) and to make decisions in (or against) the shareholders' interest. Hence, environmental factors become a more plausible cause for a particularly good or bad financial performance, and the manager is perceived less responsible for outcomes that (s)he is in fact not responsible for. (3) A lower perceived responsibility of the manager makes investors consider outcome information less indicative for his/her performance, so that their evaluations are less biased by the outcome.

In the first step, compensation disclosure is hypothesized to have an effect on the assessment of a compensation contract's incentive compatibility. Compensation reports complying with SEC's 2006 regulation disclose the amount and structure of realized compensation for the current and two preceding years and, therefore, allow for inferences about the contract's incentive compatibility: Provided that the manager has been in office for at least two years and that the contract did not change since then, the change in realized compensation between two years divided by the change in the underlying performance measure yields the performance sensitivity of the contract. Consequently, knowledge about the ex-ante incentives of the manager can be inferred even from realized compensation. However, I propose that the assessment of incentive compatibility is further facilitated when compensation reports provide a more salient presentation of the contract parameters, e.g., the steepness of the compensation

function. As also required by SEC's 2006 regulation, compensation reports explain how the realized compensation is related to the achievement of performance measures. This can either be done by a tabular comparison of realizations and target levels or through a graphical presentation of the compensation function (cf. Dodd-Frank Act Section 953a). Both ways of presenting the relationship between realized compensation and performance measures can make important contract parameters like the steepness of the compensation function more salient. Although the performance sensitivity of compensation is also inferable by comparing the realized compensation between two years, a more salient presentation may further highlight the performance sensitivity of the contract and, therefore, help investors to assess the compensation contract's incentive compatibility:

H2a: Higher salience of compensation contract parameters facilitates investors' assessment of the contract's incentive compatibility.

In the second step, I hypothesize that compensation disclosure affects the perceived outcome responsibility of the manager. In this context, experimental evidence in accounting shows that the way how information is presented can boost the salience and clarity of relevant information and, therefore, can affect individuals' judgment in general (Belzile et al. 2006; Hirst and Hopkins 1998; Maines and McDaniel 2000) and the perceived outcome responsibility of managers in particular (Mastilak et al. 2012). Further, theory suggests that causal attributions depend on the availability and salience of contextual information. In particular, Frieze and Weiner (1971) demonstrate that, while common attributions for students failing an exam are dispositional, attributions are rather situational when contextual information is *available* that a particular student is smart and hard-working. Studies on judgment heuristics suggest a similar effect for the *salience* of contextual information as evaluators primarily use the most salient information instead of reviewing and weighting all information rationally (e.g. Kanouse 1972; Tversky and Kahneman 1974).

Therefore, investors who are provided with salient contract information will more likely infer whether the manager has a stable motivation to provide effort (or not) and to make decisions in (or against) the shareholders' interest. This represents important contextual information for judging the outcome responsibility of the manager as it should support reasoning about the influence of environmental factors on financial performance. Specifically, plausible causes for a particularly good or bad financial performance are more likely to be found in environmental factors than in an exceptionally outstanding or poor performance of the manager. Therefore, investors' perceived outcome responsibility of the manager is expected to be shifted away from the manager and towards environmental factors when compensation disclosure presents the contract parameters more saliently.

H2b: Higher salience of compensation contract parameters causes investors to perceive lower outcome responsibility of the manager.

Finally, a lower perceived outcome responsibility of the manager should cause investors to consider outcome information, i.e., financial performance, as less informative for the manager's individual performance. This effect is similar to the informational effect of actual outcome controllability (Brown and Solomon 1987; Tan and Lipe 1997) and is, instead, based on investors' own perception of outcome responsibility. Yet, I expect the perceived responsibility to mitigate the outcome bias correspondingly. More specifically, relating this effect to the two scenarios where a firm's financial performance differs only due to environmental factors suggests that a lower perceived outcome responsibility results in a relatively lower (higher) performance evaluation in case of the good (bad) financial performance.

H3: Higher salience of compensation contract parameters mitigates the outcome bias in executive performance evaluation.

3 Methodology

Experimental Design

The experiment employs a 2 (good/bad outcome) x 2 (high/low salience of compensation contract parameters) between-subjects design. The participants' task was to assume the role of an investor and to evaluate the individual performance of the manager of a hypothetical firm.

The case material that the participants received portrayed the firm and the manager that should be evaluated (see Appendix). Further, the material presented ex-ante information about possible outcomes (firm's market position and demand forecast) as well as general contextual information (e.g. seasonal nature of the business and description of the manager's task). Both parts are relevant for judging the manager's outcome responsibility from a normative perspective. Further, the case material presented three strategic decisions of the manager, which were designed to have upside and downside potential for the firm from an ex-ante perspective. Next, the case referred to an unexpected demand shock and explained the consequences for the firm's sales and the particular outcome of the manager's strategic decisions. Further, it described how the manager adjusted the production capacities to the new environment, and finally, the outcome information was presented (stylized financial and compensation report).

The first treatment variable (OUTCOME) was manipulated by either describing a positive or a negative demand shock which was beyond the manager's control and which none of the professional forecasts had anticipated. The shock had a serious impact on the firm's financial performance, on the manager's realized compensation and on the outcome of the manager's strategic decisions. Yet, the manager's strategic decisions were identical in both treatment conditions and the manager's upward (positive shock) and downward (negative shock) adjustments of the production capacities can be considered adequate given the technical restrictions in place. The consequences of the positive and the negative shock on the financial

performance were symmetrical. All design choices were made in order to enable rational evaluators to arrive at identical performance evaluations in all treatments.

The second treatment variable, the salience of compensation contract parameters (SALIENCE), was manipulated by adding a stylized CD&A to the compensation report or not. In the low salience condition, the compensation report only contained a "Summary Compensation Table" that showed the fixed salary, the realized bonus and the value of awarded stocks. For matters of simplification, the compensation table included only the current and one preceding year. The underlying compensation contract was designed to be assessed as incentive compatible, i.e., the realized bonus amounts given both outcomes deviated strongly from the bonus in the previous year (good: 1,471,879 this year vs. 849,956 previous year; bad: 228,374 this year vs. 849,956 previous year). In the high salience condition, the data in the "Summary Compensation Table" were discussed so that the rationale behind all compensation components was made clear. In particular, the report showed a picture of the manager's bonus function illustrating the realizable bonus that the manager could have earned for alternative outcomes. Further, the report contained a narrative description of the amount of bonus granted per incremental increase of the performance measure. Hence, the performance sensitivity of the compensation contract was presented more prominently. Moreover, the discussion of the data from the table addressed the incentivizing effect of stock awards and, hence, further supported assessment of the contract's incentive compatibility. Even though the stylized CD&A necessarily contained contextual information that could not be contained in the low salience condition, the mere informativeness of the case material with respect to the performance sensitivity was identical in both conditions. Hence, when participants received the stylized CD&A, disclosure about the contract was not more informative for assessing the incentive compatibility, but made the relevant information more salient.

Participants and Procedures

113 students from a large European university participated in the experiment. 47% of the participants were male and the average age was 24.6 years. An overview of the experimental procedures is given in Figure 1.

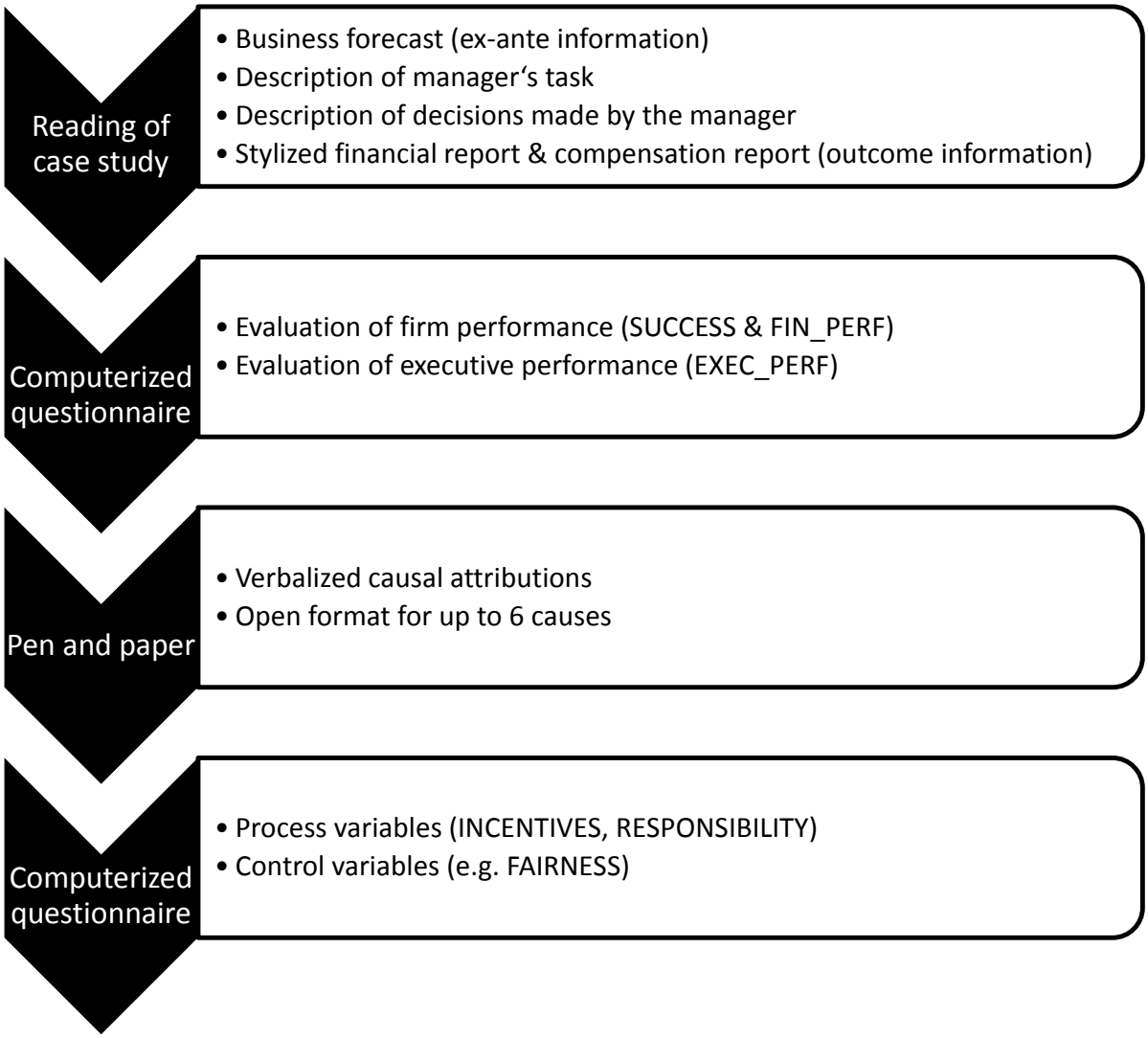

Figure 1: Experimental procedures

The experiment took place in a computer lab with separated work stations and started by giving participants the opportunity to read the paper-based case material for 20 minutes and to make personal notes. After that, the case material remained on the participants' desk, and they were allowed to refer back to the case and their notes at any time during the remainder of the

experiment. For the first set of questions, participants opened a computerized questionnaire.[7] No time restrictions were imposed on participants while evaluating the firm's financial performance and the manager's individual performance. Right after the performance evaluation, participants stated their thoughts on the perceived causes for the observed outcome by writing down up to six causes on a separate sheet of paper that they found in a sealed envelope on their desk. For this purpose, the questionnaire was automatically stopped for six minutes. Finally, back in the computerized questionnaire, causal attributions were also elicited by a formalized multi-item scale. Further, participants evaluated the contract's incentivizing quality and answered several questions for control purposes. The fixed compensation was 10 Euro per participant. As it is common in individual judgment studies, a variable compensation could not be paid.

Measures

The main dependent variables capture the participants' performance evaluations. First, participants classified the firm's financial performance overall as success or failure (SUCCESS: 0 = failure; 1 = success). Second, participants evaluated the financial performance—as all other subsequent evaluations—on a 9-point Likert scale (FIN_PERF: 1 = not successful at all; 9 = very successful). And third, the manager's individual performance was evaluated (EXEC_PERF: 1 = very low performance; 9 = very high performance).

The first process variable, INCENTIVES, measures how strong participants perceive the compensation contract's quality in incentivizing the manager "to provide a high effort and to make decisions that increase shareholder value" (1 = very low quality; 9 = very high quality). As the compensation presented in the case material is supposed to be based on an incentive compatible contract, a high value of INCENTIVES indicates an assessment of the contract's incentive compatibility consistent with the prediction made in H2a.

[7] The questionnaire was programmed with the software z-Tree (Fischbacher 2007). The main reason why the questionnaire was computerized was to have more control over the answering process.

The second process variable is the perceived outcome responsibility of the manager (RESPONSIBILITY). For this purpose, the Causal Dimension Scale (CDS) developed by Russell (1982) was adapted to an executive performance evaluation context. The CDS measures whether an outcome is attributed to rather dispositional or situational causes and consists of six bipolar semantic items (each displaying: 1 = "example for a dispositional attribution" and 9 = "example for a situational attribution").[8] Responses to the six CDS items were summed up, divided by six and reverse coded in order to construct the RESPONSIBILITY variable (1 = very low outcome responsibility; 9 = very high outcome responsibility). Other than Mastilak et al. (2012) who measure only one end of the continuum, i.e., the "believed impact of uncontrollable factors", the CDS measures the perceived causes in terms of alternatives, meaning that they have to do either with the manager or with environmental factors. Therefore, the CDS approach is more appropriate for measuring the perceived outcome responsibility of the manager.

Since individuals' judgment about compensation might be subject to fairness preferences (e.g. Adams 1965; Bolton and Ockenfels 2000), participants' perceived fairness of the manager's compensation contract is included as a control variable in order to control for different fairness perceptions between treatments. In particular, distributional fairness theories based on the receiver's net utility (Adams 1965) suggest that individuals find large compensation amounts for others more acceptable if an increase in compensation does not reflect an increase in net utility because uncertain income provides less utility than certain income. Consistent with this theory, Arnold and Grasser (2014) find empirical evidence that individuals find higher compensation amounts more acceptable when the variable compensation share is higher. Thus, in this setting, individuals who are more aware of the fact that the realized compensation is exposed to risk, i.e. if they judge INCENTIVES higher, might perceive the man-

[8] Further support for the validity of the Causal Dimension Scale is provided by Russell et al. (1987) and McAuley et al. (1992). Based on these studies, two alternative sets of items were developed and tested in a pre-study with 67 participants before the main experiment. Both sets showed high reliability and validity, yet the better one was selected for the experiment.

ager's compensation contract as fairer. Therefore, FAIRNESS measures how fair participants think the manager's compensation contract is considering "all details of the manager's compensation contract (e.g., absolute amount, structure, or relation to financial performance" (1 = not fair at all; 9 = perfectly fair).

4 Results

Descriptive Statistics

Descriptive statistics for all dependent variables are reported in Table 1. Participants' overall classification of the firm's financial performance (SUCCESS) was largely consistent with the OUTCOME manipulation. 55 of the 56 participants in the good outcome treatments classified the overall firm performance as a success, and 43 of the 53 participants in the bad outcome treatments classified the firm performance as a failure.[9] Further, comparing the mean values for FIN_PERF indicates that participants judged the firm's financial performance in the treatments reflecting a good outcome better that in the treatments reflecting a bad outcome (low salience: 7.00 vs. 3.73; high salience: 7.37 vs. 4.00). In comparison, there is no substantial difference in evaluating the financial performance between the low and the high salience condition (bad outcome: 4.00 vs. 3.73; good outcome: 7.37 vs. 7.00).

Descriptive results for all hypothesized effects on the dependent variables are also illustrated in Figure 2. As predicted by H1, mean values of EXEC_PERF differ between the good and the bad outcome treatments (low salience: 7.31 vs. 4.73; high salience: 7.33 vs. 5.67). Although this indicates an outcome bias for both salience conditions, the difference is smaller when salience is high (high salience: 1.66 = 7.33 – 5.67; low salience: 2.58 = 7.31 – 4.73). Hence, there is first support in favor of H1 and H3.

[9] Four participants had to be excluded from the final sample because of inconsistent answers. One participant classified the financial performance as a success, but rated FIN_PERF rather as a failure. Three participants classified the financial performance as a failure, but rated FIN_PERF rather as a success. Therefore, it was unclear whether their perceived outcome responsibility of the manager was related to making him/her responsible for a success or a failure.

Mean *(Std. Dev.)*	Low Salience		High Salience	
	Bad Outcome (T1)	Good Outcome (T2)	Bad Outcome (T3)	Good Outcome (T4)
Observations	26	29	27	27
SUCCESS[a]	**0.19** *(0.40)*	**0.97** *(0.19)*	**0.19** *(0.40)*	**1.00** *(0.00)*
FIN_PERF[b]	**3.73** *(1.56)*	**7.00** *(1.00)*	**4.00** *(1.24)*	**7.37** *(1.01)*
EXEC_PERF[c]	**4.73** *(1.78)*	**7.31** *(1.39)*	**5.67** *(1.54)*	**7.33** *(0.83)*
INCENTIVES[d]	**6.04** *(1.64)*	**6.93** *(1.87)*	**6.96** *(1.89)*	**7.67** *(1.27)*
RESPONSIBILITY[e]	**3.65** *(1.39)*	**5.48** *(1.43)*	**4.25** *(1.49)*	**5.48** *(1.27)*
FAIRNESS[f]	**4.85** *(1.76)*	**6.00** *(1.91)*	**6.22** *(1.93)*	**7.00** *(1.44)*

The outcome is manipulated (between participants) at two levels: bad vs. good. In the bad (good) outcome condition, the case material refers to a negative (positive) demand shock that affects the firm's financial performance and the manager's compensation negatively (positively).

Salience is manipulated (between participants) at two levels: low vs. high. In the low salience condition, the compensation report only shows the "Summary Compensation Table" and, in the high salience condition, a stylized CD&A is included.

[a] SUCCESS = participants' overall classification of the financial performance (0 = failure; 1 = success);

[b] FIN_PERF = participants' financial performance evaluation (1 = not successful at all; 9 = very successful);

[c] EXEC_PERF = participants' executive performance evaluation (1 = very low performance; 9 = very high performance);

[d] INCENTIVES = participants' perception of the compensation contract's quality in incentivizing the manager "to provide a high effort and to make decisions that increase shareholder value" (1 = very low quality; 9 = very high quality).

[e] RESPONSIBILITY = participants' perceived outcome responsibility of the manager (1 = very low outcome responsibility; 9 = very high outcome responsibility);

[f] FAIRNESS = participants' fairness perception of the compensation contract (1 = not fair at all; 9 = perfectly fair).

Table 1: Descriptive Statistics

Regarding H2a, the data also show first support as INCENTIVES is judged higher in the high salience treatments (bad outcome: 6.96 vs. 6.04; good outcome: 7.67 vs. 6.93). However, descriptive statistics for RESPONSIBILITY suggest that salience of contract parameters does not have the effect predicted by H2b. In particular, the manager is perceived even more responsible instead of less responsible for bad outcomes when salience is high (high salience: 4.25 vs. low salience: 3.65) and equally responsible for good outcomes in both salience condi-

tions (high salience: 5.48 vs. low salience: 5.48). Nonetheless, RESPONSIBILITY shows the expected outcome dependency, meaning that the manager is perceived more responsible for good outcomes than for bad outcomes (low salience: 5.48 vs. 3.65; high salience: 5.48 vs. 4.25). Further, participants judged FAIRNESS higher when salience was high (bad outcome: 6.22 vs. 4.85; good outcome: 7.00 vs. 6.00).

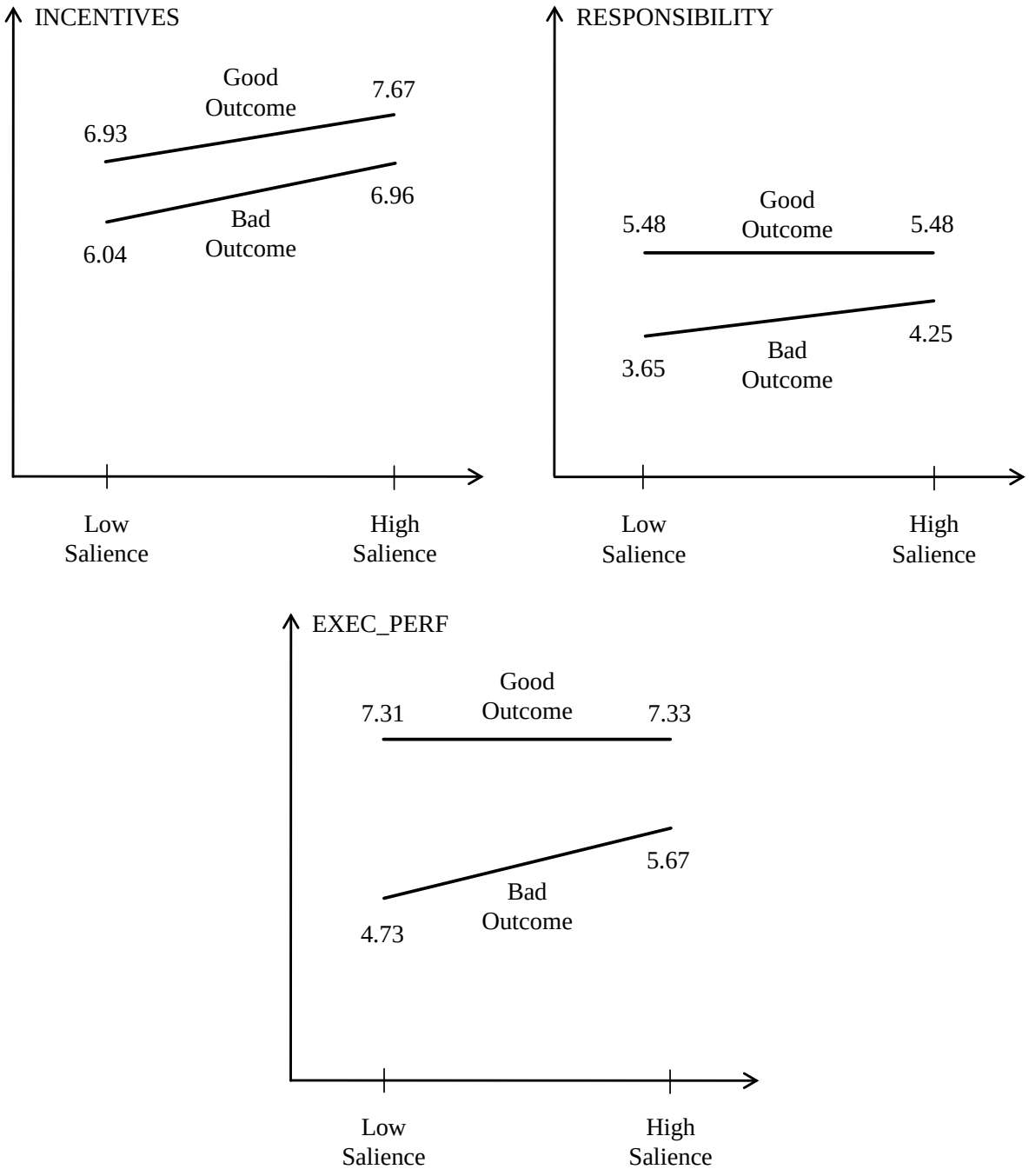

Figure 2: Results for H2a (INCENTIVES), H2b (RESPONSIBILITY), and H1 & H3 (EXEC_PERF)

Hypothesis Tests

To test H1 and H3, I ran an ANOVA with EXEC_PERF as dependent variable and the treatment variables (OUTCOME and SALIENCE) as independent variables. The ANOVA results are displayed in Panel A of Table 2. The main effect of OUTCOME is highly significant ($F = 60.37$, $p < 0.001$)[10] providing strong support for H1. Further, the interaction effect of OUTCOME and SALIENCE is significant ($F = 2.79$, $p = 0.098$). A subsequent analysis of simple main effects, displayed in Panel B, indicates that salience increases performance evaluations for bad outcomes ($\chi^2 = 5.71$, $p = 0.017$), while performance evaluations for good outcomes do not change ($\chi^2 < 0.01$, $p = 0.952$). Hence, results of the ANOVA and the simple main effects analysis support the prediction of H3 that SALIENCE mitigates the outcome bias in executive performance evaluation. Yet, the mitigating effect appears to be asymmetric as salience increases performance evaluations in the face of bad outcomes but does not affect performance evaluations in the face of good outcomes.

Panel A: Two-way ANOVA

	sum of sq.	df	mean sq.	F-Stat.	p-val.
OUTCOME	122.64	1	122.64	60.37	<0.001
SALIENCE	6.25	1	6.25	3.08	0.082
OUTCOME x SALIENCE	5.67	1	5.67	2.79	0.098
Residual	213.32	105	2.03		

Panel B: Simple effects analysis

	χ^2	p-val.
Simple main effect of SALIENCE if OUTCOME is bad	5.71	0.017
Simple main effect of SALIENCE if OUTCOME is good	<0.01	0.952

Panel A shows an ANOVA with the executive performance evaluation (EXEC_PERF) as dependent variable and the treatment variables, OUTCOME and SALIENCE, as independent variables. The ANOVA includes 109 observations. P-values are two-tailed.

Panel B shows the results of a simple effects analysis holding OUTCOME constant (bad: 53 observations; good: 56 observations). P-values are two-tailed.

Table 2: ANOVA – Effects of OUTCOME and SALIENCE on EXEC_PERF

[10] All p-values reported in this results section are two-tailed.

To test H2a, predicting that INCENTIVES is judged higher in the high salience condition than in the low salience condition, I ran an ANOVA (results displayed in Table 3) with INCENTIVES as dependent variable and the treatment variables as independent variables. The results show a significant main effect of SALIENCE ($F = 6.57$, $p = 0.012$) and, therefore, support H2a.

	sum of sq.	df	mean sq.	F-Stat.	p-val.
OUTCOME	17.33	1	17.33	6.07	0.015
SALIENCE	18.75	1	18.75	6.57	0.012
OUTCOME x SALIENCE	0.24	1	0.24	0.08	0.771
Residual	299.79	105	2.86		

The Table shows an ANOVA with participants' perception of the incentivizing quality of the contract (INCENTIVES) as dependent variable and the treatment variables, OUTCOME and SALIENCE, as independent variables. The ANOVA includes 109 observations. P-values are two-tailed.

Table 3: ANOVA – Effects of OUTCOME and SALIENCE on INCENTIVES

For the test of H2b, predicting that the manager is perceived less responsible in the high salience condition than in the low salience condition, I ran an ANOVA (results displayed in Table 4) with RESPONSIBILITY as dependent variable and the treatment variables as independent variables.

	sum of sq.	df	mean sq.	F-Stat.	p-val.
OUTCOME	63.86	1	63.86	32.54	<0.001
SALIENCE	2.48	1	2.48	1.26	0.263
OUTCOME x SALIENCE	2.41	1	2.41	1.23	0.271
Residual	206.04	105	1.96		

The Table shows an ANOVA with participants' perceived outcome responsibility of the manager (RESPONSIBILITY) as dependent variable and the treatment variables, OUTCOME and SALIENCE, as independent variables. The ANOVA includes 109 observations. P-values are two-tailed.

Table 4: ANOVA – Effects of OUTCOME and SALIENCE on RESPONSIBILITY

As descriptive statistics already suggested that higher salience even increases the perceived responsibility, the ANOVA tests whether this opposite effect is significant. The results indicate that there is no main effect of SALIENCE ($F = 1.26$, $p = 0.263$). In summary, the

results neither support H2b nor do they indicate that salience of contract parameters has the opposite effect on the perceived responsibility. Furthermore, the ANOVA shows a significant main effect of OUTCOME ($F = 32.54$, $p < 0.001$), supporting the notion that managers are held more responsible for good outcomes than for bad outcomes.

Supplemental Analysis

For the development of H1, it was argued that investors' perceived outcome responsibility is biased by outcomes in that managers' are held more responsible for good outcomes than for bad outcomes, and that investors' perceived outcome responsibility drives the outcome bias in performance evaluation. Existence of the first effect was already supported by the significant main effect of OUTCOME on RESPONSIBILITY. To further investigate the hypothesized relationship between the perceived outcome responsibility and the performance evaluation, I ran an OLS-regression analysis with EXEC_PERF as dependent variable and RESPONSIBILITY as independent variable. As from a theoretical perspective, the relationship between RESPONSIBILITY and EXEC_PERF is moderated by SUCCESS, i.e., it is negative when outcomes are classified as a failure and positive when outcomes are classified as a success, the regression also uses SUCCESS and the interaction term SUCCESS x RESPONSIBILITY as independent variables. The results, displayed in Table 5, indicate a significant interaction effect ($t = 3.39$, $p < 0.001$). Hence, there is support for the notion that RESPONSIBILITY affects EXEC_PERF differently contingent on the level of SUCCESS. More precisely, if the outcome is classified as a failure (SUCCESS = 0) the effect is negative but not significant (coeff.: -0.13, $t = -0.94$, $p = 0.348$). If the outcome is classified as a success (SUCCESS = 1), the effect is positive (coeff.: 0.48 = -0.13 + 0.61). To test for significance of this positive relationship, the regression was rerun holding the level of SUCCESS constant at 1. The result indicates significance ($t = 6.20$, $p < 0.001$). Therefore, the regression analysis lends support to the notion that, given success, a manager's performance is evaluated the higher, the higher individuals perceive the manager's outcome responsibility, and that, therefore, the out-

come bias in performance evaluations is driven by participants' perceived responsibility of the manager.

Dependent variable = EXEC_PERF	Coefficient	Standard error	t	p-value
REPONSIBILITY	-0.13	0.14	-0.94	0.348
SUCCESS	-0.93	0.87	-1.08	0.284
RESPONSIBILITY* SUCCESS	0.62	0.18	3.39	0.001
Constant	5.55	0.59	9.38	<0.001

The table shows an OLS-regression using EXEC_PERF as dependent variable and RESPONSIBILITY, SUCCESS and the interaction term of both as independent variables. The regression includes 109 observations. P-values are two-tailed.

Table 5: OLS-Regression – Effects of RESPONSIBILITY and SUCCESS on EXEC_PERF

The second relationship that is analyzed in more detail is the mitigating effect of more salient disclosure on the outcome bias. This is to understand whether the mitigation of the outcome bias is caused by the mechanism that is proposed in the hypothesis development of H3. Specifically, it was proposed that, first, higher salience facilitates the assessment of the contract's incentive compatibility, which means in this setting that the incentivizing quality is judged higher. Second, it was proposed that an easier assessment of the incentive compatibility leads to a lower perceived outcome responsibility of the manager. And, finally, a lower responsibility perception leads to a smaller outcome bias. Since from a theoretical perspective the relationship between the perceived responsibility and the performance evaluation depends on the direction of the outcome, the analysis focuses exclusively on a bad outcome subsample (n=53). Further, as the observed mitigation of the outcome bias through higher salience is asymmetric, meaning that participants evaluate executive performance higher for bad outcomes but equally high for good outcomes, the subsample refers to the more relevant part of the sample.[11] Therefore, the prediction to be tested can be limited to the following causal

[11] An alternative analysis of the good outcome subsample (n = 56) yielded no support with regard the proposed mechanism. This is not surprising because the effect of SALIENCE on EXEC_PERF is close to zero in the good outcome condition.

chain: higher salience leads to a higher perceived incentivizing quality, which in turn leads to a lower responsibility perception that, given a bad outcome, leads to a higher performance evaluation.

To formally test this prediction, I propose a mediator model with SALIENCE as independent variable, EXEC_PERF as dependent variable, and INCENTIVES and RESPONSIBILITY as two consecutive mediators. Therefore, I make predictions for three paths: path 'a' (SALIENCE → INCENTIVES: positive), path 'b1' (INCENTIVES → RESPONSIBILITY: negative), and path 'b2' (RESPONSIBILITY → EXEC_PERF: negative). As one positive relationship and two negative relationships are predicted, the entire indirect effect is predicted to be positive. In addition to that, the direct effect of salience on the performance evaluation is predicted to be not significant: path 'c' (SALIENCE → EXEC_PERF). Instead of using Baron and Kenny's (1986) step-wise approach for testing mediations or other methods that require an estimate of the standard error like the Sobel test (Sobel 1982), I use confidence intervals derived from bootstrapping procedures. These are considered more appropriate for small samples and do not impose the assumption of normality on the data (Hayes 2009; Shrout and Bolger 2002). The results show that path 'a' is significantly positive (coeff.: 0.96, z = 2.02, p = 0.043), and that path 'b1' is, other than predicted, positive and not significant (coeff.: 0.04, z = 0.34, p = 0.733). Path 'b2' is negative, as predicted, but not significant (coeff.: -0.02, z = -0.12, p = 0.901). As a consequence, the entire indirect effect through both consecutive mediators is also negative (coeff.: -0.001)[12] and not significant. The bias corrected 95%-confidence interval is (-0.083, 0.025)[13]. As the confidence interval includes zero, there is no significant effect in either direction. Moreover, at the same time, the direct effect (path 'c') is significantly positive (coeff.: 0.95, z = 2.01, p = 0.044). Therefore, the mediation analysis suggests that

[12] The coefficient is the product of path 'a', path 'b1' and path 'b2' (-0.001 = 0.96 x 0.04 x -0.02).
[13] The significance test uses bootstrapping with 2,000 random samples (Shrout and Bolger 2002).

the total effect of higher salience on the performance evaluation is due to another mechanism than the one proposed.

The alternative mechanism that I test includes the control variable FAIRNESS instead of RESPONSIBILITY, but otherwise uses the same model as before. As already indicated by the descriptive statistics, participants perceived the compensation contract fairer when salience was high. A t-test indicates a significantly higher mean of FAIRNESS in the high than in the low salience condition (6.61 vs. 5.45, $t = -3.31$, $p < 0.01$). As discussed earlier, this effect might be related to the assessment of the contract's incentivizing quality. In particular, individuals who find the contract to be more incentivizing might also judge the compensation contract to be fairer because they acknowledge that a considerable share of the realized compensation is exposed to risk (Adams 1965; Arnold and Grasser 2014). Regarding the relationship between FAIRNESS and EXEC_PERF, I assume a positive effect because perceiving the contract as unfair (fair) might have a negative (positive) spillover effect on the performance evaluation. This is because individuals might be more reluctant to giving someone a good evaluation if they know that this person is unfairly compensated (in the sense that pay is granted without performance).

Therefore, I propose a mediator model with SALIENCE as independent variable, EXEC_PERF as dependent variable, and INCENTIVES and FAIRNESS as two consecutive mediators. Since this model is not theoretically limited to a specific outcome condition, the analysis includes the full sample ($n = 109$).[14] The predicted paths are: path 'a' (SALIENCE → INCENTIVES: positive), path 'b1' (INCENTIVES → FAIRNESS: positive), and path 'b2' (FAIRNESS → EXEC_COMP: positive). As predicted, the results show that all paths are significantly positive: path 'a' (coeff.: 0.84, $z = 2.56$, $p = 0.010$), path 'b1' (coeff.: 0.77, $z = 10.02$, $p < 0.001$), and path 'b2' (coeff.: 0.45, $z = 5.46$, $p < 0.001$). Consequently, the entire

[14] Including only the bad outcome subsample ($n = 53$) does not change the following results inferentially. Moreover, including the full sample in the analysis is deemed to be the more conservative test for the proposed mechanism because the effect of SALIENCE on EXEC_PERF is close to zero in the good outcome condition.

indirect effect through both consecutive mediators is positive (coeff.: 0.29)[15] and significant as the bias corrected 95%-confidence interval is (0.063, 0.657). Further, a full mediation through the proposed mediators is suggested because the direct effect (path 'c') is not significant (coeff.: -0.06, z = -0.19, p = 0.848).

5 Conclusion

This study investigates investors' executive performance evaluations based on financial disclosure. Regulation on executive compensation requires firms to report realized compensation amounts and to explain the rationale behind the provision of all pay components as well as how each pay component contributes to meeting the objectives of the firm (SEC 2006). Yet, regulation is not very specific on how to organize the "Compensation Discussion and Analysis" (CD&A) and, thus, firms have discretion which they seem to use (Laksmana 2012).

The experiment investigates the effects on executive performance evaluation that can occur due to CD&A's increased salience of compensation contract parameters. Prior literature suggests that the perceived outcome responsibility of managers plays an important role for performance evaluation (Brown and Solomon 1987; Tan and Lipe 1997) and that increased salience and clarity of information that is relevant for judging a manager's outcome responsibility might make the performance evaluation less outcome dependent (Kanouse 1972; Mastilak et al. 2012; Tversky and Kahneman 1974).

The findings of the experimental study suggest that investors' evaluations of executive performance suffer from an outcome bias, and that CD&A mitigates this outcome bias by a more salient presentation of the compensation contract parameters. However, mitigation of the outcome bias is asymmetric as higher salience only increases performance evaluations for bad outcomes but does not affect performance evaluations for good outcomes. Although the results support the notion that biased attributions, i.e., an overestimation of the manager's

[15] The coefficient is the product of path 'a', path 'b1' and path 'b2' (0.29 = 0.84 x 0.77 x 0.45).

outcome responsibility, are a source of the outcome bias, the mitigating effect is not related to an effect on the perceived outcome responsibility. Furthermore, even though higher salience of contract parameters facilitates assessment of the contract's incentive compatibility, which should decrease uncertainty about the manager's actions, the perceived outcome responsibility is not affected. Instead, mitigation of the outcome bias can be attributed to an effect of the perceived fairness of the compensation contract. Participants perceived the compensation contract fairer in the high salience condition, i.e. when it was more salient that a considerable share of the manager's compensation was exposed to risk, and consequently evaluated the manager's performance higher. Thus, results suggest that a spillover exists between the fairness perception of compensation contracts' and executive performance evaluation.

This experiment makes two contributions to the literature. First, the study provides evidence on the moderating role of the *perceived* responsibility on the use of outcome information (Mastilak et al. 2012). This finding adds to the existing knowledge base because only few prior studies considered the influence of cognitive distortions on evaluators' perceived responsibility of the evaluated person. Instead, prior studies manipulated outcome controllability directly and, therefore, rather analyzed normative effects on the use of outcome information (e.g. Brown and Solomon 1987; Tan and Lipe 1997). Second, the findings contribute to extant research showing that accounting formats matter for investors in terms of expected firm value (e.g. Belzile et al. 2006; Hirst and Hopkins 1998; Maines and McDaniel 2000). This is because findings suggest that compensation disclosure can de-bias executive performance evaluation, which is supposed to be an important component for forming expectations about future firm performance.

Further, the findings have important implications for firms and standard setters and contribute to the discussion about executive compensation disclosure rules. The results suggest that CD&A highlights information that refers to the incentivizing properties of compensation contracts and that CD&A mitigates the relative underrating of executive performance for a

bad financial performance the manager should not be blamed for. On the one hand, given the discretion that firms have in organizing their CD&A, this finding might be especially important for firms with a bad financial performance. Therefore, on the other hand, standard setters might consider giving more specific directions about how to organize CD&A in the future to prevent managers from using the demonstrated effect strategically.

A common limitation of experimental studies using student participants is that professionals might be more sophisticated in performing the task. However, finding an outcome bias in performance evaluation should not be limited to students. In fact, business people's performance evaluations may be even more outcome-dependent as their exposure to incentive structures emphasizes the importance of performance measure (Tan and Lipe 1997). Further, in business, positive outcomes tend to be rewarded without the necessity of justifying why the performance was good. However, when performance is low evaluators provide more causal analysis (Bettman and Weitz 1983). This prior evidence is also consistent with the finding that the mitigation of the outcome bias is due to an asymmetric effect of the salience manipulation because participants apparently did not have a demand for additional explanations when the financial performance was good.

Finally, this study offers opportunities for future research. Since this study analyzed the use of outcome information by contrasting two scenarios which differed for uncontrollable causes, the observed outcome bias is of relative nature. It can be concluded that the difference between the performance evaluations of both scenarios is not rational, but there is no normative benchmark for the absolute level of the evaluations. Therefore, the observed evaluations cannot be unambiguously identified as under- or overrating of performance. Alternative experimental settings could provide a benchmark for the normative use of outcome information even if this comes to the cost of a less realistic setting (e.g. Grasser 2014; Peecher and Piercey 2008). Yet, a more reliable conclusion could be drawn whether the effect of compensation disclosure decreases the mere difference between evaluations or whether evaluations truly

become more rational. Furthermore, future research could also include an incentive contract that is not considered incentive compatible, meaning that it provides insufficient incentives. According to the findings of this study, higher salience of such a contract's lacking incentive compatibility would negatively affect the fairness perception of the contract and might, therefore, cause a negative spillover on performance evaluation.

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7 Appendix – Experimental Instruments[16]

a) Description of the firm

The company that you will evaluate is a multinational manufacturer. The shares of the company are publicly traded. The company's production and sales activities are entirely focused on the core business in one specific industry. Within its industry the company maintains an average position with regard to size (measured by sales), quality of products and innovativeness.

The company is managed by a CEO who carries the overall responsibility and makes the general strategic decisions. The CEO has been in charge for five years.

Tasks of the CEO:

The most important tasks of the CEO are to make strategic investments in production capacities and to decide in which markets the company is conducting business. For making strategic investment decisions the CEO relies on long-term demand forecasts and forecasts about the overall economic development that are both conducted by independent research institutes.

The company's industry traditionally has a strong seasonal demand in the fourth quarter. Therefore, like its competitors, the company builds up stock during the first 9 months of the year. This is the only way to satisfy demand, while the production capacity is constantly operated throughout the year. Until the end of the year, the stock has to be cleared out completely because the product life cycle is very short, and new models enter the market every year.

In order to plan the production for the first 9 months the CEO also relies on demand forecasts of independent research institutes.

Compensation policy:

The company is not known for having paid excessive remuneration in the past. In this context, it has not been named more or less often in the media than comparable companies. The compensation policy and the amount of compensation can be considered industry average.

b) Annual report

1. Forecasts and actual development

The forecasts for the reporting period predicted a demand of 3.26 million units like in the previous year and a stagnant global economy. The long-term forecast predicted a moderate economic growth and a rising demand for the industry in the next years.

[16] The experimental instruments are directly translated from German to be as close as possible to the original instruments. The case material presented here is mainly for the good outcome, high salience treatment. The bad outcome treatments differ only with respect to outcome related parts, and those for the low salience treatments do not include the "discussion of the compensation package". Modifications accounting for the other treatments are indicated in square parentheses.

In order to meet the predicted demand while operating the production capacity efficiently the CEO decided to produce 75% of the predicted annual demand within the first 9 months. The rate of utilization was 83%

Unexpectedly, the actual economic situation improved drastically towards the end of the reporting period. This had a positive effect on the demand for the company's products. This demand shift was also anticipated by a quarterly forecast published at the end of September. For the whole reporting period the total demand amounted to 110% of last year's demand. Based on the quarterly forecast the CEO decided to expand production, so that the rate of utilization was increased to 100% during the fourth quarter. To meet the increased demand the CEO also raised the prices considerably so that the average price of all units sold increased by 4.6% compared to the last year's average. Therefore, the company's profit benefited compared to the original plan. However, expensive overtime pay had to be expended in the fourth quarter because based on the original plan the company did not employ enough qualified workers. This caused the average production costs per unit to rise by 1% on an annual basis.

[Bad outcome condition:

Unexpectedly, the actual economic situation deteriorated drastically towards the end of the reporting period. This had a negative effect on the demand for the company's products. This demand shift was also anticipated by a quarterly forecast published at the end of September. For the whole reporting period the total demand amounted to 90% of last year's demand. Based on the quarterly forecast the CEO decided to reduce production, so that the rate of utilization went down to 66% during the fourth quarter. According to the fourth quarter forecast, production should have been reduced even further. However, withdrawing from long-term contracts with suppliers and workers would have imposed high costs. Still, reducing the production caused the average production costs per unit to rise by 1% on an annual basis. Further, in order to sell the whole production, the CEO also lower the prices considerably so that the average price of all units sold decreased by 5.1% compared to the last year's average. Consequently, the company's profit suffered compared to the original plan.]

2. Strategic investment decisions

The following decisions lie in the responsibility of the CEO. They reflect the key strategic decisions that were made during the reporting period.

i) At the beginning of the year the company announced to enter the Chinese market, as it had the opportunity to invest into a local sales company. As a consequence, analysts expect to see an increase in the company's global market share. The unexpected positive [negative] development of the global markets led to an increase [decrease] in Chinese demand. Hence, the investment will be more [less] profitable than the CEO had planned.

ii) In the course of the year the CEO made investments for replacement and expansion of the production capacity in several plants. The investments adjust the capacity to the long-term demand forecasts. Additionally, the replacement of equipment improves the

production technology and results in a cost advantage towards competitors. According to the plan the production costs will be lowered by 0.7% based in last year's output. As the economy was stronger [weaker] than expected, the additional and replaced capacities were utilized more than the CEO planned [were not yet put into operation]. Therefore the cost advantage was even 1.4% per unit [the additional capacities did not lead to a cost advantage but only to additional depreciation].

iii) At the beginning of the year, the CEO introduced a new strategy to cope with the volatility of input prices. All commodity purchases have to be supplemented by a forward contract. By entering a forward contract when the purchase of commodities becomes projectable the company knows the exact price for future inputs. As forward contracts are an insurance against rising input prices, they come to the cost that one cannot profit from an unexpected decline of the price. Because of the strong [weak] economy all commodity prices faced a sharp increase [decline]. Analysts estimated that the new strategy of the CEO saved [costs] the company €48 million.

3. Development of the overall economy and the industry

The economic development during the first three quarters was dominated by a rather stagnating global economy. In the fourth quarter there was an unexpected yet considerable growth [decline] in global GDP due to a recovery [recession] in Asia and America. For the whole year there was a 2.0% increase [decrease] in global GDP. In Europe growth amounted to only 1.0% [the decline amounted to even 3%].

Because of the strong [weak] demand in the fourth quarter the industry had a 10% increase [decrease] in sales over the entire year. As the products in the industry face a very cyclical demand, sales reacted strongly to the changes in the overall economy.

The industry leader which is also the most important competitor was able to beat the industry trend and realized an 11% increase [9% decline] in sales. The EBIT could be increased by 60% and the net income by 64% [only decreased by 40% and the net income by 42%]. As the product program and the markets that are covered are slightly different, the competitor's numbers are not a perfect benchmark for the company.

Together with the economic recovery [decline] the stock markets reacted positively [negatively], which also had an effect in the company's stock price. The stock market index gained [lost] 15% until the end of the reporting period. Usually, stocks of companies in cyclical industries respond a bit stronger to news than the overall market.

4. Financial Statements

in million €	**Reporting period**	Last year	+/-
Sales	**6,383**	5,803	10.0%
Costs of goods sold	**4,410**	4,213	4.7%
Gross profit	**1,973**	1,590	24.1%
Distribution expenses	**596**	567	5.1%
General and administrative expenses	**109**	110	-0.7%
Research and development	**147**	153	-3.6%
Other revenues or gains	**98**	94	3.9%
Other expenses or losses	**167**	168	-0.8%
Earnings before interest and tax (EBIT)	**1,051**	686	53.2%
EBIT margin	**16.5%**	11.8%	-
Interest income	**9**	9	4.9%
Interest expenses	**55**	54	1.5%
Earnings before tax (EBT)	**1,006**	641	56.9%
Income tax expenses	**300**	191	56.9%
Net income	**706**	450	56.9%
Total assets	**4,360**	4,184	4.2%
Equity	**2,181**	1,722	26.7%
Earnings per share (€)	**3.72**	2.37	56.9%
Dividends per share (€)	**1.30**	1.20	8.3%
Share price end of year (€)	**41.39**	35.30	17.3%
Stock market index end of year	**6,717**	5,841	15.0%
Number of employees	**19,587**	19,435	0.8%

[Bad outcome condition:]

in million €	**Reporting period**	Last year	+/-
Sales	**5,223**	5,803	-10.0%
Costs of goods sold	**4,037**	4,213	-4.2%
Gross profit	**1,185**	1,590	-25.4%
Distribution expenses	**538**	567	-5.1%
General and administrative expenses	**109**	110	-0.7%
Research and development	**147**	153	-3.6%
Other revenues or gains	**98**	94	3.9%
Other expenses or losses	**167**	168	-0.8%
Earnings before interest and tax (EBIT)	**322**	686	-53.1%
EBIT margin	**6.2%**	11.8%	-
Interest income	**9**	9	4.9%
Interest expenses	**55**	54	1.5%
Earnings before tax (EBT)	**276**	641	-56.9%
Income tax expenses	**82**	191	-56.9%
Net income	**194**	450	-56.9%
Total assets	**4,360**	4,184	4.2%
Equity	**1,669**	1,722	-3.1%
Earnings per share (€)	**1.02**	2.37	-56.9%
Dividends per share (€)	**1.30**	1.20	-8.3%
Share price end of year (€)	**29.21**	35.30	-17.3%
Stock market index end of year	**4,965**	5,841	-15.0%
Number of employees	**19,587**	19,435	0.8%

5. CEO compensation report

The CEO compensation consists of a fixed salary as well as performance dependent components. The latter components set incentives for a good CEO performance, meaning that the CEO provides a high effort in looking for investment opportunities and in executing projects with great care. A good CEO performance also means that only investments which increase shareholder value are made. In detail, the compensation package consists of the following components:

(1) A fixed salary that is paid in 12 monthly rates.

(2) A bonus contingent on the net income paid out after the reporting period.

(3) Long-term incentives via stock awards. In the compensation report, the awarded shares are recognized with their market value at grant date. The vesting period is 4 years.

in €	**(1)**	**(2)**	**(1)+(2)**		**(3)**	**(1)+(2)+(3)**
	Fixed salary	Bonus	Total cash compensation	Number of shares awarded	Value of shares awarded	Total compensation
Reporting period	**850,000**	**1,471,879**	**2,321,879**	**22,500**	**931,258**	**3,253,138**
Previous year	850,000	849,956	1,699,956	22,500	794,250	2,494,206
+/-		+73.2%	+36.6%		+17.3%	+30.4%

[Bad outcome condition:]

in €	**(1)**	**(2)**	**(1)+(2)**		**(3)**	**(1)+(2)+(3)**
	Fixed salary	Bonus	Total cash compensation	Number of shares awarded	Value of shares awarded	Total compensation
Reporting period	**850,000**	**228,374**	**1,078,374**	**22,500**	**657,242**	**1,735,616**
Previous year	850,000	849,956	1,699,956	22,500	794,250	2,494,206
+/-		-73.1%	-36.6%		-17.3%	-30.4%

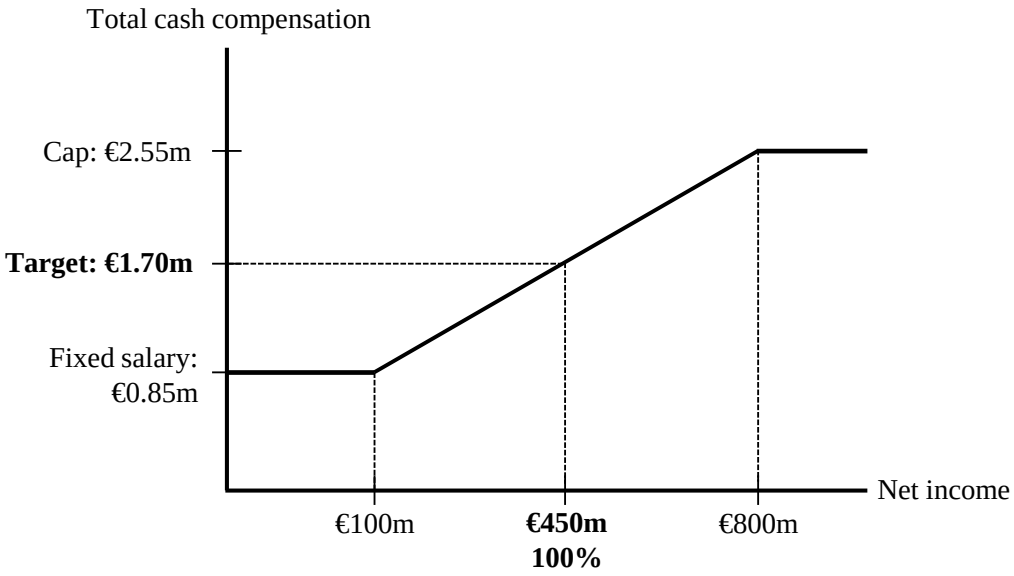
The volatility in stock prices leads to gains and losses of the total shares held by the CEO. The number of total shares held results from stock awards in former years. The gains and losses are not part of the compensation in the reporting period and are stated for information only.

The stock price increase [decline] in the reporting period led to a gain [loss] of €548,032. In the previous year, a stock price increase of €4.98 led to a gain of €336,150.

Discussion of the compensation package: [Only shown in the high salience condition]

(1) The fixed salary is similar to the salary in a peer group consisting of companies from the same industry. It was set to 100% of the peer group's mean salary, because the CEO's ability and experience are estimated to be industry average. The peer group consists of companies of comparable size and complexity. The fixed annual salary amounts to €850,000 for the whole contract period.

(2) The bonus is determined contingent on the achievement of a net income target. The target for net income was set to €450 million. In case the target is exactly met, the bonus amounts to one year's fixed salary (€0.85 million). Hence, fixed and variable compensation have an equal target share in total cash compensation of 50% each. Below a floor of €100 million net income the bonus is €0. Above this level, the CEO receives a bonus of €31,429 for every €10 million of net income. The cap that limits the bonus lies at 200% target achievement to the floor (€800 million). So the maximum bonus is €1.7 million, equal to two year's fixed salaries. The bonus function is illustrated in the following chart:



Net income as a basis for the cash bonus serves as a participation in the short-term performance of the firm. For setting long-term incentives the CEO is made a shareholder of the firm and, therefore, takes part in a stock award program (3).

(3) The stock awards follow a plan that was negotiated in the compensation contract. For each year of the contract period the CEO gets 22,500 shares. This serves the purpose of providing the CEO with a stake in the firm and to align individual goals with those of the shareholders. This means that the CEO maximizes the own long-term wealth by making only those decisions that maximize shareholder value. The value of the stock award depends on the stock price at grant date. However, the stock price is irrelevant for the number of shares awarded. A fluctuation of the stock award's value has been found acceptable. Until the beginning of the reporting period the CEO already owned 90,000 shares.

c) Questionnaire

1. How would you classify the firm's financial performance in the reporting period?

☐ Failure

☐ Success

2. Please specify your judgment. How do you evaluate last year's financial performance from the firm's perspective?

Not successful at all — Very successful

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

1 2 3 4 5 6 7 8 9

3. How do you judge the CEO's performance in the reporting period?

Very low performance — Very high performance

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

1 2 3 4 5 6 7 8 9

At this point, the participants opened an envelope that contained a blank paper in order to make verbal attributions about the perceived causes of success and failure. After that, the questionnaire was continued in z-Tree.

After you described the causes that you make responsible for the firm's performance, please complete the following nine statements.

Choose the number that completes the sentence most appropriately from your perspective. Choosing "1" means that you completely agree with the statement if it was completed by the left hand side. Choosing "9" means that you completely agree with the statement if it was completed by the right hand side. If you are not sure how to complete the sentence, choose "5". So you can express that you neither prefer the left side nor the right side. Any other number between "1 and 5" or "5" and "9" expresses that you tend more to one or the other side.

[The following sentence included either "success" or "failure" dependent on participants' general assessment of the financial performance.]

"The causes that I make responsible for the success [failure] of the firm are best described by the following statements:

4. The causes tell something about…

…the CEO himself. **1 2 3 4 5 6 7 8 9** …the situation that the CEO finds himself in.

5. The causes are controllable by…

…the CEO or someone else.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	…no one.

6. The causes are something that was…

…intended by the CEO or someone else.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	…unintended by the CEO or other people.

7. The causes lie…

…inside the person of the CEO.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	…outside the person of the CEO.

8. The causes have to do…

…with the CEO.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	…with the circumstances under which the CEO makes decisions.

9. The causes are something for which…

…the CEO or someone is responsible.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	…no one is responsible.

10. Please evaluate the quality of the CEO's strategic decisions. Refer to your notes if you like.

Decision no. 1: Entering the Chinese market.

Very bad								Very good
☐	☐	☐	☐	☐	☐	☐	☐	☐
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

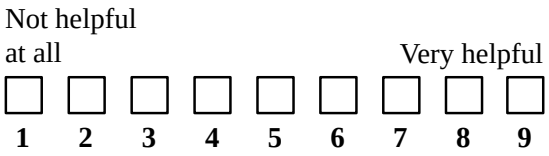
Decision no. 2: Investment in capacity.

Very bad								Very good
☐	☐	☐	☐	☐	☐	☐	☐	☐
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

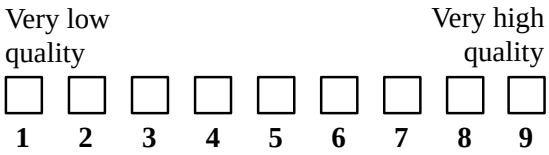
Decision no. 3: Forward contracts for commodities.

Very bad								Very good
☐	☐	☐	☐	☐	☐	☐	☐	☐
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

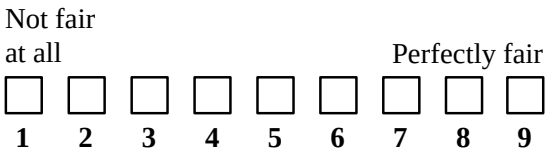
11. Is the kind and amount of information that you have been provided with helpful to form an expectation about the future performance of the CEO?



12. How do you judge the quality of the compensation contract? Please note that a good contract should fulfill the purpose of incentivizing the CEO to provide a high effort and to make decisions that increase shareholder value.



13. How fair do you think is the manager's compensation? You may consider all details of the manager's compensation contract (e.g. absolute amount, structure or relation to financial performance).



ESSAY 2

Effects of Compensation Contract Disclosure on Financial Statement Users' Effort Estimates – An Experimental Investigation of the Outcome Bias

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Abstract

This experimental study provides insight into a still under-researched field: the informational effect of mandatory compensation disclosure on investors' estimates of managers' effort. Whereas a large body of literature supports the notion that transparency is per se beneficial for investors, this study advocates a more reluctant approach. Theory is provided that compensation disclosure is informative ex-ante, but that investors are also subject to an outcome bias when revising their estimates ex-post. Specifically, information processing can be biased by conservatism and base rate neglect. I predict under which conditions disclosure can increase over- as well as underuse of outcome information. To measure the outcome bias, this study compares posterior effort estimates (after the outcome is known) against the benchmark of Bayesian belief revision. The results indicate that disclosure improves the quality of prior effort estimates (before the outcome is known) but not of posterior estimates. The latter are subject to more overuse of outcome information that is conflicting with participants' prior expectations and subject to more underuse of confirmative outcome information. Hence, in addition to those disclosure costs that literature has identified so far, compensation disclosure might come at the price of another type of disclosure costs, i.e., decreased information processing quality.

Keywords: Agency theory, Bayesian belief revision, compensation disclosure, disclosure costs, outcome bias.

1 Introduction

Executive compensation disclosure has received a lot of attention from the media as well as standard setters in the last decade. There has been a continuous trend towards higher disclosure standards of executive compensation: e.g. Dodd-Frank Act Section 953 (b) of 2010 or SEC's Executive Compensation and Related Person Disclosure (SEC 2006). From the investors' perspective, this development might be beneficial as compensation disclosure contributes to solving the agency problem of compensation. In particular, disclosure exposes compensation contracts that provide excessive compensation or pay without performance. But despite this effect on the design of executive compensation, standard setters' most common motivation to demand more disclosure is to provide investors with a true and fair view of the firm for making investment decisions. Quite often, standard setters' objective is to demand as much transparency as possible, because *all* information is considered to reduce uncertainty, and investors are supposed to pay a premium for lower risk (Foster 2003; Levitt 1998). Therefore, the question arises whether transparent compensation disclosure has not only a disciplining effect on the design of compensation but also an informational effect for investors.

Literature studying the association between transparent disclosure and the cost of capital suggests that a higher disclosure level might be beneficial for the firm (Barth et al. 2013; Botosan 1997; Diamond and Verrecchia 1991; Lambert et al. 2007; Leuz and Verrecchia 2000). Yet, with regard to executive compensation in particular, evidence for the effect of disclosure is scarce. Sheu et al. (2010) found that the market grants a higher valuation to those firms that provide comprehensive *voluntary* compensation disclosure, but not to those firms that just exceed minimum requirements, because voluntary comprehensive disclosure can be perceived as a signal that the firm has few agency problems. However, due to signaling effects the positive valuation effect cannot be attributed to the informational effect of compensation disclosure alone. Hence, based on these findings, only limited inferences for the effect of *mandatory* compensation disclosure can be made.

In contrast to analytical and archival studies that directly analyze the cost of capital, this study is the first to address the effect of compensation disclosure on investors' individual effort estimates which are an important antecedent of investment decisions. Specifically, this study analyzes the effect of the disclosure of a contract's pay-for-performance sensitivity. As making investment decisions includes forming expectations about future firm performance, investors strive for information that is predictive of future firm performance. Yet, managers' effort as one of the most important indicators is unobservable. However, future executive efforts may be inferred from executive compensation reports as they contain details about top management's incentive contracts, especially the contracts' pay-for-performance sensitivity. Provided that managers largely respond to monetary incentives by choosing higher effort when the pay-for-performance sensitivity is higher (Grossman and Hart 1983; Holmström 1979), disclosure of the pay-for-performance sensitivity represents valuable information for estimating a manager's effort ex-ante and might, hence, contribute to the standard setters' objective of reducing uncertainty about future firm performance.

However, while disclosure of the pay-for-performance sensitivity is supposed to reduce the ex-ante uncertainty about managers' efforts, there might be unintended psychological effects on the ex-post inference of efforts, i.e. when outcome information is present. From a Bayesian perspective, a firm's financial performance is informative for the effort of the firm's manager (Hershey and Baron 1992, 1995). Hence, using outcome information for inferring a manager's effort is not per se irrational. However, individuals tend to overuse (Bar-Hillel 1980; Kahneman and Tversky 1972; Tversky Kahneman 1974) or underuse (Edwards 1968; Phillips et al. 1966) the more recently acquired information when revising their prior beliefs, i.e., in many cases the outcome. This study joins the extant literature on belief revision and predicts under which circumstances investors are subject to over- and underuse of outcome information while estimating a manager's effort ex-post. Further, I predict that disclosure of the pay-for-performance sensitivity can even promote situations in which individuals over- or

underuse outcome information and that, therefore, the outcome bias in effort estimates is increased.

Hence, overall, this study aims to analyze two conflicting effects of compensation disclosure. First, disclosure of a contract's pay-for-performance sensitivity is expected to decrease the ex-ante uncertainty about effort and, therefore, reflects an increase in information quality. But second, effort estimates that are more biased by outcomes reflect a decrease in information *processing* quality and, thus, may constitute an unintended consequence of compensation disclosure regulation.

The experiment employs a 2 x 2 x 2-design. The treatment variables are the disclosure condition (yes/no), the contract type (incentive compatible/ not incentive compatible), and the outcome (good/bad). Participants assumed the role of potential investors who observed the development of a hypothetical firm in which they might want to invest. Participants were provided with materials that portrayed the firm and the manager. In the disclosure condition, the materials included all necessary information for identifying whether the manager's contract was incentive compatible (effort costs, outcome probabilities, and bonus function). In the non-disclosure condition, the information about the bonus function was missing. Based on the materials, participants made their prior effort estimate (before learning the outcome). The outcome was realized after the participants' prior effort estimate. Subsequently, participants made their posterior (outcome informed) effort estimate.

The results indicate that, under disclosure, prior effort estimates are closer to the effort level that is implied by the respective contract. This supports the general view that disclosure decreases uncertainty about agency problems and might be rewarded with lower cost of capital. The second finding, however, suggests that outcome information biases the effort estimate *after* the outcome is known. More specifically, when the outcome is surprising, i.e. in conflict with the prior effort estimate (e.g. good outcome and low prior effort estimate), outcome information is overused, meaning that participants are subject to an outcome bias in these situa-

tions. Likewise, when the outcome was only confirming what was already expected (e.g. bad outcome and low prior effort estimate), outcome information was underused reflecting a reverse outcome bias. The third and most important finding is that the outcome bias and the reverse outcome bias are even stronger under disclosure. This suggests that disclosure decreases the information processing quality. The overall effect of the improved information quality and the lower information processing quality indicates no benefit of disclosure from the investors' perspective. More specifically, the posterior effort estimates under disclosure are not significantly closer to the actual effort level that is implied by the respective incentive contract.

The paper makes three contributions to the literature. First, it provides evidence for the under-researched informational effect of compensation disclosure (Sheu et al. 2010). While standard setters' effort to make compensation disclosure more transparent is traditionally associated with corporate governance concerns, this study opens up another perspective on the informational effect for investors. Second, the decreasing information processing quality implies that there is another type of cost associated to compensation disclosure. Not only that the positive effect of disclosure on cost of capital (e.g. Botosan 1997) might be mitigated by the direct costs of gathering and preparing the information as well as by leaking information to competitors (Yosha 1995), disclosure might also come to the cost of more biased effort estimates. Therefore, this study takes a more reluctant position when evaluating the costs and benefits of transparency. And third, the experimental design adds to the methodological literature on outcome biases and belief revision by extending the framework of Peecher and Piercey (2008). In particular, the design offers a normative benchmark for disentangling the normative and non-normative use of outcome information and is able to detect both over- and underuse of outcome information at the same time. To my best knowledge, this is the first experiment that identifies the importance of the relationship between the level of prior expec-

tations and conflicting/confirmative outcome information for the direction of biases in individuals' belief revision.

The remainder of this paper is organized as follows. Section II explains the theoretical background. Section III introduces the setting of the experiment and develops the hypotheses. Section IV describes the experimental design, and section V presents the results. Section VI concludes the paper.

2 Theoretical Background

Research about the benefits of more transparent disclosure builds on models claiming that a higher level of transparency leads to higher liquidity of a firm's securities and less information asymmetry between investors and the firm. Therefore, the costs of capital are supposed to be smaller when there is more transparent disclosure (Diamond and Verrecchia 1991; Lambert et al. 2007). Empirical studies have found the association between disclosure level and costs of capital difficult to quantify and results have been mixed. Nonetheless, in certain settings, e.g. when prior disclosure standards have been relatively low (Leuz and Verrecchia 2000) or when there is low analyst coverage (Botosan 1997), theory is supported by the empirical results. However, in addition to the benefits of disclosure being not unambiguous, there are also costs of disclosure. Besides the direct costs of gathering, preparing and distributing information, leaking information to competitors can be a problem (Yosha 1995). Adding to the trade-off between the mitigation of information asymmetry and the known disclosure costs, this paper focusses on another kind of costs, i.e. biased information processing.

From an agency theory perspective, there is a clear prediction how a manger's effort is determined. According to the incentive compatibility constraint, managers choose their individually optimal effort contingent on their participation in the outcome. Given that a manager has standard preferences, i.e. a utility function increasing only in the compensation amount, and given that the utility function is known, the board can anticipate the manager's effort lev-

el. Hence, an incentive contract can be designed that enforces the desired effort level (Grossman and Hart 1983; Holmström 1979). Despite this theoretical unambiguousness, there are concerns that real world compensation contracts are not always optimal. For instance, one of the most popular concerns is rent extraction due to managerial power (Bebchuk and Fried 2003). Further, effort and decisions of managers are not observable. Hence, from the investors' perspective, there is uncertainty whether managers provide the efficient effort. Despite the manager's significance for the firm's financial performance, the financial performance is only a noisy indicator for the manager's effort as it is to some extent the result of external factors that are beyond the manager's control. Hence, a good performance can reflect luck while the manager was in fact lazy or the manager can end up with a bad performance although providing a high effort.

There are numerous studies that analyze unobservable action and the use of outcome information in various evaluation contexts (Baron and Hershey 1988; Bol and Smith 2011; Brown and Solomon 1987; Frederickson et al. 1999; Kadous 2001; Kennedy 1995; Lipe 1993; Marshall and Mowen 1993; Peecher and Piercey 2008; Tan and Lipe 1997). There is extensive evidence that individuals adjust their judgment about someone's decision quality or performance after learning about the outcome. Part of this outcome effect is justified by the informativeness of the outcome (Hershey and Baron 1992, 1995). However, as pointed out by Peecher and Piercey (2008), besides the fact that outcome effects reflect rational belief revision, they may also reflect an outcome bias (i.e. overuse of outcome information), or a reverse outcome bias (i.e. underuse of outcome information). In an agency context, this means that even if firm performance is stochastic, the outcome is partly informative with regard to the manager's effort, as long as the manager's effort has some influence on the outcome, i.e. that the manager can increase the chance for a better outcome by providing a higher effort.

So far, there is little evidence on the composition of outcome effects. Prior studies either measure the entire difference between the judgments following a good and a bad outcome as

bias (e.g. Baron and Hershey 1988) or they consider the difference between the judgments of informed and uninformed evaluators (e.g. Kadous 2001; Lipe 1993). In contrast to that, Peecher and Piercey (2008) developed a framework that distinguishes the rational belief revision from the outcome bias that follows from over- or underuse of outcome information. For this purpose, the authors use Bayes' rule as a normative benchmark. However, they only demonstrate this for adverse outcomes. This study applies the framework of Peecher and Piercey (2008) to an agency context, in which a manager's effort choice determines the firm's chances for realizing a good or a bad outcome. Using Bayes' rule as a normative benchmark for the use of outcome information, this study employs an adequate framework for analyzing the effect of compensation disclosure on investors' effort estimates before and after knowing the outcome. The framework further offers the opportunity to disentangle the informational effect of compensation disclosure and its potential distorting effect on information processing.

3 Setting and Hypotheses

Setting

The experimental task comprises two consecutive estimations of a hypothetical manager's effort: (1) prior to learning the outcome and (2) posterior to learning the outcome. Before developing the hypotheses, I first define the experimental setting. The setting employs an agency model where the manager is risk-neutral and has standard preferences, i.e. the manager maximizes his/her expected utility by maximizing the expected compensation net of effort costs. Further, outcomes of subsequent periods are independent from each other so that memoryless contracts are optimal (Amershi et al. 1985; Fellingham and Newman 1985). As effort is restricted to only two levels (high/low), participants' effort estimate can be elicited as estimated *probability* that the manager chooses one of the two effort levels, that is $p(e^H)$ or $p(e^L)$. By choosing the high effort over the low effort the manager can increase the chance for achieving the better of two possible outcomes (good/bad). However, the manager can neither

ensure the good outcome by choosing the high effort nor does the bad outcome certainly follow form the low effort. Hence, effort and outcome are related over a statistical relationship, where $1 > p(good|e^H) > p(good|e^L) > 0$ and $p(bad|e^i) = 1 - p(good|e^i)$, $i \in \{L, H\}$. Given standard economic preferences, the manager chooses the high effort level instead of the low effort level when the expected additional compensation, which depends on the uncertain outcome, exceeds the additional costs of effort. Therefore, the manager's effort depends on the form of the bonus function that can either be incentive compatible (IC) or non-incentive compatible (NIC) in this setting.

The setting offers the opportunity to compare each participant's effort estimate to a normative benchmark. The prior effort estimate which is made before the outcome is realized is measured against the agency theory prediction. In particular, the manager would certainly choose the high effort, i.e., $p(e^H) = 100\%$, when working under the IC contract. Correspondingly, the NIC contract would lead to a certain choice of the low effort, i.e., $p(e^H) = 0\%$. Provided that the assumptions of risk neutrality and standard preferences of the manager are made, a rational prior effort estimate should be identical to the agency theory prediction if the contract's incentive compatibility is disclosed ex-ante. Without ex-ante disclosure, there can only be arbitrary effort estimates.

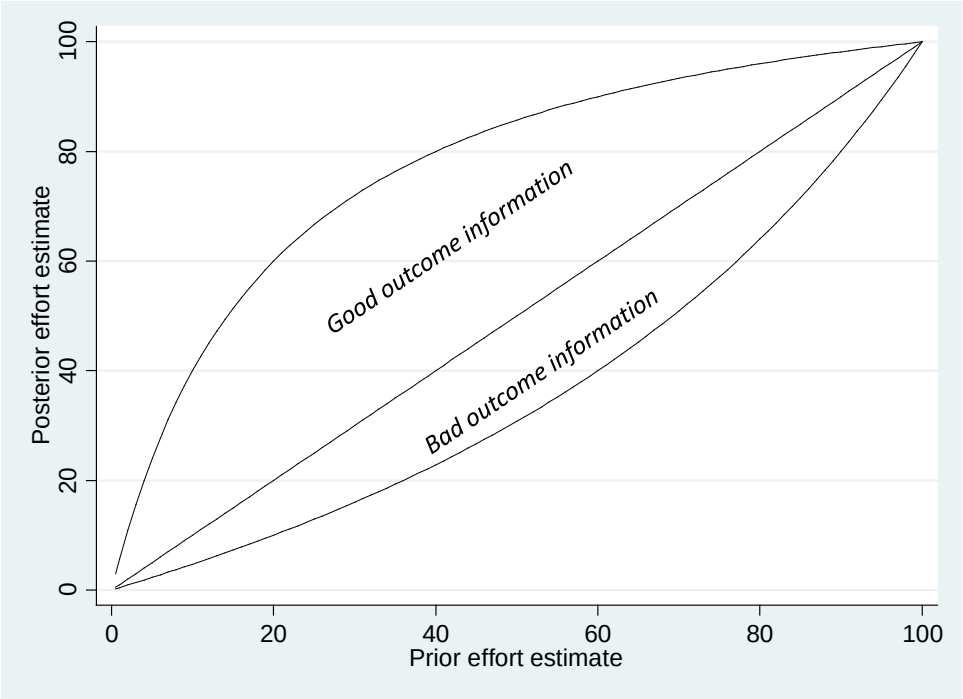
The benchmark for evaluating the posterior effort estimate (after learning the outcome) is derived from Bayes' rule for belief revision (e.g. Peterson and DuCharme 1967). As, in this setting, the manager's effort choice increases the probability to achieve the good outcome, learning which outcome was realized is informative for revising the prior effort estimate if $0\% < p(e^H) < 100\%$.[17] Processing the outcome information rationally requires calculating the Bayesian posterior probability for the high effort $p(e^H|outcome^j)$, $j \in \{good, bad\}$, by using

[17] If the prior effort estimate reflects absolute certainty about the manager's effort choice, the outcome is not informative and no belief revision should be done according to Bayes' rule.

one's own prior estimate $p(e^H)$ and the conditional probabilities $p(good|e^H)$ and $p(good|e^L)$. The following representation of Bayes' rule assumes the realization of the good outcome:[18]

$$p(e^H \mid good) = \frac{p(e^H) * p(good \mid e^H)}{p(good)} = \frac{p(e^H) * p(good \mid e^H)}{p(good \mid e^H) * p(e^H) + p(good \mid e^L) * (1 - p(e^H))} \qquad (1)$$

In how far a posterior effort estimates reflects a rational the belief revision can be measured by the outcome bias, which is the deviation of one's own posterior effort estimate from the own individual Bayesian posterior probability. As a Bayesian posterior probability accounts for the prior effort estimate between $p(e^H) = 0$ and $p(e^H) = 100$ and depends on the direction of the outcome information, there is a large number of possible benchmarks. Figure 1 illustrates the benchmark contingent on the prior effort estimate and the direction of the outcome.



The graph shows the Bayesian posteriors contingent on participants' prior effort estimates for all prior estimates from 0% to 100%. The upper curve reflects the correct Bayesian posterior probability after observing the good outcome and the lower curve reflects the correct Bayesian posterior probability after observing the bad outcome. The diagonal reflects a total omission of a belief revision.

Figure 1: Bayesian posteriors $p(e^H|outcome)$ based on prior effort estimates $p(e^H)$

[18] Given that a participant's prior effort estimate was $p(e^H) = 0.5$, the Bayesian posterior probability after observing the good outcome is $p(e^H|good) = 0.857$. This represents the *normative* use of outcome information. For comparison, the participant's Bayesian posterior after observing a bad outcome is $p(e^H|bad) = 0.308$.

The upper (lower) curve reflects the correct Bayesian posterior probability after observing the good (bad) outcome. Any deviation from the respective curve reflects non-normative use of outcome information, e.g., a posterior estimate after observing a good outcome that lies "above" the upper curve indicates overuse of outcome information. The diagonal line indicates the total omission of outcome information, leaving the posterior estimate unchanged relative to the prior effort estimate.

Hypotheses Development

The Prior Effort Estimate:

Similar to the agency model in the experimental setting, investors in reality could predict the manager's effort with certainty if they knew about the manager's risk attitude and preferences, and if the costs of effort and the pay-for-performance sensitivity of the incentive contract were known ex-ante. But even if investors do not assume standard preferences of the manager or do not have full insight into the manager's tradeoff between risky compensation and certain costs of effort, the agency benchmark should give some orientation for the investors' prior effort estimates. First, departing from the standard preference assumption does not have to mean that investors would expect the manager to choose the effort level disregarding the incentive contract. According to the extrinsic incentive bias (Heath 1999) individuals even seem to overemphasize the importance of extrinsic incentives when hypothesizing about the motivation of others. Second, even if the costs of effort and the degree of risk aversion cannot be exactly assessed, a higher pay-for-performance sensitivity should unambiguously increase the effort level of the manager. Hence, when the pay-for-performance sensitivity of the incentive contract is not disclosed ex-ante, investors lack useful information for making their prior effort estimate. Therefore, the first hypothesis formally states:

H1: Ex-ante disclosure of the pay-for-performance sensitivity shifts investors' prior effort estimates towards the effort level that is implied by the contract.

The Posterior Effort Estimate:

Outcomes following from an action are usually informative with regard to the action that has been taken (Brown and Solomon 1987; Hawkins and Hastie 1990; Hershey and Baron 1992, 1995; Tan and Lipe 1997). The outcome is only non-informative when the observer has perfect information about the action, i.e. if the effort is observable. In this case, any revision of a prior belief due to learning the outcome would be irrational and reflect an outcome bias (Baron and Hershey 1988). But as in agency relationships the effort is not observable, outcome information is informative, and investors should revise their prior effort estimates as soon as the outcome is known.

The difference between the prior and the posterior effort estimate reflects the outcome effect. Applying Bayes' rule as normative benchmark for the use of outcome information in probability estimates (Peterson and DuCharme 1967), the outcome effect can be distinguished in a rational belief revision-part and an irrational part. Therefore, only if investors use outcome information normatively, no outcome bias is contained in the outcome effect. Yet, when investors do not perform a perfect Bayesian belief revision, their bias can take on two possible directions: *overuse* and *underuse* of outcome information (Peecher and Piercey 2008).

Prior literature has identified humans to be not very good Bayesians when assessing the probability of uncertain events (Edwards 1968; Kahneman and Tversky 1972; Phillips et al. 1966; Tversky and Kahneman 1974). Early judgment and decision making studies found that individuals are too conservative when processing new information, meaning that their belief revision on the basis of new information is insufficient in amount (Edwards 1968; Peterson and DuCharme 1967; Phillips et al. 1966). With regard to the experimental setting, this conservatism bias suggests that investors rely too heavily on their prior effort estimates and would, therefore, underuse the outcome information. Yet, the conservatism bias provides no explanation for the outcome bias that rather occurs when investors neglect their prior effort estimate and rely too heavily on the outcome information. Instead, overuse of outcome infor-

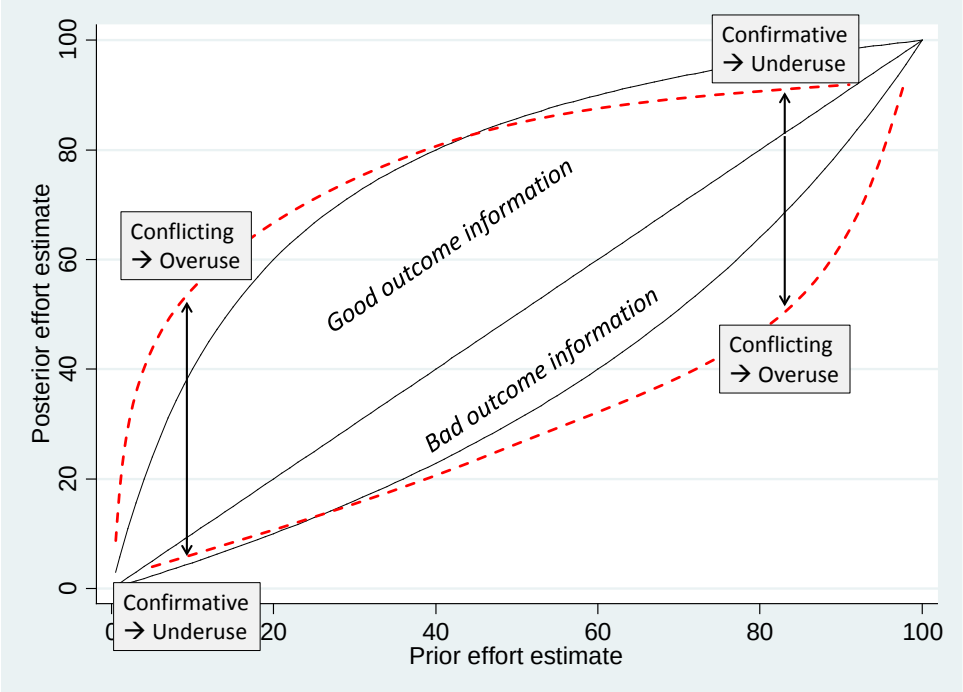
mation is suggested by the base rate fallacy in probability judgments (Bar-Hillel 1980), which describes individuals' tendency to ignore their knowledge about the overall likeliness of an event in favor of allegedly more representative information (Kahneman and Tversky 1972; Tversky Kahneman 1974) or more relevant information (Tversky and Kahneman 1980) instead of integrating both pieces of information. For the experimental setting, this means that outcome information might be perceived overly informative for the manager's effort compared to the prior effort estimate. For instance, a prior effort estimate suggesting a good outcome might be ignored if, in fact, a bad outcome is observed, which rather suggests that the effort was low. Consequently, the belief revision might reflect an overuse of outcome information.

Given this prior evidence, it is unclear whether the belief revision might be subject to over- or underuse of outcome information. However, Peecher and Piercey (2008) find that over- and underuse of outcome information depend on the level of individuals' own Bayesian posterior probability, i.e. the level of the normative benchmark. More specifically, the authors find that outcome information indicating that some event has occurred is overused when the event is relatively unlikely (<40%) and underused when the event is relatively likely (>40%). Relating this finding to the base rate fallacy suggests that outcome information which requires a large belief revision might be perceived as highly relevant so that the overall likeliness of an event is ignored. On the other hand, outcome information which requires a small belief revision might not be perceived as relevant so that individuals see no need for revising their initial belief and are rather subject to the conservatism bias.

In the following, I make specific predictions for the experimental setting that are illustrated in Figure 2. In particular, I predict that information about the good outcome is overused when investors' prior estimate for the high effort is low and when, consequently, expectations for the realization of the good outcome are relatively low as well. This is in line with the base rate fallacy because, in this case, information about the good outcome is *conflicting* with prior

expectations and might, therefore, be perceived as overly relevant. In contrast to that, I predict that good outcome information is underused when the prior estimate for the high effort is high and when, therefore, the expectations for the realization of the good outcome are high as well. In this case, the outcome information is *confirmative* with regard to the prior effort estimate, which might signal that a belief revision is not necessary. The same considerations as for the use of good outcome information can be made for the use of bad outcome information. Bad outcome information is *confirmative* when the high effort is estimated to be relatively unlikely and *conflicting* when the high effort is expected to be relatively likely. Thus, for formally stating the hypothesis, I classify outcome information as either *confirmative* or *conflicting* with regard to the prior effort estimate.

H2: When outcome information is conflicting (confirmative) with regard to prior effort estimates, outcome information is overused (underused).



The graph shows predictions for the use of good and bad outcome information contingent on the prior effort estimate. The solid black curves represent the Bayesian posterior probabilities and the dashed red lines predict the bias exemplarily. The arrows reflect the predicted belief revision in four representative situations when prior effort estimates are extreme: the upper left and the lower right arrow indicate the expected posterior effort estimate for conflicting outcome information (when a good outcome follows a low prior effort estimate or when a bad outcome follows a high prior effort estimate). In this case, overuse is expected. The other two arrows indicate the expected belief revision for confirmative outcome information (when a bad outcome follows a low prior effort estimate or when a good outcome follows a high prior effort estimate). In this case, underuse is expected.

Figure 2: Hypothesis 2 – Predictions for the use of outcome information for conflicting and confirmative outcome information

The Effect of Disclosure on the Over-/Underuse of Outcome Information:

As predicted in H1, disclosure of the pay-for-performance sensitivity provides useful information with regard to the contract's incentive compatibility so that investors' prior effort estimates are shifted more towards the effort level that is implied by the incentive contract (i.e., in the experimental setting, they either expect the low or the high effort with more certainty). From a normative perspective, disclosure about incentives possesses an informational value that substitutes part of the informativeness of the outcome. Consequently, the normative need for belief revisions is smaller for prior effort estimates that are more certain.[19] However, H2 suggests that biases in belief revision are result from the interpretation of the outcome as conflicting or confirmative with regard to prior expectations, and this is more likely when prior effort estimates are extreme. Therefore, I predict that belief revisions reflect the pattern for over- and underuse of outcome information predicted by H2 more strongly under disclosure than under non-disclosure:

H3: Disclosure of the pay-for-performance sensitivity of incentive contracts leads to more overuse (underuse) of conflicting (confirmative) outcome information.

4 Methodology

In order to test the hypotheses, I conduct an experiment using a 2 x 2 x 2 between-subjects design. In particular, the independent variables are (1) DISCLOSURE (yes/no), (2) CONTRACT (incentive compatible/not incentive compatible), and (3) OUTCOME (good/bad). Participants were 100 graduate and undergraduate students from a large European university. On average participants were 25.3 years old and 46% of them were male. All participants assumed the role of a potential investor of a hypothetical firm in order to carry out the estimation task. The role of the manager was not assigned to any of the participants and the effort choice was only subject to participants' estimates.

[19] Cf. Figure 1: The distance between the diagonal and the upper/lower curve approaches zero for prior effort estimates of 0% and 100%.

Task

Participants received materials (see Appendix) describing a hypothetical firm that realized good and bad financial performances in the past. It was explained that external factors which are not controllable for the manager have something to do with the unsteady success of the firm. In order to prevent participants from making inferences about the manager's past performance and its consequences for the past and future financial performance of the firm, it was reported that the board hired a new manager for the current reporting period. The materials further included information about (1) the statistical relationship between effort and outcome, (2) the manager's estimated effort costs, and (3) an ex-ante statement of the board about the manager's compensation contract. As the participants' first estimation task was to estimate the probability that the manager chooses the high effort ex-ante, an explanation was provided how to interpret the presented information. However, the materials did not give explicit instructions how to calculate whether the contract was incentive compatibility, and participants were not explicitly encouraged to do so. Instead, participants were free to estimate the probability for the provision of the high effort $p(e^H)$. The second part of the estimation task was to estimate the probability that the manager has chosen the high effort after the outcome of the first period was revealed $p(e^H|good)$ or $p(e^H|bad)$. Hence, participants were asked to update their prior estimate. While the estimation task was relatively difficult, average task complexity was rated 4.0 on a 7 point Likert-scale. After the estimation task, participants could invest part of their initial balance of €10. The investment decision made the estimations payoff-relevant for participants in order to ensure participants' motivation for the task. However, the results reported in this paper are limited to the hypothesized effects. The investment decision is further explained in the procedures section.

Independent Variables

DISCLOSURE varies whether participants were informed ex-ante about the *attainable* bonuses that the manager could receive contingent on the two possible outcomes (disclosure)

or whether participants only learned about the *realized* bonus ex-post (non-disclosure). Hence, DISCLOSURE manipulates whether participants, who assume that the manager is rational and risk neutral, had all the necessary information to assess the contracts incentive compatibility or not.

The CONTRACT manipulation is implemented by two different contracts that differ in their pay-for-performance sensitivity. Under the high pay-for-performance sensitivity contract the manager receives a bonus of 100k for the bad outcome and 400k for the good outcome. Under the low pay-for-performance sensitivity contract the manager receives 170k for the bad outcome and 270k for the good outcome. In addition to the uncertain monetary reward, the manager carries certain costs of effort of 50k when providing the low effort and 150k when providing the high effort. The probabilities for realizing the good outcome given both effort levels are $p(good|e^L) = 0.1$ and $p(good|e^H) = 0.6$. Correspondingly, the probabilities for the bad outcome are $p(bad|e^L) = 0.9$ and $p(bad|e^H) = 0.4$. This means that the manager can increase the chance for the good outcome from 10% to 60% by choosing the high effort instead of the low effort. In order to make the effort choice, a rational and risk neutral manager would compare the expected net compensation (bonus less effort costs) following from the two effort levels. Under the low pay-for-performance sensitivity contract, choosing the low effort yields an expected net compensation for the manager of 130k while choosing the high effort only yields 80k.[20] Hence, as providing the high effort would be beneficial from the firm's perspective, the low pay-for-sensitivity contract is not incentive compatible (NIC). The high pay-for-sensitivity contract is incentive compatible (IC), because it yields an expected net compensation of 130k for the high effort while the low effort only yields 80k.

The OUTCOME variable is manipulated by giving a short note to the participants that the firm did or did not meet analysts' expectations, while meeting the expectations indicates

[20] The expected net compensation is 130k = 0.1 x 270k + 0.9 x 170k - 50k for the low effort and 80k = 0.6 x 270k + 0.4 x 170k - 150k for the high effort.

the good outcome and not meeting the expectations indicates the bad outcome. The labels 'good' and 'bad' are used to abstract from a specific realization of the firm's performance. Hence, paying the manager a (small) bonus even for the 'bad' outcome indicates that not the worst possible performance was realized. First, this design choice preserves the plausibility of the statistical relationship between effort and outcome. If, instead, the bad outcome indicated the worst possible performance, realization of that outcome given the high effort would be less credible. Second, the manager would not receive any bonus in 40% of the cases in which (s)he indeed provided a high effort. The decision to communicate the outcome directly to the participants instead of presenting stylized financial data, which participants would have had to assess as good or bad, was chosen for reasons of experimental control and for keeping the task complexity as low as possible.[21]

Procedures and Measures

Participants started the experiment by reading the case material for at maximum 12 minutes. After reading the case material, the experiment was continued with a computerized questionnaire.[22] Separating the questionnaire from the case material offered two advantages for this particular task. First, the computerized questionnaire provides more control over the answering process as participants could not return to previous questions to change their estimates. Second, participants could browse in the materials and their notes while instructions for the estimation task were simultaneously displayed on the screen. In order to provide participants with an incentive to perform the estimation task deliberately, the welcome instructions pointed out that their estimate would be helpful for making a payoff-relevant decision later in the experiment and that, consequently, their final compensation could be considerably higher or lower than the initial balance of €10.

[21] Further, manipulating OUTCOME independently from CONTRACT allowed for having a balanced sample of bad and good outcomes under the IC contract as well as under the NIC contract.

[22] The experiment was programmed and conducted with the software z-Tree (Fischbacher 2007).

After reading the materials, participants estimated the probability for the provision of the high effort, PEH (measured from 0% to 100%). In the next step, participants were informed about the end of the first period and whether the outcome was good or bad. In addition to the realized outcome, all participants also learned about the manager's realized bonus. After that, participants were asked to update their prior effort estimate considering their outcome knowledge. The dependent variable for the posterior effort estimate is PEHUPDATE (measured from 0% to 100%).

After making the posterior effort estimate, participants were asked to form an expectation about the outcome in the second period. It was explained that the statistical relationship between effort and outcome remained unchanged, and that the outcome of the second period is independent from the first period's effort and outcome. Based on their estimates, participants were offered the opportunity to invest (part of) their initial balance of €10. For this purpose, two outcome dependent cash flows were communicated to the participants that would follow from investing the entire initial balance: €4 for the bad outcome and €14 for the good outcome. Based on their expectations about the outcome in the second period, and based on the two possible cash flows, participants could determine their expected value of the investment. The market prices for one 'share' were determined under the assumption of an efficient market. Therefore, for each treatment, cash flows were designed as if a market would perfectly process all information about the firm that was reported in the materials. Owing to this assumption, a rational and risk-neutral investor would be indifferent towards the investment. To make sure that all participants fully understood the investment decision and the consequences for their compensation, they answered a quiz. After that, participants were free to invest any amount of their initial balance of €10 in increments of €1 or not to invest at all. The outcome of the second period was determined as if the manager had provided the effort level implied by the respective contract. Participants' final compensation was determined by adding the

payoff from the investment decision to the share of the initial balance that was not invested. The average compensation was €10.10 and ranged from €4.00 to €28.00.

5 Results

Descriptive Statistics

Table 1 displays descriptive statistics for all dependent variables. Panel A shows the prior effort estimate, PEH, for both contract types (IC and NIC) and for non-disclosure and disclosure. Data for the good and the bad outcomes are aggregated in this overview because the OUTCOME manipulation took effect after participants estimated PEH. As predicted, the mean values suggest that PEH does not substantially differ between the contract types when the pay-for-performance sensitivity was not disclosed (76.8% for NIC and 72.0% for IC), but differs strongly when disclosed (54.8% for NIC and 74.6% for IC). This provides first evidence in favor of H1 as the agency solution predicts 0% for NIC and 100% for IC.

Panel A

Mean *(Std. dev.)*	Non-disclosure		Disclosure	
	NIC contract	IC contract	NIC contract	IC contract
Observations	24	24	28	24
PEH[a]	**76.8%**	**72.0%**	**54.8%**	**74.6%**
	(14.4%)	*(21.0%)*	*(34.9%)*	*(17.1%)*

[a] PEH = prior effort estimate before observing the outcome (probability of high effort).

Panel B

Mean *(Std. dev.)*	PEH ≤ 50%		PEH > 50%	
	Bad outcome	Good outcome	Bad outcome	Good outcome
Observations	13	8	36	43
PEHUPDATE[b]	**27.3%**	**63.8%**	**55.7%**	**83.7%**
	(18.6%)	*(16.9%)*	*(16.0%)*	*(13.3%)*
BAYESUPDATE[c]	**16.7%**	**52.1%**	**63.4%**	**95.7%**
	(12.1%)	*(43.2%)*	*(15.5%)*	*(3.3%)*
OUTCOMEBIAS[d]	**-10.6%**	**11.6%**	**7.7%**	**-12.0%**
	(15.4%)	*(55.3%)*	*(20.3%)*	*(12.4%)*

[b] PEHUPDATE = posterior effort estimate after observing the outcome (probability of high effort);

[c] BAYESUPDATE = correct Bayesian posterior based on each participant's own prior effort estimate;

[d] OUTCOMEBIAS = deviation of observed PEHUPDATE from the normative BAYESUPDATE. The participant--based computation of OUTCOMEBIAS is: OUTCOMEBIAS = PEHUPDATE – BAYESUPDATE for the good outcome and OUTCOMEBIAS = BAYESUPDATE – PEHUPDATE for the bad outcome. Therefore, overuse is always indicated by a positive sign and underuse is indicated by a negative sign.

Panel C

Mean *(Std. dev.)*	Non-disclosure		Disclosure	
	Conflicting[e]	Confirmative[f]	Conflicting	Confirmative
Observations	20	28	24	28
PEHUPDATE	**58.5%**	**73.5%**	**56.0%**	**67.8%**
	(17.0%)	*(27.8%)*	*(16.0%)*	*(28.5%)*
BAYESUPDATE	**67.0%**	**81.2%**	**56.7%**	**73.6%**
	(14.8%)	*(30.3%)*	*(27.2%)*	*(38.0%)*
OUTCOMEBIAS[*]	**2.4%**	**-9.7%**	**13.5%**	**-13.8%**
	(23.9%)	*(13.9%)*	*(32.1%)*	*(12.1%)*

[e] Conflicting = all observations where PEH ≤ 50% followed by a good outcome and where PEH > 50% followed by a bad outcome;

[f] Confirmative = all observations where PEH > 50% followed by a good outcome and where PEH ≤ 50% followed by a bad outcome;

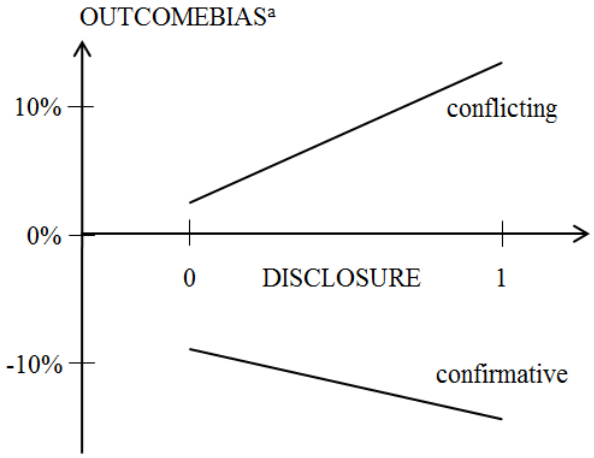
[*] In Panel C, the mean of OUTCOMEBIAS is not equal to the difference between the means of PEHUPDATE and BAYESUPDATE because the conflicting and confirmative observations each include both good and bad outcomes, which means that the normative belief revision goes into different directions. Therefore, OUTCOMEBIAS can only be determined on the basis of an individual participant.

Table 1: Descriptive statistics for all dependent variables

Panel B of Table 1 reports descriptive statistics for the variables describing the belief revision. Data for both contract types are aggregated because, according to theory, the effects on belief revision depend on the direction of the outcome and the level of the prior effort estimate, i.e., whether the outcome is conflicting or confirmative with regard to the prior effort estimate. For this reason, Panel B distinguishes for the good and the bad outcomes as well as for observations with PEH ≤ 50% and PEH > 50%. The results indicate that the posterior effort estimate, PEHUPDATE, comprises an outcome effect (PEH ≤ 50%: 27.3% for bad vs. 63.9% for good; PEH > 50%: 55.7% for bad vs. 83.7% for good). However, part of this outcome effect is justified by the normative Bayesian belief revision. To illustrate over- or underuse of outcome information, OUTCOMEBIAS indicates the deviation of PEHUPDATE from the Bayesian benchmark BAYESUPDATE, which is computed applying Bayes rule

using each participant's individual prior effort estimate.[23] For low prior effort estimates (PEH ≤ 50%), OUTCOMEBIAS indicates underuse of bad outcome information (-10.6%) and overuse of good outcome information (11.6%). The opposite can be observed for high prior effort estimates (PEH > 50%): overuse of bad outcome information (7.7%) and underuse of good outcome information (-12.0%). Therefore, the descriptive statistics provide first evidence for H2.

Panel C of Table 1 shows the same variables as Panel B, but distinguishes between non-disclosure vs. disclosure and conflicting vs. confirmative outcomes. This is because H3 makes a prediction for the effect of disclosure on the overuse (underuse) of conflicting (confirmative) outcome information. The results for OUTCOMEBIAS, which are also illustrated in Figure 3, suggests that disclosure facilitates overuse of conflicting outcome information (increasing from 2.4% to 13.5%) and underuse of confirmative outcome information (increasing from -9.7% to -13.8%).



The graph shows the mean values of OUTCOMEBIAS for conflicting and confirmative outcomes under disclosure and non-disclosure. The outcome is considered conflicting when a bad outcome follows a prior estimate that rather expects the high effort (PEH > 50%) or when a good outcome follows a prior estimate that rather expects the low effort (PEH ≤ 50%). Correspondingly, the outcome is considered confirmative when a bad outcome follows PEH ≤ 50% or a good outcome follows PEH > 50%.

[23] OUTCOMEBIAS is positive whenever there is overuse of outcome information and negative whenever there is underuse. If the outcome is good, OUTCOMEBIAS is computed by PEHUPDATE less BAYESUPDATE. For instance, if the normative probability goes *up* to 70% due to a *good* outcome, while the participant's posterior estimate even goes up to 80%, this would indicate an overuse of +10 percentage points. On the other hand, if the outcome is bad, OUTCOMEBIAS is computed by BAYESUPDATE less PEHUPDATE. For example, if the normative probability goes *down* to 20% due to a *bad* outcome, while the participant's posterior estimate only goes down to 30%, this would indicate an underuse of -10 percentage points. This computation of OUTCOMEBIAS accounts for the fact that it depends on the direction of the belief revision whether a deviation from the normative benchmark is considered as overuse or underuse of outcome information.

[a] OUTCOMEBIAS = deviation of the individual posterior effort estimate (PEHUPDATE) from the correct Bayesian posterior probability (BAYESUPDATE). A positive value means that outcome information was overused, because the individual update went farther into the direction suggested by the outcome than the Bayesian posterior probability. Correspondingly, a negative value indicates underuse of outcome information. The participant-based computation of OUTCOMEBIAS is: OUTCOMEBIAS = PEHUPDATE – BAYESUPDATE for the good outcome and OUTCOMEBIAS = BAYESUPDATE – PEHUPDATE for the bad outcome.

Figure 3: The effect of DISCLOSURE on OUTCOMEBIAS[a] contingent on whether the outcome information is conflicting or confirmative with regard to the prior effort estimate

Hypotheses Tests

In order to formally test H1, I use non-parametric statistic as the Shapiro-Wilk test indicates non-normality of PEH. A Wilcoxon rank-sum test indicates that PEH is not significantly different for the two contract types under non-disclosure (76.8% vs. 72.0%: z = 0.52, p = 0.60, two-tailed). In the disclosure condition, PEH is significantly lower for the NIC contract than for the IC contract (54.8% vs. 74.6%: z = -1.93, p=0.027, one-tailed). Analysis of the effect of disclosure given both contracts also indicates a significantly lower PEH in the disclosure condition for the NIC contract (54.8% vs. 76.8%: z = 2.10, p=0.018, one-tailed), but no significantly higher PEH for the IC contract (74.6% vs. 72.0%: z = 0.08, p=0.467, one-tailed). Therefore, disclosure shifts participants' prior effort estimates only towards the probabilities implied by the NIC contract, and H1 is partially supported.

As H2 predicts that outcome information conflicting with the prior effort estimate is overused and outcome information confirmative for the prior effort estimate is underused, I formally test H2 by running two regressions with OUTCOMEBIAS as the dependent variable and PEH as the independent variable (one for good outcomes and one for bad outcomes).This is because the interpretation of the outcome type depends on the prior effort estimate: For low PEH, good outcomes (bad outcomes) are considered conflicting (confirmative) and, for high PEH, good outcomes (bad outcomes) are considered confirmative (conflicting). Hence, H2 translates into two predictions that are also illustrated in Figure 2: For good outcomes, the first regression line has a positive intercept and intersects the *upper* curve with a negative slope (going from overuse to underuse). For bad outcomes, the second regression line has a positive intercept and intersects the *lower* curve with a negative slope (going from underuse to

overuse).[24] As White's test indicates heteroskedasticity of the data, the regressions calculate robust standard errors using the Huber-White estimator. The results are reported in Table 2. Both regressions support H2: For the good outcome condition, the intercept is positive (32.3, t = 1.79, p = 0.04, one-tailed) and the slope is negative (-0.56, t = -2.51, p = 0.008, one-tailed). For the bad outcome condition, the intercept is negative (-24.96, t = -3.24, p = 0.001, one-tailed) and the slope is positive (0.43, t = 3.70, p < 0.001, one-tailed).

Panel A: Good outcome (n = 51)				
Dependent variable = OUTCOMEBIAS[a]	Coefficient	Robust standard error	t	p-value
PEH[b]	-0.56	0.22	-2.51	0.008
Constant	32.3	18.06	1.79	0.040
Panel B: Bad outcome (n = 49)				
Dependent variable = OUTCOMEBIAS	Coefficient	Robust standard error	t	p-value
PEH	0.43	0.12	3.70	<0.001
Constant	-24.96	7.71	-3.24	0.001

The table shows two OLS-regressions with robust standard errors for the hypothesis test of H2. Both use OUTCOMEBIAS as dependent variable and PEH as independent variable. Panel A includes the treatments with the good outcome in period 1 and Panel B includes the treatments with the bad outcome in period 1. The p-values are one-tailed for PEH and the intercept as there are directional predictions.

[a] OUTCOMEBIAS = deviation of observed PEHUPDATE from the normative BAYESUPDATE;

[b] PEH = prior effort estimate before observing the outcome (probability of high effort).

Table 2: Regressions of PEH on OUTCOMEBIAS

To test H3, I ran a regression with OUTCOMEBIAS as a dependent variable and CONFIRMATIVE[25], DISCLOSURE and the interaction term of both as independent variables. Again, the regression uses robust standard errors. The prediction of H3 is that for conflicting outcomes disclosure increases overuse (positive slope of DISCLOSURE) and for confirma-

[24] Note that overuse of bad outcome information (posterior effort estimate lies below the *lower* curve) is coded in order to yield a *positive* value of OUTCOMEBIAS. Therefore, the *empirical* prediction regarding the bad outcomes has a negative intercept and a positive slope (going from underuse to overuse) while the regression line drawn in the graph has a positive intercept and a negative slope relative to the *lower* curve.

[25] This binary variable is introduced for the formal hypothesis test. Like for H2, the distinction of "confirmative" and "conflicting" follows the participants' prior effort estimates. Therefore, CONFIRMATIVE = 0 (conflicting) if a bad outcome follows a prior estimate that expects the high effort (PEH > 50%) or when a good outcome follows a prior estimate that rather expects the low effort (PEH ≤ 50%). Correspondingly, CONFIRMATIVE = 1 (confirmative) if a bad outcome follows PEH ≤ 50% or a good outcome follows PEH > 50%.

tive outcomes disclosure increases underuse (negative slope of DISCLOSURE). Therefore, a disordinal interaction, as indicated by Figure 3, is expected. Table 3 presents the regression results. The interaction effect is significant (t = -1.67, p = 0.049, one-tailed) indicating that disclosure affects OUTCOMEBIAS differently for confirmative outcomes than for conflicting outcomes. Although, further analysis of the simple effects of DISCLOSURE for confirmative (coefficient: 11.13, t = 1.32, p = 0.095, one-tailed) and conflicting outcomes (coefficient: -4.08, t = -1.17, p = 0.122, one-tailed) only marginally support the prediction, H3 is supported overall.

n = 100				
Dependent variable = OUTCOMEBIAS[a]	Coefficient	Robust standard error	t	p-value
CONFIRMATIVE[b]	-12.05	5.93	-2.03	0.045
DISCLOSURE	11.13	8.43	1.32	0.095
CONFIRMATIVE x DISCLOSURE	-15.21	9.12	-1.67	0.049
Constant	2.37	5.32	0.45	0.657

The table shows an OLS-regression with robust standard errors for the hypothesis test of H3. It uses OUTCOMEBIAS as dependent variable and CONFIRMATIVE, DISCLOSURE and the interaction term of both as independent variables. The p-values are one-tailed for the interaction effect as H3 makes a directional prediction and for DISCLOSURE as this reflects the simple effect of DISCLOSURE when the outcome is conflicting. Otherwise, p-values are two-tailed otherwise.

[a] OUTCOMEBIAS = deviation of observed PEHUPDATE from the normative BAYESUPDATE;

[b] CONFIRMATIVE = indicates whether the outcome information is confirmative or conflicting with regard to the prior effort estimate. This means that CONFIRMATIVE = 0 (conflicting) if a bad outcome follows a prior estimate that rather expects the high effort (PEH > 50%) or when a good outcome follows a prior estimate that rather expects the low effort (PEH ≤ 50%). Correspondingly, CONFIRMATIVE = 1 (confirmative) if a bad outcome follows PEH ≤ 50% or a good outcome follows PEH > 50%.

Table 3: Regression of CONFIRMATIVE and DISCLOSURE on OUTCOMEBIAS

Supplementary Analysis

Supplementary evidence from the post experimental questionnaire suggests that participants perceived the disclosure manipulation as it was conjectured in the development of H1, i.e., that disclosure of the pay-for-performance sensitivity helps participants making more accurate estimates of PEH, because they have a better understanding of the contract's incentive compatibility.

The first question related to this point asked: “How do you generally judge the quality of the manager’s incentive contract?” (measured from 1 = “very low quality” to 7 = “very high quality”). Consistent with PEH, participants did not rate the NIC and the IC contract differently in the non-disclosure condition (4.88 vs. 4.79: $t = 0.22$, $p = 0.826$, two-tailed) but rated the quality lower for the NIC contract than for the IC contract in the disclosure condition (3.50 vs. 4.42: $t = 1.81$, $p = 0.038$, one-tailed). The second related question asked directly for participants’ perception of the contract’s incentive compatibility: “Do you think the manager’s contract is incentive compatible (meaning that more effort leads to a higher increase in the expected bonus than to an increase in effort costs)?” Again, in the non-disclosure condition, participants did not come to significantly different judgments for the two contract types (91% vs. 75%: $t = 1.56$, $p = 0.127$, two-tailed). The absolute level of the perceived incentive compatibility is relatively high. This might explain why the prior effort estimates given the NIC contract are relatively high as well. In the disclosure condition, fewer participants rated the NIC contract as incentive compatible than the IC contract (46% vs. 67%: $t = -1.47$, $p = 0.074$, one-tailed). These results suggest that disclosure has helped many participants to assess the true nature of the NIC contract but did not affect the assessment of the IC contract. Therefore, participants’ perception of incentive compatibility might explain why disclosure only decreased PEH for the NIC contract but did not further increase PEH for the IC contract.

As the results for the prior and the posterior effort estimates suggest that there are two conflicting effects of disclosing pay-for-performance sensitivity, i.e., a better assessment of the incentive compatibility ex-ante but a stronger outcome bias in belief revision, the question arises whether the overall effect of disclosure indicates a benefit of disclosure or not. Therefore, I compute the deviation of the posterior effort estimate from the probability that is implied by the respective contract type. The implied probability of the high effort is 100% for the IC contract and 0% for the NIC contract, respectively. The deviation in the non-disclosure condition is not significantly different from the deviation under disclosure (49% vs. 46%: $t =$

0.63, p = 0.527). This suggests that the two conflicting effects of disclosure on the prior and the posterior effort estimate cancel out each other. Hence, the experimental results indicate no beneficial effect of disclosing the pay-for-performance sensitivity on investors' judgment.

6 Conclusion

The topic of transparency in financial reporting has received a lot of attention by theoretical and empirical research. While theorists predominantly promote the idea that transparency always decreases uncertainty and thereby the cost of capital (Diamond and Verrecchia 1991; Lambert et al. 2007), empiricists have found mixed evidence (Botosan 1997; Leuz and Verrecchia 2000). Not only that the benefits are rather ambiguous, there are also costs associated to transparency such as the costs of information gathering or leaking information to competitors (Yosha 1995). Contributing to this discussion about transparency, this study identifies another category of costs associated to disclosure: the quality of information processing.

In recent years, regulation of executive compensation disclosure has complemented efforts to strengthen corporate governance. In this context, compensation disclosure is considered to expose sub-optimal compensation contracts and to prevent excessive compensation. This study analyzes another perspective of compensation disclosure: the informational effect. I argue that disclosure of the pay-for-performance sensitivity comprises useful information for judging whether a manager is incentivized to provide the efficient effort, and that this judgment is important for investors and their investment decisions. In addition to the beneficial informational effect, theory suggests that disclosure has an effect for the over- and underuse of outcome information that result in a judgmental bias. Therefore, the study aims to identify two conflicting effects of compensation disclosure.

The experimental results show that compensation disclosure including the pay-for-performance sensitivity indeed might improve investors' prior effort estimates in terms of making estimates closer to the effort that is implied by the respective contract. However, dis-

closure increases the (reverse) outcome bias in posterior effort estimates. In particular, disclosure increases overuse of outcome information when the outcome is in conflict with prior expectations and it increases underuse when the outcome is confirming prior expectations. Owing to the two conflicting effects, the overall quality of the posterior effort estimate when measured against the effort level implied by the contract is not significantly improved by disclosure.

These findings have implications for theory and practice. First of all, standard setters are informed about the effect of mandatory compensation disclosure that allows for ex-ante inferences about a compensation contract's incentive compatibility. As the findings suggest that information processing quality of outcome information deteriorates, investors might not make better informed investment decisions. Although current regulation already demands disclosure of the pay-for-performance sensitivity, standard setters might consider the findings when demanding further disclosure that presents the incentive compatibility of compensation contracts even more clearly. Second, the study detects a new type of disclosure costs and, therefore, contributes to the discussion about the costs and benefits of more transparent disclosure in general. Third, the experimental design adds to the prior literature on outcome effects and biases (e.g. Baron and Hershey 1988; Peecher and Piercey 2008) by offering a framework that offers the opportunity to disentangle the normative belief revision and the non-normative use of outcome information.

As all experiments, this study is subject to some limitations. One limitation is inherent in the setting that contains only two possible effort levels and two possible outcomes. However, the agency theoretical prediction is that agents shirk or work contingent on the incentive compatibility of the contract. Hence, a low and a high effort level can be considered representative for an agency relationship. Further, as Bayes rule for belief revision generally applies to problems where new information must be integrated, the findings should be general-

izable to continuous effort scales as well. Further, the binary setting provides the advantage of a distinct and descriptive benchmark for rational behavior.

Finally, the study offers opportunity for future research. As transparent compensation disclosure is demanded by standard setters for several good reasons, it would be worthwhile identifying contextual factors that interact with the disadvantageous effect of declining information processing quality. Hence, if the outcome bias in posterior effort estimates was mitigated by these factors, the overall effect of compensation disclosure on investors' judgment might be beneficial. Further, experimental markets could analyze whether the outcome bias prevails on an aggregate level and how prices are affected by mandatory as well as voluntary compensation disclosure.

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8 Appendix – Experimental Instruments[26]

Preliminary Remarks

Welcome and thank you for participating in this experiment!

The experiment will take about 60 minutes of your time. Your task in the experiment is to estimate probabilities for the financial success of a fictional company and to judge the role that the CEO plays for achieving the company's success. The answers and decisions that you make will remain anonymous. The experimenters will not be able to link your answers to your identity. All participants are assigned to individual work stations so that their decisions cannot be observed by the experimenters or other the participants.

The experiment has two tasks. Before you start with the tasks, you will read a short case study about a company that hires a new CEO. Your first task is to estimate how likely it is that the new CEO will provide a high personal effort to contribute to a successful outcome from the firm's perspective.

As compensation you will receive an initial balance €10 that includes your show up fee. Your final compensation will depend on the decisions that you make during the experiment. It can be considerably higher or lower. However, you will always have the opportunity to make decisions that guarantee your initial balance of €10. This will be explained in detail after the first task. As your decisions will affect your earnings, it is important that you read the case study and all instructions carefully.

The money is provided by the University of Hamburg and will be paid to you in cash right after the experiment.

Please note:

- Please do not talk with anyone other than the experimenter after this point.
- If you have any questions or a technical problem while we are going over the instructions, or during the study, please raise your hand and we will answer your question in private.
- You don't need to rush through the experiment. You will have enough time to make all your estimates and decisions carefully.
- Please help us maintain control over this study by not discussing it with anyone who may be participating in future sessions.

At the end of the study, you will use your unique participant number to collect your pay from the study, and you will be paid in private.

[26] The experimental instruments are directly translated from German to be as close as possible to the original instruments. The materials presented here account for the other treatments by indicating modifications in square parentheses.

Your Role and Task Description

Your first task is to read a short case about a company that hires a new CEO. You will find the case on the following pages. The assigned reading time is 12 minutes. You are allowed to take notes on the materials and to refer back to the case and your notes later in this task.

After the 12 minutes are over you are asked to estimate some probabilities referring to the CEO's job and the future success of the company. You will answer the questions on the computer. To activate the questionnaire you will be requested to enter the code on the front page of these materials.

Please assume the following situation:

Assume that your role is that of an observer and potential investor of the company described in the case. This means that you should read the case from the perspective of a person who is interested to know how successful the company will be in the future.

The Case

Imagine that a company's CEO retires. (S)he led the company for a couple of years of which some were successful and some were not. Although most of the board members think that (s)he did a good job, the firm's performance did not always meet or beat the analysts' expectations. This is because the outcome not only depends on the CEO's effort and ability, but also on other factors that are not controllable. Assume that these other factors are external and random, meaning that the realized outcome is not 100% controllable or predictable. However, the CEO played an important role for success and failure of the company.

At the beginning of the current year, a new CEO was hired. The board considers him/her to be a quite promising candidate based in his performance record at his former employer. However, only the outcome of his/her work could be observed and neither actual decisions nor behavior. Thus, there is uncertainty about his actual behavior. More specifically, one cannot predict with certainty how much effort he will provide on his new task.

Usually, for incentivizing executives to provide effort, companies use incentive contracts. As in this case, the board negotiates these contracts with the CEO candidate. In addition to a fixed salary, executives are granted a bonus whose size depends on the firm's performance. This is because executives are assumed to be able to influence the firm's performance positively by providing more personal effort. A high effort means that the CEO spends a high amount of time on his/her job and not on other unrelated activities. Just like there is a cost to working harder in the real world, there is a cost to choosing a higher effort level for the CEO in this study. This is because the CEO spends more time on job related tasks, which might be stressful for him/her and make him/her feel uncomfortable. Further, (s)he spends less time on leisure and tasks (s)he enjoys.

Hence, by providing a higher effort the CEO increases not only the chance for a good firm performance but also the personal costs. As long as (s)he only receives a fixed salary there is little financial incentive to do so, because more effort only causes higher personal costs at the same pay level. For setting effective financial incentives, a compensation contract that grants the CEO a bonus contingent on the firm's performance should assure that the CEO's expected

compensation increases more than the costs of effort when (s)he decides to provide more effort.

For the new CEO, who is going to be hired, the board negotiated an incentive contract that is presented to the shareholders right before the CEO starts his/her job. The board hopes to convince current shareholders and potential investors that the new CEO is going to provide a high effort for the benefit of the company. But as the CEO's actual behavior could not be observed in the past, shareholders and potential investors follow the disclosure of the incentive contract with great interest in order to estimate the probability of a high effort.

[MANIPULATION: 2 (disclosure vs. non-disclosure) x 2 (NIC vs. IC contract)]

The board discloses the following details about the incentive contract. The CEO is compensated with:

- A fixed salary of €400,000.
- A bonus that depends on the achievement of a performance target. The bonus accounts for a considerable share of the total compensation. The performance target reflects the firm's performance from the perspective of the shareholders.

For matters of simplification, there are only two possible outcomes: a good firm performance that clearly outperforms the analysts' expectations and a bad firm performance that clearly misses the expectations.

[Only disclosure]

To demonstrate the effect of the firm's performance on the CEO's bonus the board further discloses the following details:

[Only disclosure & NIC contract]

In the case of the good firm performance, the CEO will receive a bonus of €270,000. In case of the bad firm performance the bonus will only be €170,000.

[Only disclosure & IC contract]

In the case of the good firm performance, the CEO will receive a bonus of €400,000. In case of the bad firm performance the bonus will only be €100,000.

[All treatments]

Based on the experience that the board and the shareholders as well as observers have made with the company, the influence that a high or low effort has on the firm's performance can be estimated. As the new CEO will have the same decisions rights and the same estimated ability as former CEOs, it is likely that (s)he will be able to influence the firm's performance by making his/her effort choice in the same way as former CEOs could. But even a high effort does not guarantee a good outcome in the sense that the analysts' expectations are outperformed. In the real world, you may work hard and end up with a bad outcome, or conversely, not work hard and still get a lucky outcome. The same is true for the CEO in this case. However, a high effort *increases the probability* of a good outcome. Experts summarize the probabilities of the two possible outcomes contingent on the degree of effort as follows:

	low effort	high effort
good outcome	10 %	60 %
bad outcome	90 %	40 %

The table reads for example: Although the CEO expends a low effort there is a 10% chance for a good outcome. When (s)he provides a high effort instead, the chance for a good outcome increases to 60%. By choosing a high effort, the CEO, of course, not only increases the probability for a good firm performance but also for a higher bonus for himself/herself.

At the same time, however, by deciding for the high effort the CEO increases his/her costs of effort, which are the same regardless of a good or bad outcome. The former CEO once said that (s)he would have abstained from a considerable amount of pay when (s)he could have delegated all the tasks that are not enjoyable. Assume that based on this statement the board estimated the new CEO's costs of effort. There are only two degrees of effort for reasons of simplification:

	costs of effort
high effort	€150,000
low effort	€50,000

Hence, the decision of the new CEO to provide a high effort or a low effort needs to consider whether the chance for a higher bonus is a sufficient compensation for the additional costs of effort.

[From here on the experiment was conducted in z-Tree]

Question 1

How likely do you think it is that the new CEO provides the high effort?

Please complete the following statement by indicating a percentage between 0 and 100:

The probability of a high effort is _____%.

[MANIPULATION: good vs. bad outcome in period 1]

After one year, the new CEO presents his/her first annual report. The firm's performance has met *[did not meet]* the analysts' expectations. Hence, the board considers the outcome as good *[bad]*. According to the incentive contract, the CEO gets a total compensation of:

[Good outcome & IC contract]

400,000 fixed salary + 400,000 bonus = 800,000 total compensation

[Good outcome & NIC contract]

400,000 fixed salary + 270,000 bonus = 670,000 total compensation

[Bad outcome & IC contract]

400,000 fixed salary + 100,000 bonus = 500,000 total compensation

[Bad outcome & NIC contract]

400,000 fixed salary + 170,000 bonus = 570,000 total compensation

Question 2

Now that you know about the good *[bad]* firm performance, how likely do you think it is that the new CEO indeed *[nonetheless]* provided the high effort?

Indicate the probability of the high effort in %, given that you already learned about the good *[bad]* firm performance in the current year: _____%.

For you to remember: your previous estimate for a high effort was _____%.

Question 3

Imagine that the external factors which can cause an outcome that is not in line with the CEO's effort remain stable in the next year, meaning that a *high effort still can only increase*

the probability of a good outcome from 10% to 60%. Moreover, the CEO will still have the same incentive contract. Again, the criterion for a good or bad firm performance is reflected by beating or not beating the analysts' expectations.

Now that you have a clearer picture about the likeliness that the CEO expends a high effort (question 2), how likely do you think it is that the firm performance will be good in the next year?

Indicate the probability of a good firm performance in %: _____

You completed the first task. On the next screen you will get a description of your second task and an explanation how your final payoff is determined. To check whether you assessed all relevant information for the task you will answer with a short quiz.

Instructions for Investment Decision

At the beginning of the last year you decided to keep track of the company's development. Therefore, you followed the board's decision to hire the new CEO and the board's presentation of the incentive contract. Then you judged whether the contract is able to incentivize the CEO to provide the high effort. After that you learned more about the probability of a high effort from the *[good/bad]* outcome in the first year and estimated the probability for a good firm performance in the next year.

Right now, you want to decide whether and how much you should invest into the company. You can decide to invest part of or your initial balance of €10. You may invest any portion of the €10 in increments of €1. Your payoff from the investment depends on the outcome that is actually realized. Remember that the higher the probability of a high effort, the higher is the probability of a good outcome.

In the stock market, investment opportunities reflect the expectations of all participants in the market. This means, for example, if you are completely certain that next year's firm performance will be good, other people might have the same or other expectations. In this case, the chance for a good performance may be already reflected in the current stock price. In the other case, however, when you are certain that the future performance is bad, the current stock price might also reflect the lower expectations of the other market participants.

For simplification, assume that in the year following your investment the firm will be liquidized. Hence, the future value of the firm will only differ from the current value by the different cash flows realized in the second year, which depend on the good or bad outcome. Given that you invested your whole initial balance of €10, in the real world, you could buy more or less stock contingent on the market price. In this study, for your convenience, your investment opportunity is illustrated by the possible payoffs from an investment of €10. Hence, you don't need to account for the underlying stock price. Your payoff for an investment of €10 will be [€10 * 'x' = €14.00 / €28.00 / €15.07 / €21.41] in the good case and [€10 * 'y' = €4.00 / €8.00 / €4.31 / €6.12] in the bad case.

Therefore, for a good outcome your final payoff equals:

Invested amount * 'x' + (€10 - invested amount)

For a bad outcome your final payoff equals:

Invested amount * ‘y’ + (€10 - invested amount)

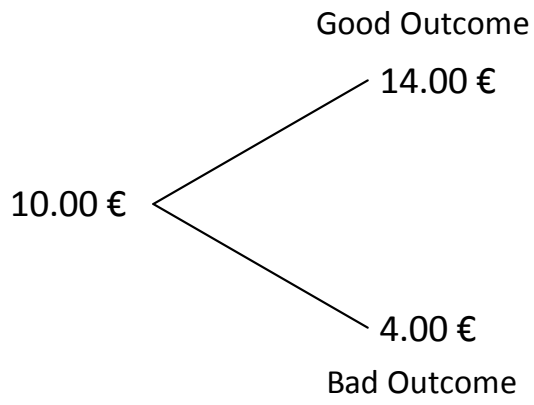
Example: *[example for IC contract and disclosure]*

In case you decide to invest €5 you receive…

…€5 * 1.4 + (€10 - €5) = €12 when the outcome is good.

…€5 * 0.4 + (€10 - €5) = €7 when the outcome is bad.

The following graph illustrates the possible payoffs that you can expect to results from an investment of €10.



Quiz

Please indicate whether the following statement is correct or false.

1. When you are certain that the effort is going to be low, your invested amount will be multiplied by ‘y’.

Answer is “correct”:

No, the statement is wrong. There are external factors that can cause a good outcome, so that your investment is multiplied by ‘x’. Remember that a bad or a good outcome is never certain, even when the manager indeed expends a low or high effort.

Answer is “false”:

Yes, the statement is wrong. There are external factors that can cause a good outcome, so that your investment is multiplied by ‘x’. Remember that a bad or a good outcome is never certain, even when the manager indeed expends a low or high effort.

Please indicate whether the following statement is correct or false.

2. Investing your initial balance rather pays out when you estimated a high probability of a good outcome than when you estimated a low probability.

Answer is “correct”:

Yes, given the two possible payoffs, a higher estimated probability of a high outcome gives you a higher expected payoff from the investment. When you estimated a low probability of a good outcome, you still have the option to invest €0.

Answer is “false”:

No, given the two possible payoffs, a higher estimated probability of a high outcome gives you a higher expected payoff from the investment. When you estimated a low probability of a good outcome, you still have the option to invest €0.

3. Assume you invest €1 and the outcome is good. What is your <u>total</u> payoff?
   _____ [Subjects need to enter the correct amount.]

Investment Decision

[Multipliers depend on the treatment and account for the respective market prices of one share]

Please make your investment decision now. Remember your possible payoffs:

Your payoff for an investment of €1 will be multiplied by [‘x’ = 1.4 / 2.8 / 1.51 / 2.14] in the good case and [‘y’ = 0.4 / 0.8 / 0.43 / 0.61] in the bad case.

For a good outcome your final payoff equals:

Invested amount * ‘x’ + (€10 - invested amount)

For a bad outcome your final payoff equals:

Invested amount * ‘y’ + (€10 - invested amount)

Please state the amount in € that you want to invest into the firm (between €0 and €10):

_____

ESSAY 3

Effects of Agent Competition and Effort Announcements on Compensation Contracts and Effort Provision: Evidence from a Laboratory Experiment

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Abstract

This study investigates two important features of recruitment processes in practice: competition among agents and pre-contractual announcements of agents' effort. As effort is non-contractible in reality, both features are irrelevant for agents' effort choices from a standard economic perspective. However, drawing on behavioral theories, we predict that both features have positive effects on agents' effort choices because contract offers that are considered as unfair in a bilateral setting may be perceived as justifiable under agent competition and because agents may have a preference for promise-keeping and may therefore feel committed to their non-binding effort announcements. Moreover, we predict that the effect of the agents' effort announcements is stronger when agent competition is present than when it is absent. Our findings are broadly consistent with our predictions. Further, we find that principals offer lower surplus shares and can realize higher payoffs when agent competition is present but do not change their contract offers and cannot realize higher payoffs under effort announcements. Our findings have important theoretical and practical implications for the question of how organizations can benefit from considering the effects of contextual factors and social preferences on contract design even if these factors are irrelevant from a standard economic perspective.

Keywords: Principal-agent theory, incentive contracts, competition, effort announcements, promise-keeping, reciprocity.

1 Introduction

Principal-agent conflicts and the question of how these conflicts can be mitigated by the choice of appropriate incentive contracts are among the most intensively studied problems in management accounting and have received considerable attention from both theoretical and empirical research (Indjejikian 1999; Kuang and Moser 2009; Milgrom and Roberts 1992). While standard economic models usually assume that agents choose their effort only in response to monetary incentives, and principals determine the optimal contract thereby perfectly anticipating the agents' behavior (Grossman and Hart 1983; Holmström 1979), empirical research has demonstrated that effort and contract choices can be strongly affected by fairness preferences (Anderhub et al. 2002; Fehr et al. 1993). Specifically, agents may negatively reciprocate contract offers that imply unequal surplus sharing because they feel unfairly treated and respond with low effort (Anderhub et al. 2002; Kuang and Moser 2009) or may positively reciprocate generous contract offers by providing particularly high effort (Güth et al. 1998; Hannan et al. 2002).

This study analyzes two important features of recruitment and selection processes in practice: competition among agents and non-binding announcements of agents' effort. So far, principal-agent theory has often been tested in bilateral bargaining settings where one principal faces only one agent. In reality, however, recruitment processes are often characterized as selection processes that involve several stages and a large number of candidates (Guion and Gibson 1988; Breaugh and Starke 2000; Russo et al. 2000). Additionally, in the course of the recruitment process, candidates usually have the opportunity to present and market themselves by making non-binding announcements about their future effort. Thus, recruitment processes are usually characterized by competition among the job applicants who are trying to create a positive impression in the course of the selection process (Stevens and Kristof 1995).

From a standard economic perspective, both factors are irrelevant and should not affect contract offers and effort choices: First, because agents do not make their effort choice until

one of the agents has been selected and the contract has been concluded on a bilateral basis with the principal, the principal's bargaining power does not increase as the number of agents increases. Second, as agents' announcements about future effort represent cheap talk from a standard economic perspective and deviations from the announced effort level cannot be contractually punished, the announcements are non-binding and should also not matter in principal-agent relationships (Farrell 1987).

However, we develop theory and provide evidence that both factors affect agents' effort choices and the outcome of principal-agent relationships. First, based on prior research demonstrating that fairness concerns may differ according to the circumstances of the interaction (e.g., Bowles 1998; Fischbacher et al. 2009; Sobel 2007), we predict that agents will respond more positively to contract offers under agent competition because actions that are considered unfair in a bilateral setting may be perceived as justifiable under agent competition. Second, as individuals feel guilty when disappointing the expectations of others and thus, have a preference for promise-keeping (Battigalli and Dufwenberg 2007; Charness and Dufwenberg 2006; Charness et al. 2013), agents may feel committed to their effort announcements made in the course of the recruitment process, and this can increase their effort choices as well (Douthit et al. 2012). Moreover, we predict that the effect of the agents' effort announcements is stronger when agent competition is present than when it is absent. The intuition underlying this prediction is that agents' effort announcements are likely to increase as they try to overbid each other, but simultaneously agents are unlikely to exhibit less commitment to their announcements because the principal relies on these announcements for selecting the agents.

We investigate the effects of competitive pressure and non-binding effort announcements in a setting where principals can choose among a large variety of contracts and, particularly, can offer different amounts of fixed wages and revenue shares to the agent including gift exchange contracts with fixed wages and no incentive component as well as incentive

contracts with a positive share of the agent in the generated output. We use a setting where the principal can offer a large variety of contracts for mainly three reasons. First, doing so allows us to gain insights into the principals' contract design and their ability to anticipate the agents' reaction to the factors under investigation. This is important to investigate because the effectiveness of incentive contracts strongly depends on the principals' ability to correctly anticipate the agents' reciprocal reactions to their contract offers (Kuang and Moser 2009). Second, prior research suggests that agents positively reciprocate in gift exchange settings (Akerlof 1982; Hannan et al. 2002) but often reciprocate negatively in settings with incentive contracts (Anderhub et al. 2002; Kuang and Moser 2009). Our setting includes both possibilities thereby allowing us to study the mechanisms behind the effects of agent competition and effort announcements more deeply. Finally, our setting has external validity because incentive contracts are descriptive of many real world principal-agent relationships.

In our laboratory experiment, participants assume the role of either a principal or an agent. Principals can offer linear compensation contracts to the agents consisting of a fixed wage and a constant share in the firm's revenue. Agents can accept the contract or not and, in case they accept the contract, choose an effort. We manipulate agent competition at two levels (no vs. yes) by setting the number of agents competing for the contract to one (no agent competition) or three (agent competition). We manipulate non-binding effort announcements at two levels (no vs. yes) by varying whether agents communicate to the principal an effort level that they intend to choose if the contract is concluded (effort announcements) or not (no effort announcements). The communicated effort level is non-binding.

Our results show that both factors affect the agents' effort. Agents deviate more positively from the effort level that would maximize their financial payoff when agent competition is present and when they make a non-binding announcement about their future effort. The effect of agent competition seems to be more pronounced when principals' contract offers are "unfair", i.e., imply only low surplus shares for the agent. Further, we find that the effect of

non-binding announcements on effort is particularly strong in a situation of agent competition, indicating an ordinal interaction of both factors. Finally, our results show that principals are able to correctly forward-induce the effect of increased agent competition by offering contracts including a lower surplus share for the agent, but they do not change their contract offers as a response to non-binding effort announcements. Additional analyses indicate that principals can realize higher payoffs when agent competition is present, while total welfare (i.e. the sum of principals' and agents' payoffs) is neither significantly affected by agent competition nor by effort announcements.

Our study has important implications for theory and practice: From a theoretical perspective, the study builds theory by identifying two factors, non-binding effort announcements and agent competition, which may affect agents' effort choices despite their standard economic irrelevance. Our study also contributes to the existing knowledge base by providing evidence that announcements about future effort have a particularly positive effect on effort in a situation of agent competition because agents make particularly high effort announcements but do not deviate more strongly from these announcements as principals rely on the announcement for selection purposes. This extends prior literature on non-binding announcements (Charness et al. 2013; Douthit et al. 2012; Ostrom et al. 1992; Vanberg 2008) and prior evidence on honesty preferences in competitive environments without subsequent effort (Brüggen and Luft 2011).

Further, our study helps inform practitioners on the optimal design of contracts and recruitment processes. While prior research suggests that principals in bilateral settings are reluctant to offering incentive contracts that seize a large share of the surplus (Anderhub et al. 2002; Kuang and Moser 2009), our experiment provides evidence that agents react more positively in their effort choices if they face competition and make effort announcements. This suggests that principals in real recruitment processes might be more successful in seizing a considerable share of the surplus when they are able to make the competition more salient in

these processes and can further elicit effort announcements from the agents. Informing practitioners about our findings is particularly important as our experiment provides evidence that principals can forward-induce the effect of competition but do not adjust their contracts under effort announcements. Moreover, our findings may also carry over to consultancy and procurement contracts as our two studied factors are natural characteristics for most of these processes.

The remainder of the paper is structured as follows: Section 2 reviews the related literature and develops the hypotheses. Section 3 presents the experimental design and the procedures. In Section 4, we analyze the experimental data, and Section 5 concludes.

2 Background and Hypothesis Development

Related Literature

Our study is related to the research on principal-agent relationships in general and especially to the literature studying behavioral aspects of this relationship. Prior experimental research has found that principal-agent relationships are not only affected by monetary incentives but also by fairness preferences of the principal and the agent. Specifically, experiments have provided evidence for the existence of positive and negative reciprocal considerations (Fehr et al. 1993; Güth et al. 1998; Kuang and Moser 2009), and that these preferences exist in settings with incentive contracts (e.g., Anderhub et al. 2002) and without incentive contracts (e.g., Hannan et al. 2002).

While most of the prior studies on principal-agent relationships have been conducted in bilateral bargaining settings, competition among agents has been studied less often. Moreover, the results are ambiguous and strongly depend on the contractibility of the agent's effort. In situations in which the increased bargaining power of one party can be enforced through a contract, responders more readily accept unequal offers under competition (Fischbacher et al. 2009; Roth et al. 1991). In contrast, the effect of agent competition on effort in settings with

non-contractible effort is considerably weaker. Prior research in this field has mainly concentrated on gift exchange games and does not show any consistent effect of competition on effort. Specifically, Brandts and Charness (2004) do not find strong effects when varying the excess supply of agents or principals in the market,[27] but Choi (2014) demonstrates that the effect of signing bonuses on effort is stronger when there is competition among agents than when there is no competition. While gift exchange settings capture the realistic feature that effort is not contractible, they do not consider the possibility that principals can also offer incentive contracts in reality to provide agents with financial incentives to increase their effort. Thus, while in gift exchange settings, the principal can only rely on the agent positively reciprocating the offered fixed wage prior research demonstrates that the principal's intention to control the agent's effort by setting up incentive contracts can lead to negative agent reactions and low effort (Kuang and Moser 2009). Our setting allows investigating whether and how competition affects both negative and positive reciprocal agent reactions to contract offers.

Further, our study is closely related to prior research on the effects of non-binding effort announcements on future effort. While literature on non-binding effort announcements is generally scarce, recent evidence from gift exchange games in economics (Charness et al. 2013) and accounting (Douthit et al. 2012) shows that pre-contractual, non-binding effort announcements have the potential to mitigate the moral hazard problem by activating the agents' preference for promise-keeping and can thus lead to higher effort levels, higher wages for the agent and higher expected profits. Such announcements are effective because individuals exhibit guilt aversion, i.e., they are reluctant to disappointing someone else's expectations (Battigalli and Dufwenberg 2007; Charness and Dufwenberg 2006). Consequently, they are committed to their announcements and prefer to keep promises even if this is associated with per-

[27] Similarly, differences between gift exchange experiments with excess supply of agents (Fehr et al. 1998a, 1998b; Hannan et al. 2002) and with an equal number of principals and agents (Gächter and Falk 2002; Charness et al. 2004) are not substantial.

sonal monetary costs (Ellingsen and Johannesson 2004; Ostrom et al. 1992; Vanberg 2008). We extend this stream of literature by investigating the interaction of effort announcements and agent competition which is likely to be characteristic of many recruitment processes in practice.

Finally, our study is partly related to the research on the role of honesty preferences in management control systems. Prior research in accounting has intensively analyzed the role of honesty preferences in coordination and control processes (e.g., Evans et al. 2001; Hannan et al. 2006, Rankin et al. 2003). Moreover, Brüggen and Luft (2011) demonstrate that in capital budgeting settings without subsequent effort provision from the agent, competition can mitigate the influence of honesty preferences and can lead to larger overstatements of project costs. However, while the agents' effort announcement may be more or less honest relative to their intended effort level at the time of the announcement, effort announcements are likely to affect actual effort provision through the agents' preferences for promise-keeping and their commitment to the announced effort level rather than through honesty preferences. This is because effort announcements create expectations of the principal about the actual effort choice and agents may feel guilty if their behavior falls short of these expectations (Charness and Dufwenberg 2013; Vanberg 2008). Thus, even if effort announcements are overstated relative to the effort level intended at the time of the announcement, preferences for promise keeping could lead agents to deviate less from their announced effort levels than originally intended.

Hypotheses

Agents' Effort Choices

From an economic perspective, pre-contractual competition among agents does not affect the relative bargaining power of principal and agents because the contractual relationship between principal and agent is reduced to a bilateral setting once the agent has been selected. However, existing research suggests that effort levels in principal-agent relationships are not

only affected by monetary incentives but also by the agent's reciprocal considerations. Agents provide a larger effort than the effort level maximizing their individual payoffs[28] if a contract offer is perceived as generous and punish principals for unfair offers by providing less effort than the payoff maximizing effort level (Anderhub et. al. 2002; Kuang and Moser 2009).

However, prior research suggests that fairness is not a concept that is independent of the circumstances in which an interaction takes place (De Dreu et al. 1998), and reciprocal considerations may differ according to the circumstances of the interaction (Arnold 2013; Hannan 2005). Specifically, a competitive setting may shift agents' and principals' perception of bargaining power (Schotter et al. 1996). Fairness models (e.g., Fehr and Schmidt 1999) suggest that competition in market settings can shift fairness perceptions, and that actions considered as unfair in a bilateral setting may be acceptable in a market setting. Relative to a bilateral relationship, a market setting may shift the agents' reference group for the surplus distribution from the principal to the competing agents. This means that contract offers that are perceived as unfair in a bilateral setting may be acceptable in a setting of agent competition because accepting a small surplus share still makes the agent better off compared to all other agents (Fehr and Schmidt 1999). This implies that agent competition may substantially influence effort choices by altering the effect of agents' reciprocal considerations on effort choices. Specifically, agents may react more positively to contract offers when agent competition is present than when it is absent. We predict:

H1: Controlling for the payoff maximizing effort level, agents' effort is larger when agent competition is present than when it is absent.

If agents can make non-binding announcements about their intended future effort level after the principal has made her contract offer, agents are likely to announce effort levels that are higher than or at least equal to their payoff maximizing effort level. For example, if the principal offers a contract that pays only a fixed wage but has no variable component, the

[28] In the following, we will refer to this effort level as the agent's payoff maximizing effort level.

agent's payoff maximizing effort level is the minimum effort, but simultaneously, the agent is likely to announce a larger effort level in order to signal that he will reciprocate the principal's trust. Similarly, agents have little incentive to announce an effort level lower than the payoff maximizing effort level implied by a compensation contract including variable payments because they would risk that the principal retracts the contract offer.

Even though these announcements are non-binding and represent cheap talk in a game-theoretical sense, they may still affect the agents' effort choices because principals form expectations about subsequent effort based on the announcements. Prior research suggests that individuals experience guilt when disappointing others' expectations and therefore feel committed to non-contractual obligations even if this behavior is costly to them (Charness et al. 2013; Douthit et al. 2012; Ellingsen and Johannesson 2004; Ostrom et al. 1992; Vanberg 2008). Thus, in making their actual effort choice, agents are likely to be affected by their announced effort level because in order to reduce the feeling of guilt, they may tend towards fulfilling their announcements (Battigalli and Dufwenberg 2007; Charness and Dufwenberg 2006). Therefore, as announced effort levels are likely to deviate positively from the payoff maximizing effort levels, non-binding effort announcements are likely to increase the agents' subsequent effort choices as well. We test the following hypothesis:

H2: Controlling for the payoff maximizing effort level, non-binding effort announcements increase effort relative to a setting without effort announcements.

We now develop theory to predict that the positive effect of non-binding effort announcements on effort choices, predicted in H2, is stronger when agent competition is present than when it is absent. The intuition underlying this prediction is that agents are likely to make particularly high effort announcements in order to be selected and may then feel particularly guilty when deviating from their announced effort levels because the principal has based her selection decision on the announced effort level. Thus, to investigate how agent competition and effort announcements interact, two separate effects have to be examined:

First, the effect of agent competition on the level of announced effort and, second, the effect of agent competition on the agents' feeling of guilt when deviating from their announcements.

First, prior research suggests that under agent competition, agents will overbid each other in order to be selected by the principal (Brüggen and Luft 2011; Fehr and Falk 1999). Thus, announced effort levels are likely to deviate more positively from the payoff maximizing effort level when agent competition is present than when it is absent. Second, even though principals are unlikely to always select the agent announcing the highest effort level under agent competition (Fehr and Falk 1999), the principal is likely to base her selection in some way on the effort announcements made by the agents. Moreover, the agents' effort announcement reflects their expectation of how much effort announcement is credible for being selected, reflecting the agents' awareness of the fact that principals will base their selection decision on the effort announcements. Thus, under agent competition, the selected agent may feel particularly guilty when deviating from his announced effort, since this would disappoint the principal who relied on the announcement (Battigalli and Dufwenberg 2007; Charness and Dufwenberg 2006). Additionally, the selected agent may also feel guilty towards the agents who did not get selected if he assumes that their announcements deviated less from the payoff maximizing effort level. This implies that despite the agents' increased costs of fulfilling their increased effort announcements under competition, agents are unlikely to feel less committed to their announcements than in a setting without competition owing to their simultaneously increased feeling of guilt.

Together, this suggests that the effect of effort announcements on agents' effort is larger when agent competition is present than when it is absent because the effort announcements deviate more strongly from the payoff maximizing level under competition, and the agents' commitment to their announcements is unlikely to decrease relative to the announcements in a setting without competition. Therefore, we predict an ordinal interaction in that the effect of

effort announcements on the deviation from the payoff maximizing effort is larger when agent competition is present than when it is absent:

H3: Controlling for the payoff maximizing effort level, the effect of effort announcements on effort is larger when agents face competition than when they do not.

Principals' Contract Offers

Agent competition may have two, non-mutually exclusive effects on the principals' contract offers: First, principals may forward-induce the agents' more positive reactions to their contract offers and, second, principals themselves may perceive an increase in bargaining power and may feel entitled to make more unequal contract offers.

As predicted in H1, agent competition is likely to make agents react more positively to a given contract offer because agents' fairness perceptions may differ according to the circumstances of the contract offer (Fehr and Schmidt 1999). If principals correctly anticipated the agents' shifted fairness perceptions, they could exploit the shifted fairness preferences and offer contracts that imply lower surplus shares for the agents than in a bilateral setting, i.e., lower shares in the relationship's surplus net of effort costs.[29]

Further, it may be possible that principals' perception of their own bargaining power and of the fairness of their contract offers are shifted in a competitive setting as well (Schotter et al. 1996) even if their bargaining power remains unchanged from a standard economic perspective. That is, in a setting of agent competition, principals themselves may feel entitled to make contract offers that imply a smaller surplus share for the agents.

Both arguments imply that agent competition is likely to lead principals to make contract offers that imply lower surplus shares for the agents relative to a bilateral setting, and we formally state this as H4:

[29] The surplus at the time of the contract offer, i.e., before the agent's actual effort choice, can either be defined as the surplus following from the agent's payoff maximizing effort choice or the maximum feasible effort choice. However, this distinction has no implications for our theory, and, in the following, we define the surplus of the principal-agent relationship as the surplus implied by the payoff maximizing effort choice.

H4: Agent competition leads to contract offers that imply lower surplus shares for the agents.

We do not make an explicit hypothesis regarding the effect of non-binding effort announcements on the principals' contract choices. As we explained above, the effect of non-binding effort announcements on agent reactions may not only be influenced by the agents' degree of commitment to their announcements, but also by the circumstances in which the interaction takes place. The principal's ability to exploit the agents' effort announcements for their own welfare will strongly depend on their ability to correctly predict the different effects and interactions. As it is unclear whether principals possess this capability to correctly predict all agents' reactions, we do not state a formal hypothesis on the effect of effort announcements on the principals' contract offer but leave this as an open empirical question.

3 Methodology

Setting

The setting of our study builds upon the setting used in Anderhub et al. (2002). A principal (P) hires an agent (A) to carry out a task. The *revenue* (x) of the firm depends on the agent's effort (e):

$$x = x(e) = 35e. \qquad (1)$$

Once the principal's contract offer is accepted by the agent, the set of feasible effort levels is given by {1, 2, ..., 18}. Rejection of the contract offer reflects an effort provision of 0. In case the agent provides a positive effort, he incurs increasing private costs of effort, c = c(e):

e	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
c(e)	5	10	15	25	35	45	60	75	90	110	130	150	175	200	225	255	285	315

Thus, as for all feasible effort levels the marginal productivity (35) is larger than the marginal costs of effort (30 at maximum), the efficient effort level in our setting is $e^* = 18$,

leading to a revenue for the firm of 630. The maximum *total surplus* of the agency-relationship is 315, accounting for the agent's effort costs of 315 that he incurs if he chooses the efficient effort level of 18.

We assume that the agent's effort is non-contractible. The principal makes a take-it-or-leave-it contract offer to the agent(s), choosing from a large set of linear contracts. The principal's contracting variables are the fixed salary (f) that can be set between -600 and +600 and the agent's revenue share (s) that can be chosen from the set $s \in \{0.00, 0.05, ..., 0.95, 1.00\}$. We included also negative fixed wages into the set of potential contracting parameters because it allows principals to offer contracts with high revenue shares and still receive a substantial share of the surplus (Anderhub et al. 2002). For example, as we demonstrate below, the optimal contract from an economic perspective would predict a negative fixed wage and a high revenue share.

When the parties agree on a contract, the principal's and agent's payoffs (π) are given by:

$$\pi^{P} = (1-s) \cdot x - f \tag{2}$$

$$\pi^{A} = s \cdot x + f - c(e) \tag{3}$$

and zero for both parties if the agent rejects the contract offer. Agents who are not selected in the conditions with agent competition also receive zero payoff.

From a standard economic perspective, agents only increase effort beyond the minimum effort if they receive incentive compensation. Thus, the revenue share (s) determines the agent's effort choice. To maximize his payoff, the agent increases his effort level until the marginal costs of effort are as large as the marginal revenue from his share in the firm's revenue ($s \cdot 35$). Figure 1 illustrates how the agent's payoff maximizing effort level is determined. Given the piece-wise linear specification of the effort cost function and the agent's constant marginal productivity, there are seven effort levels $e \in \{0, 3, 6, 9, 12, 15, 18\}$ that maximize the agent's payoff for different revenue shares included in the principal's contract offer. For

example, for a revenue share of s = 0.50 the agent maximizes his payoff by choosing an effort of e = 9 because his marginal revenue from increasing his effort (0.50 x 35 = 17.5) exceeds his marginal costs of effort if e ≤ 9. Similarly, for a revenue share of s ≥ 0.90, the agent maximizes his payoff by choosing an effort of e = 18 because his marginal revenue (0.90 x 35 = 31.50) exceeds the maximum marginal effort costs.

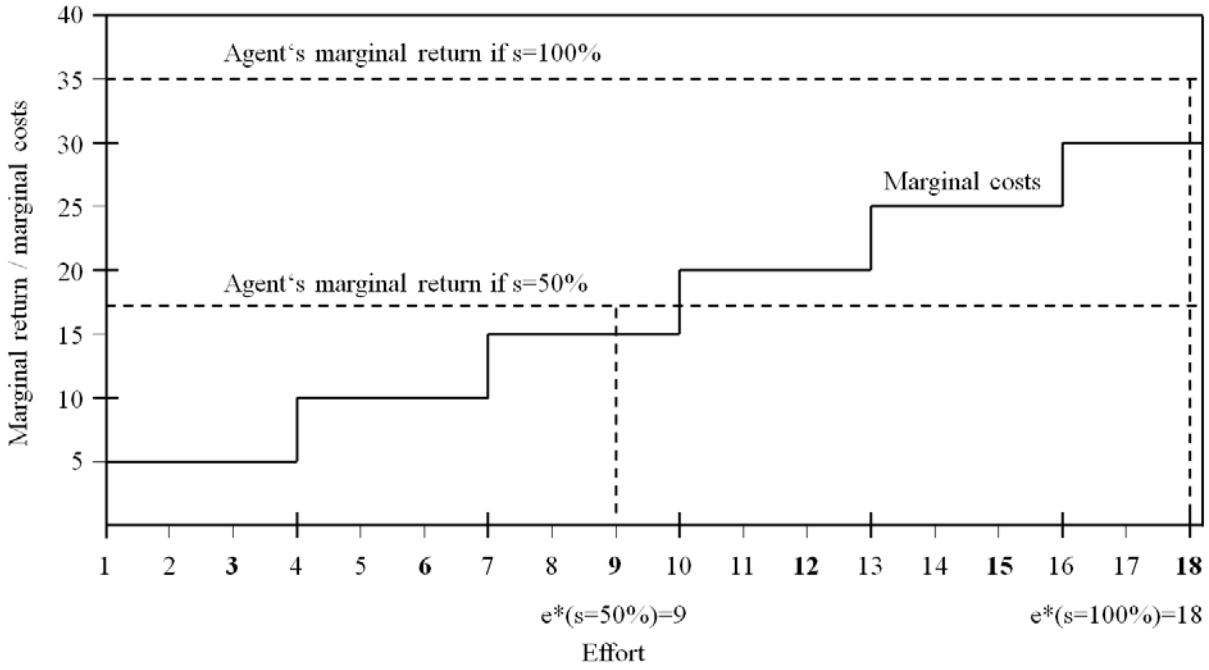

Figure 1: Marginal Return, Marginal Cost and Payoff Maximizing Effort (based on Anderhub et al. 2002)

From an economic perspective, the principal would have to anticipate the agent's payoff maximizing effort choice and simultaneously fulfill the agent's participation constraint, i.e., guarantee that the agent does not earn less than his reservation utility of 0 after his private costs of effort are deducted. The principal would then maximize her own payoff by offering a contract that induces the efficient effort level e* = 18 at the lowest possible cost (Grossman and Hart 1983). Thus, from an economic perspective, the principal should choose a revenue share s ≥ 0.90 to induce the effort level of e* = 18 and set the fixed wage f such that the agent receives a payoff equal to (or slightly larger than) his reservation utility of zero. Consequently, the set of optimal contracts in our setting is given by:[30]

[30] Note that the fixed wage would have to be equal to f = 316 – 630 s if the principal wanted to make the agent strictly better off by choosing an effort of 18 instead of choosing 0. This would guarantee the agent a payoff of 1.

$s^* \in \{0.90, 0.95, 1.00\}$

$f^* = 315 - 630\, s$

$e^* = 18$

All these contracts are equivalent and lead to a total surplus of 315 for the firm, a principal's payoff of 315 and an agent's payoff of 0.

In our experimental setting, we abstract from any risk in order to avoid problems arising from various risk preferences and cognitive complexities arising from stochastic outcomes. This increases experimental control. Further, our one-shot design conserves the main characteristics of a principal-agent relationship in a stochastic world. In particular, for a given contract, agents are free to provide any effort and the principals have no opportunity to sanction them. As a consequence, principals have to take incentive effects into account when offering contracts.

Experimental Design

The experiment employs a 2 (agent competition yes/no) x 2 (non-binding effort announcements yes/no) x 2 (rounds) design. Agent competition and non-binding effort announcements are between-subjects factors, round is a within-subject factor. The first factor (agent competition) was manipulated by setting the number of agents competing for the contract to one (agent competition-no) or three (agent competition-yes). The second factor (non-binding effort announcements) was manipulated by requiring the agent(s) to make a non-binding announcement about their intended effort level (effort announcements-yes) or not (effort announcements-no). The effort announcement was made after the agents had decided whether to accept or reject the principal's contract offer. Principals and agents were informed that the effort announcement is non-binding.

Figure 2 illustrates the timeline of events and highlights the differences across the four conditions. In step 1, the principal is either matched with one or three agents (agent competition yes/no). In step 2, the principal makes her contract offer. In step 3, the agents decide

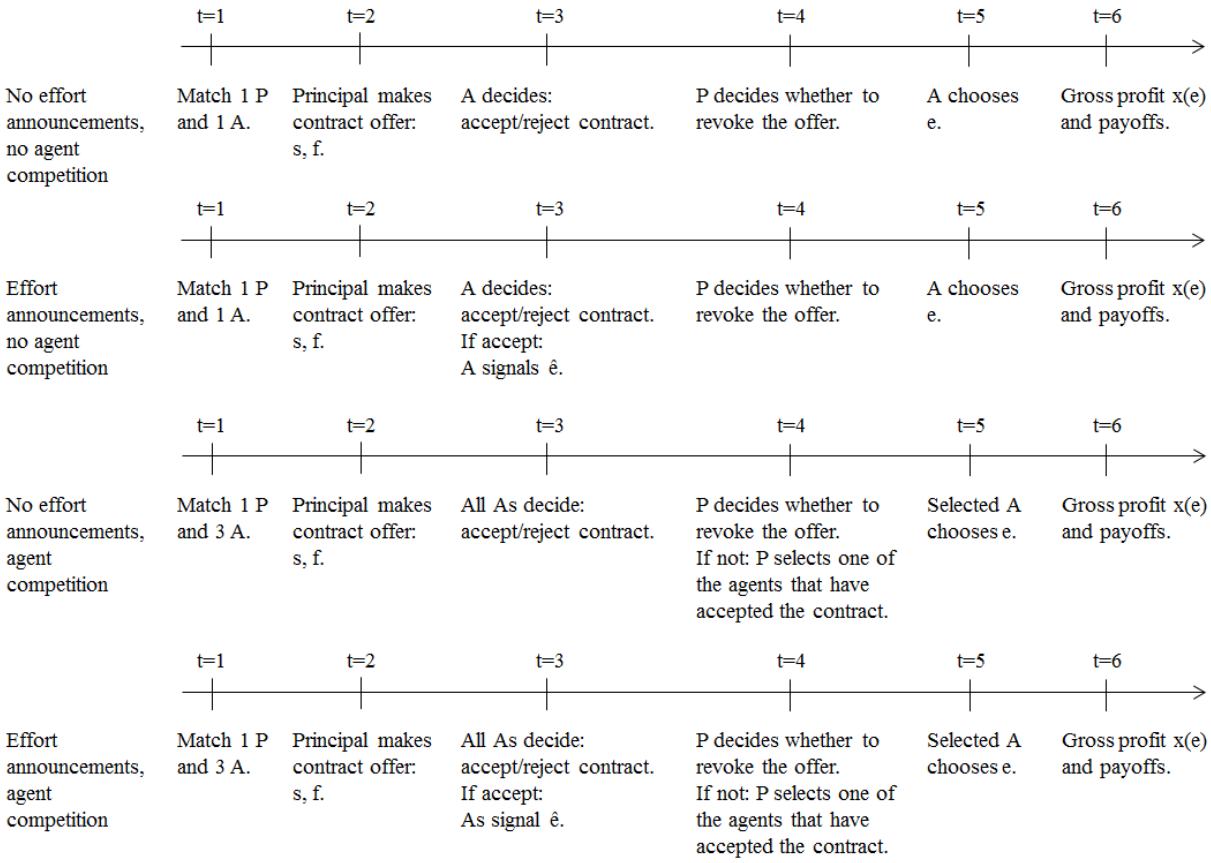

Figure 2: Timeline of Events

whether to accept or reject the contract offer and, in case they accept it, make an announcement about their effort or not (effort announcements yes/no). Thus, the agents made their effort announcements based on the principal's contract offer. This implies that the principal can interpret the agents' announcement as their intended effort level for the specific contract she offered and that the principal will base her expectation on this announcement. Importantly, in all treatments, the principal can decide in step 4 about whether to revoke the contract offer once the agent has decided to accept the contract and, in the treatments with effort announcements, have announced an effort level.[31] However, the principal cannot *change* her contract offer at this point. In step 4 of the agent competition-yes condition, the principal also selects one of the agents who have accepted the contract. In the effort announcements-no condition,

[31] The opportunity to revoke the contract offer enables the principal to avoid a potential loss when agents make low effort announcements in case of a gift exchange-style contract, i.e., when the offered fixed salary is relatively high and the revenue share and the payoff maximizing effort are close to the minimum level. Giving the principal the opportunity to revoke the offer also in the treatments without effort announcements enables principals to rethink their contract offer at this point as well.

the selection is similar to a random draw because the agents accepting the contract cannot be distinguished from each other. Agents who are not selected receive a payoff of zero for this round. If no agent accepts the contract or the principal revokes her contract offer, all players receive a payoff of zero. In step 5, the (selected) agent chooses his effort level for the current round. At this point, agents can no longer reject the contract but they can freely choose their effort from the set $e \in \{1, 2, 3, \ldots, 18\}$. Finally, in step 6, the principals' and the agents' payoffs are determined and communicated to them.

Participants and Procedures

A total of 190 students from a large European university participated in the experiment. The mean age of the participants is 24.3 years. 52 percent of participants are female, and 44 percent majored in business or economics. 32 participants (16 dyads) took part in each treatment without agent competition and 64 participants (16 groups of four) took part in each treatment with agent competition. Two sessions were conducted for each treatment condition without agent competition, and four sessions for each treatment with agent competition. No subject participated in more than one session. The sessions took between 50 and 60 minutes.

Participants were randomly assigned to the role of a principal or an agent and maintained the same role throughout the experiment. The experiment consisted of two rounds. At the beginning of the second round, agents were randomly re-matched with a new principal and—in the treatments with agent competition—also with two new competing agents. Matching was such that in round 2, no participant had played with any other participant of his/her group in round 1. This was known to all participants. Thus, any reputation building in round 1 is excluded, and both observations are fully independent (Keser and Willinger 2007).

The entire experiment, including the negotiation, was computerized and was conducted in a laboratory using z-tree software (Fischbacher 2007). At the beginning of the experiment, the instructions appeared on the computer screen and were simultaneously read aloud by one of the experimenters. After the instructions, the participants had to answer a set of control

questions to ensure that they had understood the procedures and their payoffs from the experiment. The experiment did not continue until all participants had answered all questions correctly. In order to facilitate payoff calculations for each possible contract offer as well as subsequent effort choices, participants received payoff tables and were instructed how to use them (see Appendix).

Before the experiment started, both principals and agents had the opportunity to design incentive contracts during 10 practice rounds without a real counterpart. In order to make sure that all participants were fully aware of the broad set of feasible contracts and their implications for both players' payoffs, participants could enter any combination of fixed wage and revenue share. The software calculated and displayed both players' payoffs for all feasible effort levels {1, 2, ..., 18} as well as for the rejection of the contract. Participants varied the contract offers considerably during the practice rounds. The practice rounds had no consequences for the participants' payoffs from the experiment. This was known to the participants.

Participants' cash earnings were determined by converting their experimental points earned in both experimental rounds into Euros. The conversion rate was €1 for each 30 points. Participants earned an average of €10.52 for their participation in the experiment. Compensation varied between €0.00 and €26.00.

Measures

The agents' effort choice is labeled EFFORT. To test our hypotheses we measure the effort choice against the agency theoretical prediction. Therefore, for each contract offer, we determine the agents' payoff maximizing effort (RATEFFORT). DEVEFFORT = EFFORT − RATEFFORT measures the deviation of an agent's actual effort choice from the payoff maximizing effort level. DEVSIGNAL represents the deviation of the effort announcement from the payoff maximizing effort level. Thus, DEVSIGNAL measures the level of effort announcements by simultaneously controlling for potential differences in the principals' contract offers.

REVSHARE is the agent's revenue share and SALARY is the agent's fixed wage as offered by the principal in her contract offer. As a measure for the agent's surplus share implied in the principal's contract offer, we calculate SURPSHARE as the agent's share in the firm's total surplus (net of effort costs) that would result if the agent provided the payoff maximizing effort. Finally, $PAYOFF_P$ represents the principal's payoff while $PAYOFF_A$ represents the agent's payoff. WELFARE = $PAYOFF_P$ + $PAYOFF_A$ is the total welfare generated by the agency-relationship.

4 Results

Descriptive Statistics

Rather than treating multiple responses by the same participant as independent, we calculate means over the two rounds, so that each participant serves as one independent observation (Rankin et al. 2003). Table 1, Panel A, shows descriptive statistics for the agents' dependent variables.[32] As reported in Table 1, the deviations of the agents' actual effort from the payoff maximizing effort, DEVEFFORT, increase both with agent competition (effort announcements-no: -0.25 vs. -0.72; effort announcements-yes: 1.28 vs. 0.44) and with announcements about future effort (agent competition-no: 0.44 vs. -0.72; agent competition-yes: 1.28 vs. -0.25). These findings provide first evidence in favor of H1 and H2. Moreover, as predicted in H3, the effect of effort announcements seems to be more pronounced when agent competition is present (1.28 - (-0.25) = 1.53) than when agent competition is absent (0.44 - (-0.72) = 1.16). Finally, as included in the theoretical development of H2, Table 1 reports that the agents' announced effort level relative to the payoff maximizing level, DEVSIGNAL, increases under agent competition (3.28 vs. 0.84).

[32] We excluded one effort observation in the treatment with effort announcements and agent competition from the analysis as the selected agent's effort choice cannot be justified by any monetary or fairness preferences. Instead, the effort choice seemed to be due to the participant's insufficient motivation for the experiment. Further, we excluded one principal observation in the treatment with effort announcements and without agent competition, because, in both rounds, he or she offered a revenue share of 0 and a non-positive fixed wage, making it impossible for the agent to earn a positive payoff.

Panel A: Dependent variables based on agent observations

	Agent competition-no		Agent competition-yes	
Mean (Median) *Standard Deviation*	Effort announcements-no (T1)	Effort announcements-yes (T2)	Effort announcements-no (T3)	Effort announcements-yes (T4)
Observations	16	16	26	23
EFFORT[a]	**9.91** (10.50) *4.92*	**11.50** (11.75) *2.88*	**10.27** (9.00) *5.06*	**12.96** (13.00) *5.16*
RATEFFORT[b]	**10.63** (11.25) *4.13*	**11.06** (12.00) *2.68*	**10.52** (9.25) *5.06*	**11.67** (12.00) *6.37*
DEVEFFORT[c]	**-0.72** (0.00) *2.46*	**0.44** (0.00) *2.85*	**-0.25** (0.00) *1.44*	**1.28** (0.00) *3.06*
DEVSIGNAL[d]	- - -	**0.84** (1.75) *3.22*	- - -	**3.28** (1.50) *4.23*
$PAYOFF_A$[e]	**91.22** (90.19) *30.22*	**101.93** (111.54) *26.41*	**78.51** (70.63) *90.60*	**75.44** (65.63) *53.34*

The number of observations in the treatments T3 and T4 is not equal to the number of groups (16), because the mean of our dependent variables over the two rounds can either be based on two observations of the same agent when selected twice or on only one observation when two different agents have been selected.

Agent competition is manipulated (between participants) at two levels: no/yes. In the agent competition-no condition, one agent is matched with one principal, and in the agent competition-yes condition, three agents are matched with one principal.

Effort announcements is manipulated (between participants) at two levels: no/yes. In the effort announcements-yes condition, agents make non-binding announcements about their future effort after the principal has made her contract offer. In the effort announcements-no condition, no announcements about future effort are made.

[a] EFFORT = agent's actual effort choice;

[b] RATEFFORT = payoff maximizing effort choice for a given contract;

[c] DEVEFFORT = deviation of the actual effort choice from the payoff maximizing effort;

[d] DEVSIGNAL = deviation of the effort announcement from the payoff maximizing effort;

[e] $PAYOFF_A$ = final payoff to the agent consisting of fixed salary and revenue share less the costs of effort.

Panel B: Dependent variables based on principal observations

	Agent competition-no		Agent competition-yes	
Mean (Median) *Standard Deviation*	Effort announcements-no (T1)	Effort announcements-yes (T2)	Effort announcements-no (T3)	Effort announcements-yes (T4)
Observations	16	15	16	16
SURPSHARE[f]	**58.43%** (42.79%) *47.14%*	**75.22%** (45.56%) *126.10%*	**17.45%** (30.76%) *137.67%*	**46.48%** (25.54%) *130.68%*

	-2.72	**-24.23**	**-59.69**	**-102.31**
SALARY[g]	(0.00)	(0.00)	(-41.25)	(-114.50)
	84.09	*107.08*	*87.24*	*137.84*
	55.19%	**57.77%**	**52.06%**	**60.78%**
REVSHARE[h]	(60.00)	(60.00)	(45.00)	(62.50)
	26.96%	*26.76%*	*30.54%*	*35.32%*
	110.03	**115.75**	**120.23**	**151.35**
$PAYOFF_P$[i]	(134.88)	(129.93)	(143.63)	(166.25)
	79.48	*76.19*	*102.81*	*106.15*
	201.25	**216.50**	**190.94**	**206.27**
WELFARE[j]	(253.75)	(255.00)	(205.00)	(263.75)
	107.61	*104.50*	*99.74*	*105.31*

[f] SURPSHARE = agent's theoretical share in the firm's total surplus (firm's revenue less costs of effort) given the provision of the payoff maximizing effort;

[g] SALARY = fixed salary included in the principal's contract offer;

[h] REVSHARE = agent's share of the firm's revenue stated in the principals' contract offer.

[i] $PAYOFF_P$ = final payoff to the principal consisting of the share in the firm's revenue less the fixed salary that is paid to the agent;

[j] WELFARE = sum of payoffs per group, i.e. the principal and the agent who cooperate in a given round.

Table 1: Descriptive Statistics

Descriptive statistics for the principals' contract offers are reported in Panel B of Table 1. The data show that the agents' surplus share implied by the contract offers, SURPSHARE, decreases under agent competition but remains nearly unaffected by effort announcements. Under agent competition, the median values decrease from 43% to 31% in the effort announcements-no condition and from 46% to 26% in the effort announcements-yes condition.[33] These findings provide initial evidence in favor of H4. In addition, the descriptive data in Panel B suggest that, under agent competition, principals offer lower fixed wages (effort announcements-no: -59.68 vs. -2.72; effort announcements-yes: -102.31 vs. -24.23) while the revenue shares included in the offers remain largely unaffected by agent competition.

Hypotheses Tests

To test H1 and H2, we run an ANOVA with DEVEFFORT as dependent variable and the treatment variables as independent variables. H1 and H2 predict that both agent competition and non-binding effort announcements increase agents' deviations from the payoff max-

[33] As will be explained in more detail below, we refer to median values because SURPSHARE is widely dispersed and the distribution does not fulfill the assumptions for parametric tests.

Panel A: All contract offers

	sum of sq.	df	mean sq.	F-Stat.	p-val.
Effort announcements	34.94	1	34.94	5.71	0.019
Agent competition	8.34	1	8.34	1.36	0.247
Eff. ann. x Agent comp.	0.68	1	0.68	0.11	0.739
Residual	470.96	77	6.12		

Panel B: SURPSHARE[b] ≤ 40% ("unfair" offers)

	sum of sq.	df	mean sq.	F-Stat.	p-val.
Effort announcements	4.47	1	4.47	0.62	0.436
Agent competition	43.88	1	43.88	6.06	0.017
Eff. ann. x Agent comp.	2.68	1	2.68	0.37	0.546
Round	0.58	1	0.58	0.08	0.777
Residual	427.43	59	7.24		

Panel C: SURPSHARE > 40% ("fair" offers)

	sum of sq.	df	mean sq.	F-Stat.	p-val.
Effort announcements	46.04	1	46.04	5.41	0.025
Agent competition	3.17	1	3.17	0.37	0.545
Eff. ann. x Agent comp.	2.81	1	2.81	0.33	0.569
Round	2.71	1	2.71	0.32	0.575
Residual	374.32	44	8.51		

Panel A shows an ANOVA with the deviation from the payoff maximizing effort as dependent variable and the treatment variables as independent variables. Unit of observation is the mean value for each participant over the two experimental rounds. The ANOVA includes 81 observations.

Panel B and C show a repeated measures ANOVA with the deviation from the payoff maximizing effort as dependent variable and the treatment variables as independent variables. Unit of observation is the value of DEVEFFORT per round and agent, because the mean value over both rounds cannot distinguish a "fair" offer in the first round and an "unfair" offer in the second round, and vice versa. The ANOVAs include 64 (Panel B) and 49 (Panel C) observations.

Agent competition is manipulated (between participants) at two levels: no/yes. In the agent competition-no condition, one agent is matched with one principal, and in the agent competition-yes condition, three agents are matched with one principal.

Effort announcements is manipulated (between participants) at two levels: no/yes. In the effort announcements-yes condition, agents make non-binding announcements about their future effort after the principal has made her contract offer. In the effort announcements-no condition, no announcements about future effort are made.

[a] DEVEFFORT = deviation of the actual effort choice from the payoff maximizing effort.

[b] SURPSHARE = agent's theoretical share in the firm's total surplus (firm's revenue less costs of effort) given the provision of the payoff maximizing effort.

Table 2: Effects of Agent Competition and Effort Announcements on DEVEFFORT[a]

imizing effort. As reported in Table 2, Panel A, the results of the ANOVA provide evidence in favor of H2 ($p = 0.01$, one-tailed), but no evidence for H1 ($p = 0.123$, one-tailed). Thus, the hypothesis that agent competition makes agents respond more positively to contract offers is not supported when the entire set of contract offers is considered.

Because our theory suggests that agent competition shifts agents' perception of bargaining power and, thus, influences effort choices by altering agents' reciprocal reactions to the principals' contract offers, we also test whether our results hold for both "fair" and "unfair" contract offers. This is important since contract offers implying a low surplus share are likely to trigger negative reciprocal reactions while contracts with a high surplus share are likely to trigger positive reciprocal reactions (Offermann 2002). Therefore, we divide our sample into contract offers implying a surplus share for the agents of SURPSHARE $\leq 40\%$ and those implying a SURPSHARE $> 40\%$. We choose a threshold of SURPSHARE $\leq 40\%$ for "unfair" contract offers because prior research suggest that nearly no second mover or "responder"—as the agent in our setting—rejects an offer of at least 40 percent of a given surplus (Camerer 2003). The ANOVA in Panel B of Table 2 includes observations with SURPSHARE $\leq 40\%$, Panel C includes observations with SURPSHARE $> 40\%$. Panel B indicates a significant effect of agent competition ($p = 0.009$, one-tailed) in the case of "unfair" contracts but no significant effect for non-binding announcements ($p = 0.218$, one-tailed). In contrast, Panel C demonstrates that for contracts with SURPSHARE $> 40\%$, the effect of agent competition is not significant ($p = 0.273$, one-tailed) while non-binding announcements have a significant effect on agents' effort ($p = 0.013$, one-tailed). These results suggest that effort announcements have particularly positive effects when contract offers are "fair" which is consistent with the results reported by Douthit et al. (2012). Further, the results suggest that agent competition seems to mitigate negative reciprocal reactions when contract offers are "unfair". This finding provides at least partial support for H1.

H3 predicts that the positive effect of effort announcements on agents' effort is stronger when agent competition is present than when it is absent. We test this ordinal interaction using a contrast analysis (Hays 1994; Keppel 1991; Kirk 1982). Therefore, we estimate a contrast model with DEVEFFORT as dependent variable. The contrast weights are set according to the relationship implied by our prediction [effort announcements-yes/ agent competition-yes > effort announcements-yes/ agent competition-no ≥ effort announcements-no/ agent competition-yes > effort announcements-no/ agent competition-no]. Specifically, we use two sets of weights for the analysis: [4, 1, -2, -3] and [4, -1, -1, -2]. In both cases, results indicate that the interaction is significant ($F \geq 6.4$, $p \leq 0.01$ in both cases).[34] These findings support H3. Additionally, we conduct a planned contrast analysis and find evidence for a significant simple effect of effort announcements when agent competition is present ($p = 0.017$, one-tailed) and a marginally significant effect of effort announcements when agent competition is absent ($p = 0.095$, one-tailed). These findings provide additional support for H2 and H3.

Finally, H4 predicts that principals offer contracts with lower surplus shares for the agents when agents compete for a contract. As for our dependent variable SURPSHARE, the Bartlett's test rejects the assumption of variance homogeneity and the Shapiro-Wilk test indicates a violation of the normality assumption ($p \leq 0.01$ in both cases), we use non-parametric statistics to test this hypothesis. A Wilcoxon test indicates that the median SURPSHARE without agent competition is significantly larger than with agent competition (45.18% vs. 29.21%, $z = 2.69$, $p < 0.01$, one-tailed). This result supports H4.

In contrast, a comparison of the median values of SURPSHARE when agents make or do not make non-binding effort announcements reveals that the effect of effort announcements on the agents' surplus share included in the contract offers is small (34.8% vs. 37.8%). A Wilcoxon test indicates that this difference is insignificant ($z = 0.32$, $p = 0.75$, two-tailed).

[34] Concerning the weights for our contrast model, we follow the arguments of Buckless and Ravenscroft (1990) and Rosnow and Rosenthal (1995, 1996). However, contrast weights do not distinguish satisfactorily here.

This result suggests that, although effort announcements increase agents' effort choices, principals do not react to the non-binding effort announcements and do not seem to fully anticipate their effect on agents' effort choices. We will explore this result in more detail in the next section.

Supplemental Analysis

Bargaining Power under Agent Competition

We use post-experiment questionnaire data collected from agent participants to further bolster support for the theoretical process. The hypotheses development argues that agents and principals may perceive a shift in their relative bargaining power in the agent competition-yes condition even though standard economic analysis suggests no effect. Although the above hypotheses tests of agents' effort choices and principals' contract offers provide support for the notion that agent competition increases the principal's bargaining power, we investigate whether participants' perceptions are consistent with this relation. A post-experiment question asked principal- and agent-participants in all treatments to report their perceptions of the strength of the principal's bargaining power, using a 7-point Likert scale.[35] Analysis shows that both principals and agents indicate a larger bargaining power for the principal in the agent competition-yes condition (principals: 5.34 vs. 4.19, $z = -2.20$, $p = 0.014$, one-tailed; agents: 5.98 vs. 5.06, $z = -3.18$, $p < 0.001$, one-tailed). This result provides evidence in favor of our theoretical development. Specifically, it indicates that principals' contract offers in the agent competition-yes condition may not have only been driven by their anticipation of increased agent effort as a response to less perceived bargaining power but also by their own perception of increased bargaining power in this setting.

[35] We use 7-point Likert scales to measure the participants' answers to all post-experiment questions. Therefore, all reported tests for the post-experiment data are non-parametric.

Commitment to Effort Announcements

The development of H3 argues that under agent competition, effort announcements are likely to have a larger effect on agents' effort because agents overbid each other, but are not less committed to their announcements because principals base their selection decisions on this announcement. As we explained above, the first part of the theory development is supported by the increased effort announcements in the agent competition-yes condition as reflected in the increased DEVSIGNAL (3.28 vs. 0.84, $t = -1.94$, $p = 0.03$, one-tailed).[36]

To provide evidence on the agents' commitment to their effort announcements, we use two measures. First, in the effort announcement condition, we measure on the post-experiment questionnaire the agents' commitment to the effort announcement they made to the principal before the contract was concluded. Consistent with the development of H3, agents do not indicate a significantly lower commitment in the agent competition-yes than in the agent competition-no condition (2.83 vs. 3.44, Wilcoxon rank-sum, $z = 0.89$, $p = 0.371$) even though the announcements deviate more strongly from payoff maximizing effort level which makes promise-keeping more costly. Additionally, we compare the effort announcements of the selected agents to their actual effort choices in the two conditions. As we explained above, in the agent competition-yes condition, agents' effort announcements are much larger and, thus, the fulfillment of the announced deviation from the payoff maximizing effort level (measured by DEVSIGNAL) induces much higher costs. Nevertheless, agents do not fulfill their announcements to a significantly lower extent under agent competition. Specifically, we find that agents' actual effort choices fulfill 61 percent of DEVSIGNAL when agent

[36] The mean DEVSIGNAL of the agents selected in the competition was 3.28 whereas the mean DEVSIGNAL of the agents who were not selected was 3.09. This indicates that principals do not always select the agent with the highest DEVSIGNAL. Indeed, of the 15 cases in which agents under competition announced different effort levels, principals selected the agent with the highest announcement in eight cases, the agent with the second highest announcement in two cases, and the agent with the third highest announcement in five cases. Principals mainly refused to select the agent with the highest announcement when his DEVSIGNAL was very large. In the seven cases in which this agent was *not* selected, his DEVSIGNAL was 10.57 on average while principals selected agents with an average DEVSIGNAL of 3.29. In contrast, in the eight cases in which the agent with the highest DEVSIGNAL was selected, his average DEVSIGNAL was only 7.38.

competition is present and 75 percent when agent competition is absent.[37] This difference is not significant (t=0.90, p=0.373, two-tailed). Further, DEVSIGNAL and DEVEFFORT are positively correlated ($r = 0.76$, $p < 0.001$), indicating that the deviation from the payoff maximizing effort is higher when higher announcements are made. These results provide support for the theoretical process underlying H3.

In contrast to the agents' commitment to their announcements, results from the post-experiment questionnaire indicate that principals expected agents' commitment to their announcements to decrease under agent competition. Specifically, in the agent competition-yes condition principals indicated that they assumed less agent commitment to their announcements (3.19) than in the agent competition-no condition (4.13). The difference is marginally significant (Wilcoxon rank-sum, $z = 1.28$, $p = 0.099$, one-tailed). This result suggests that principals may not have correctly anticipated the relevance of the agents' non-binding announcements for their actual effort choice. This may contribute to explain why principals did not adjust their contract offers under non-binding effort announcements.

Payoffs and Welfare

Finally, we analyze the principals' and the agents' payoffs and the total welfare generated by the agency-relationship. First, consistent with our finding that principals' contract offers imply a lower surplus share for the agents and that agents respond more positively to a given contract offer when agent competition is present than when it is absent, we find that the principals' payoffs increase under agent competition relative to the agent competition-no condition (135.8 vs. 112.8, Wilcoxon rank-sum, $z = -1.37$, $p = 0.086$, one-tailed).[38] Simultaneously, the agents' payoffs decrease under agent competition (77.0 vs. 96.6, $z = 2.07$, $p = 0.019$, one-tailed). In contrast, pre-contractual announcements of future effort do not have a significant

[37] We calculate the fulfillment of agents' announcement as DEVEFFORT/DEVSIGNAL for positive values of DEVSIGNAL. In cases where DEVSIGNAL is 0 and the subsequent effort choice does not deviate from the announcement we consider the effort choice as showing 100% commitment.

[38] We use non-parametric statistic for the analysis of both player's payoffs because the Bartlett's test rejects the assumption of variance homogeneity ($p < 0.01$) and the Shapiro-Wilk test indicates a violation of the normality assumption ($p < 0.01$) for the agents' payoff.

effect on the principals' (134.1 vs. 115.1, z = -0.63, p = 0.53) and agents' payoffs (86.4 vs. 83.3, z = -0.43, p = 0.67).

Overall, the welfare generated by the agency-relationship, i.e. the total surplus, is not affected by agent competition (204.0 vs. 208.6, z = -0.08, p = 0.94). Thus, the increase in principals' payoffs is only due to a relative shift of the welfare generated to the principal. Further, even though, agents' non-binding effort announcements have a positive effect on total welfare (216.8 vs. 196.1), the difference is not statistically significant (z = -1.185, p > 0.20).

5 Conclusion

Principal-agent conflicts are inherent to many relationships in firms. Consequently, the question of how these conflicts can be solved or mitigated has attracted considerable attention from both theoretical and empirical research (Indjejikian 1999; Anderhub et al. 2002; Milgrom and Roberts 1992). Besides the design of financial incentives, recent research has particularly focused on how fairness preferences may affect contract offers and effort choices (Anderhub et al. 2002; Fehr et al. 1993; Kuang and Moser 2009). This study investigates how two important features of recruitment and selection processes in reality, agent competition and non-binding effort announcements, affect principal-agent relationships. As neither agents' effort announcements nor their effort is contractible in reality, both features are irrelevant from a standard economic perspective. We examine our research questions in a setting where principals can choose among a large variety of contracts and, particularly, can offer different amounts of fixed wages and revenue shares to the agent.

Our experimental findings show that both factors affect agents' effort. First, agent competition increases agents' deviations from the payoff maximizing effort level because it makes contract offers that are considered unfair when agent competition is absent more acceptable when agent competition is present. The effect of agent competition seems to be more pronounced when principals' contract offers are "unfair", i.e., imply only low surplus shares for

the agent. Second, we find that non-binding effort announcements increase agents' effort. Moreover, this positive effect is stronger under agent competition, indicating an ordinal interaction of both factors. Finally, principals are able to forward-induce the effect of competition on agents by offering contracts with lower surplus shares for the agents, but they do not change their contract offers as a response to non-binding effort announcements as they seem incapable to correctly anticipate agents' commitment to their effort announcements.

The results of our study have important implications for both theory and practice. From a theoretical perspective, the study helps building theory by identifying two factors, non-binding effort announcements and agent competition, which may affect agents' effort choices and principals' contract offers. As such, the study adds to the growing stream of research demonstrating how organizations can benefit from considering the effects of contextual factors and social preferences when designing agency-contracts even though these factors may be irrelevant from a standard economic perspective (Charness et al. 2013; Douthit et al. 2012; Kuang and Moser 2009).

From a practical perspective, the results of our study have important implications for firms that regularly advertise jobs or consultancy and procurement contracts as the two studied features, agent competition and non-binding effort announcements, are characteristic for most of these processes. A potential way to seize a considerable share of the surplus for the firm would be to make the competition more salient in the process. Moreover, asking job candidates or other potential contracting partners to make announcements about their future performance may—even if the announcement cannot be contracted on—increase the firm's benefits from the contracting relationship.

As all studies, this study presents opportunities for future research. The experimental setting employed in this study is one in which the agents have no information about the announcements of their competitors. However, in practice, people may be informed about others' effort announcements or principals could make this information public. Future research

could examine whether agents' commitment to their announcements observed in the current study holds under these conditions and whether the knowledge of the competitors' announcements even further increases agents' behavior to overbid each other. In addition, agents in our study were homogeneous with regard to their capabilities and their knowledge. However, in practice, the goal of selection processes may not only be to find the person providing the highest effort but also the person whose capabilities fit best with the task and the organization (Adkins et al. 1994). Future research could examine agents' announcements about both effort and capabilities and whether agents' commitment to their effort announcements increases when the fit of their capability with the organization does not meet their announced level.

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7 Appendix – Experimental Instruments[39]

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Principals are denoted as A-Players
Agents are denoted as B-Players
****

Preliminary remarks I

Welcome and thank you for your participation. The money that you will earn in this experiment is provided by the University of Hamburg. The purpose of the experiment is to analyze economic decision making.

In order to be assigned to your work station, we made you draw a random number. Please return this number when collecting your compensation. You will need this card to prove your identity at the payout.

Your identity will remain anonymous to the experimenter and the other participants. Neither the experimenter nor the other participants will be able to link your decisions and behavior to your person.

Preliminary remarks II

The number of points that you will earn during the experiment depends on the decisions that you will make in the course of this experiment.

Your compensation will be computed based on the number of points that you will have earned at the end of the experiment. The conversion rate is:

30 points = €1.

As an initial balance for your participation you receive 180 points. This is equivalent to €6. In case that the **additional** points that you earn in the experiment are negative, these points will be subtracted from your initial balance until you reach 0 points. Yet, your final compensation from the experiment cannot become negative. Further, you will always be able to make decisions that preserve your initial balance.

Please note:

- You may not speak during the experiment.
- Make your own decisions and do not contact other participants.
- If you have a question during the experiment, please raise your hand. We will answer your question in private. At the end of these instructions, you will have the opportunity to ask questions if something has remained unclear.

****

Participants and Procedures

There are two types of players in this experiment: A-players and B-players.

[39] The experimental instructions are directly translated from German to be as close as possible to the original instructions. The instructions presented here are for the agent competition-yes, effort announcements-yes treatment. For the other treatments, instructions differ only with respect to some minor modifications accounting for the specific treatment conditions.

You are an A-player/B-player.

You will maintain this role as a(n) A-player/B-player throughout the entire experiment.

The experiment consists of two rounds. At the beginning of the first and the second round, three B-players will be randomly assigned to each A-player. Assignment in the second round will ensure that each B-player will be assigned to a new A-player, and additionally, that he/she will play together with two new B-players with whom he/she has not played in the first round. In the second round, nobody will be informed about the decisions that their new team-mates have made in the first round.

****

Decision setting

Assume the following decision setting: The A-player acts as an owner of a firm. This firm is looking for an employee (one of the three B-players) who can influence the firm's revenue through his/her working effort. The larger the working effort of the B-player, the larger will be the firm's revenue, but the larger will also be the private costs that a B-player has to bear. These costs are to reflect any inconvenience for the B-player that is caused by the working effort (e.g. foregoing spare time, execution of inconvenient tasks, stress, et cetera).

The working effort of the B-player in this experiment won't be a real effort. Instead, the B-player chooses the effort level as a number between 1 and 18.

The firm's revenue depends on the B-player's working effort. The productivity of the B-player is 35. That means: if the working effort increases by 1, the firm revenue increases by 35. Thus, the firm revenue is given as:

Firm revenue = 35 · working effort.

****

Every round consists of four stages.

(1) In the first stage, the A-player as the owner of the firm makes a contract offer. This offer consists of a fixed wage for the B-player and a percentage share in the firm's revenue.

The fixed wage has to be set **between -600 and +600** by steps of 1. A negative fixed wage means that the B-player has to pay a fixed amount to the A-player, and a positive fixed wage means that the A-player has to pay a fixed amount to the B-player.

The B-player's share in the firm's revenue has to be set **between 0% and 100%** by steps of 1%.

In every round, the contract can only be concluded **with one of the three B-players**. Yet, the contract offer is identical for all B-players.

(2) In the second stage, every B-player can either reject or accept the contract offer. In case of acceptance he/she can make a counter offer about his/her working effort, provided that he/she would be selected by the A-player.

If a B-player rejects the contract offer, the round will be finished for him/her, and he/she will receive 0 points. In case all three B-players reject the contract, the A-player will also receive 0 points in this round.

In contrast, if a B-player is willing to provide a working effort for the offered revenue share, he/she has to make a counter offer about the working effort that he/she would provide if he/she was selected by the A-player. This counter offer has to be a number **between 1 and 18**.

(3) In the third stage, the A-player will be informed about which B-player(s) accepted the contract offer and about the respective working effort that they would provide if they were selected by the A-player.

Now, the A-player can either revoke the contract offer or select one of the B-players with whom he/she concludes the contract. If the A-player revokes the contract offer, all players receive 0 point in this round. If the he/she selects a B-player, he/she can no longer change the contract offer.

(4) In the fourth stage, the selected B-player chooses the actual working effort. At this stage, the contract can no longer be rejected, i.e. he/she has to choose a working effort between 1 and 18.

Please note:

The counter offer of the B-player that he/she has made about the working effort is non-binding. In case a B-player is selected by the A-player, he/she can freely choose the level of his/her actual working effort.

If a contract between the A-player and a B-player is concluded, both players will receive their points according to the rules that will be described in the following. The B-players who do not conclude a contract will receive **0 points** in this round.

****

Points of the A-player:

As the owner of the firm, the A-player receives the firm's revenue (firm revenue = 35 · working effort B) less the B-player's fixed wage and revenue share. Thus, the points of the A-player are given by:

A-player points

= firm revenue – fixed wage of B – revenue share of B (in %) · firm revenue

If the A-player sets a negative fixed wage, he/she receives this amount from the B-player.

****

Points of the B-player:

The points of the B-player who concludes the contract with the A-player consist of the fixed wage and the revenue share. In addition to that, the B-player also has to bear private costs depending on the working effort. These costs are characterized as follows: the higher the working effort, the higher will be the costs. The particular costs for each level of working effort can be gathered from the following table:

Work-ing effort	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Costs	5	10	15	25	35	45	60	75	90	110	130	150	175	200	225	255	285	315

Thus, the points of the B-player are given by:

B-player points

= fixed wage B + revenue share of B (in %) · firm revenue – costs of the working effort

The table that will now be distributed to you will help you determining the points for the A-players and the B-players. Please wait while we distribute the table.

Payoff table

		Reject	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0%	P	0	35	70	105	140	175	210	245	280	315	350	385	420	455	490	525	560	595	630
	A	0	-5	-10	-15	-25	-35	-45	-60	-75	-90	-110	-130	-150	-175	-200	-225	-255	-285	-315
5%	P	0	33	67	100	133	166	200	233	266	299	333	366	399	432	466	499	532	565	599
	A	0	-3	-7	-10	-18	-26	-35	-48	-61	-74	-93	-111	-129	-152	-176	-199	-227	-255	-284
10%	P	0	32	63	95	126	158	189	221	252	284	315	347	378	410	441	473	504	536	567
	A	0	-2	-3	-5	-11	-18	-24	-36	-47	-59	-75	-92	-108	-130	-151	-173	-199	-226	-252
15%	P	0	30	60	89	119	149	179	208	238	268	298	327	357	387	417	446	476	506	536
	A	0	0	1	1	-4	-9	-14	-23	-33	-43	-58	-72	-87	-107	-127	-146	-171	-196	-221
20%	P	0	28	56	84	112	140	168	196	224	252	280	308	336	364	392	420	448	476	504
	A	0	2	4	6	3	0	-3	-11	-19	-27	-40	-53	-66	-84	-102	-120	-143	-166	-189
25%	P	0	26	53	79	105	131	158	184	210	236	263	289	315	341	368	394	420	446	473
	A	0	4	8	11	10	9	8	1	-5	-11	-23	-34	-45	-61	-78	-94	-115	-136	-158
30%	P	0	25	49	74	98	123	147	172	196	221	245	270	294	319	343	368	392	417	441
	A	0	6	11	17	17	18	18	14	9	5	-5	-15	-24	-39	-53	-68	-87	-107	-126
35%	P	0	23	46	68	91	114	137	159	182	205	228	250	273	296	319	341	364	387	410
	A	0	7	15	22	24	26	29	26	23	20	13	5	-3	-16	-29	-41	-59	-77	-95
40%	P	0	21	42	63	84	105	126	147	168	189	210	231	252	273	294	315	336	357	378
	A	0	9	18	27	31	35	39	38	37	36	30	24	18	7	-4	-15	-31	-47	-63
45%	P	0	19	39	58	77	96	116	135	154	173	193	212	231	250	270	289	308	327	347
	A	0	11	22	32	38	44	50	50	51	52	48	43	39	30	21	11	-3	-17	-32
50%	P	0	18	35	53	70	88	105	123	140	158	175	193	210	228	245	263	280	298	315
	A	0	13	25	38	45	53	60	63	65	68	65	63	60	53	45	38	25	13	0
55%	P	0	16	32	47	63	79	95	110	126	142	158	173	189	205	221	236	252	268	284
	A	0	14	29	43	52	61	71	75	79	83	83	82	81	75	70	64	53	42	32
60%	P	0	14	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252
	A	0	16	32	48	59	70	81	87	93	99	100	101	102	98	94	90	81	72	63
65%	P	0	12	25	37	49	61	74	86	98	110	123	135	147	159	172	184	196	208	221
	A	0	18	36	53	66	79	92	99	107	115	118	120	123	121	119	116	109	102	95
70%	P	0	11	21	32	42	53	63	74	84	95	105	116	126	137	147	158	168	179	189
	A	0	20	39	59	73	88	102	112	121	131	135	140	144	144	143	143	137	132	126
75%	P	0	9	18	26	35	44	53	61	70	79	88	96	105	114	123	131	140	149	158
	A	0	21	43	64	80	96	113	124	135	146	153	159	165	166	168	169	165	161	158
80%	P	0	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126
	A	0	23	46	69	87	105	123	136	149	162	170	178	186	189	192	195	193	191	189
85%	P	0	5	11	16	21	26	32	37	42	47	53	58	63	68	74	79	84	89	95
	A	0	25	50	74	94	114	134	148	163	178	188	197	207	212	217	221	221	221	221
90%	P	0	4	7	11	14	18	21	25	28	32	35	39	42	46	49	53	56	60	63
	A	0	27	53	80	101	123	144	161	177	194	205	217	228	235	241	248	249	251	252
95%	P	0	2	4	5	7	9	11	12	14	16	18	19	21	23	25	26	28	30	32
	A	0	28	57	85	108	131	155	173	191	209	223	236	249	257	266	274	277	280	284
100%	P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	A	0	30	60	90	115	140	165	185	205	225	240	255	270	280	290	300	305	310	315

****
The table shows you the points for A-players and B-players for alternative revenue shares of the B-player **assuming a fixed wage of 0**.

All numbers in the table are rounded to the next whole number. This will be the case in the course of the entire experiment.

The table reads as follows:

The first column on the left side shows all revenue shares of the B-player by steps of 5%, ranging from 0% to 100%.

In the first row, you find all possible levels of working effort that the B-player can choose when a contract has been concluded with him/her.

That means: By making the contract offer, the A-player determines, on the one hand, the fixed wage between -600 and +600. On the other hand, by setting the revenue share the A-player determines the **row** of the table that will be relevant for both players. Subsequently, by choosing the working effort the B-player determines the **column**, and thus, the **cell** that shows the A-player's and the B-player's points.

****
Each cell consists of a white field (top) and a grey field (bottom). The white fields always indicate the A-player's points for the respective combination of revenue share and working effort for a fixed wage of 0 points. The grey fields indicate the B-player's points (**after costs of the working effort**).

If the A-player sets a fixed wage larger or smaller than 0 points, the table can help you to determine the points of the A-player and the B-player as well.

For instance, if the A-player sets a fixed wage of +F that is paid to the B-player, the points are given by subtracting F points from the A-player's points and adding F points to the B-player's points for the respective combination of working effort and revenue share.

In contrast, if the A-player sets a negative fixed wage of -F points that the B-player has to pay to the A-player, the points are given by subtracting F points from the B-player's points and adding F points to the A-player's points or the respective combination of working effort and revenue share.

****
Please consider the following two random examples:

(1) If the A-player sets the fixed wage to +200 and the revenue share to 25%, and the B-player chooses 9 as a working effort, the A-player receives, according to the table, 236 points and the B-player receives -11 points. As the numbers in the table assume a fixed wage of 0, the fixed wage of 200 has to be accounted for in the next step. This means that the A-player would receive 236 – 200 = 36 points, and the B-player would receive -11 + 200 = 189 points.

In case the A-player had set a negative fixed wage of -200, the numbers from the table (236 for A, -11 for B) would have to be adjusted by subtracting 200 points from the B-player's points and adding 200 points to the A-player's points because a negative fixed wage means

that the B-player has to pay this amount to the A-player. This means that the A-player would receive 236 + 200 = 436 points, and the B-player would receive -11 – 200 = -211 points.

(2) If the A-player sets the fixed wage to +200 and the revenue share to 75%, and the B-player chooses 9 as a working effort, the A-player receives, according to the table, 79 points and the B-player receives 146 points. As the numbers in the table assume a fixed wage of 0, the fixed wage of 200 has to be accounted for in the next step. This means that the A-player would receive 79 – 200 = -121 points, and the B-player would receive 146 + 200 = 346 points.

In case the A-player had set a negative fixed wage of -200, the numbers from the table (79 for A, 146 for B) would have to be adjusted by subtracting 200 points from the B-player's points and adding 200 points to the A-player's points because a negative fixed wage means that the B-player has to pay this amount to the A-player. This means that the A-player would receive 79 + 200 = 279 points, and the B-player would receive 146 – 200 = -54 points.

****

Practice rounds

All A-players and B-players will get the opportunity to try 10 contract offers to observe the consequences of different contract offers on the compensation of both A-players and B-players. There will be no real interaction between A-players and B-players. Instead, you will see a table after each contract offer which shows you the B-player's feasible choices of working effort and the respective consequences for the compensation of the A- and B-player. Please assume which working effort the B-player would choose based on this contract offer.

Please wait until we have distributed a summary of the most important points of these instructions.

****

Summary and payoffs from the experiment

The experiment consists of **two** rounds. In each round, one A-player is teamed up with three B-players. Between both rounds, teams will be re-assigned, so that you will play with three new team members in the second round. You will maintain your role over both rounds.

Each round consists of four stages:

In the first stage, the A-player makes a contract offer to the three B-players. This offer consists of a fixed wage for the B-player **between -600 and +600** and a revenue share for the B-player **between 0% and 100%**.

In the second stage, every B-player decides whether he/she rejects or accepts the contract offer and makes a counter offer about his/her working effort. This counter offer must be **between 1 and 18**. If a B-player rejects the contract offer, the round will be finished for him/her, and he/she will receive 0 points. In case all three B-players reject the contract, the A-player will also receive 0 points in this round.

In the third stage, the A-player will be informed about which B-player(s) accepted the contract offer and about the respective working effort that they would provide if they were selected by the A-player. Now, the A-player can either revoke the contract offer or select one of the B-players with whom he/she concludes the contract. If the A-player revokes the contract of-

fer, all players receive 0 point in this round. If the A-player selects a B-player he/she can no longer change the contract offer.

In the fourth stage, the selected B-player chooses the actual working effort. At this stage, the contract offer can no longer be rejected, i.e. he/she has to choose a working effort between 1 and 18. Yet, the counter offer of the B-player about the working effort is non-binding.

In each round, the contract can only be concluded with one of the three B-players. The B-players who do not conclude a contract will receive 0 points in this round.

The points of the A-player and the B-player are given by:

As the owner of the firm, the A-player receives the firm's revenue (firm revenue = 35 · working effort B) less the B-player's fixed wage and revenue share. Thus, the points of the A-player are given by:

A-player points

= firm revenue – fixed wage of B – revenue share of B (in %) · firm revenue

The points of the B-player who concludes the contract with the A-player consist of the fixed wage and the revenue share. In addition to that, the B-player also has to bear private costs depending on the working effort.

Thus, the points of the B-player are given by:

B-player points

= fixed wage B + revenue share of B (in %) · firm revenue – costs of the working effort

All points received in both rounds are summed up and converted to €, while 30 points equal €1.

Quiz

The following questions are designed to improve your understanding of the experimental procedures. After the quiz, you will get the opportunity to practice 10 contract offers to observe the consequences for the compensation of the A-player and B-player. Please indicate whether the following statement is true or false.

1. The contract offer made by the A-player consists of a fixed wage for the B-player between -600 and +600 and a revenue share between 0% and 100%. (True)

2. If a B-player rejects a contract offer in the second stage, he/she can still be selected by the A-player. (False)

3. In stage three, the A-player is informed about the counter offers of the B-players who accepted the contract offer. After that, the A-player has the opportunity to revoke the contract offer and to design a new contract. (False)

4. In stage four, the selected B-player chooses the working effort. In making the effort choice, he/she has to follow the counter offer made to the A-player in stage two. (False)

5. If the A-player sets a positive fixed wage, this means that the A-player has to pay this amount to the B-player. If the A-player sets a negative fixed wage, this means that the B-player has to pay this amount to the A-player. (True)

6. The private effort costs are jointly born by the A-player and by the B-player. (False)

ESSAY 4

What is Fair Executive Compensation?

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Abstract

In the popular media and in politics, it is often claimed that the amount of executive compensation should be "fair". However, it is unclear what "fairness" signifies in this context and how it translates into executive compensation. Based on a telephone survey among 671 representative eligible voters in Germany, we provide evidence in this paper that fairness seems to be relevant for many people but that there is no general agreement about what constitutes the "fair" amount or preferred structure of executive compensation. Instead, our results show that the perception of "fair executive compensation" is widely dispersed and strongly related to personality traits of the respondents. Additionally, we provide evidence from a web-based survey among 140 investment professionals that "fairness" matters as a criterion for executive compensation for the majority of this group as well, but fairness perceptions deviate systematically from the perceptions of representative eligible voters.

Keywords: Executive compensation, fairness, self-serving bias, social projection.

1 Introduction

The public discussion in the media and politics often claims that the amount of executive compensation should be "fair". However, fairness is an ambiguous and subjective concept (Cappelen et al. 2005; Konow 2000), and therefore, it is unclear what "fairness" signifies in this context and how it translates into executive compensation. This study investigates representative eligible voters' perception of "fair" amounts of executive compensation and their preferred structure of executive compensation and explores how these perceptions are related to the voters' personality characteristics. Moreover, we compare their judgments about executive compensation to the judgments of investment professionals.

So far, the academic discussion about executive compensation has mainly focused on the question whether executive compensation in practice is structured optimally or rather affected by managerial power. That means agency theory usually considers the question of how executive compensation contracts should be structured to achieve optimal risk-sharing and motivation (e.g. Holmström 1979; Milgrom and Roberts 1992). If deviations from this paradigm are considered, they mainly treat the question whether boards—disregarding any fairness considerations—set incentives in cost-effective ways to maximize the value of the company or whether managers have the power to extract rents and influence their compensation in desired ways (Bebchuk and Fried 2006; Edmans and Gabaix 2009; Murphy 2002).

However, public media has covered the topic of executive compensation for many years as well, and, in contrast to the scientific debate, the discussion in the public media appears to be rather driven by fairness considerations. Media has been found to exhibit a tendency to cover stories of excessive compensation in general (Core et al. 2008) and major compensation scandals like Tyco International in particular. Moreover, in addition to concerns about high *absolute* amounts of executive compensation, concerns have been expressed about the amount of executive compensation *relative* to other employees in the same firm (Abowd and Kaplan 1999). Thus, overall, calls to limit CEO pay have received growing attention in recent years

(McCall 2003; Page and Jacobs 2009). This discussion about excessive absolute and relative amounts of compensation is closely related to distributional fairness considerations.

Public discussions and concerns about "unfair" executive compensation are also relevant for compensation practice, particularly for firms, investors and regulators. To avoid public attention, firms restructure compensation packages (Kuhnen and Niessen 2012; Weisbach 2007), and, also as a response to public criticism, legislators tightened the rules for executive compensation disclosure like, e.g., the Dodd-Frank Act Section 953 (b) of 2010 or SEC's Executive Compensation and Related Person Disclosure of 2006.

However, despite the importance of fairness considerations, the question of what executive compensation is perceived as fair or unfair and what determines the public perception of executive compensation is a rather understudied field. McCahery and Sautner (2012) recently examined the attitudes of institutional investors towards executive compensation and find that many institutional investors doubt that current CEO pay is properly designed. However, to our knowledge there is no study that has analyzed individual determinants of the fairness evaluations of executive compensation. Thus, despite the popular perception that some amounts of executive compensation may be considered as "unfair", little is known about how large a fair executive compensation should be, how executive compensation should be structured into fixed and variable parts, and which factors determine individuals' opinion about these questions.

Our study aims at filling this research gap. More specifically, we analyze which overall amount of compensation would be considered fair for the CEO of a representative exchange-listed firm and how the compensation should be structured into fixed and variable compensation parts. Further, we identify and analyze subjective determinants for the perceived fairness of executive compensation. For this purpose, we conduct a telephone survey interviewing 671 representative eligible voters about their preferences. In addition, we also examine the fairness perceptions of investment professionals in a web-based survey with 140 participants and

analyze whether fairness matters as a criterion for this group as well, and how their fairness perceptions are related to the perceptions of representative eligible voters.

We predict that the perception of the fair amount of executive compensation and the way executive compensation should be structured depends strongly on personality traits. The intuition underlying this prediction is that research in social psychology has shown that individuals exhibit egocentric fairness biases (Babcock and Loewenstein 1997), which is the tendency to focus on fairness criteria that benefit their own self-interest. Thus, the perception of the fair amount of executive compensation can be affected by individuals' perceived similarity with executives. Moreover, as prior research has shown that individuals tend to overgeneralize their own characteristics when making inferences about others (Krueger and Clement 1997; Taft 1955), we predict that an individual's attitudes towards risk and risk-affected variable pay may influence his/her judgment of how to structure executive compensation. Finally, we predict that the perceived fair amount of executive compensation and the preferred structure of the compensation are interrelated in that the amount of fair executive compensation is the higher, the higher the assumed share of variable compensation is.

Our results support our predictions. Specifically, we show that even though the vast majority of representative eligible voters have an opinion about what a fair amount of executive compensation is, the opinions are widely dispersed. Further, we find that eligible voters consider the amount of fair executive compensation to be the higher, the larger the assumed share of variable compensation is and the more they perceive themselves to possess management skills. Similarly, eligible voters' preferred share of variable compensation in executive compensation contracts is strongly affected by individual personality traits related to their *own* perception of variable compensation like, e.g., their own risk attitude or their optimism about good outcomes. Nevertheless, even though the vast majority of participants make judgments about the fairness of executive compensation, their knowledge about *actual* executive compensation is poor as the majority largely under- or overestimates the actual amounts. Finally,

the results of our second survey show that fairness also matters for investment professionals as a criterion of executive compensation. However, some criteria deviate systematically from the judgments of representative eligible voters.

Our study has important implications for both theory and practice. From a theoretical perspective, we contribute to the literature by identifying personal traits that influence individuals' judgments of fair executive compensation and the preferred structure of executive compensation. As the perception of being treated fairly and the fair treatment of others is an important determinant of employee motivation (Fehr et al. 1997; Gilliland 1993; Konovsky and Cropanzano 1991), this evidence may help to develop further theory on how to optimally structure executive compensation in different firms.

Further, our study helps inform practitioners on how to pay executives and how to structure their compensation. We provide evidence about the level and the structure of executive compensation that is acceptable for both eligible voters and investments professionals. Thus, our evidence may help firms to design executive compensation and to communicate information about it to the capital market and stakeholders in the society.

The remainder of the paper is structured as follows: Section 2 reviews the related literature and develops the hypotheses. Section 3 presents the empirical design and the measures for our first survey targeting representative eligible voters. In Section 4, we present the results of the first survey. In Section 5, we describe the design and results of our second survey targeting investment professionals, and Section 6 concludes.

2 Survey 1 – Theory Development

Theoretical Foundations

Prior research shows that people have preferences for fairness (Camerer 2003; Fehr and Schmidt 1999; Kahneman et al. 1986), and fairness also seems to matter as a criterion for judging executive compensation (Abowd and Kaplan 1999; Core et al. 2008). However, while

distributional fairness theories are based on the relative distribution of income (Bolton and Ockenfels 2000; Fehr and Schmidt 1999), the mere fact that executive compensation is larger than the average compensation of an employee does not necessarily imply that it is perceived as unfair. The reason is that fairness concepts usually include others' inputs and their entitlements (Adams 1965; Hoffman and Spitzer 1985). For example, an individual who produces twice as much is also entitled to twice as much money (Konow 1996).

Even though the vast majority of people are likely to have *some* fairness preference, the concept of fairness is ambiguous. Specifically, opinions about what can be considered as fair tend to be widely dispersed among individuals (Cappelen et al. 2005; Konow 2000). In the following, we will investigate how individual traits can influence the opinion on what is considered fair executive compensation and the preferences about how executive compensation should be structured. As described in detail below, the theories underlying these predictions are based in social psychology. Specifically, extant research in social psychology suggests that individuals exhibit egocentric fairness biases, which is the tendency of individuals "to conflate what is fair with what benefits oneself" (Babcock and Loewenstein 1997, p. 110). Egocentric interpretations of fairness typically arise when the interpretation of outcomes is ambiguous (Thompson and Loewenstein 1992). This is clearly the case for executive compensation as no unambiguous benchmark about the fairness of compensation exists. As a consequence, we suggest that, when judging the fairness of executive compensation, individuals are likely to apply reference points and fairness criteria that favor their own self-interest (Arnold et al. 2013; Babcock et al. 1995; Messick and Sentis 1979).

Moreover, prior research in social psychology suggests that individuals over-generalize their own characteristics when making inferences about others. Specifically, individuals have a tendency for social projection, i.e., they over-rely on their own characteristics and disregard other people's actual traits and preferences when judging or predicting others' behavior (Ludwig and Nafziger 2011; Taft 1955; Van Boven and Loewenstein 2003). Owing to the

phenomenon of social projection, we suggest that in their judgment of how executive compensation should be structured, individuals are likely to be affected by their own individual characteristics and will over-generalize their own traits to executives.

Determinants of the Amount of Fair Executive Compensation

Perceived Similarity with Executives

As we explained above, when judging the fairness of an action or an outcome, individuals are likely to be affected by an egocentric fairness bias when choosing the reference point for their judgment (Babcock et al. 1995; Kagel et al. 1996; Messick and Sentis 1979). This is particularly the case when there is no unambiguous benchmark for the judgment (Thompson and Loewenstein 1992). We argue that when judging the fairness of executive compensation, individuals are also likely to be biased in an egocentric way. Specifically, we suggest that when individuals' perceive themselves to be similar to executives, i.e. when they perceive themselves to possess strong management skills, they are likely to judge larger amounts of executive compensation as fair. The reason is that if individuals perceive themselves to be similar or in a similar position as executives, they are likely to value the characteristics and work of executives more highly, and therefore, will more readily justify higher executive compensation to be fair. Thus, we predict that the perceived similarity with executives increases the amount of executive compensation that is considered to be fair:

> **H1:** A higher perceived similarity with executives increases the executive compensation amount that is considered as fair.

Variable Compensation Share

Additionally, differences with regard to the amount of fair executive compensation may arise because individuals make different assumptions about the share of the executives' variable compensation. When executives are risk averse, the utility derived from a given amount of expected compensation decreases in the degree of risk aversion if their compensation is (partly) based on variable pay. Vice versa, if the variable share of a risk averse executive's com-

pensation increases, the executive has to be paid a higher expected amount of compensation, i.e., a risk premium, in order to compensate him/her for the loss in expected utility caused by the increased risk. In this case, the increase in the (expected) amount of compensation does not reflect an increase in the executive's net utility.

According to distributional fairness theories based on individuals' net utility (Adams 1965), this implies that the structure of executive compensation and the perception of the fair amount may be interrelated. When individuals assume a larger variable compensation share, they are likely to accept larger compensation amounts as fair because the increase in the executive's compensation does not reflect an increase in his/her net utility. Thus, we predict that individuals' perception of a fair compensation amount for an executive depends on the size of the assumed variable compensation share in the compensation package:

H2: A higher assumed variable compensation share increases the compensation amount that is considered as fair.

Determinants of the Variable Target Compensation Share[40]

Attitude Towards Risk

Since variable compensation represents a risky component of executive pay and, therefore, increases the riskiness of the executive's expected future wealth, a higher risk tolerance of the executive should be associated with a higher acceptance of variable compensation. This is consistent with existing experimental evidence when workers can self-select into different payment schemes (Chow 1983; Dohmen and Falk 2011).

As social projection suggests that individuals rely on their own characteristics when making inferences about others (Ludwig and Nafziger 2011; Taft 1955; Van Boven and Loewenstein 2003), individuals may unintentionally refer to their own risk tolerance when making assumptions about the risk attitude of executives and the resulting structure of executive

[40] We define target compensation as the amount that would be paid in case an executive realizes a 100% target achievement. Higher (lower) target achievements lead to variable shares of the *actual* compensation amount that would be higher (lower) than the target compensation.

compensation. Specifically, the higher individuals' own risk tolerance, the higher will be the assumed risk tolerance of an executive and, consequently, the larger will be the individuals' judgment of the variable share that should be included into the executive compensation. We predict:

H3: A higher personal risk tolerance has a positive effect on the judgment of the variable target compensation share that should be included into executive compensation.

Optimism

Research in psychology suggests that an important personality trait of individuals is individuals' optimism in their predictions about the future (e.g. Scheier and Carver 1985; Weinstein 1980). While literature on personality traits demonstrates that individuals are—on average—subject to an optimistic bias when making predictions (e.g. Weinstein 1984), the same stream of literature also suggests that people exhibit individual differences regarding their optimism. For example, a source of diverse levels of optimism among individuals might be their heterogeneous and motivated attention to risk factors (Weinstein and Klein 1995).

Based on social projection theory (Krueger and Clement 1997; Taft 1955), we predict that the more optimistic individuals are when making predictions, the larger is their preferred variable compensation share for executive compensation. This is because the focus on positive outcomes makes variable compensation relatively more attractive to fixed compensation than when an individual focuses on negative outcomes. Therefore, we predict a positive association between an individual's optimism and his/her judgment of the variable compensation share that should be included in an executive compensation contract:

H4: Higher personal optimism has a positive effect on the judgment of the variable target compensation share that should be included into executive compensation.

Competitiveness

Another personality trait that is likely to influence individuals' judgment of variable compensation is their preference for egalitarianism or competitiveness. Prior research pro-

vides evidence that individuals who have a preference for egalitarian outcomes have been found to refrain from self-selecting into a competitive work environment while individuals with lower preferences for egalitarian outcomes choose competitive payment schemes more often (Bartling et al. 2009; Dohmen and Falk 2011).

Clearly, performance-based pay is one of the primary properties of a competitive compensation contract and can lead to highly unequal outcomes. This implies that individuals who are more competitive and have lower preferences for egalitarian outcomes are likely to see variable compensation as more attractive than more egalitarian individuals. Assuming again a projection of own characteristics and preferences on others (Krueger and Clement 1997; Taft 1955), the preferred variable compensation share for executive compensation should increase, the more competitive an individual is. We predict:

> **H5:** A higher personal competitiveness has a positive effect on the judgment of the variable target compensation share that should be included into executive compensation.

Interaction of Optimism and Competitiveness

Additionally, we suggest that optimism and competitiveness can interact in their effect on individuals' judgment of the preferred share of variable compensation because the effect of an increase in competitiveness on the variable share is larger when individuals exhibit high optimism than when they exhibit low optimism. Specifically, if an individual exhibits low optimism, higher competitiveness may increase his/her preference for variable pay but the increase is likely to be small because the individual focuses on negative outcomes. In contrast, if an individual exhibits high optimism, increasing competitiveness is likely to increase his/her preferences for variable pay by a larger extent because the focus on positive outcomes strongly increases his/her perceived benefits from the variable compensation. That is, combined optimism and competitiveness make variable pay most attractive. Therefore, we predict

an interaction effect of optimism and competitiveness on the preferred share of variable target compensation in executive compensation:

H6: Higher personal optimism increases the positive effect of competitiveness on the judgment of the variable target compensation share that should be included into executive compensation.

Interpersonal Trust

Finally, an important personality trait in the context of managerial control mechanisms is an individual's interpersonal trust. Interpersonal trust can be defined as the expectation that a word or promise (verbal or written) of another individual or group can be relied upon (Rotter 1967). For example, as executives are hired to act in the best interest of the firm and its owners, joining the company can be interpreted as their promise to do so. In firms, trust may represent a substitute for formal control or incentive mechanisms (Christ 2013; Falk and Kosfeld 2006). That means, instead of using costly control and incentive mechanisms like variable compensation to prevent executives' opportunistic actions, owners may trust executives that they provide sufficiently high effort and act in the best interest of the firm.

We suggest that if an individual is a trusting person and exhibits general trust in others (Mayer et al. 1995; Rotter 1967), (s)he is also more likely to trust an executive to act in the interest of the firm even without formal incentive and control systems. Consistent with this conjecture, prior research has treated trust as a personality trait increasing the general expectation of others' trustworthiness that also translates into transactions inside an organization (Farris et al. 1973; Mayer et al. 1995). Consequently, individuals that exhibit a higher propensity for interpersonal trust should be convinced that an executive compensation contract should include a lower variable compensation share. Therefore, we hypothesize:

H7: A higher level of an individual's interpersonal trust has a negative effect on the judgment of the variable target compensation share that should be included into executive compensation.

3 Survey 1 – Methodology

Data Collection

For Survey 1, we collected data from a representative random sample of eligible voters in the city of Hamburg via a computer-assisted telephone interview. The survey was part of a broader representative study about various opinions and attitudes of eligible voters, which is regularly conducted by the social science department of the University of Hamburg. All questions were commented and checked for comprehensibility by "GESIS – Leibniz-Institute for the Social Sciences". The survey was conducted from mid-May to end of June 2013. The survey population is constituted by all residents of the city of Hamburg over the voting age of 16.[41] The random sample was selected using the Gabler-Häder-random procedure for representative telephone interviews.[42] The average interview time was 30 minutes. Participation was not incentivized, but the interviewer emphasized that participation is important as it offers the opportunity to state personal opinions on current political issues. 671 participants completed the standardized questionnaire. Participants were on average 51.4 years old and 55% were female.

Variable Measurement

Dependent Variables

We measure participants' judgment of the fair executive compensation amount (COMP_FAIR) for a representative CEO. This is to exclude heterogeneous assumptions about firm characteristics such as size, net income or capital market orientation. Specifically, we asked participants to refer to a CEO who is representative for the average of the 30 largest exchange-listed German companies (DAX30). For this purpose, we also provided participants with the average total revenue, net income and number of employees of the respective com-

[41] Since 2013, 16 years is the voting age for local elections in Hamburg.

[42] In order to include non-listed telephone numbers into the survey, the procedure randomizes the last two digits of listed telephone numbers.

panies in 2012. After that, we ask "Which total annual amount would you consider fair for compensating the CEO of such a company? Please state a €-amount per year." Further, similar to the rejection threshold known from bargaining experiments (e.g., Camerer 2003), we also elicited a judgment of the maximum compensation amount that participants consider acceptable (COMP_UNFAIR) by asking "Irrespective of the CEO's performance, which is the maximum amount for an annual compensation that you would consider acceptable?"[43] Additionally, we asked participants what they consider to be the minimum amount that a representative CEO would demand to lead such a company (COMP_REQUEST). This question captures participants' expectations of the managers' reservation wage. Finally, we ask participants about the actual average compensation of a DAX30-CEO in the year 2012 (COMP_ACTUAL) to capture their knowledge of the executive compensation paid in practice.[44]

To measure the variable target compensation share (VAR_SHARE) that should be included into the compensation contract of a representative CEO, we asked participants to indicate the share of total compensation that should consist of variable components like a cash bonus. To measure the participants' judgment of the variable *target* compensation share and to avoid diverging assumptions about the firms' performance in 2012, we asked participants to consider a situation in which the performance of the representative firm is neither particularly good nor particularly bad and the target achievement is 100%.

Explanatory Variables

To measure participants' perceived similarity (SIMILARITY) with the reference group of executives we used participants' assessment of their own management skills on a 4-point multiple-item personality strength scale (Noelle-Neumann 1985; Schaeufele and Shah 2000).

[43] Our results remain inferentially unaffected if we use COMP_UNFAIR instead of COMP_FAIR as dependent variable in our analyses.

[44] Note that shortly before the survey began, the DSW (Deutsche Schutzvereinigung für Wertpapierbesitz e.v.) had published a study (DSW 2013) on the amounts of executive compensation paid in DAX30 companies in the year 2012. The average amount that was very close to the one derived in our own analyses was prominently communicated in the public media in Germany.

We suggest that the measured personality strength factors are indicative of management skills and, therefore, reflect the perceived similarity with executives. Specifically, the personality strength factors are: "responsibility" ("I enjoy taking on responsibility"), "leadership" ("When involved in a joint project I take the lead"), "persuasiveness" (I enjoy convincing other people"), "serving as role model" ("I often notice that others comply with my actions"), "authority" ("I can make my point"), and "being a trend-setter" ("Very often, I am one step ahead"). We use a reflective measurement approach as we suggest that the factors mentioned above *are determined by* (instead of determining) participants' perceived management skills. A factor analysis indicates a good fit with a single factor. To assess measurement quality, we compute Cronbach's alpha, the construct's composite reliability (Fornell and Larcker 1981), and the average variance extracted (AVE). This procedure results in values of 0.86 for Cronbach's alpha, 0.89 for composite reliability, and 0.59 for the AVE. All reliability measures exceed established empirical thresholds: 0.70 for alpha, 0.70 for composite reliability, and 0.50 for AVE (Bagozzi and Baumgartner 1994; Nunnally 1978). Thus, we use the weights of an exploratory factor analysis including all items to construct the perceived similarity with executives.

The measure of participants' risk tolerance (RISK_TOL) is taken from the Socio-Economic Panel 2013. Specifically, participants were asked to indicate how risk tolerant they are on a Likert-scale from 1 (not at all risk tolerant) to 10 (very risk tolerant). To measure optimism (OPTIMISM) participants indicated their agreement to the following statement: "Usually, I expect that my personal affairs turn out to be successful" (Noelle-Neumann 1985), scaled from 1 = not at all to 4 = totally agree. Competitiveness (COMPET) reflects a person's attitude towards egalitarian vs. competitive outcomes (Bartling et al. 2009; Dohmen and Falk 2011). To proxy for competitiveness, we use leadership, i.e., participants' agreement to the statement: "When involved in a joint project I take the lead", scaled from 1 (not at all) to 4 (totally agree). This proxy is defensible for at least two reasons. First, research on leadership

and personality suggests that competitiveness is a core characteristic of charismatic leaders (House and Howell 1992). Second, as our measure refers to taking the lead in a joint project, it also reflects individuals' perception of developing better solutions or leading better than others and is, therefore, closely connected to their competitiveness and their preference for non-egalitarian compensation. We measure the participants' general propensity for interpersonal trust (TRUST) using a measure from the Socio-Economic Panel 2013. Specifically, participants' stated in how far they believe that other people can be trusted on a Likert-scale from 1 ("you cannot be cautious enough") to 10 ("you can trust most other people").

Control Variables

We employ a series of control variables to account for contextual factors that might affect the dependent variables in our models. In order to control for experience with compensation-related topics, we measure participants' exposure to business news (NEWS). Specifically, participants indicate whether they followed the business news within the last three months (0 = no, 1 = yes). We further measure EDUCATION as participants' highest educational degree at six levels (1 = no degree, 2 = degree after 9 years of school, 3 = degree after 10 years of school, 4 = degree after 12 years of school, 5 = degree qualifying for university admission, 6 = college/university degree). INCOME is measured by participants' monthly household net income in Euro on a non-linear 8-point scale (1 = 0-500, 2 = 501-1,000, 3 = 1,001-1,500, 4 = 1,501-2,000, 5 = 2,001-3,000, 6 = 3,001-4,000, 7 = 4,001-5,000, 8 = 5,000 and more). GENDER is coded as 0 (male) and 1 (female), and AGE measures participants' age in years.

4 Survey 1 – Results

Descriptive Statistics

Table 1 reports summary statistics for all dependent, independent and control variables for the representative eligible voters sample. To limit the effect of outliers in the subsequent

Variable	Mean	Std. dev.	Percentile					*N*	*n/a*
			10th	25th	Median	75th	90th		
COMP_FAIR[a]	1,381,958	2,242,969	100,000	200,000	500,000	1,500,000	3,500,000	465	206
VAR_SHARE[b]	21.15%	20.67%	0%	5%	15%	30%	50%	570	101
COMP_UNFAIR[c]	4,131,144	9,081,725	120,000	400,000	1,000,000	4,000,000	10,000,000	493	178
COMP_REQUEST[d]	5,070,406	8,051,341	200,000	750,000	2,000,000	5,000,000	12,000,000	463	208
COMP_ACTUAL[e]	8,715,900	16,300,000	500,000	1,500,000	4,000,000	10,000,000	20,000,000	434	237
SIMILARITY[f]	0	1	-1.25	-0.66	0.04	0.76	1.23	583	88
RISK_TOL[g]	4.56	2.27	2	3	5	6	7	642	29
OPTIMISM[h]	3.29	0.64	3	3	3	4	4	646	25
COMPET[i]	2.78	0.86	2	2	3	3	4	642	29
TRUST[j]	5.47	2.35	2	4	6	7	8	649	22
NEWS[k]	0.88	0.32	0	1	1	1	1	639	32
EDUCATION[l]	4.24	1.47	2	3	5	6	6	632	39
INCOME[m]	4.82	1.96	2	3	5	6	8	549	122
GENDER[n]	0.55	0.50	0	0	1	1	1	651	20
AGE[o]	51.38	18.32	26	37	52	66	75	642	29

[a] COMP_FAIR: Euro amount per year that participants consider fair for compensating the representative CEO from the reference group.
[b] VAR_SHARE: Variable compensation share in % that participants perceive optimal for a 100% target achievement.
[c] COMP_UNFAIR: Euro amount per year surpassing the threshold beyond which any compensation would not be acceptable irrespective of the CEO's performance.
[d] COMP_REQUEST: Euro amount per year that participants assume to be the CEO's reservation wage.
[e] COMP_ACTUAL: Euro amount per year that participants estimate to be the actual overall compensation of the representative CEO from the reference group in 2012.
[f] SIMILARITY: Factor formed of 6 items measuring the participants' management skills: "responsibility", "leadership", "persuasiveness", "serving as role model", "authority", and "being a trend-setter".
[g] RISK_TOL: Participants' self-assessment of their risk tolerance (1 = not at all risk tolerant, 10 = very risk tolerant).
[h] OPTIMISM: Agreement to the statement "Usually, I expect that my personal affairs turn out to be successful" (1 = not at all, 4 = totally agree).
[i] COMPET: Participants' agreement to the statement "When being involved in a joint project with other people I enjoy taking the lead" (1 = not at all, 4 = totally agree).
[j] TRUST: Participants' stated in how far they believe that other people can be trusted (1 = you cannot be cautious enough, 10 = you can trust most other people).
[k] NEWS: Participants stated whether they have followed business news within the last three months (0 = no, 1 = yes).
[l] EDUCATION: Measuring participants' highest educational degree (1 = no degree, 2 = degree after 9 years of school, 3 = degree after 10 years of school, 4 = high school graduation (12 years), 5 = high school graduation (13 years), 6 = university degree).
[m] INCOME: Monthly household income in Euro (1 = 0-500, 2 = 501-1,000, 3 = 1,001-1,500, 4 = 1,501-2,000, 5 = 2,001-3,000, 6 = 3,001-4,000, 7 = 4,001-5,000, 8 = 5,000 and more).
[n] GENDER: 0 = male, 1 = female.
[o] AGE: Participants' age in years.

Table 1: Descriptive statistics for the representative eligible voters sample (Survey 1)

analysis, we winsorize the compensation data by setting data below the 2.5th percentile to the 2.5th percentile and data above the 97.5th percentile to the 97.5th percentile.[45]

Table 1 shows that 465 of 671 participants (69%) chose to answer the question about the fair amount of executive compensation (COMP_FAIR). The remaining participants decided not to answer the question at all, indicated no exact sum or mentioned that the fair amount of compensation cannot be determined generally. The amounts of executive compensation indicated by the participants who answered the question seem to be relatively low on average but also dispersed. While the mean value of COMP_FAIR is € 1.38m, the values for the 10th and 90th percentile are 100,000 and € 3.5m, respectively. The 95th percentile is even € 6.0m, indicating that even though the majority of eligible voters have an opinion about the fair amount of executive compensation, fairness perceptions are widely dispersed.

When asked about the maximum acceptable amount of executive compensation (COMP_UNFAIR), the amount indicated by participants increases. The mean COMP_UNFAIR is € 4.13m. Interestingly, when asked about the executives' reservation wage (COMP_REQUEST), participants indicate on average an even larger amount of compensation (mean COMP_REQUEST = € 5.07m), and when asked about the actual average compensation of the reference group of executives (COMP_ACTUAL), the amounts indicated by the participants increase even further (mean COMP_ACTUAL = € 8.72m). This implies that the majority of representative eligible voters think that even the lowest compensation that executives would demand, exceeds the compensation amount that is acceptable for them at maximum. Moreover, the finding that estimated actual compensation exceeds the estimated reservation wage implies that eligible voters perceive actual executive contracts as inefficient because executives are estimated to receive a higher compensation than they request.

Descriptive statistics for the variable compensation share (VAR_SHARE), illustrated by Figure 1, imply that variable compensation shares are preferred to be rather low compared to

[45] Our results are statistically and inferentially unaffected for any winsorization threshold between 2% and 5%.

the actual variable compensation share. The average variable share is 21.2%, and a majority of 70% of the participants stated that the variable share should be less than or equal to 30%. From compensation reports, we were able to infer the target structure of variable and fixed compensation of 15 of the DAX30 firms. In 2012, the average variable target compensation share of these firms was 69%, and the actual variable compensation share of all DAX30 firms was 67%.

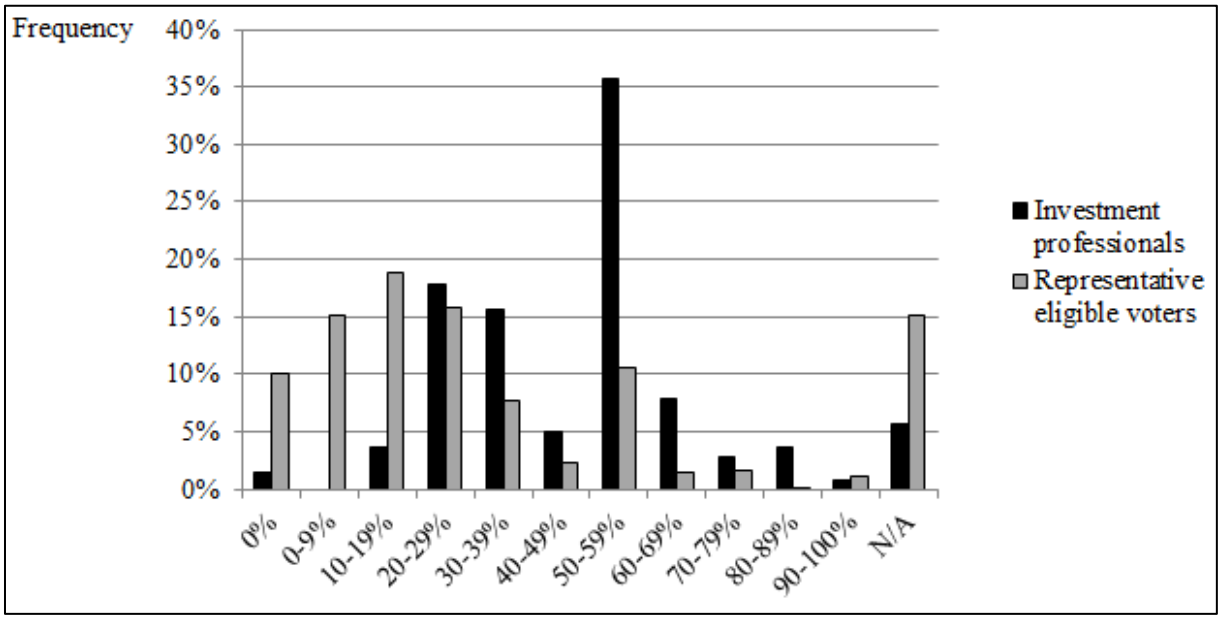

Figure 1: Variable compensation shares considered optimal by the representative eligible voters sample (Survey 1) and the investment professionals sample (Survey 2)

Table 2 reports the Pearson correlations between all variables. The correlations provide first evidence in favor of most of our hypotheses. First, VAR_SHARE and SIMILARITY are significantly positively correlated with COMP_FAIR. Second, RISK_TOL and COMPET are significantly positively correlated with VAR_SHARE. While OPTIMISM is also positively correlated with VAR_SHARE, the significance is marginal ($p = 0.063$). Only the correlation between TRUST and VAR_SHARE is close to zero. Generally, all correlations are not sufficiently high to warrant concerns about multicollinearity.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) COMP_FAIR[a]	1.000													
(2) VAR_SHARE[b]	0.268***	1.000												
(3) COMP_UNFAIR[c]	0.701***	0.189***	1.000											
(4) COMP_REQUEST[d]	0.414***	0.070	0.436***	1.000										
(5) COMP_ACTUAL[e]	0.316***	0.011	0.440***	0.557***	1.000									
(6) SIMILARITY[f]	0.175***	0.157***	0.109**	0.015	0.098	1.000								
(7) RISK_TOL[g]	0.046	0.119***	0.080	-0.013	-0.025	0.348***	1.000							
(8) OPTIMISM[h]	0.080*	0.078*	0.078*	0.024	0.013	0.362***	0.195***	1.000						
(9) COMPET[i]	0.162***	0.130***	0.125***	0.008	0.034	0.651***	0.249***	0.132***	1.000					
(10) TRUST[j]	0.026	-0.005	-0.056	-0.018	-0.054	0.031	0.192***	0.016	0.042	1.000				
(11) NEWS[k]	0.128***	0.071*	0.113**	0.085	0.030	0.161***	-0.020	0.035	0.103***	0.014	1.000			
(12) EDUCATION[l]	0.126***	0.181***	0.109**	0.127***	0.053	0.117**	0.132***	0.056	0.116***	0.173***	0.097**	1.000		
(13) INCOME[m]	0.135***	0.152***	0.121**	0.085	0.012	0.200***	0.083*	0.160***	0.099**	0.097**	0.098**	0.238***	1.000	
(14) GENDER[n]	-0.185***	-0.161***	-0.145***	-0.165***	-0.102**	-0.123***	-0.145***	-0.029	-0.132***	0.061	-0.012	-0.016	-0.098**	1.000
(15) AGE[o]	-0.032	-0.041	-0.084	0.006	0.071	-0.083**	-0.196***	0.022	-0.174***	0.003	0.060	-0.230***	0.022	0.052

* $p<0.10$; ** $p<0.05$; *** $p<0.01$, two-tailed

See Table 1 for variable definitions.

Table 2: Correlation matrix (Survey 1)

Hypotheses Tests

To test our hypotheses, we run OLS regressions using alternative models with and without control variables. To correct for heteroskedasticity, we calculate robust standard errors in all regressions using the Huber-White estimator.

H1 - H2: Determinants of the Fair Compensation Amount

Table 3 displays the results of our regressions used to test H1 and H2. The results of Model (1) are consistent with our predictions that the fair compensation amount is positively related to the perceived similarity with executives ($p < 0.01$) and the assumed variable compensation share ($p < 0.01$). Adding personality traits as control variables in Model (2) indicates that our findings are robust. Similarly, adding demographic variables in Model (3) does not change the findings for SIMILARITY and VAR_SHARE. Thus, H1 and H2 are strongly supported. The control variables in Model 3 further reveal that women perceive lower amounts of executive compensation as fair than men and that exposure to business news increases the judgment of the fair amount.

H3 - H7: Determinants of the Variable Compensation Share

Table 4 reports the results of our tests for H3 to H7. Model (1) includes only the independent variables of our hypotheses but excludes the interaction between OPTIMISM and COMPET predicted in H6. Model (1) provides support for the influence of personal risk tolerance predicted in H3 ($p < 0.05$), the effect of optimism predicted in H4 ($p < 0.10$) and the effect of competitiveness predicted in H5 ($p < 0.01$). However, even though the coefficient of TRUST is negative as predicted, its effect on VAR_SHARE is not significant ($p > 0.10$). Thus, Model (1) rejects H7.

	Hypothesis	COMP_FAIR (1)	COMP_FAIR (2)	COMP_FAIR (3)
SIMILARITY	H_1 [+]	301,214	296,610	269,278
		(109,225)***	(125,952)***	(148,533)**
VAR_SHARE	H_2 [+]	28,211	27,969	28,075
		(7,224)***	(7,270)***	(7,586)***
RISK_TOL			-8,310	-51,600
			(51,247)	(54,626)
OPTIMISM			85,621	72,472
			(181,718)	(197,815)
TRUST			29,387	-6,066
			(52,662)	(56,622)
NEWS				648,892
				(238,994)***
EDUCATION				69,443
				(86,091)
INCOME				36,999
				(69,324)
GENDER				-676,449
				(225,665)***
AGE				-1,133
				(7,029)
_cons		779,517	383,253	193,409
		(154,401)***	(711,408)	(872,357)
R^2		0.09	0.10	0.14
N		418	414	363

* $p<0.1$; ** $p<0.05$; *** $p<0.01$, p-values are one-tailed for variables with a directional hypothesis (+,–) and two-tailed otherwise (standard errors are shown in parentheses).

Table 3: OLS-regression with robust standard errors on the fair compensation amount (H1 – H2) (Survey 1)

Model (2) adds the interaction between OPTIMISM and COMPET to test H6. The regression reports a significantly positive interaction effect ($p < 0.01$) that supports H6.[46] Thus, the effect of an increase in competitiveness on VAR_SHARE is the stronger, the more optimistic a person is. Further analysis of Model (2) reveals that individuals who exhibit an average competitiveness state higher variable compensation shares when being more optimistic: using the mean value of COMPET (2.78) yields a partial effect of OPTIMISM of 2.38 = -9.66 + (2.78 x 4.33). Rerunning the regression with (COMPET – mean(COMPET)) x OPTIMISM

[46] Adding the interaction term of OPTIMISM and COMPET leads to a regression output where the single coefficients of OPTIMISM and COMPET cannot be easily interpreted. Both coefficients measure only the effect of the respective variable assuming that the other variable is set to 1 (the minimum value on the scale). For a meaningful interpretation we also report the partial effects using mean values of OPTIMISM and COMPET.

	Hypothesis	VAR_SHARE (1)	VAR_SHARE (2)	VAR_SHARE (3)
RISK_TOL	H_3 [+]	0.82	0.79	0.68
		(0.41)**	(0.41)**	(0.47)*
[A] OPTIMISM	H_4 [+]	1.82	[-9.67]	[-11.06]
		(1.30)*	(3.63)***	(3.80)***
[B] COMPET	H_5 [+]	2.75	[-11.74]	[-13.96]
		(1.05)***	(4.64)***	(4.76)***
[A] x [B] Interaction	H_6 [+]		4.33	4.91
			(1.42)***	(1.46)***
TRUST	H_7 [-]	-0.17	-0.22	-0.36
		(0.42)	(0.42)	(0.46)
NEWS				3.52
				(2.76)
EDUCATION				1.85
				(0.72)**
INCOME				0.61
				(0.51)
GENDER				-5.49
				(1.90)***
AGE				0.03
				(0.05)
_cons		4.69	43.27	37.80
		(5.58)	(12.48)***	(13.50)***
R^2		0.03	0.04	0.11
N		558	558	472

* $p<0.1$; ** $p<0.05$; *** $p<0.01$, p-values are one-tailed for variables with a directional hypothesis (+,–) and two-tailed otherwise (standard errors are shown in parentheses).

Table 4: OLS-regression with robust standard errors on the variable target compensation share (H3 - H7) (Survey 1)

as interaction term yields the effect of OPTIMISM at the average level of COMPET. The coefficient (2.38) is significant ($p < 0.05$, one-tailed). This further supports H4. Similarly we calculate the partial effect of COMPET for the mean value of OPTIMISM (3.29). This yields a partial effect of COMPET of 2.51 = -11.74 + (3.29 x 4.33). The coefficient (2.51) is significant ($p < 0.01$, one-tailed), and this further supports H5.

Model (3) includes additional control variables and further provides support for hypotheses H3 to H6 but no support for H7. Interestingly, the control variables reveal that EDUCATION has a significantly positive effect on VAR_SHARE ($p < 0.05$) which may be due to the fact that a higher level of education increases the likelihood that individuals understand varia-

ble compensation as an integral pay component that provides a risk-sharing and motivating function. Moreover, similar to the fair compensation amount, women prefer lower variable compensation shares than men ($p < 0.01$).

Supplementary Analysis

After studying the determinants of fair compensation and the variable target compensation share, we also investigate how well representative eligible voters estimate the actual level of executive compensation. The overall compensation that was paid to the average CEO from the reference group in 2012 was € 5,309k. The participants' estimations of the actual compensation amount are illustrated in Figure 2.

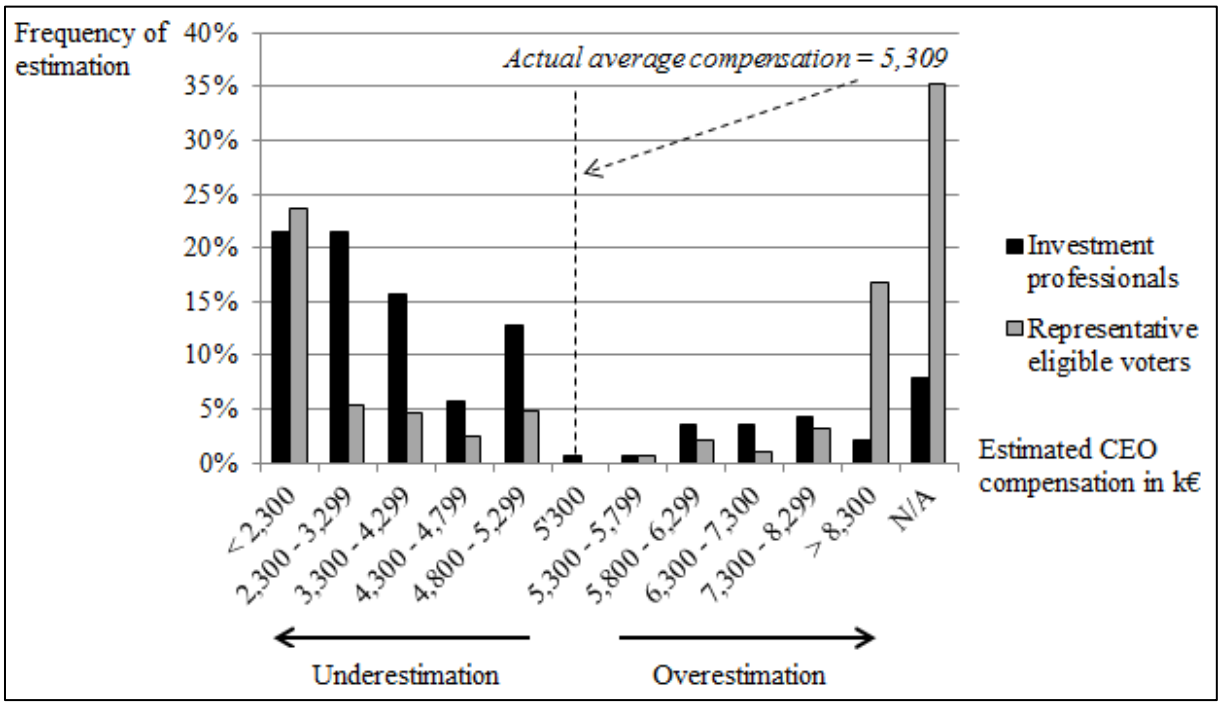

Figure 2: Estimation of executives' actual compensation by the representative eligible voters sample (Survey 1) and the investment professionals sample (Survey 2)

Figure 2 shows that only 67 of 671 participants (10.0%) made an estimation lying within an interval of +/- € 1m around the true value of € 5,309k. Instead, 159 participants (23.7%) estimated the actual compensation to be less than € 2,300k and 113 participants (16.8%) estimated the actual executive compensation to be higher than € 8,300k. Thus, over 40% of the participants estimated amounts that are either lower than 50% of the actual amount or higher

than 150%. Therefore, Figure 2 suggests rather a U-shaped distribution of the eligible voters' estimates. Further, 35.3% of the eligible voters did not provide any estimate at all. These results suggest that even though many participants hold opinions about the fair amount of executive compensation, the knowledge about actual executive compensation is rather poor.

5 Survey 2 – Design and Results

The results of Survey 1 indicate that the judgments of what represents a fair amount of executive compensation and how executive compensation should be structured are highly dependent on personality traits and that fairness matters as a criterion for the vast majority of representative eligible voters. More specifically, the answers reflect serious concern with the overall amount of executive compensation. However, despite these findings, firms and regulators may not perceive fairness as a relevant factor for the determination of executive compensation because investment professionals representing one of the most important groups of capital market participants may evaluate executive compensation only on the basis of economic criteria. Therefore, we conduct a second survey with investment professionals as participants using the same compensation-related questions. Additionally, we ask them to indicate the importance of fairness as well as economic factors for the evaluation of executive compensation. Thus, the second survey investigates whether fairness matters as a criterion of executive compensation for investment professionals as well.

Data Collection

We collected data via an online survey addressing professionals in the investment industry. The survey targeted members of a professional association that represents investment professionals in German speaking countries and included a variety of professions in the investment industry like, e.g., financial analysts or fund managers. Invitation links were sent by e-mail to 1,453 members of the association in early November 2013, followed by two e-mail

reminders. In total, we received 140 surveys until mid-December, resulting in a response rate of 9.6%.

Panel B of Table 5 summarizes our final sample. It shows that our sample mainly consists of (buy-side or sell-side) financial analysts, fund managers, investment bankers and bankers and that the overwhelming majority of respondents are based in Germany. The mean age of our participant group is 44.5 years and the mean work experience in the investment industry is 19.2 years. Furthermore, no participant has less than 4 years of work experience which indicates high validity of our data.

Variable Measurement

In addition to the compensation-related questions described in section 3 (COMP_FAIR, VAR_SHARE, COMP_UNFAIR, COMP_REQUEST and COMP_ACTUAL), we collected data on the following variables. To measure how important fairness and economic criteria are for investment professionals in judging executive compensation we asked four questions, two for fairness and two for economic criteria. All questions ask for participants' agreement to a statement measured from 1 (not at all) to 7 (totally agree). The first statement (FAIR_A) is "It is important to me that the overall amount of compensation is fair", and the second (FAIR_B) is "It is important to me that the overall amount of compensation does not exceed a maximum acceptable threshold". Third, PPS measures how important participants perceive the pay-for-performance sensitivity of executive compensation through agreement with the following statement "It is important to me that the compensation is closely related to changes in the firm value". Finally, RISK_PREM measures how important participants perceive the fact that higher compensation is associated with higher risk through the statement "It is important to me that a higher compensation is only granted when, in return, the CEO carries more risk".

As control variables we include variables that are indicative for investment professionals' familiarity with executive compensation. COVERAGE measures to which extent the par-

Panel A: Summary statistics

Variable	Mean	Std. dev.	Percentile					*N*	*n/a*
			10th	25th	Median	75th	90th		
COMP_FAIR[a]	2,439,490	2,095,191	500,000	1,000,000	2,000,000	3,000,000	5,000,000	98	42
VAR_SHARE[b]	41.74%	17.97%	20%	30%	50%	50%	60%	132	8
COMP_UNFAIR[c]	7,218,532	7,349,464	1,000,000	3,000,000	5,000,000	10,000,000	15,000,000	109	31
COMP_REQUEST[d]	2,457,833	1,843,839	500,000	1,000,000	2,000,000	3,500,000	5,000,000	120	20
COMP_ACTUAL[e]	4,069,225	4,517,756	1,250,000	2,500,000	3,500,000	5,000,000	7,000,000	129	11
FAIR_A[p]	5.75	1.73	3	5	7	7	7	131	9
FAIR_B[q]	5.35	1.98	2	4	6	7	7	136	4
PPS[r]	5.53	1.62	3	4	6	7	7	139	1
RISK_PREM[s]	5.53	1.95	2	5	6	7	7	139	1
COVERAGE[t]	3.81	1.76	2	2	4	5	6	140	0
EXPERIENCE[u]	19.15	7.12	10	15	20	25	30	140	0
AGE[o]	44.52	7.98	35	40	45	50	53	140	0

Panel B: Profession and country

Profession	*N*	%	Country	*N*	%
Analyst (buy-side and sell-side)	25	17.9%	Germany	130	92.9%
Fund manager	43	30.7%	Switzerland	8	5.7%
Investment banker	23	16.4%	Austria	1	0.7%
Banker	27	19.3%	USA	1	0.7%
Investment consultant	8	5.7%			
Other (e.g., Broker, Risk manager)	14	10.0%			

See Table 1 for the variable definitions a-e & o.

[p] FAIR_A: Participants' agreement to the statement "It is important to me that the overall amount of compensation is fair" (1 = not at all, 7 = totally agree).

[q] FAIR_B: Participants' agreement to the statement "It is important to me that the overall amount of compensation does not exceed a certain threshold which would not be justifiable (1 = not at all, 7 = totally agree).

[r] PPS: Participants' agreement to the statement "It is important to me that the compensation is closely related to the change in firm value" (1 = not at all, 7 = totally agree).

[s] RISK_PREM: Participants' agreement to the statement "It is important to me that a higher compensation is only granted when, in return, the CEO carries more risk" (1 = not at all, 7 = totally agree).

[t] COVERAGE: Measures to which extent the participants' job includes covering the companies from our reference group (DAX30) (1 = not at all, 7 = very much).

[u] EXPERIENCE: Participants' job experience in years.

Table 5: Descriptive statistics for the investment professionals sample (Survey 2)

ticipants' job requires them to cover the DAX30 firms, scaled from 1 (not at all) to 7 (very much), and EXPERIENCE measures participants' job experience in years.

Results

Fair Compensation Amount

Panel A of Table 5 reports descriptive statistics for the investment professionals sample. The table shows that 98 of 140 participants (70%) indicated an amount when asked about the fair amount of executive compensation (COMP_FAIR). This fraction is surprisingly close to the fraction of representative eligible voters that answered this question (69%). Many of the investment professionals not indicating a specific amount for this question mentioned that the "fair" amount of executive compensation cannot be generally determined but depends on a number of other factors. While Panel A of Table 5 also reveals that, similar to the sample of eligible voters, the notion of fairness seem to be quite diverse with € 2.42m as mean compensation and € 500k for the 10^{th} percentile and € 5.00m for the 90^{th} percentile, these results also imply that the large majority of investment professionals seems to care about fairness aspects of executive compensation. However, compared to the sample of eligible voters, the mean amount of executive compensation judged as fair by investment professionals is significantly higher (€ 2.44m vs. € 1.38m: $t = -4.29$, $p < 0.001$).

Similar to our survey among eligible voters, we investigate whether the judgment of the fair amount of executive compensation is influenced by individual characteristics. As we were not able to collect data on personality traits of the investment professionals due to time restrictions, we limit our analysis to the influence of the variable compensation share and other control variables like, e.g., the profession or the work experience. Table 6 displays the results of the three regression models we ran using COMP_FAIR as dependent variable. All regressions calculate robust standard errors using the Huber-White estimator.

All three models support our prior result from the eligible voters sample that the assumed share of variable compensation increases the fair compensation amount ($p < 0.01$ in all

	COMP_FAIR (1)	COMP_FAIR (2)	COMP_FAIR (3)
VAR_SHARE	25,817	26,485	35,665
	(9,659)***	(9,936)***	(12,354)***
COVERAGE		-17,725	-36,403
		(144,136)	(136,562)
EXPERIENCE		17,549	86,087
		(45,033)	(51,404)*
AGE		7,496	-43,753
		(44,578)	(43,886)
profession_analyst			2,314,619
			(1,053,656)**
profession_fund_manager			308,905
			(658,809)
profession_investment_banker			598,092
			(609,288)
profession_banker			-167,808
			(619,126)
profession_investment_consultant			-707,881
			(688,001)
_cons	1,398,191	757,382	863,117
	(354,269)***	(1,818,883)	(1,687,369)
R^2	0.05	0.06	0.21
N	97	97	97

* $p<0.1$; ** $p<0.05$; *** $p<0.01$, p-values are two-tailed (standard errors are shown in parentheses).

Table 6: OLS-regression with robust standard errors on the fair compensation amount (Survey 2)

models). Further, Model (3) including all control variables suggests that longer work experience increases the judgment about fair executive compensation ($p < 0.10$) and that relative to the baseline group of "other professionals", financial analysts indicate higher amounts of fair compensation. This result prevails if we use all other professions as baseline group for the regression. Thus, financial analysts generally seem to perceive higher amounts as fair than other investment professionals.

Variable Target Compensation Share

Panel A of Table 5 reports descriptive statistics on VAR_SHARE for the investment professionals, and Figure 1 compares the judgments of investment professionals to the eligible

voters' judgments. The mean VAR_SHARE stated by investment professionals is 41.7%. Not very surprisingly, Figure 1 reveals that the variable compensation shares indicated by investment professionals are substantially larger than those of representative eligible voters (41.7% vs. 21.2%: t = -10.56, p < 0.001). 36% of the investment professionals indicate a VAR_SHARE of 50%. Thus, their judgments of VAR_SHARE are much closer to but still considerably lower than the actual average variable target share of 69%.[47]

Actual Compensation Amount

Panel A of Table 5 summarizes COMP_ACTUAL for the investment professionals sample. Our analysis shows that even though their estimates are closer to the actual average compensation of € 5,309k than eligible voters' estimates, the average quality of investment professionals' estimates is still rather low. As illustrated in Figure 2, only 33 of 140 participants (23.6%) estimated an amount within an interval of +/- € 1m around the true value. But 30 investment professionals (21.4%) estimated the actual compensation to be less than € 2,300k and 3 professionals (2.1%) estimated it higher than € 8,300k. To compare the estimation quality of eligible voters and investment professionals, we calculate the absolute deviation of each participant's COMP_ACTUAL from the actual average amount (€ 5,309k) and find that this deviation is smaller for investment professionals than for eligible voters (2,465k vs. 7,283k: t = 3.61, p < 0.001).

Interestingly, while the comparison of COMP_UNFAIR, COMP_REQUEST and COMP_ACTUAL for the sample of eligible voters has revealed that, on average, they assume that executives' reservation wage is higher than the maximum acceptable amount (COMP_REQUEST > COMP_UNFAIR) and that boards do not contract efficiently (COMP_ACTUAL > COMP_REQUEST), these relations do not hold for our sample of investment professionals. The estimated reservation wage (mean COMP_REQUEST = € 2,458k) is lower than the maximum amount that is considered acceptable (mean

[47] A one-way ANOVA indicates no significant difference in VAR_SHARE across professions.

COMP_UNFAIR = € 7,219k). Moreover, for those participants that indicated an amount for both COMP_REQUEST and COMP_ACTUAL, the estimated actual amount of compensation is not significantly higher than the requested amount (€ 3,704k vs. € 3,307k: $t = 0.45$, $p = 0.65$), indicating that investment professionals do not perceive significant inefficiencies in current executive compensation.

Fairness and Economic Criteria

Finally, we analyze investment professionals' answers to the questions about the importance of different evaluation criteria for executive compensation (FAIR_A, FAIR_ B, PPS, RISK_PREM). Panel A of Table 5 displays descriptive statistics of these measures and shows that all criteria seem to be equally important. Pairwise comparisons reveal that only the first fairness criterion seems to be more important than the second fairness criterion (5.75 vs. 5.35, $t = 1.90$, $p = 0.060$) but show no other significant differences. Thus, fairness criteria do not seem to be less important for judging executive compensation than conventional economic criteria.[48] Further analyses of the criteria show that even though the two fairness criteria are significantly correlated ($r = 0.42$, $p < 0.01$) as well as the two economic criteria ($r = 0.24$, $p < 0.01$), none of the fairness criteria is significantly positively correlated with any of the two economic criteria ($p > 0.10$ in all cases). This suggests that fairness constitutes an independent criterion of investment professionals for judging executive compensation in addition to conventional economic criteria.

6 Conclusion

This study investigates perceptions of "fair" amounts of executive compensation and of the structure of executive compensation and explores which individual characteristics affect these perceptions. We investigate both a sample of representative eligible voters and a sample of investment professionals.

[48] Kruskal-Wallis tests imply that the profession has no significant effect on any of the criteria.

We find that fairness considerations are important for both groups when judging executive compensation. However, simultaneously, opinions about fair compensation amounts are widely dispersed, particularly among eligible voters, and the judgment of the fair amount is strongly influenced by individuals' perceived similarity with executives. Similarly, judgments about the preferred variable compensation share in executive compensation contracts are affected by personality traits related to the perception of risk-affected variable pay. In addition, we provide evidence that even though the majority of survey participants seem to hold an opinion about fair amounts of executive compensation, the level of knowledge about the *actual* amounts of executive compensation seems to be rather low, particularly for eligible voters. Finally, we find that, even though fairness also matters as a criterion for investment professionals when judging executive compensation, some criteria deviate systematically from the opinion of representative eligible voters. Specifically, investment professionals seem to accept higher overall compensation amounts and have a preference for larger variable compensation shares.

Our results have important implications for both theory and practice. They contribute to the literature by clarifying the relationship between personality traits and individuals' judgments of fair executive compensation and their preferred structure of executive compensation. As the perception of being treated fairly and the fair treatment of others is an important determinant of employee motivation, our findings may help to develop further theory on how to optimally structure executive compensation in different firms.

Finally, our findings may help inform practitioners on how to pay executives and how to structure their compensation. We provide evidence on the level and structure of executive compensation that are acceptable from the perspective of eligible voters and investment professionals. Thus, firms might consider these insights when communicating their pay schemes to stakeholders in the society as well as to investors at the capital market.

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Bern, 28. April 2014

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