

# Say on Pay Design, Executive Pay, and Board Dependence\*

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**Abstract:**

Motivated by important international differences in the design of "say on pay" (SoP), this paper studies how its enforceability and its timing affects compensation decisions of the board of directors (BoD) and the level of board dependence. The analysis suggests that SoP design can have significant economic consequences that should be considered by regulatory authorities. In the context of a three-layer agency model I find that an advisory SoP increases the level of board dependence, the agent's compensation and her equilibrium effort. I also demonstrate that advisory SoP can only affect CEO compensation if the BoD and some of the firms' shareholders exhibit social preferences. By contrast, a binding SoP provides shareholders with an effective control over the BoD's compensation decision. This threat works without any behavioral preconditions but its economic consequences crucially depend on the timing of the vote. A pre-contractual and binding vote effectively reduces the level of board dependence and the agent's compensation and thereby increases the residual claim of shareholders. A post-contractual and binding vote is an even more effective instrument to control the level of board dependence and the agent's compensation but it is costly for shareholders because it destroys the agent's effort incentives. The most appropriate SoP design depends on the objectives of the regulatory authority. A shareholder-oriented regulator does best with a pre-contractual and binding SOP, whereas a welfare-oriented regulator prefers an advisory SoP. Both types of regulators would never adopt a post-contractual and binding SoP because it is associated with the lowest welfare and the lowest shareholder value. A post-contractual and binding SoP can only be attractive for a regulator who aims to accommodate the concerns of compensation critics and therefore prefers the SoP method that provides the most effective measure against seemingly excessive compensation levels.

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**JEL Classification:** G34, G38, K22, M12, M48.

# 1 Introduction

## 1.1 Motivation and overview of main results

In an attempt to improve the compensation practices in publicly listed firms, a number of countries have recently introduced shareholder votes on executive pay, also referred to as “say on pay” (henceforth SoP). According to its proponents, SoP is thought to facilitate the communication between shareholders and the board of directors (henceforth BoD) on compensation issues rather than placing the responsibility for a firm’s compensation policy to its shareholders. The feedback provided by shareholder’s should strengthen the BoD’s responsibility towards its shareholders and thereby make the BoD’s compensation policy more independent from the interests of the firm’s executives.<sup>1</sup> Therefore, SoP can be expected to discourage the use of compensation practices that are not in the best interest of shareholders, namely compensation arrangements that either reflect a poor link between pay and performance or a presumably excessive compensation level.<sup>2</sup>

The first SoP legislation was introduced in 2002 in the U.K. where listed firms are since then required to submit an annual remuneration report to an advisory vote at the annual shareholder meeting.<sup>3</sup> In the meantime, the U.S. as well as several other European countries followed the U.K. example and adopted similar rules. According to a recent report of the European Commission (2010), a total of 19 out of the 27 member states of the European Union have either introduced mandatory legal provisions or at least recommendations in their local corporate governance codes requiring shareholder votes on the remuneration of executives. The report shows important disparities not only concerning the legal basis but also with respect to the practical implementation of SoP, most importantly with regard to the enforceability, the subject and the timing of the shareholder vote.

Unlike the U.K. and the U.S., where SoP is advisory, the majority of European SoP adopters actually introduced binding shareholder votes. Moreover, a substantial fraction of the newly introduced voting rights do not refer to the annual compensation report but

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1 See e.g. European Commission (2004) or Gordon (2009, p.337) who defines the role of SoP as *”to buttress boards independence-in-fact by making them more accountable.”*

2 See e.g. Bebchuk and Fried (2003, 2004), Kaplan (2008), and Bogle (2008) for a critical dicussion of executive compensation pratices.

3 See The Directors Remuneration Report Regulations (2002) for details.

to the firm's compensation policy or even to the actual remuneration of executives. Since votes on the compensation policy apply to future compensation arrangements and not to the compensation paid out during the current reporting period, the different subject of the vote also implies a different timing.<sup>4</sup> These observations show that there is no unique approach to SoP and raise the question for the most effective SoP design. Motivated by the existence of important institutional differences, this paper analyzes how the design of SoP affects the BoD's compensation decision and the level of board dependence. The analysis focuses on the enforceability and the timing of the vote as the major design options and considers advisory SoP as well as two binding versions of SoP, a pre-contractual and a post-contractual vote.<sup>5</sup>

The study is based on a three-layer agency model with three risk neutral players, the CEO, the BoD, and the firm's shareholders. The agent must be motivated to exert productive effort in order to increase the firm's profit. An agency problem arises because the agent is protected by limited liability. Different from the standard agency model, shareholders delegate the design of the agent's compensation contract to a potentially dependent BoD. The key variable in the model is the level of board dependence. A higher level of board dependence has two effects. On the one hand, a more dependent board, composed of insiders or managers of peer firms, provides better advice to the CEO and thereby contributes to firm value. On the other hand, it partly considers the CEO's utility in designing the incentive system and offers her a more generous compensation package than a less dependent board. The equilibrium level of board dependence is determined in a non-cooperative multi-stage game between the CEO, the BoD and the firm's shareholders.

The CEO can affect the level of board dependence by nominating the appropriate persons as directors. Shareholders can shape the governance structure of the firm in two ways. First, they must approve the CEO's board proposal and second, they can indirectly impact the equilibrium level of board dependence by threatening to disapprove the BoD's compensation decision. If SoP is binding, the shareholders can effectively force the BoD to reduce the CEO's compensation. If SoP is advisory, shareholders cannot directly constrain the

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4 In fact, 13 out of the 19 European SoP adopters within Europe require a binding shareholder vote. Only 4 countries rely on a pure advisory vote and 2 countries allow for both types of votes, see European Commission (2010) for details.

5 See Gordon (2009, p. 337) for an attempt to classify the available design options. He classifies them along "...four binary choices: (1) 'before' versus 'after', (2) 'binding' versus 'advisory', (3) 'general' versus 'specific' compensation plans, and (4) 'mandatory' versus 'firm-optional'."

board's compensation policy but they can influence it by a negative advisory vote. In the absence of SoP, the equilibrium level of board dependence is determined by the credibility of the shareholders' threat to refuse the CEO's board proposal and to eventually replace it by an independent BoD. In equilibrium, this threat is never carried out but the value of the outside option determines the equilibrium level of board dependence. *Ceteris paribus*, the shareholders are willing to accept a more dependent board, the higher its marginal contribution to firm profit, the lower its generosity towards the CEO and the lower the net value of the outside option.

An advisory SoP leads shareholders to accept a higher level of board dependence because they anticipate that a negative shareholder vote prompts the BoD to reduce the CEO's compensation and thereby make the dependent BoD relatively more attractive than the outside option. Consequently, the agent receives a higher compensation and provides a higher effort level. However, I demonstrate that this equilibrium can only be sustained if both, the BoD and some of the firms' shareholders partly exhibit social preferences. In particular, the BoD must derive disutility from a negative shareholder vote and there must be at least a small group of activist shareholders that refuse the BoD's compensation proposal even if the vote does not alter their utility once the compensation contract has been closed. If one of the two conditions is not met, advisory SoP has no impact on the equilibrium level of board dependence.

By contrast, both versions of a binding SoP are effective means to control the level of board dependence and the agent's compensation. The key difference between the two regimes is the timing of the vote. A pre-contractual SoP imposes tighter limits on the firm's governance structure whenever the threat of disapproving the BoD's compensation proposal is stricter than the threat of replacing the board. Since the CEO anticipates the shareholders' outside options, she proposes a less dependent BoD that sets a lower compensation and induces a lower equilibrium effort than with advisory SoP. In equilibrium, this compensation proposal is accepted by shareholders so that the threat of disapproving the BoD compensation proposal is not carried out. The shareholders benefit from this solution by increasing their utility up to the higher value of the binding outside option.

The opposite is true if a binding vote takes place after the contracting stage. In this case, shareholders have a strict incentive to refuse all elements of the agent's compensation that are subject to shareholder approval. A rational CEO anticipates the ex-post pay cut and reduces her effort to zero. Since the binding SoP allows shareholders to remove any excess

compensation granted by a dependent BoD, the CEO forfeits her interest in influencing the level of board dependence and proposes an independent board. As a consequence, the agent's compensation as well as the firm's profit are lower than for all other versions of SoP.

These findings suggest that SoP design can have a significant impact not only on the equilibrium degree of board dependence and the level of executive compensation but also on the utilities of the players. The most appropriate SoP design depends on the objectives of the regulatory authority. In particular, a shareholder-oriented regulator does best with a pre-contractual and binding SoP because it is the only SoP method that increases the residual claim of shareholders. By contract, a welfare-oriented regulator ranks the regulatory alternatives according to their implied equilibrium level of board dependence, so that his most preferred alternative is advisory SoP. For both types of regulators, a post-contractual and binding SoP is the least preferable alternative because it reduces both, shareholder value and welfare. This form of regulation can only be attractive for a compensation-oriented regulator who is guided by the views held by activist shareholders or compensation critics and therefore ranks the alternatives according to their ability to control the structure and the level of the agent's compensation. Complying with this objective requires to revert the ordering preferred by a welfare-oriented regulator.

The rest of the paper is organized as follows. The next subsection provides a review of related literature. Section 2 explains the model assumptions, the regulatory environment and the structure of the multi-stage game. Section 3 derives the optimal contract and the equilibrium board structure in the absence of SoP. Section 4 analyzes the impact of SoP design on the equilibrium of the multi-stage-game. The analysis starts with the role of advisory SoP and continues with the two versions of binding SoP. Section 5 compares the regulatory regimes and derives recommendations for the optimal SoP design under different regulatory objective functions. Section 6 concludes the analysis with a summary of main results and some suggestions for further research.

## 1.2 Related literature

Due to the fact that SoP is a relatively recent phenomenon, the economic literature on the topic is limited. There are a couple of empirical studies that analyze the relation between

advisory SoP and executive pay using data from the U.K.<sup>6</sup> These analyses suggest that higher compensation levels trigger a higher voting dissent on the part of shareholders, but they provide mixed results on the consequences of a negative shareholder vote. Alissa (2009) finds that a high voting dissent seems to curb extreme cases of excess compensation. Both, Carter and Zamora (2009) and Ferri and Maber (2011) find a positive relation between voting dissent and the pay-for-performance-sensitivity in later periods, particularly in the case of poor performance.<sup>7</sup> Ferri and Maber (2011) also find that a high voting dissent seems to motivate boards to remove controversial provisions from compensation contracts. They also report that firms often adjust contracts before the advisory SoP is conducted in order to avoid a disapproval of questionable compensation arrangements by shareholders.

Unlike the other empirical studies, Conyon and Sadler (2010) do not find any evidence for the hypotheses that a negative shareholder vote affects the compensation structure or reduces the overall level of executive pay. Moreover, consistent with the results of the theoretical analysis in section 4.1, they even find a weak positive relation between voting dissent and total CEO compensation. This observation is confirmed in a recent laboratory experiment conducted by Göx et al. (2010). In this study, shareholders face the problem of motivating a risky investment decision of a CEO who has partial control over the terms of her own incentive compensation. The experiment analyzes the effectiveness of post-contractual SoP in solving the resulting trade-off between rent extraction and goal congruent project selection. As long as SoP is advisory, it motivates higher rent extraction by the CEO but does not affect the CEO's investment incentives as compared to a world without SoP.

Göx et al. (2010) also show that a post-contractual and binding SoP provides shareholders with an effective instrument to control the agent's compensation but that it destroys the agent's investment incentives and thereby significantly reduces the firm's profit. These findings are consistent with the predictions on the impact of a post-contractual and binding SoP in section 4.2.2 of this paper. Empirical support for the potential risks associated with this SoP method is provided by Wagner and Wenk (2011). These authors analyze the reaction of capital market participants to the announcement of a public voting initiative proposing a post-contractual and binding SoP for listed firms in Switzerland. They find abnormal negative price reactions for two thirds of the firms in their sample suggesting that shareholders

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<sup>6</sup> See Alissa (2009), Carter and Zamora (2009), Conyon and Sadler (2010) as well as Ferri and Maber (2011).

<sup>7</sup> Both, the evidence presented by Alissa (2009) and Carter and Zamora (2009) is relatively weak.

understand the fundamental problems associated with a post-contractual and binding SoP.<sup>8</sup>

This paper contributes to the literature by providing the first theoretical analysis of the relation between SoP design, executive compensation and board dependence. Earlier studies such as Drymiotis (2007), Kumar and Sivaramakrishnan (2008), and Laux and Mittendorf (2011) have already analyzed the cost and benefits of delegating the compensation decision to a partially dependent boards in settings where the BoD also monitors the CEO’s activities or where it must provide incentives to identify profitable investment incentives. In all these studies, a partially dependent BoD offers some net contribution to firm value, albeit for different economic reasons.<sup>9</sup> However, none of these studies has so far analyzed the possibility of letting shareholders control the BoD’s compensation decision by means of SoP. This study aims to close this gap and to provide a better understanding of the potential role of shareholder voting rights in determining executive compensation and the firm’s governance structure.

## 2 Model assumptions

### 2.1 Firm setup and governance structure

I consider an agency-relation between three risk neutral parties: a group of shareholders (the "principal"), a board of directors ("BoD"), and an effort averse CEO (the "agent"). The agent exerts personal effort  $a \in [0, 1]$  that affects the distribution of the firm’s results. There are two possible results,  $x_H$  and  $x_L$ , where  $\Delta_x = x_H - x_L > 0$ . The probabilities of the high and the low outcome depend on the agent’s effort and equal  $p(x_H|a) = a$  and  $p(x_L|a) = 1 - a$ , respectively. That is, the higher the agent’s effort, the higher the likelihood of a high outcome and the higher the expected result,  $E[s(x)] = x_L + a \cdot \Delta_x$ .

The amount of effort spent on improving the distribution of outcomes is the agent’s

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<sup>8</sup> See Cai and Walking (2011) for a similar study regarding the announcement effect of an advisory SoP bill in the U.S where they find positive market reactions for firms with inefficient compensation practices. They also analyze the market reaction to company-specific SoP-proposals and find a negative impact of labor union-sponsored proposals.

<sup>9</sup> From a broader perspective, this paper also contributes to the literature on endogenously determined boards of directors. See Hermalin and Weisbach (1998, 2003), Adams and Ferreira (2007), as well as Adams et al. (2010) for a recent survey.

private information and not contractible. Effort is personally costly to the agent. The cost equals  $C(a)$ , where  $C(a)$  is strictly convex, and  $\lim_{a \rightarrow 1} C(a) = \infty$  to assure that the incentive problem has a non-trivial solution. To motivate the agent, the firm offers her a compensation contract  $s(x)$  that comprises a salary  $w$  and a bonus  $B$  in case of good performance. From these assumptions, the agent's expected remuneration equals  $E[s(x)] = w + a \cdot B$  and her expected utility is

$$E[U_A] = w + a \cdot B - C(a). \quad (1)$$

An agency problem arises from the agent's limited liability. Particularly, I assume that the agent's compensation cannot fall below the amount of  $\underline{w}$ , where  $x_L > \underline{w} \geq 0$ . The income level  $\underline{w}$  can be interpreted as the minimum income that the agent can attain without exerting a positive effort level.<sup>10</sup> This amount is not to be confused with the reservation utility  $\underline{U} \geq 0$  that the agent receives from his next best employment alternative. While  $\underline{w}$  puts a lower bound on the agent's pay,  $\underline{U}$  restricts the agent's expected utility from below. In what follows,  $\underline{U}$  is normalized to zero so that  $\underline{w} \geq \underline{U}$ . Different from standard agency models but in line with business practice I assume that the firm's shareholders delegate the decision on the agent's compensation contract to the BoD. Consistent with previous literature I allow for a potentially dependent BoD that aims to balance shareholder and CEO interest in setting the CEO's compensation according to the following objective function<sup>11</sup>

$$V_B = (1 - \lambda) \cdot U_P + \lambda \cdot U_A, \quad (2)$$

where  $U_P$  is the utility of the principal and  $\lambda$  measures the degree of board dependence. The higher  $\lambda$ , the more the board considers the agent's utility in designing the compensation contract. The equilibrium degree of board dependence is jointly determined by the CEO and the firm's shareholders. The CEO can affect  $\lambda$  by proposing an appropriate mix of independent and dependent directors. To avoid scenarios in which the CEO can dominate shareholder interest, I restrict  $\lambda$  to take values from the interval  $[0, 1/2]$ .<sup>12</sup> Moreover, to allow for clear cut results, I assume that the CEO only proposes a dependent BoD if doing so increases her utility.

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10 Other limited liability models assume that the agent's pay can become negative but cannot fall below an exogenously given wealth level  $-L < 0$ . See e.g. Laffont and Martimort (2002), pp. 155. Letting  $\underline{w} < 0$  would not change results. I choose  $\underline{w} \geq 0$  because negative executive compensation is uncommon and since the minimum pay interpretation is more convenient in terms of the research question.

11 See e.g. Drymiotis (2007), Kumar und Sivaramakrishnan (2008), and Laux and Mittendorf (2011).

12 See Laux and Mittendorf (2011) for a corresponding assumption.

Shareholders play a twofold role in shaping the governance structure of the firm. First, they have the right to approve the board proposal made by the CEO and second, they can indirectly impact the equilibrium level of board dependence by threatening to disapprove the BoD's compensation decision via SoP. To model a non-trivial choice of board structure I assume that the BoD proposed by the CEO makes a net contribution of  $v \cdot \lambda$  to firm value, where  $v > x_L$ . From these assumption, the principal's expected utility equals

$$E[U_P] = v \cdot \lambda + x_L - w + a \cdot (\Delta_x - B), \quad (3)$$

that is, the principal maximizes the difference between the contributions of the BoD and the agent to firm value minus the expected compensation cost. The term  $v \cdot \lambda$  represents the net benefits that shareholders derive from the board's advice and its monitoring efforts. The fact that the board contribution is increasing in  $\lambda$  reflects the idea that insiders or managers of peer firms do not only show more understanding for the CEO's position but are also capable of providing better advice.<sup>13</sup>

If shareholders disagree with the CEO's board proposal, they cannot directly alter the level of board dependence proposed by the CEO but they can replace the CEO's proposal with an independent board ( $\lambda = 0$ ), where changing the board incurs transaction cost of  $k > 0$ .<sup>14</sup> This assumption reflects the fact that shareholders are usually not in a position to micro-manage the board structure by proposing their own candidates. Instead they must rely on their voting power over the CEO's board proposal. Rejecting the CEO's proposal is the crudest type of shareholder voting rights. Instead of adopting such drastic measures, the shareholders can alternatively rely on SoP to influence the pay policy pursued by the BoD.

The model allows for advisory as well as for binding versions of SoP, the details of the regulatory options are discussed in section 2.2. Whenever the SoP is binding, the shareholders can effectively force the BoD to reduce the compensation to the lowest possible level  $\underline{w}$ . If the SoP is advisory, shareholders cannot directly constrain the board's contract proposal but they can aim at influencing the BoD's compensation decision by a negative advisory

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<sup>13</sup> Since the focus of our model is the impact of SoP on executive pay and shareholder value, we do explicitly model the advice and control activities of the BoD but assume that they have a potentially positive net benefit for shareholders. See e.g. Adams and Ferreira (2007), or Kumar and Sivaramakrishnan (2008) for more detailed models of board activities.

<sup>14</sup> In fact, the shareholders can ultimately force the CEO to propose an independent BoD in that they refuse all her board proposals unless she finally makes a proposal consistent with the requirements of shareholders.

vote. In fact, the evidence from advisory votes in the UK suggests that a certain fraction of shareholders regularly disagrees with the director's remuneration report even though their vote actually cannot enforce a change of the BoD's pay practice.<sup>15</sup>

To provide sufficient motivation for a negative advisory vote within the context of the model, I assume that there are two types of shareholders, ordinary shareholders and activist shareholders. Both types of shareholders aim to maximize the utility function in (3) but they practice a different voting behavior. Ordinary shareholders only disagree with the BoD's pay policy if a negative vote increases their utility. By contrast, activist shareholders evaluate the proposed compensation level against a benchmark compensation level and disagree with any compensation that exceeds the benchmark level. That is, activist shareholders use SoP as a means to complain about seemingly excessive pay practices even though their opposition does not increase their personal wealth. I subsequently assume that the benchmark level equals the compensation that would be granted by an independent board. In what follows, I let  $q \in [0, 1/2)$  denote the proportion of shareholder activists so that the proportion of ordinary shareholders equals  $1 - q$ . Since  $q < 1/2$ , it is excluded that shareholder activists can effectively reject a compensation proposal without the support of ordinary shareholders.

The efficacy of an advisory vote as a means to discourage the generous pay practice of a management-friendly board depends on the BoD's ability to withstand a negative shareholder vote. Although the BoD could simply ignore the shareholders' dissatisfaction with its pay policy, the empirical findings for the U.K. presented in section 1.2 suggests that it can at least not be excluded that advisory votes can initiate changes in firms' pay practices. Since there are also examples of firms where the BoD did not change its pay policy despite substantial shareholder voting dissent,<sup>16</sup> there must be differences in the BoD's responsiveness to advisory SoP. In practice, these differences depend on the directors' ability to cope with shareholder concerns and the pressure of the popular press that has in the past been particularly critical about large pay packages and a poor link between pay and firm performance.<sup>17</sup>

To capture the potential impact of SoP on the BoD's compensation policy I allow the shareholders' voting dissent to affect the BoD's utility and thereby its decision on the agent's

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15 See e.g. Conyon and Sadler (2010) or Ferri and Maber (2011).

16 See e.g. the Economist (2010) for some recent examples of negative advisory votes without effect.

17 See Core et al. (2008) for a detailed analysis and discussion of the relation between negative press coverage and executive pay.

compensation. I do not explicitly consider monetary incentives for the BoD but allow the board to derive disutility from a negative shareholder vote. Particularly, I assume that the disutility function takes the multiplicative form  $D_B = \theta \cdot \alpha \cdot s(x)$ . Here,  $\theta$  is a nonnegative parameter determining the BoD's responsiveness to the shareholders' concerns about the level of executive compensation, and  $\alpha \in [0, 1]$  denotes the percentage level of shareholder dissent realized in the SoP vote. The higher the BoD's readiness to react to shareholder concerns, the higher the voting dissent, and the higher the overall level of CEO pay, the higher is the disutility of the BoD. It can also be seen that the BoD incurs no disutility if either  $\theta$  or  $\alpha$  are zero.<sup>18</sup> That is, whenever all shareholders agree with the BoD's compensation proposal, or the BoD does not care for the shareholders' concerns about its pay policy, no disutility arises on the part of the BoD.

## 2.2 Regulatory environment and order of moves

Rational decisions on the introduction of regulatory measures must satisfy the objectives of the regulator. In order to evaluate the alternative SoP options analyzed in this paper I consider three potential regulatory objectives. First, a shareholder oriented regulation, second, a welfare oriented regulation, and third, a compensation oriented regulation. The objective of a shareholder oriented governance consists of maximizing the expected shareholder value. In the context of the model, this objective is equivalent to maximizing the principal's expected utility. By contrast, a welfare oriented governance focuses on the aggregated utility of the agency. In the context of the model, the most appropriate welfare measure is the sum of the principal's and the agent's expected utilities. Finally, I also consider a compensation oriented governance that is mainly concerned with a reduction of undesirable compensation practices such as seemingly excessive compensation levels or a poor link between pay and performance. This objective is consistent with the concerns articulated by activist shareholders, labor unions and other compensation critics.

Based on its objective function, the regulatory body decides on the introduction of SoP and the best way to implement it. I consider three different versions of SoP and compare these to the benchmark case in which shareholders have no SoP. First, I consider an advisory SoP as it is practiced in the U.K. and since very recently also in the U.S. In accordance with

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<sup>18</sup> The same holds for the rather theoretical case of zero compensation.

the practice of these countries, I assume that the advisory vote takes place after the firm's results are realized and the size of the agent's bonus has been determined.

Second, I analyze two different forms of binding SoP as they are used in a number of European countries. The first version is a pre-contractual vote on the BoD's compensation proposal as it is currently used in the Netherlands or Sweden. With a binding ex ante vote, the BoD submits the compensation contract of the CEO to the general shareholder meeting for approval before the contract is signed by the agent. Based on the voting outcome, the BoD decides on a revision of the contract offer and proposes a potentially revised contract to CEO.

The second version is a post-contractual vote on the realized compensation of the CEO as it is currently included in law proposal put forward in a public voting initiative in Switzerland and practiced in some countries of the European Union.<sup>19</sup> With a binding ex post vote, the BoD signs the compensation contract with the CEO without asking for prior shareholder approval. After the firm's results are realized and the size of the agent's bonus has been determined, the shareholders can vote on the agent's compensation. In practice, this type of regulation would require that the BoD closes all compensation contracts subject to later shareholder approval in order to avoid the payment of damages in case of a negative shareholder vote. I ignore this sort of legal complications and assume that shareholders can effectively enforce a pay cut after a binding no vote.

In all of the three cases, I allow shareholders to vote on all elements of the agent's compensation above the minimum income level  $\underline{w}$ . That is, the shareholders have the right to vote on the CEO's bonus  $B$  as well as any part of the salary  $w$  exceeding  $\underline{w}$ . The optimal regulatory policy is identified as an equilibrium of a multistage game. The order of moves of this game is described below:

Stage 0: The regulator decides whether and how he implements SoP according to his objective function. The regulatory alternatives are an advisory SoP, a pre-contractual and binding SoP, and a post-contractual and binding SoP.

Stage 1: The CEO proposes a BoD with a given level of board dependence  $\lambda$  and marginal value  $v$  to shareholders.

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<sup>19</sup> See Economist (2007) as well as Wagner and Wenk (2011) for a detailed account of the legislative process in Switzerland. According to the report provided by the European Commission (2010), a binding vote on the actual remuneration amount is already law in Czechia and in Latvia.

Stage 2: The firm’s shareholders approve the CEO’s board proposal or replace it with an independent board ( $\lambda = 0$ ) incurring transaction cost  $k$  whenever it is profitable to do so.

Stage 3: The approved BoD designs the compensation contract.

Stage 3a: If SoP is pre-contractual, shareholders vote on the BoD’s contract proposal.

Stage 3b: Based on the voting outcome, the BoD decides on the revision of the contract offer and proposes a potentially revised compensation contract to CEO.

Stage 4: The agent decides on contract offer and makes her effort decision.

Stage 5: The firm’s results materialize.

Stage 5a: If SoP is post-contractual, shareholders vote on the agent’s compensation.

Stage 5b: Based on the voting outcome, the agent’s compensation is adjusted if required.

Stage 6: The final compensation is paid to the agent.

### 3 Optimal contracting in the absence of SoP

#### 3.1 First best solution

As a benchmark case for the subsequent analysis of the multi-stage game I consider the first-best solution of the agency problem. If effort were contractible, the principal and the agent could write a contract specifying the effort level that maximizes the joint surplus of the agency<sup>20</sup>

$$E[W] = E[U_P] + E[U_A] = v \cdot \lambda + E[x] - C(a). \quad (4)$$

subject to the agent’s participation and her limited liability constraint, that is,

$$E[s(x)] - C(a) \geq 0 \quad (5)$$

$$s(x) \geq \underline{w} \quad \forall x. \quad (6)$$

The surplus comprises the contribution of the BoD, the expected result and the agent’s personal cost. Since the surplus is monotonically increasing in  $\lambda$ , the optimal level of board

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<sup>20</sup> The surplus definition in (4) is standard in agency theory. Adding the BoD’s utility would imply double counting because the BoD already balances the utilities of the principal and the agent.

dependence equals  $\lambda^{FB} = 1/2$ . The surplus maximizing effort level is implicitly defined by the following first order condition

$$\Delta_x = C'(a^{FB}). \quad (7)$$

According to (7) the first best effort is found by equating the agent's marginal contribution to the firm's result with its marginal cost of effort  $C'(a)$ .<sup>21</sup> Since effort is contractible, the agent's compensation contract contains a salary but no bonus. The optimal salary falls in two cases. If  $\underline{w} < C(a^{FB})$ , the salary is determined by the participation constraint and equal to  $w^{FB} = C(a^{FB})$ . If the opposite holds, that is if  $\underline{w} > C(a^{FB})$ , the salary is determined by the agent's limited liability constraint and equals  $w^{FB} = \underline{w}$ . In the first case, the agent just receives her reservation utility, whereas in the latter case, the agent earns a rent of  $\underline{w} - C(a^{FB})$  due to the fact that her limited liability constraint is binding.

The first best effort level would also obtain if the firm would first install a BoD with the maximum level of board dependence and let the BoD write the contract with the agent. Indeed, if it is mandatory that the board decides on the compensation contract, it is a subgame perfect equilibrium to establish a BoD with a dependence level of  $\lambda^{FB}$  whenever effort is contractible and there is no SoP. Since  $V_B(\lambda^{FB}) = W/2$ , the first best effort level also maximizes the objective function of the BoD. However, different from the firm's shareholders a dependent BoD might not have the same incentives to fully shift the residual surplus, after satisfying the agent's constraints in (5) and (6), to the principal. To address this problem within the model, I subsequently assume that the BoD considers a minimum compensation constraint when it determines the agent's salary. The constraint is given by

$$s(x) \geq \lambda \cdot \beta \cdot x_L + \underline{w} \quad \forall \quad x, \quad (8)$$

that is, an increasing level of board dependence translates into a larger salary for the agent, where  $\beta \in [0, 1]$  is a parameter that scales the salary effect. The larger  $\beta$ , the larger the generosity that a BoD with a given level of board dependence  $\lambda$  shows to the agent. Since  $x_L$  is the result in case of unsuccessful effort, the salary supplement granted by the BoD can also be interpreted as a "reward for failure".

With condition (8) the agent's minimum salary increases by the term  $\lambda \cdot \beta \cdot x_L$  as compared to the first best solution with centralized contracting. Moreover, since both, the utilities of

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<sup>21</sup> For a given cost function, the first best effort level can be obtained by inverting  $C'$  and solving for  $a$ , i.e.  $a^{FB} = C'^{-1}(\Delta_x)$ .

the agent and the principal are monotonically increasing in  $\lambda$ , both parties have an interest in establishing a BoD with a dependence level of  $\lambda^{FB}$ .

### 3.2 Second best solution

Since the agent's effort is not contractible, the compensation must not only assure a sufficient pay level but also provide incentives to exert productive effort. On stage 3, the BoD designs the optimal bonus contract by maximizing its objective function in (2) subject to the minimum compensation constraint in (8), the agent's participation constraint (5) and the incentive constraint:<sup>22</sup>

$$B = C'(a). \quad (9)$$

The incentive constraint in (9) stems from maximizing the agent's expected utility in (1) with respect to  $a$  and implicitly defines the agent's optimal effort choice as the effort level that equates the bonus with the marginal cost of effort provision. Since  $C(a)$  is strictly convex, the agent's equilibrium effort is monotonically increasing in the bonus. Solving the BoD's optimal contracting problem on stage 3 yields the following result.

**Lemma 1:** *The agent's equilibrium effort is monotonically increasing in the level of board dependence. For  $\lambda < 1/2$  the equilibrium effort is implicitly defined by the following expression*

$$a^*(\lambda) = h(\lambda) \cdot \frac{\Delta_x - C'(a)}{C''(a)}, \quad h(\lambda) = \frac{1 - \lambda}{1 - 2 \cdot \lambda}, \quad (10)$$

where the term  $h(\lambda)$  is monotonically increasing in  $\lambda$ . For  $\lambda = 1/2$ ,  $a^* = a^{FB}$ . **Proof:** see appendix.

Lemma 1 suggests that an increasing level of board dependence alleviates the agency problem. The higher the level of board dependence, the closer is the agent's equilibrium effort to the first best effort level. At the same time, both elements of the agent's compensation are monotonically increasing in  $\lambda$ , as it can be seen after solving (8) for the optimal salary and (9) and (10) for the optimal bonus:

$$w^*(\lambda) = \lambda \cdot \beta \cdot x_L + \underline{w}, \quad B^*(\lambda) = \Delta_x - \frac{a \cdot C''(a)}{h(\lambda)}. \quad (11)$$

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<sup>22</sup> The limited liability constraint (6) can be ignored because the minimum compensation constraint is always stricter. For  $\beta = 0$ , both constraints coincide.

In the limited liability setting, the agency problem arises because the bonus does not only determine the agent's effort incentives but also the sharing of the surplus between the agent and the principal. The total surplus generated by the agent's effort equals  $\Pi(a) = a \cdot \Delta_x - C(a)$  whereof the agent receives the share  $G(a)$  and the principal retains the share  $H(a)$ . In equilibrium, these shares are defined as follows

$$G(a) = a \cdot C'(a) - C(a), \quad H(a) = a \cdot (\Delta_x - C'(a)), \quad (12)$$

where I use the fact that  $B = C'(a)$  from the agent's incentive constraint. From the assumptions about the cost function,  $G(a)$  is monotonically increasing whereas  $H(a)$  is strictly concave in  $a$ .

To implement the first best effort, the principal must set the bonus equal to  $B = \Delta_x$ . This solution cannot be optimal because it transfers the entire surplus to the agent. At the other extreme, a bonus of zero would attribute the maximum share to the principal but provide no effort incentives. An independent BoD solves this trade-off in the best interest of the principal by setting a bonus rate of  $B^*(0) = \Delta_x - a \cdot C''(a)$  and thereby implements an equilibrium effort level of  $a^*(0) = [\Delta_x - C'(a)]/C''(a)$ , the effort level that maximizes  $H(a)$ . An increasing level of board dependence puts more weight on the agent's share and thereby mitigates the conflict between surplus sharing and incentive provision. For  $\lambda = 1/2$ , the BoD puts equal weight on both parties' shares so that the BoD essentially maximizes the joint surplus.<sup>23</sup>

I determine next the equilibrium level of board dependence. At stage 1 the CEO proposes a BoD with a given dependence level  $\lambda$ . This proposal is subject to shareholder approval at stage 2. If the shareholders accept the CEO's proposal, their utility equals

$$E[U_P(a^*(\lambda), \lambda)] = (v - \beta \cdot x_L) \cdot \lambda + H(a^*(\lambda)) + x_L - \underline{w} \quad (13)$$

Since  $v > x_L$  a marginal increase of  $\lambda$  increases the shareholders' utility by  $v - \beta \cdot x_L$ . Because  $H(a)$  is monotonically decreasing in  $a$  for  $\lambda > 0$ , this positive effect is offset by a reduction of the principals' share in the surplus generated by the agent. The optimal level of board dependence from the principal's perspective balances the two effects and can be found by maximizing (13) with respect to  $\lambda$ .<sup>24</sup> However, since the CEO proposes the

<sup>23</sup> In fact  $[G(a) + H(a)]/2 = [a \cdot \Delta_x - C(a)]/2 = \Pi(a)/2$ .

<sup>24</sup> In fact, since  $H(a)$  is strictly concave and monotonically decreasing in  $a$  for  $\lambda > 0$ , (13) has a unique maximum implicitly defined by the first order condition  $v - \beta \cdot x_L + H'(a) \cdot da/d\lambda \geq 0$ . An interior solution obtains if  $v$  is not too large, otherwise  $\lambda = 1/2$ .

board composition, the principal cannot implement the optimal degree of board dependence. Nonetheless he can influence the CEO's decision on  $\lambda$  by threatening to replace her proposal by an independent BoD. In this case, the shareholders' utility equals  $E[U_P(a^*(0), 0)] - k$ .

A rational CEO anticipates the shareholders' decision problem and proposes a level of board dependence that is accepted at stage 2. Since  $G'(a) > 0$  and since the agent's equilibrium effort is monotonically increasing in  $\lambda$ , her utility is monotonically increasing in the level of board dependence. Therefore, the agent has a strict incentive to propose the maximum level of board dependence that satisfies the inequality  $E[U_P(a^*(\lambda), \lambda)] \geq E[U_P(a^*(0), 0)] - k$ . Proposition 1 summarizes the optimal solution:

**Proposition 1:** *Let  $\lambda^N$  denote the equilibrium level of board dependence in the absence of SoP. It holds that  $\lambda^N \leq \lambda^{FB} = 1/2$ . The equilibrium level of board dependence solves*

$$(v - \beta \cdot x_L) \cdot \lambda^N + H(a^*(\lambda^N)) = H(a^*(0)) - k, \quad (14)$$

*whenever a solution  $\lambda^N \in (0, 1/2)$  exists. Otherwise,  $\lambda^N = 1/2$ . **Proof:** see appendix.*

As in the first best case, the equilibrium level of board dependence is strictly positive. However,  $\lambda^N \leq \lambda^{FB}$  because the principal must solve the trade-off between incentive provision and surplus sharing. Since  $H(a^*(\lambda^{FB})) = 0$ , it is only optimal for the principal to allow for the first-best level of board dependence if the BoD's contribution to firm profit is relatively more important than the net contribution of the agent. Particularly, the shareholders approve the most dependent board proposal whenever  $(v - \beta \cdot x_L) \cdot 2 \geq H(a^*(0)) - k$ . That is, the net contribution of a BoD with  $\lambda = 1/2$  must not be lower than the difference between the surplus share attainable with an independent board and the transaction cost, otherwise  $\lambda^N < 1/2$ . Ceteris paribus, the shareholders are willing to accept a more dependent board, the higher its marginal contribution to the firm's result ( $v$ ) and the lower its generosity to the manager ( $\beta$ ). Likewise, the equilibrium level of board dependence is decreasing in the benchmark contribution of an independent board,  $H(a^*(0))$ , and increasing in the transaction cost ( $k$ ).

## 4 Optimal contracting with SoP

### 4.1 Advisory SoP

I consider first an advisory vote that is conducted ex post as it is practiced in the U.K. since 2002 and since very recently also applies for the U.S. Because the vote is not binding for the firm, it cannot directly affect the payments defined in the compensation contract. Theoretically, the BoD could simple ignore the possibility of a negative shareholder vote when designing the compensation contract. Likewise, rational shareholders should be indifferent between accepting and refusing the CEO' compensation contract because they receive the same utility with both votes.

This pragmatic view of the problem is contrasted by the empirical evidence from the UK. Recent studies suggest that a constant fraction of shareholders votes against the director's remuneration report (DRR)<sup>25</sup> and that SoP has actually induced changes in compensation practices. Particularly, Ferri and Maber (2011) find that SoP has indeed motivated firms to adjust compensation contracts after receiving a high voting dissent and, more importantly, that a number of firms have removed controversial contract provisions before submitting the DRR to the general assembly of shareholders in order to avoid a negative voting outcome. These findings suggest that the advisory SoP mechanism works more subtle than standard theory would predict. The present model integrates the empirical and the theoretical perspective by allowing for different types of shareholders and BoDs.

The analysis of equilibrium strategies starts on stage 5a with the voting decision of shareholders. As explained in section 2.1, there are ordinary shareholders and activist shareholders, where the fraction of activist shareholders equals  $q$ . Since SoP is advisory and ordinary shareholders only disagree with the firm's compensation policy if a negative vote increases their utility, ordinary shareholders will approve the BoD's compensation contract. By contrast, activist shareholders disagree with any compensation that exceeds the compensation granted by an independent BoD. Let  $\lambda^A$  denote the equilibrium level of board dependence with advisory SoP and suppose that the optimal compensation contract defines a salary  $w^\circ(\lambda^A) > \underline{w}$  and a bonus  $B^\circ(\lambda^A) > B^*(0)$ .<sup>26</sup> Under these conditions the activist

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25 For example, Conyon and Sadler (2010) find a mean voting dissent of 7.61 % in a sample of 3,640 SoP votes.

26 In the proof of proposition 2 we show that these conditions are actually met in equilibrium.

shareholders vote no and the equilibrium voting dissent for an advisory vote equals  $\alpha = q$ .

Anticipating the shareholders' equilibrium vote, the BoD maximizes its objective function in (2) net of the disutility arising from a negative shareholder vote to determine the optimal contract. Lemma 2 characterizes the equilibrium effort induced by the optimal contract.

**Lemma 2:** *The agent's equilibrium effort in the presence of advisory SoP is implicitly given by the following expression*

$$a^\circ(\lambda) = \frac{(1 - \lambda) \cdot [(\Delta_x - C'(a))] - q \cdot \theta \cdot C'(a)}{(1 - 2 \cdot \lambda + q \cdot \theta) \cdot C''(a)}. \quad (15)$$

For a given value of  $\lambda$ , it holds that  $a^\circ(\lambda) \leq a^*(\lambda)$ . The inequality is strict whenever  $\theta$  and  $q$  are positive. **Proof:** see appendix.

According to lemma 2, advisory SoP prompts a BoD with a given dependence level  $\lambda$  to offer the agent a contract that provides lower effort incentives. It does so by reducing the bonus, whereas the equilibrium salary is independent of the desired effort level and for a given value of  $\lambda$  identical with the salary without SoP in (11). The BoD trades off its interest in balancing the principal's and the agent's utilities against the disutility arising from the prospects of a negative shareholder vote. In equilibrium, the downward adjustment of the bonus partly corrects for the positive impact of board dependence on the agent's compensation. The higher the BoD's responsiveness to shareholder concerns ( $\theta$ ) and the higher the equilibrium voting dissent ( $q$ ), the lower the bonus and the equilibrium effort induced by the optimal contract.

However, advisory SoP can only impact the compensation policy if the BoD actually cares about the shareholders' concerns. If  $\theta = 0$ , the compensation contract is the same as without SoP even if the BoD anticipates a strictly positive voting dissent. Likewise, it is essential for the effectiveness of advisory SoP that some shareholders openly disagree with the firm's compensation policy even if doing so does not add to their utility once the compensation contract has been signed. Only the interplay of a responsive BoD with some activist shareholders ( $q > 0$ ) suffices to make advisory SoP an effective governance instrument despite the fact that it is not binding. Without these ingredients this subtle mechanism has no bite.

The equilibrium level of board dependence is determined as in section 3.2. On stage 1, the CEO anticipates the shareholders' decision problem and proposes a board with the

maximum acceptable level of board dependence at stage 2. The result is summarized in proposition 2:

**Proposition 2:** *The equilibrium level of board dependence with advisory SoP solves*

$$(v - \beta \cdot x_L) \cdot \lambda^A + H(a^\circ(\lambda^A)) = H(a^*(0)) - k, \quad (16)$$

*whenever a solution  $\lambda^A \in (0, 1/2)$  exists. Otherwise,  $\lambda^A = 1/2$ . The following relations hold in equilibrium:  $\lambda^A \geq \lambda^N$ ,  $a^\circ(\lambda^A) \geq a^*(\lambda^N)$ ,  $B^\circ(\lambda^A) \geq B^*(\lambda^N)$ , and  $w^\circ(\lambda^A) \geq w^*(\lambda^N)$ .*

**Proof:** see appendix.

According to proposition 2, the introduction of an advisory SoP leads to weakly higher levels of board dependence and executive pay as compared to the equilibrium levels in the absence of SoP. Intuitively,  $\lambda^A \geq \lambda^N$  because the marginal benefits of board dependence are constant whereas the marginal cost for a given level of  $\lambda$  are reduced by advisory SoP because the BoD anticipates the shareholders' concerns about the CEO's compensation and reduces the agent's bonus for a given value of  $\lambda$ . Thus, the shareholders' net benefit for a given level of level of board dependence is a higher with advisory SoP than without SoP. Since the value of the outside alternative is the same for both cases, the shareholders are willing to accept a higher level of board dependence than in the absence of SoP. A rational CEO anticipates the shareholders willingness to accept a more dependent BoD and composes her proposal accordingly.

The increased level of board dependence directly translates into a higher salary because of the minimum compensation constraint in (8). Moreover, despite the fact that advisory SoP reduces the equilibrium effort level for a given value of  $\lambda$ , it holds that  $a^\circ(\lambda^A) \geq a^*(\lambda^N)$ . That is, in equilibrium the difference between  $\lambda^A$  and  $\lambda^N$  outweighs the marginal reduction of the agent's effort level caused by advisory SoP. To induce the increased equilibrium effort, the firm must also increase the bonus so that both elements of the agent's compensation are higher than without SoP.

## 4.2 Binding SoP

### 4.2.1 Pre-contractual vote

As explained in the introduction, a number of European countries did not follow the UK model and adopted binding versions of SoP. One version is a pre-contractual vote on the

BoD's compensation proposal as it is practiced in the Netherlands or Sweden. With a binding ex ante vote, the general shareholder meeting must approve the main elements of the CEO's remuneration package before the BoD draws up the compensation contract. I assume that the BoD must respect the binding vote so the shareholders can effectively preclude unwanted compensation practices. For the ease of exposition I assume that the shareholders can vote on all elements of the agent's compensation above the minimum income level  $\underline{w}$ . That is, the shareholders can refuse the bonus as well as any part of the salary exceeding  $\underline{w}$ .

The analysis starts with the BoD's compensation proposal at stage 3. Because the BoD's net utility is monotonically decreasing in  $\alpha$ , it cannot have an incentive to propose an arbitrary contract that is later rejected by shareholders and then to revise this contract after a negative vote. A rational BoD anticipates the shareholders' voting decision at stage 3a and proposes a contract that can be expected to find the support by the majority of shareholders. The decision problem of the BoD at stage 3 is economically equivalent to the decision problem with advisory voting rights. If the board exhibits a positive dependence level, it proposes a higher compensation than an independent BoD. This contract is accepted by the majority group of ordinary shareholders but refused by activist shareholders so that  $\alpha = q$ . Thus, for a given level of board dependence, the BoD proposes a compensation contract that induces the equilibrium effort defined in equation (15).

The enforceability of the principal's vote at stage 3a is crucial for the effectiveness of SoP. With a binding voting right on the CEO's compensation, shareholders can credibly threaten to enforce an adjustment of the BoD's compensation proposal. Even if this threat is not carried out in equilibrium it constrains the set of feasible compensation arrangements. Suppose that shareholders have approved a dependent BoD on stage 2. If they accept the BoD's compensation proposal, the BoD proposes the approved contract to the CEO who accepts it and exerts the equilibrium effort  $a^\circ(\lambda)$ . For this case, the shareholders' utility equals

$$E[U_P(a^\circ(\lambda), \lambda)] = (v - \beta \cdot x_L) \cdot \lambda + H(a^\circ(\lambda)) + x_L - \underline{w}, \quad (17)$$

where  $H(a^\circ(\lambda)) = a^\circ(\lambda) \cdot (\Delta_x - B^\circ(\lambda))$ . If shareholders refuse the compensation proposal, the BoD is forced to offer the agent a revised contract with a total pay equal to  $\underline{w}$  at stage 3b. The agent will accept the minimum pay level but not exert any effort because the contract does not contain a bonus component. For a given level of board dependence, the

shareholders' utility in case of a contract refusal equals

$$E[U_p(0, \lambda)] = v \cdot \lambda + x_L - \underline{w}. \quad (18)$$

A comparison of the expressions in (17) and (18) shows that a rejection of the compensation proposal has two countervailing effects. On the one hand, the firm can discipline the compensation policy of its dependent board and reduce the agent's expected compensation by  $\beta \cdot x_L \cdot \lambda + a^\circ(\lambda) \cdot B^\circ(\lambda)$ . On the other hand, the shareholders forfeit the potential contribution of the agent's effort to the firm's profit,  $a^\circ(\lambda) \cdot \Delta_x$ . The shareholders will accept the BoD' compensation proposal as long as

$$H(a^\circ(\lambda)) - \beta \cdot x_L \cdot \lambda \geq 0. \quad (19)$$

As  $H(a^\circ(\lambda))$  is monotonically decreasing in  $\lambda$ , there exists a critical level of board dependence  $\lambda^+$  for which (19) holds with equality. If  $\lambda \leq \lambda^+$ , the shareholders accept the BoD's compensation proposal, otherwise they refuse it. Since the compensation is cut to  $\underline{w}$  whenever  $\lambda > \lambda^+$ , the CEO cannot have an interest to propose a BoD with a level of board dependence higher than  $\lambda^+$  because for smaller values of  $\lambda$  she receives a strictly higher compensation. Consequently, a binding SoP imposes an additional constraint on the CEO's discretion over the composition of the BoD. Proposition 3 compares the effectiveness of this constraint to the threat of replacing the BoD at stage 2.

**Proposition 3:** *A pre-contractual and binding SoP effectively limits the level of board dependence to  $\lambda^B$ , where  $\lambda^B \leq \lambda^A$ . It holds that  $\lambda^B < \lambda^A$  whenever*

$$v \cdot \lambda^A > H(a^*(0)) - k. \quad (20)$$

*If (20) is satisfied,  $\lambda^B$  solves (19). Otherwise, SoP does not affect the board composition and the equilibrium level of board dependence equals  $\lambda^B = \lambda^A$ . **Proof:** see appendix.*

Pursuant to proposition 3, a binding SoP imposes tighter limits on board dependence than the threat of replacing the BoD. Moreover, since the right to vote on the BoD's compensation proposal does not preclude the right to refuse the CEO's board proposal, the level of board dependence cannot be higher than  $\lambda^A$ , where  $\lambda^A$  is the equilibrium level of board dependence with advisory SoP as defined in proposition 2.

It can be seen from condition (20) that SoP puts a stricter limit on board dependence than the threat of replacing the BoD whenever the BoD's contribution to firm profit evaluated

at  $\lambda^A$  exceeds the difference between the net contribution of the agent and the transaction cost for replacing the BoD. Intuitively, this result stems from the fact that the two governance mechanisms have different consequences for the firm's profit. A binding SoP allows shareholders to discipline the BoD and to enjoy the benefits of board dependence without suffering from its generous pay policy. On the other hand it distorts the incentives of the agent and thereby diminishes her contribution to firm value. By contrast, the replacement option sacrifices the potential contribution of the dependent BoD but improves the agent's incentives and maximizes her net contribution to firm profit. Consequently, the threat of a binding SoP becomes more effective the higher the BoD's contribution to firm value, whereas the threat of a board change becomes more effective the higher the significance of the agent for the firm's results.

#### 4.2.2 Post-Contractual Vote

The second form of a binding SoP is a post-contractual vote on the realized compensation of the CEO as it is currently included in law proposal put forward in a public voting initiative in Switzerland. With a binding ex post vote, the BoD signs the compensation contract with the CEO without asking for prior shareholder approval. After the firm's results are realized and the size of the agent's bonus has been determined, the shareholders can vote on the agent's compensation. In practice, this type of regulation would require that the BoD closes all compensation contracts subject to later shareholder approval in order to avoid the payment of damages in case of a negative shareholder vote. I ignore this sort of legal complications and assume that shareholders can effectively enforce a pay cut after a binding refusal of the agent's compensation.

Due to the change in the order of moves, the analysis starts with the shareholders' voting decision on stage 5a. Since the vote takes place after the agent has supplied her effort and the firm's results have materialized, the shareholders are confronted with a moral hazard problem. If they approve the CEO's compensation, they must pay  $s(x)$ , if they refuse it they must pay a compensation of  $\underline{w}$ . Since  $s(x) > \underline{w}$  regardless of the firm's results, rational shareholders are strictly better off if they refuse to pay out the promised compensation and cut the agent's pay to  $\underline{w}$ . Consequently, the voting dissent is  $\alpha = 1$ , whenever the agent's compensation exceeds  $\underline{w}$ , otherwise  $\alpha = 0$  because a compensation of  $\underline{w}$  is also acceptable for activist shareholders.

A rational manager anticipates the compensation cut and chooses an effort level of  $a = 0$  on stage 5. Since the participation and the limited liability constraints are still satisfied, she will accept the initial contract offered by the BoD on stage 4. At the contracting stage, the BoD anticipates the agent's effort decision and proposes a contract that contains no bonus and a salary of  $\underline{w}$ . Given this strategy profile, the shareholders' profit at stage 2 is given by (18). Since this expression is monotonically increasing in  $\lambda$ , the shareholders approve any level of board dependence that the CEO proposes at stage 1. However, since the CEO anticipates that proposing a dependent BoD does not increase her utility she proposes an independent BoD in the first place. Proposition 4 summarizes the findings.

**Proposition 4:** *A post-contractual and binding SoP eliminates the incentives to nominate a dependent BoD and reduces the agent's compensation to her minimum income level. In equilibrium, all shareholders support the proposed compensation. That is,  $\lambda^C = 0$  and  $s(x) = \underline{w}$ , and  $\alpha = 0$ .* **Proof:** see appendix.

The analysis shows that a post-contractual and binding SoP is the most effective way to control the CEO's compensation regardless of the composition of the BoD. Moreover, because the CEO can no longer benefit from her influence on the composition of the BoD, she has no strict incentives to propose a dependent board. On the other hand, the tight control of the BoD's compensation policy distorts the agent's effort incentives and thereby also reduces the firm's profit so that both, the firm and the agent suffer a substantial loss. Both parties would be better off, if the shareholders' could credibly commit to accept the agent's compensation package at the general shareholder meeting.

## 5 Optimal regulation

The analysis in section 4 shows that SoP can have a significant impact not only on the level of executive compensation but also on the equilibrium composition of the BoD and the utilities of the players. Moreover, the results also suggest that the question of SoP design can have important consequences on its effectiveness, especially as it concerns the timing of the shareholder vote and its enforceability. These consequences must be taken into consideration when a regulatory body decides on whether or not it introduces SoP and how it should be designed.

Subsequently I discuss the regulatory options regarding their desirability under three

different regulatory objectives. First, I consider a shareholder oriented regulation, second, a welfare oriented regulation, and third, a compensation oriented regulation. If the regulator aims to implement a shareholder oriented corporate governance, it seems natural that he ranks the regulatory alternatives according to their expected contributions to shareholder value. In the context of the model, this objective is equivalent to maximizing the expected utility of the principal. Proposition 5 summarizes the result.

**Proposition 5:** *Shareholders do best with a pre-contractual and binding SOP. The introduction of an advisory SoP does not affect the position of shareholders, whereas a post-contractual and binding SOP strictly reduces shareholder value as compared to an unregulated business environment. Proof:* see appendix.

According to proposition 5, a shareholder-oriented regulator should aim to introduce a pre-contractual and binding SOP because it is the only regulatory alternative that increases the shareholders' expected utility. It does so because it effectively uses the threat to refuse excessive compensation arrangements to limit the equilibrium level of board dependence proposed by the agent at stage 1, but it does not impair her effort incentives at stage 4. Even though the threat is never carried out in equilibrium, it is essential for its credibility that the vote is binding because otherwise the agent cannot be forced to propose a less dependent BoD.<sup>27</sup>

The analysis also shows that a binding voting right reduces the shareholders' utility if it is executed after the compensation contract has been signed and the agent has taken her effort decision. With this timing, a binding SoP is detrimental for shareholders. Because the principal cannot credibly commit to refrain from a retroactive pay cut, a post-contractual SoP destroys the agent's effort incentives. As a consequence, the binding SoP does not only reduce the agent's compensation but it also minimizes her contribution to firm profit.

Contrary to the perceptible consequences of binding SoP, the introduction of an advisory SoP neither improves nor reduces the principal's utility. This result obtains because with or without an advisory SoP the shareholder can only limit the level of board dependence by the threat to replace the BoD. Therefore, the equilibrium levels of board dependence with and without an advisory SoP,  $\lambda^N$  and  $\lambda^A$ , are set so that the shareholders' utility equals the utility attainable with an independent board net of the transaction cost for a replacement.

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<sup>27</sup> In fact, I do not formally analyze a pre-contractual advisory vote but it can be shown that the timing of the vote does not affect the equilibrium outcome of an advisory vote.

A welfare oriented governance focuses on the aggregated utility of the agency. In the context of the model, the appropriate welfare measure is the aggregate surplus of the agency, given by the sum of the principal's and the agent's expected utilities. As shown in section 3.1, the surplus is monotonically increasing in the level of board dependence. First, because a more dependent BoD is more valuable and second, because it mitigates the agency problem so that the agent's effort comes closer to the first best solution. Therefore, the level of board dependence is an appropriate criterion for ranking the alternatives in terms of their welfare impact.

**Proposition 6:** *A welfare oriented regulator ranks the regulatory alternatives according to their implied equilibrium level of board dependence. His most preferred alternative is advisory SoP, his least preferred alternative is post-contractual and binding SoP. As long as  $\lambda^N > \lambda^B$ , his second best preference is no SoP, otherwise it is a pre-contractual and binding SoP. Proof:* see appendix.

Pursuant to proposition 6, a welfare oriented regulator would be well advised to introduce advisory SoP because it leads to the highest level of board dependence and thereby to the highest welfare. As argued in section 4.1, advisory SoP makes a higher level of board dependence attractive to shareholders because it motivates the BoD to reduce the CEO's compensation for a given value of  $\lambda$ . Since shareholders face the same outside option, this fact allows the CEO to establish a more dependent BoD than in the absence of SoP. For the same reason, the CEO can pocket the marginal increase of the total surplus.

At the other extreme, a post-contractual and binding SoP eliminates the CEO's incentives to establish a dependent board and thereby minimizes the total surplus of the agency. The attainable surplus in the absence of SoP can be smaller or larger than with a pre-contractual and binding SoP because  $\lambda^B$  and  $\lambda^N$  cannot be unequivocally ranked. Ceteris paribus,  $\lambda^B < \lambda^N$  whenever a refusal of the CEO's compensation is a more credible threat than replacing the BoD in the absence of SoP. This criterion stems from the fact that the equilibrium value of board dependence is determined by the respective outside options of shareholders under the two regulatory regimes. The more attractive the outside option, the lower the equilibrium level of board dependence.

The final regulatory objective function under consideration is a compensation oriented regulation as it is supported by activist shareholders or compensation critics. These groups typically criticize firms' compensation practices either on grounds of a poor relation between

pay and performance and/or because of excessive compensation levels. Within the context of the model, both objectives are ceteris paribus better achieved, the lower the level of board dependence. Since both elements of the agent's compensation are monotonically decreasing in  $\lambda$ , the level of compensation is also decreasing in the level of board dependence. Moreover, the salary add-on granted by a dependent BoD can be interpreted as a reward for poor performance since it is paid if the low result materializes. Thus, the link between pay and performance becomes stronger with a lower level of board dependence. I can therefore make the following observation.

**Corollary 1:** *A compensation oriented regulator ranks the alternatives in the reverse order of a welfare oriented regulator. Proof:* see appendix.

If regulators were primarily following the arguments of compensation critics, they should favor a post-contractual and binding SoP because it allows for the strictest control of pay practices. However, this objectives is achieved at the cost of the lowest welfare and the lowest shareholder value. The next best voting alternative is a pre-contractual and binding SoP. It generally allows shareholders to control effectively the BOD's compensation policy without distorting her effort incentives. However, since  $\lambda^B$  can also be larger than  $\lambda^N$ , it is not granted, that it actually leads to more desirable pay practices than in the absence of SoP. Finally, an advisory SoP even increases the agent's compensation and thereby contradicts the objectives of compensation critics.

Interestingly, the advisory pay model is used in the Anglo-Saxon countries suggesting that these countries are not supporting a strict shareholder value philosophy but rather improve the conditions for maximizing the total surplus generated by the agency. By contract, the majority of other European countries uses a precontractual and binding SoP which suggest that these countries effectively practice a shareholder-oriented regulatory philosophy. Finally, and consistent with the predictions of the analysis, a campaign for the introduction of a post-contractual and binding SoP has actually been initiated by a single shareholder activist in Switzerland and will probably be subject to a referendum in 2012.

## 6 Summary and conclusions

Motivated by the existence of fundamental international differences in the design of shareholder voting rights, this paper analyzes how the enforceability and the timing of SoP affects

the BoD's compensation decision and the level of board dependence. I propose a three-layer agency model with a CEO, a BoD, and shareholders. All parties are risk neutral but the CEO is protected by limited liability so that an agency problem arises. The BoD is in charge of setting the CEO's compensation and potentially dependent from the CEO. The level of board dependence has two countervailing effects. First, a dependent BoD considers the CEO's utility in designing the incentive system and offers her a higher salary and a higher bonus than a less dependent board. Second, a more dependent BoD adds to firm value by providing valuable advice to the CEO. The equilibrium level of board dependence solves the trade-off between these forces and arises endogenously as the equilibrium of a non-cooperative game between the three players.

At the first stage of this game, the CEO proposes a BoD with a given dependence level. At the second stage, shareholders have the right to approve the CEO's proposal or to replace it with an independent BoD. In equilibrium, the replacement threat is never carried out but the value of the outside option determines the equilibrium level of board dependence. *Ceteris paribus*, the shareholders are willing to accept a more dependent board, the higher its marginal contribution to firm profit, the lower its generosity towards the CEO and the lower the net value of the outside option.

Giving shareholders a say on pay provides them with an additional measure to control the equilibrium level of board dependence and thereby the agent's compensation. This instrument works indirectly through the threat of rejecting the BoD's compensation decisions. The impact of SoP on the equilibrium level of board dependence depends on the enforceability and the timing of the shareholder vote. The analysis shows that an advisory SoP prompts shareholders to accept a higher level of board dependence than without SoP. This strategy is profitable because the threat of a negative shareholder vote induces the BoD to reduce the CEO's compensation and thereby make a dependent BoD relatively more attractive than the outside option. As a consequence, the agent's compensation and her equilibrium effort level are increasing. However, this equilibrium can only be sustained if both, the BoD and some of the firms' shareholders partly exhibit social preferences. First, the BoD must derive disutility from a negative shareholder vote and second, there must at least be a small group of activist shareholders that refuse the BoD's compensation proposal even if such a vote does not alter their utility once the terms of the compensation contract have been fixed. Whenever one of the two conditions is not met, advisory SoP has neither an impact on CEO compensation nor on the equilibrium level of board dependence.

A binding SoP works without such behavioral preconditions because it allows shareholders to exercise an effective control over the BoD's compensation decision. The analysis also shows that it is crucial for the consequences of a binding SoP at what stage of the decision process the shareholders are allowed to vote. If the vote takes place before the compensation contract is closed, a binding SoP effectively reduces the level of board dependence whenever the threat of disapproving the BoD's compensation proposal is stricter than the threat of replacing the board. Even though both threats are not carried out in equilibrium, the CEO has a strict incentive to propose a less dependent BoD because she anticipates the shareholders' outside options. As a consequence, a pre-contractual and binding SoP induces the BoD to set a lower compensation than with an advisory SoP. The shareholders benefit from this outcome because they are able to increasing their utility up to the higher value of the binding outside option.

The opposite result obtains if the binding vote is post-contractual. This SoP version induces a moral hazard problem on the part of shareholders. Since the vote takes place after the agent's effort decision, the provision of incentives is no longer an issue so that shareholders have a strict incentive to refuse all elements of the agents' compensation that are subject to shareholder approval. A rational CEO anticipates the retroactive pay cut and provides no effort in the first place. At the same time the CEO no longer benefits from influencing the level of board dependence and proposes an independent board. Thus, a post-contractual and binding SoP provides shareholders with the most effective control of board dependence and CEO compensation. However, this control is costly because it not only destroys the agent's effort incentives but also sacrifices the potential contributions of a dependent BoD. As a result, the firm's profit is the lowest among all SoP versions discussed in this paper.

The results of the theoretical model demonstrate that the design of SoP is crucial for its economic impact. The timing and the enforceability of SoP can have significant consequences for the equilibrium levels of board dependence and executive compensation as well as for the utilities of the players. The design choice depends on the objectives of the regulatory authority. The analysis suggests that a shareholder-oriented regulator does best with a pre-contractual and binding SOP because it is associated with the highest net utility of shareholders. If the regulator aims at maximizing welfare, he ranks the regulatory alternatives according to their implied equilibrium level of board dependence. It follows that his most preferred alternative is advisory SoP. Both types of regulators should refrain

from adopting a post-contractual and binding SoP because it is associated with the lowest welfare and the lowest shareholder value. A post-contractual and binding SoP can only be an attractive option for a regulator who aims to achieve the most effective control of compensation levels. This objective is consistent with the views of some activist shareholders and compensation critics and requires to rank the alternatives in the opposite order of a welfare-oriented regulator.

## Appendix

### Proof of Lemma 1:

For a given value of  $\lambda$ , the BoD maximizes

$$E[V_B] = (1 - \lambda) \cdot (v \cdot \lambda + x_L + a \cdot \Delta_x) - \lambda \cdot C(a) - (1 - 2\lambda) \cdot [w + a \cdot B] \quad (21)$$

subject to the minimum compensation constraint in (8), the participation constraint in (5) and the incentive constraint in (9).

I first show that the participation constraint is not binding. Substituting for  $B$  from the incentive constraint into the participation constraint yields

$$w + a \cdot C'(a) - C(a) \geq 0 \quad (22)$$

Since  $C(a)$  is strictly convex,  $G(a) = a \cdot C'(a) - C(a)$  is positive and monotonically increasing in  $a$ , i.e.  $G'(a) = a \cdot C''(a) > 0$ . It follows that  $w < 0$  if the participation constraint should be binding. However, a negative salary violates the minimum compensation constraint, a contradiction. It follows that (8) must be binding and that the optimal salary equals  $w^* = \lambda \cdot \beta \cdot x_L + \underline{w}$ . Substituting for  $B$  and  $w$  from (8) and (9) into (21) and rearranging terms yields the first order condition

$$\partial E[V_B]/\partial a = (1 - \lambda) \cdot [(\Delta_x - C'(a))] - (1 - 2\lambda) \cdot [a \cdot C''(a)] = 0, \quad (23)$$

solving for  $a$  yields the expression in (10). Since  $h(\lambda) = (1 - \lambda)/(1 - 2\lambda) \geq 1$  and  $h(\lambda)$  is monotonically increasing in  $\lambda$ ,  $a^*(\lambda) = h(\lambda) \cdot [(\Delta_x - C'(a))/C''(a)]$  is monotonically increasing in  $\lambda$ .

For  $\lambda = 1/2$ , the ratio  $h(\lambda)$  is not defined but (23) becomes

$$\partial E[V_B]/\partial a = \frac{1}{2} \cdot [\Delta_x - C'(a)] = 0. \quad (24)$$

This condition is only satisfied by the first best effort level in (7)

### Proof of Proposition 1

Suppose that the CEO proposes a dependent BoD on stage 1. If the shareholders accept the proposal on stage 2, their utility equals

$$E[U_P(a^*(\lambda), \lambda)] = (v - \beta \cdot x_L) \cdot \lambda + x_L - \underline{w} + H(a^*(\lambda)) \quad (25)$$

if they refuse the proposal, their net utility after transaction cost equals

$$E[U_P(a^*(0), 0)] - k = x_L - \underline{w} + H(a^*(0)) - k. \quad (26)$$

It follows that the shareholders accept the CEO's proposal whenever

$$(v - \beta \cdot x_L) \cdot \lambda + H(a^*(\lambda)) \geq H(a^*(0)) - k. \quad (27)$$

Since  $H(a^*(1/2)) = H(a^{FB}) = 0$ , it holds that  $\lambda^N = 1/2$ , whenever

$$k \geq H(a^*(0)) - (v - \beta \cdot x_L) \cdot 2.$$

Otherwise,  $\lambda^N$  solves (14) for  $\lambda$ . Since the left hand side of (14) is strictly concave in  $\lambda$  and  $k > 0$ , I conclude that the solution is unique and that  $\lambda^N \in (0, 1/2]$ .

### Proof of Lemma 2

Maximizing  $E[V_B - D_B]$  under the minimum compensation constraint in (8), the participation constraint in (5) and the incentive constraint in (9) yields the following first order condition

$$\partial E[V_B - D_B] / \partial a = \partial E[V_B] / \partial a - \hat{\alpha} \cdot \theta \cdot [a \cdot C''(a) + C'(a)] = 0, \quad (28)$$

where  $\hat{\alpha} = q$  is the equilibrium voting dissent anticipated by the BoD and  $\partial E[V_B] / \partial a$  is given by (23). Solving for  $a$  yields the expression in (15). Let  $\lambda^A$  denote the level of board dependence with advisory SoP, it holds that

$$\partial E[V_B - D_B] / \partial a|_{a=a^*(\lambda^A)} = -\hat{\alpha} \cdot \theta \cdot [a \cdot C''(a) + C'(a)] < 0. \quad (29)$$

It follows that  $a^\circ(\lambda^A) \leq a^*(\lambda^A)$ . The inequality is strict whenever  $\theta$  and  $\hat{\alpha} = q$  are positive.

### Proof of Proposition 2:

As in the absence of SoP shareholders compare the attainable profit with a dependent board with the profit of an independent board net of the transaction cost in case of a replacement. They accept the CEO's board proposal whenever

$$(v - \beta \cdot x_L) \cdot \lambda + H(a^\circ(\lambda)) \geq H(a^\circ(0)) - k, \quad (30)$$

where  $a^\circ(\lambda)$  denotes the agent's equilibrium effort for a given level of board dependence as defined in (15). The condition in (30) is identical to (27) except for the fact that the equilibrium effort level equals  $a^\circ(\lambda)$  and not  $a^*(\lambda)$ .

Suppose that activist shareholders vote against the compensation proposed by an independent board so that  $\alpha = q$  for  $\lambda = 0$ . It follows that  $w^\circ(0) = \underline{w}$  and  $B^\circ(0) \leq B^*(0)$  from (8), (9) and Lemma 2. This is a contradiction because activist shareholders accept all compensation that satisfies  $w \leq \underline{w}$  and  $B \leq B^*(0)$ . It follows that  $\alpha = D_B = 0$  so that  $a^\circ(0) = a^*(0)$  and  $H(a^\circ(0)) = H(a^*(0))$  as stated on the right hand side of (16).

Let  $\lambda^N, \lambda^A < 1/2$  so that (14) and (16) are satisfied in equilibrium.. Since the right hand side of both equations is identical, it must hold that

$$(v - \beta \cdot x_L) \cdot \lambda^N + H(a^*(\lambda^N)) = (v - \beta \cdot x_L) \cdot \lambda^A + H(a^\circ(\lambda^A)). \quad (31)$$

Assume now that  $\lambda^N = \lambda^A = \lambda$  so that  $a^\circ(\lambda) \leq a^*(\lambda)$  from Lemma 2. Since  $H(a)$  is monotonically decreasing in  $a$  for  $a > a^*(0)$  it must hold that  $H(a^\circ(\lambda)) > H(a^*(\lambda))$ , so that the right hand side of equation (31) is larger than the left hand side for a given value of  $\lambda$ . Since  $k > 0$  and both function are strictly concave there exists a unique set of solutions for (14) and (16) so that  $\lambda^A > \lambda^N$ .

To rank the resulting equilibrium efforts under both regimes fix  $\lambda^N$  and suppose that the shareholders accept board proposals up to  $\lambda^A > \lambda^N$  so that  $a^\circ(\lambda^A) = a^*(\lambda^N)$  and  $H(a^\circ(\lambda^A)) = H(a^*(\lambda^N))$ . With this policy (31) becomes  $(v - \beta \cdot x_L) \cdot \lambda^N < (v - \beta \cdot x_L) \cdot \lambda^A$  so that the firm must further increase  $\lambda^A$  to satisfy (31). It follows that in equilibrium  $H(a^\circ(\lambda^A)) < H(a^*(\lambda^N))$  and since  $H'(a) < 0$  for  $a > a^*(0)$  it must hold that  $a^\circ(\lambda^A) > a^*(\lambda^N)$ .

Moreover, since  $\lambda^A > \lambda^N$  and  $a^\circ(\lambda^A) > a^*(\lambda^N)$  the minimum compensation constraint in (8) and the incentive constraint in (9) imply that  $w^\circ(\lambda^A) \geq w^*(\lambda^N)$  and  $B^\circ(\lambda^A) \geq B^*(\lambda^N)$ .

### Proof of Proposition 3:

Suppose that the CEO proposes a dependent BoD on stage 1. If the shareholders accept the board proposal on stage 2 and its subsequent compensation proposal on stage 3a their utility equals  $E[U_P(a^\circ(\lambda), \lambda)]$  as defined in (17). If they accept the BoD but refuse the compensation proposal, their utility equals  $E[U_P(0, \lambda)] = v \cdot \lambda + x_L - \underline{w}$ . If they already replace the BoD at stage 2, their utility equals  $E[U_P(a^*(0), 0)] = x_L - \underline{w} + H(a^*(0)) - k$ . It follows that the threat of cutting the compensation is stricter if (20) is satisfied. Otherwise, the BoD is already replaced at stage 2 so that  $\lambda^B = \lambda^A$ .

### Proof of Proposition 4

The equilibrium strategies of the CEO and shareholders are obvious. It remains to show that the BoD actually prefers to offer a contract offering a compensation of  $s(x) = \underline{w}$ . The BoD maximizes  $E[V_B - D_B]$  under the minimum compensation constraint in (8), the participation constraint in (5) anticipating that the agent's equilibrium effort is zero.

$$E[V_B - D_B|a = 0] = (1 - \lambda) \cdot (v \cdot \lambda + x_L) - (1 - 2\lambda + \alpha \cdot \theta) \cdot w.$$

Since this expression does not depend on  $a$ , there is no need for incentive provision and the optimal bonus equal zero. Suppose now that the BoD offers the agent a salary  $w(\lambda) > \underline{w}$ . Since shareholders will refuse this compensation arrangement at stage 5, the equilibrium salary equals  $\underline{w}$  and the equilibrium voting dissent  $\alpha = 1$ . If the BoD proposes a salary of  $\underline{w}$  in the first place, all shareholders will accept the agent's compensation and  $\alpha = 0$ . Since the BoD's utility is strictly decreasing in  $\alpha$ , the latter solution dominates the former.

### Proof of Proposition 5

For a given level of board dependence and a given effort level of the agent, the shareholders' utility equals

$$E[U_P(a(\lambda), \lambda)] = (v - \beta \cdot x_L) \cdot \lambda + x_L - \underline{w} + H(a(\lambda)).$$

It follows from (14) and (16) that in equilibrium

$$E[U_P(a^*(\lambda^N), \lambda^N)] = E[U_P(a^\circ(\lambda^A), \lambda^A)] = H(a^*(0)) - k \quad (32)$$

so that the shareholders receive the same expected utility with and without an advisory SoP. From proposition 3 and (20) it must be that  $E[U_P(a^\circ(\lambda^B), \lambda^B)] \geq E[U_P(a^\circ(\lambda^A), \lambda^A)]$ . Finally, it can be seen that  $E[U_P(a(\lambda), \lambda)] \geq E[U_P(0, 0)] = x_L - \underline{w}$ .

### Proof of Proposition 6

Observe first that the expected welfare, defined as the sum of the principal's and the agent's utility is monotonically increasing in  $\lambda$ . From propositions 2, 3, and 4, it follows that  $\lambda^A \geq \lambda^N \geq \lambda^C = 0$ ,  $\lambda^A \geq \lambda^B \geq \lambda^C = 0$ . Note that  $\lambda^B$  can be smaller or larger than  $\lambda^N$ . It holds that  $\lambda^B < \lambda^N$  whenever (20) is satisfied for  $\lambda^B$ .

### Proof of Corollary 1

Follows immediately from the proof of proposition 6 and the fact that both elements of the agent's compensation are monotonically increasing in  $\lambda$ .

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