CEO Autonomy, Tenure, and Turnover

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Abstract

The paper analyzes how much autonomy a board will grant managers who are better informed how their productivity/vision changes over time. Autonomy determines whether managers depart following conflicts with the board, potentially appearing to leave voluntarily, or are forced out following underperformance. It further affects severance and compensation agreements, and has implications for contract length and the use of renewable contracts. Among the model's insights is that contracts are shorter, and replacing CEOs following underperformance is more likely in industry downturns, appearing to outsiders as lack of relative performance evaluation. Furthermore, firms might prefer hiring older managers with better outside options.

Keywords: voluntary and forced turnover, renewable contracts, contract lenght, CEO age, disagreement, adverse selection.

JEL Classification: G30, G34, D82

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1 Introduction

One of the most important questions in organizations is how much autonomy principals should offer better-informed agents (Aghion and Tirole, 1997). This problem is especially pertinent when it comes to the appointment of new managers who continuously obtain privileged information about the firm's prospects and their own productivity. In particular, boards are concerned that if they would have the same information, they might disagree with how the firm is run and the manager's place in it. Accounting for such behind-the-scene conflicts presents a challenge for empirical research analyzing CEO contracts (Jenter and Kanaan, 2015; Kaplan and Minton, 2012), as well as for theoretical research, which provides few guidelines how to think about the dynamic evolution of these conflicts.

This paper addresses the problem of how boards should make tenure, turnover, and compensation decisions when managers have better information how their fit with the firm changes over time. In this framework, one of the board's main concerns is how much autonomy to give CEOs to run the firm. This question has implications for compensation and severance agreements and for why CEOs sometimes depart voluntarily, potentially absent underperformance, while at other times are forced out by the board. The paper further addresses how a board chooses the optimal length of managers' contracts and why it would often use renewable contracts that are performance-sensitive mainly close to renewal. These issues are important in practice (Gillan et al., 2009), but have attracted relatively little theoretical attention. Among the model's insights is that contract length will be shorter and forced turnover will occur more often in times in which the whole industry underperforms, seemingly implying a lack of relative performance evaluation—shedding light on the corresponding stylized fact that has puzzled scholars in recent years (Jenter and Kanaan, 2015). Another insight concerns why boards might prefer "star-managers" with highly-paying alternative employment opportunities even if they would not be better at running the firm. A key insight is that it is cheaper to keep such managers honest.

The model considers a board that repeatedly hires managers who become better informed. Crucially, their private information changes over time and concerns the attractiveness of projects under their management. Henceforth, this attractiveness is referred to as their productivity or vision.[1] The main frictions in the model are that the board can neither verify the manager's effort, exerted to improve her productivity, nor her resulting productivity. If the board had that information, its ideal course of action would be to

[1] The interpretation as "productivity" is more pertinent if the manager's information conerns her current fit with the firm that is beyond her control. The alternative interpretation as "vision" might better describe situations in which the manager's private information concerns the profitability of what she believes to be the best course of action.

replace managers who it believes are no longer the best fit, and to keep non-controversial managers, as they are likely to be less controversial also in the future. However, since the manager could keep the board in the dark about aspects that could lead to her dismissal, the board needs to decide whether and how often to offer the manager incentives to truthfully disclose such information.[2] Understanding how autonomy arises in this setting and the factors affecting it, which are the main insights from this paper, requires explaining first in some detail the how the board chooses the manager's contract.

Being less informed than the manager, the board could incentivize truthful voluntary disclosure by offering the manager sufficiently high performance bonus accompanied by a severance package. Severance payments are needed, as the board replaces the manager if it dislikes her productivity or disagrees with her vision.[3] In such cases, turnover need not follow underperformance and could appear "voluntary" to outsiders, even though it effectively restricts the manager's autonomy to run the firm. Compensating for this initial lack of autonomy is that the board finds it suboptimal to fire a manager with whom it agrees, even if the firm has produced low cash flows under her management.

Stimulating truthful disclosure at all times could make the manager very expensive to employ, however. The problem is that by hiding information to avoid disagreement, the manager can stay on the job even following underperformance and extract a high wage also in the future. These incentives to lie are stronger and, thus, her severance package must be higher to induce truth-telling, the longer tenure she can look forward to—an insight in line with the evidence of Rau and Xu (2013). Hence, the cost of offering truthful incentives in the future leads to higher managerial pay already at the contract's inception. This is in stark contrast to the board's benefit from offering incentives for truth-telling in, say, year ten, as the latter benefit is realized only if the manager is still with the firm at this point. Thus, the dwindling likelihood that the manager remains the best fit and stays with the firm over the contract's maximal potential length could make offering truth-telling incentives over that entire length suboptimal. This has wide-ranging implications.

Not offering incentives for truth-telling is tantamount to offering the manager autonomy, as then the manager can stay with the firm and run it as she sees fit. This not only reduces the need for incentive compensation, but (contrary to the case with disclosure) also allows paying the manager such compensation with delay conditional on performing well in the future. However, the manager's initial autonomy comes at the cost of more in-

[2] This follows an old insight that in settings in which a principal cannot commit not to act on the private information disclosed by the agent, it might be suboptimal to screen out that information (see Hart and Tirole, 1988; Bester and Strausz, 2001).

[3] Indeed, half of S&P 1500 firms have ex ante severance agreements, with such agreements being associated with more truthful managers (Rau and Xu, 2013; Brown, 2015).

terference by the board following underperformance: Since the manager has no incentives for truthful disclosure, she needs to be judged based on the firm's performance. In particular, the manager is fired without severance pay for generating low cash flows, giving rise to forced and sometimes inefficient replacements, as well as inefficient retentions. Because such inefficient decisions hurt the firm, the board faces a trade-off between minimizing the manager's autonomy and preventing the manager's compensation from growing too large. The first main insight is that this is best resolved by offering autonomy in regular intervals.

A novel insight from the paper concerns a simple way such contract can be implemented in practice: namely, by offering managers renewable fixed-term contracts that stipulate (i) severance pay as a multiple of the manager's wage and remaining tenure, and (ii) for which it is costless to discontinue the manager's contract at the end of the contract's term. In particular, the board can choose the term-end to coincide with a period in which it is optimal to offer the manager autonomy. Autonomy results if the board prefers not to replace the manager in the renewable contract's final period, as it can avoid triggering severance pay by waiting until it is due for renewal. Anticipating this, the manager has no incentives for truthful disclosure, and the board decides on renewal based on the firm's cash flow performance. Indeed, renewable contracts, featuring such severance pay structure and higher performance-sensitivity towards renewal, are very common in practice (Gillan et al., 2009; Cziraki and Groen-Xu, 2015), but there have been few theoretical attempts to explain their use.

The paper's main implications arise from analyzing the factors affecting the board's decision when to offer autonomy. One factor is the manager's outside option. A manager with a higher outside option is hurt less from voluntarily disclosing information that would lead to her dismissal, as she can look forward to a high wage from an alternative employment. Hence, when employing a manager with a higher outside option, the board will seek more disclosure and will rely less often on the firm's performance to judge the manager's fit. As a result, there is more "voluntary" and less forced turnover. This gives rise to several predictions. First, there will be less voluntary and more forced turnover in industry downturns (when managers' outside options are lower), as less-informed boards will rationally interfere more strongly following underperformance (by firing the manager). This could shed some light on Jenter and Kanaan's (2015) corresponding finding, which they interpret as a lack of relative performance evaluation. Second, despite being ex post more ready to fire an underperforming manager, the weaker incentives for disclosure imply that in industry downturns the board runs a higher ex ante risk that the manager in charge is not a good fit. This could exacerbate downturns. Third, (renewable) contracts offered in downturns will be of shorter length. Fourth, all these effects will be more pronounced in smaller firms and firms with lower growth prospects, as for such firms it would be more important to minimize the manager's rents.

Another tool at the board's disposal to limit the manager's compensation from growing too large is offering non-renewable fixed-term contracts. Setting such tenure limits is optimal in situations in which it is not possible for the board to commit to the (ex post inefficient) strategy of not renegotiating the manager's autonomy. By contrast, a commitment to a non-renewable term limit could be achieved by choosing the term limit to coincide with the manager's retirement age. Thus, the model's second set of predictions relate contracting to the age of newly hired managers. First, firms would have to promise higher severance packages to younger CEOs, which is in line with the findings of Rau and Xu (2013). Second, since it would be more expensive to incentivize truthful disclosure in downturns, when managers' outside options are low, the board would set shorter limits and hire older managers.

Extending the baseline model yields further implications of the result that a higher outside option makes it easier to keep the manager truthful even if it costs her job. One noteworthy prediction is that a firm might sometimes prefer hiring a "star"-manager with better outside options rather than one who appears to be a better fit. Another extension implies that a board seeking more effective control could try compensating for the need of more generous pay by hiring less disagreement-prone managers. Hence, the higher pay needed to stimulate truthful disclosure would go hand-in-hand with hiring more generalist CEOs that are more likely to think like the board (Custódio et al., 2013).

Versions of the idea of managerial autonomy have been analyzed in Aghion and Tirole (1997), Burkart et al. (1997), and Boot et al. (2008). In these papers, the frictions are that managers extract private benefits from projects that might not be in shareholders' best interests, that managers might disagree about the best way forward, or that they might turn out not to be the best fit for the firm (Crémer, 1995).[4] Similar to these papers, autonomy results when the principal willingly remains uninformed about the extent of such frictions, as it helps him reduce the agent's compensation. However, in the present setting, the board's lack of information is not due to reduced monitoring, but to not offering severance pay that would compensate a manager for revealing information that would lead to her dismissal. As a result, autonomy serves not as much to boost the manager's effort

[4] The interpretation of the manager's fit with the firm as her vision relates the paper also to the literature on managerial overconfidence (e.g., Goel and Thakor, 2008; Gervais et al., 2011), which exploits the fact that it is cheaper to incentivize an overoptimistic CEO. By contrast, what makes managerial replacement rather than hiring central to the present paper is disagreement about the alternatives to the manager's vision. Also related is Harris and Raviv (2010), in which managerial autonomy balances the relative importance of the manager's and boards private information.

incentives, but to cut through her ability to extract information rent, which is magnified in a dynamic setting. Analyzing autonomy in a dynamic setting is the main contribution of the paper, as it allows to derive novel implications for turnover, hiring, and compensation practices.

A key difference of the present paper to prior work in which managers are better informed about their fit (Hermalin and Weisbach, 1998; Taylor, 2010; Dow, 2013) is that the manager's vision/productivity changes over time and that the board can choose to screen out managers by offering generous severance packages. In this case, replacements might occur absent underperformance, and could appear voluntary to outsiders. Other papers exploring the role of severance pay include Levitt and Snyder (1997), Inderst and Mueller (2010), Almazan and Suarez (2003), Van Wesep (2010), and Van Wesep and Wang (2014). However, these models do not feature changing managerial productivity. Thus, the present dynamic setting gives rise to new issues, such as analyzing what factors affect managerial autonomy, forced and voluntary turnover, and term limits.

These issues distinguish the paper also from Jenter and Lewellen (2014) and Garrett and Pavan (2012). Both papers consider dynamically changing types, but take diametrically opposite approaches. In Jenter and Lewellen (2014), the board does not screen out managers and must, thus, rely on the firm's most recent performance to infer their productivity. By contrast, Garrett and Pavan (2012) analyze contracts that always incentivize managers to disclose their private information. Their main insight is that the board needs to share less surplus with the manager over time, making the board progressively tolerant towards lower managerial quality. The decision when to give autonomy in the present paper can be seen as optimally relying on both approaches in a setting in which the board cannot commit not to replace a controversial manager.

The dynamics of managerial turnover are also analyzed in Eisfeldt and Rampini (2008) who predict that managerial turnover is procyclical. In business cycle upturns, boards are forced to pay managers more, since their outside option is higher. However, there is an upside for shareholders, as then executive pay can be designed to include more generous severance packages to stimulate bad managers to leave the firm. Similar to Inderst and Mueller (2010), however, managers in their model only live for one period, which does not allow analyzing the dynamics of the employment relationship between the firm and its manager. Related contributions are Anderson et al. (2016) and Eisfeldt and Kuhnen (2013), in which a publicly observable shock prompts the firm to look for a manager who is better suited to the new environment. Assuming that the shock also decreases industry returns offers one explanation to Jenter and Kanaan's (2015) findings that forced turnover is higher in industry-wide bad times (Eisfeldt and Kuhnen, 2013). Instead, in the present paper, such apparent lack of relative performance evaluation emerges when it becomes too expensive for firms to stimulate voluntary information disclosure by managers, leading to less voluntary and more forced turnover. This could explain why Fee et al. (2015) find no evidence for a lack of relative performance evaluation once reclassifying voluntary turnover.

Prior arguments for setting upper tenure limits include Prescott and Townsend (2006) and Hertzberg et al. (2010). In these papers, rotating a manager makes her payoff less dependent on her private information, and a replacement manager only benefits from reporting a bad state that has occurred under her predecessor. Though none of these effects features in the present paper, also here tenure limits serve to reduce agency costs. Related to Lazear (1979), they limit the potential time horizon over which the manager can extract rent, making it cheaper to incentivize disclosure. One of the novel aspects is to analyze the factors affecting these limits.

Turnover features in the literature also as a threat to discipline managers (Stiglitz and Weiss, 1983), as well as when managers are risk averse and become too expensive to motivate or when they take a better outside option (Sannikov, 2008; Wang, 2011, 2015). Instead, the reason for turnover in the present paper is to appoint a better manager. In a broader sense, the paper is related also to the political economy literature in which committing to fixed term limits incentivizes politicians to focus on riskier, but beneficial long-term policies (Aghion and Jackson, 2016). In contrast to this literature, turnover can occur during the manager's contract term, and monetary incentives play a key role.

The paper continues as follows. Section 2 describes the model. Section 3 derives the optimal contract and discusses its implementation. Section 4 concludes. All derivations and proofs are in the Appendix.

2 Model

Consider an infinitely lived firm in which the board maximizes shareholder wealth and is in charge of hiring and replacing the firm's manager (she). The firm operates in an economy, in which every season t consists of three dates. In the first date of every season, $\tau_t = 0$, the manager needs to exert effort to increase the likelihood that a project produces high cash flows. This effort carries a non-monetary cost c. In the second period $\tau_t = 1$, the manager can disclose her latest productivity and the board can decide whether or not to keep her on the job. Replacing the incumbent implies that a replacement manager will steer the firm to a project preferred by the board for the remainder of the season. All cash flows from the season are realized in the final period, $\tau_t = 2$. If the board has not already replaced the manager in the interim period, it can choose again whether or not to keep her for the next season. At all times, the manager is protected by limited liability. All parties are risk neutral and the common discount factor between two neighboring seasons is $\delta < 1$. We now add more structure to this framework.

Information Structure Neither the board nor potential managers have private information when a new manager is hired. Furthermore, the managers from which the board can choose have zero wealth and are identical in all respects except their age (i.e., managers are not infinitely lived and leave the labor market once they reach their retirement age). However, upon being hired, the manager obtains private information, which keeps evolving over time. This is modeled as follows.

Assume that the firm can produce one of two verifiable cash flows $x > 0$ or $x + \Delta x > x$ at the end of each season. The manager's likelihood of reaching the high cash flow state can be $\theta_t \in \{\theta_C, \theta_A\}$, and the key assumption is that the realization of θ_t becomes the manager's private information in $\tau_t = 1$ of every season. This realization depends on whether the manager exerts effort. Without exerting effort at the beginning of a season, the manager's productivity would have the controversial success likelihood θ_C. If, instead, the manager exerts effort, there is a probability e_t that the success likelihood is $\theta_A > \theta_C$, and probability $1 - e_t$ that it is θ_C. Both θ_C and θ_A are positive and less than one.

The probability e_t that a manager's productivity (when exerting effort) is controversial depends on her productivity θ_{t-1} from the previous season. Specifically, there is a positive correlation in the manager's productivity across seasons with $e_t(\theta_A) > e_1 > e_t(\theta_C)$, where e_1 is the likelihood of θ_A in the manager's first (complete) season after being hired. In this Markov environment, the t-subscripts in $e_t(\theta_A)$ and $e_t(\theta_C)$ are not necessary, but they are helpful to keep track of the intertemporal forces affecting contracting. Initially, it is assumed that $\{e_1, e_t(\theta_A), e_t(\theta_C)\}$ are the same for all managers the firm can hire.

Contracting At the beginning of the employment relation, the board offers the manager a contract that specifies the manager's wage and probability of replacement in every season of the potential employment duration. The contract components characterizing any given season t are $\{w_t(\widehat{\theta}_t), \Delta w_t(\widehat{\theta}_t), w_{s,t}(\widehat{\theta}_t), \psi_t^1(\widehat{\theta}_t), \psi_t^2(\widehat{\theta}_t, x_t)\}$, which can depend on the manager's report $\widehat{\theta}_t$ and the history of reports and cash flow realizations in the previous seasons (unless otherwise noted, the history dependence is captured by the subscript t). In this contract, $w_t(\widehat{\theta}_t)$ stands for the manager's wage in the low cash flow state and $\Delta w_t(\widehat{\theta}_t)$ stands for how much she receives in addition (i.e., her "bonus") in the case of a high cash flow realization; $w_{s,t}(\widehat{\theta}_t)$ is the manager's severance pay if she leaves the firm in the interim period $\tau_t = 1$; $\psi_t^1(\widehat{\theta}_t)$ stands for the probability of replacing the manager in the interim period, i.e., in $\tau_t = 1$ prior to the realization of cash flows in that season; $\psi_t^2(\widehat{\theta}_t, x_t)$ stands for the probability of replacing the manager at the end of the season, i.e., in $\tau_t = 2$ after the realization of a performance measure $x_t = \{x, x + \Delta x\}$. To simplify the analysis, attention is restricted to deterministic strategies $\psi_t^\tau = \{keep, replace\}$. While we do not explicitly consider a payment to the manager for leaving the firm at the beginning of a season before she obtains private information, we show that such payments will not arise.

The manager is penniless and protected by limited liability, which requires that $w_t, w_{s,t} \geq 0$.[5] The analysis further imposes the standard requirement that the manager should have no incentives to destroy cash flows, $\Delta w_t \geq 0$ (Innes, 1990). Contracts that satisfy these requirements are labeled as "feasible." Furthermore, it is assumed that the manager cannot be prevented from leaving the firm at any time during the employment relationship, which implies that the contract should at least compensate her for her outside employment opportunity, which would pay her $\overline{U}$ at the end of every season until retirement.[6] We assume that if the manager leaves the firm in the interim period $\tau_t = 1$ of a season, she still obtains $\overline{U}$ from her outside employment opportunity for that season.[7] Figure 1 summarizes the timeline of a typical season.

Replacement and Autonomy If the board replaces the incumbent at the interim stage, the new manager is paid $\overline{U}$ to complete the season with the board's preferred strategy, which has a success likelihood of $\overline{\theta}$, requiring no effort and not giving rise to private information. Then, the board makes the manager an offer covering the whole potential relationship in the beginning of the following season. At this point, the board's problem of incentivizing the replacement manager is identical to that when appointing her predecessor. Specifically, the likelihood of becoming non-controversial in her first (complete) season is e_1, and then becomes $\{e(\theta_A), e(\theta_C)\}$ in all following seasons, depending on her private information from the preceding seasons. If a manager is replaced, it is assumed that she is not rehired. The following assumption further helps to streamline the analysis.

[5] Since both the board and managers are risk neutral and use the same discount factor, savings do not play a role, unless the manager tries to save to buy the firm or pay the board never to replace her. However, this would not arise if the board believes that a replacement manager can increase firm profits by more than what the incumbent believes can achieve.

[6] One could also think of $\overline{U}$ as the manager's payoff from pursuing her vision outside the present firm as in Klepper and Thompson (2010). It should be noted, however, that CEOs typically take a big pay cut in their new employment following dismissal (Fee and Pierce, 2004).

[7] One can also solve the model by assuming that the manager receives only $\eta\overline{U}$ in the season in which she discloses bad information (where $\eta \in [0, 1]$), but apart from some trivial case distinctions, the qualitative results are identical.

$\tau_t = 0$	$\tau_t = 1$	$\tau_t = 2$
If new manager: board offers contract covering relationship & manager accepts/rejects. Manager decides on costly effort – If effort exerted, probability of being non-controversial is $e_t(\theta_{t-1})$ – With probability $1 - e_t(\theta_{t-1})$ or if no effort: controversial.	Manager privately learns $\theta_t = \{\theta_A, \theta_C\}$ and can disclose $\widehat{\theta}$. Board decides on replacement $\psi_t^1(\widehat{\theta}_t) = \{keep, replace\}$ depending on $\widehat{\theta}$ and history – If $\psi_t^1\left(\widehat{\theta}_t\right) = replace$, manager paid $w_{s,t}$ – If no report $\widehat{\theta}_t$ & $\psi_t^1 = keep$ manager has autonomy.	$x_t = \{x, x + \Delta x\}$ realized. Probability of $x + \Delta x$ is θ_t. Manager paid $\{w_t, w_t + \Delta w_t\}$ & board decides on replacement $\psi_t^2(\widehat{\theta}, x_t) = \{keep, replace\}$ depending on $\widehat{\theta}_t$, x_t, history. If new manager hired in $\tau_t = 1$, paid $\overline{U}$ to pursue board's project $\overline{\theta}$ in t.

Figure 1: Timeline of a season.

Assumption 1. *The board's replacement and retention decisions should not be suboptimal given the information it has at that point in time.*

Assumption 1 rules out commitment not to renegotiate retention and replacement strategies that are suboptimal given the board's ex post information. In particular, it rules out replacing a manager who discloses θ_A or retaining a manager who discloses θ_C, as it is assumed that the board believes that $\theta_C < \overline{\theta} < \theta_G$.[8]

Autonomy results if the board retains the manager in the interim period $\tau_t = 1$ of a season without screening out her private information θ_t in that season.[9] In this case, the manager effectively has autonomy, as she can run the firm until the end of the season as she sees fit. This echoes Burkart et al.'s (1997) assumption that the board might abstain from "effective" control if it does not know the manager's information, which in the present setting is guaranteed to be the case if

$$e_t(\theta_C)\,\theta_A + (1 - e_t(\theta_C))\,\theta_C > \overline{\theta} \Longleftrightarrow e_t(\theta_C) > \frac{\overline{\theta} - \theta_C}{\theta_A - \theta_C}. \tag{1}$$

In this case, if the firm produces high cash flows at the end of this season, the board expects that the incumbent's likelihood of not being controversial in the following season will be higher than that of a replacement manager; the board assumes the opposite if the

[8] With continuous types, the board would exhibit more patience before replacing a manager (Taylor, 2010; Garrett and Pavan, 2012).

[9] Remaining uninformed is often optimal in dynamic settings with limited commitment (Hart and Tirole, 1988; Bester and Strausz, 2001).

firm has produced low cash flows

$$E\left[e_{t+1}\left(\theta_t\right)|x\right] < e_1 < E\left[e_{t+1}\left(\theta_t\right)|x+\Delta x\right], \tag{2}$$

where the expectation is about to realization of information θ_t, conditional on the cash flow realization in t and the prior history (though recall that θ_t follows a Markov process). A sufficient condition for (2) to hold in terms of primitives is given in the Appendix (cf. (57)). Assumption 2 implies that replacing a manager following low cash flows and retaining her after high cash flows in a season in which the board is uninformed about θ_t (which we show would be ex ante optimal in such seasons), would not clash with Assumption 1. Here it should be noted that Assumption 1 is not as strong as requiring full renegotiation-proofness. Section 3.2.2 discusses the implications of the case when stipulating autonomy in some seasons might not be renegotiation-proof.

Discussion: Interpretation of Productivity as Vision The standard interpretation of θ is that of the manager's productivity or fit with the firm, which changes over time. Declining productivity is referred to as controversial for the simple reason that managers are often perceived to have different beliefs about their abilities (cf. Introduction). Taking this perspective further, an alternative interpretation of θ is that of the manager's vision—her way of doing things and steering the firm at a level that is difficult for the board to control or verify. Specifically, assuming in addition that the board and the manager disagree on the profitability of the board's alternative and that the manager's actions are too hard or costly to verify, the board would be forced again to replace the manager to make sure that the firm's success probability is not θ_C.[10,11] Both interpretations of θ lead to the same analysis and are, thus, used interchangeably.

We conclude the model description with a brief note on the terminology. If a manager is replaced at the interim stage of a season following voluntary disclosure of θ_C, such turnover is labeled as *voluntary*, while turnover following underperformance as *forced*.

[10]For example, one can assume that the board believes that $\overline{\theta} > \theta_C$, while the incumbent manager believes that the board's preferred way has a success probability of only $\overline{\theta}^m < \theta_C$. The ability to partially keep the board in the dark is especially relevant when the manager is a firm insider who has an intimate understanding of the business compared an outside board. Over 75% of CEOs fit this description (Gillan et al., 2009).

[11]In practice, the reason beliefs might be heterogenous and there might be scope for disagreement is that there is no opportunity for the manager's and the board's beliefs about the board's alternative to converge, as it would pay off only if it is undertaken and then only at the end of the season. Examples for firms in which actions are not well-defined and vision and productivity are especially hard to judge based on very short-term metrics include firms that seek to stay ahead of the innovation curve, firms in the software, pharmaceutical-, bio-, and high-tech industries, mature firms seeking to reinvent themselves, or firms in industries undergoing change.

3 A Multi-Season Employment Relation

In the first season of the employment relation, the board decides in which seasons it would like to stimulate the manager to truthfully reveal her private information, and offers a contract covering the whole potential span of the employment relationship that implements this policy. The board's and manager's payoffs in season one can be stated as

$$V_1(\mathbf{w}) = E\left[\sum_{i=1}^{T} \delta^{i-1}\left(q_i(x_i - \omega_i) + \widetilde{q}_i V^*\right) + \delta^T q_{T-1} V^*\right] \tag{3}$$

$$U_1(\mathbf{w}) = E\left[\sum_{i=1}^{T} \delta^{i-1}\left(q_i(\omega_i - c) + \widetilde{q}_i \sum_{j=i+1}^{T} \delta^{j-i}\overline{U}_i\right)\right], \tag{4}$$

where $\mathbf{w}$ is the manager's contract, $\omega_t \in \{w_t, w_t + \Delta w_t, w_{s,t} + \overline{U}\}$ is the potential wage bill in season t,[12] which could depend on the manager's report, cash flow realizations, and prior history; E is the expectation over the future θ and x realizations; and q_i and $\widetilde{q}_i$ are the (endogenous) probabilities that the incumbent manager is still with the firm in season i and, respectively, leaves the firm by the end of that season.[13] V^* denotes the board's equilibrium expected payoff from hiring a new manager starting from the first complete season of that manager. Finally, T denotes the manager's upper tenure limit within the employment relation, where T is chosen to coincide with the manager's retirement age. The last term in (3) takes into account that the manager is replaced for sure after the final season regardless of the prior history.

Using (4) to plug in for the manager's compensation in (3), the board's objective in season one can be stated as that of choosing $\mathbf{w} = \{w_t(\widehat{\theta}), \Delta w_t(\widehat{\theta}), w_{s,t}(\widehat{\theta}), \psi_t^1(\widehat{\theta}), \psi_t^2(\widehat{\theta}, x_t)\}_{t=1}^{T}$, which includes setting the upper term limit T, to maximize

$$\max_{\mathbf{w}} -U_1(\mathbf{w}) + E\left[\sum_{i=1}^{T} \delta^{i-1}\left(q_i(x_i - c) + \widetilde{q}_i\left(\sum_{j=i+1}^{T} \delta^{j-i}\overline{U}_j + V^*\right)\right) + \delta^T q_{T-1} V^*\right], \tag{5}$$

subject to the constraints that the contract is feasible, individually rational, incentive compatible, and Assumption 1. Observe that the board's belief that $\overline{\theta} > \theta_C$ implies that it will always provide effort incentives, since the manager's value-added is the potential for generating θ_A. Overall, the board acts as a residual claimant and trades off maximizing

[12] If the manager is replaced at an interim stage $\tau_t = 1$ and obtains severance pay $w_{s,t}$, the board pays $\overline{U}$ to the new manager to complete the season, while the old manager obtains $\overline{U}$ from the labor market.

[13] Under the interpretation of vision, if there is disagreement about the board's alternative (footnote 10), it is without loss to assume that the expectation is taken from the board's point of view, as $\overline{\theta}$ (about whose magnitude relative to θ_C there is disagreement) does not enter the manager's payoff.

the firm's cash flows with minimizing the manager's payoff. Clearly, in equilibrium the board's expected payoff in (5) must be equal to V^*.

Specifying the relevant constraints requires some work. Before turning to this analysis, a useful benchmark is the first-best world in which the manager's effort is verifiable and she has no private information. In such a setting, the manager's rent, which captures how much her expected payoff from staying with the firm in the present season, $U_t(\theta_{t-1}, \mathbf{w}_t)$, is above her outside option

$$\nu_t(\theta_{t-1}, \mathbf{w}_t) := U_t(\theta_{t-1}, \mathbf{w}_t) - \sum_{j=t}^{T} \delta^{j-t}\overline{U}_j, \tag{6}$$

is zero in all seasons (where $\mathbf{w}_t$ denotes the manager's contract from t onwards). This can be achieved by paying her c in any given season to compensate her for the cost of exerting effort regardless of the outcome and her private information. Additionally, she is paid $\overline{U}$ if she is non-controversial. If she turns out to be controversial, she is dismissed and obtains $\overline{U}$ from her alternative employment. Crucially, the positive correlation of productivity/vision between seasons ($e(\theta_A) > e_1$) implies that it is not optimal to set a maximal tenure limit (i.e., the board hires the manager with the longest time to retirement T), as it is optimal to keep the manager on the job as long as she does not turn controversial. If effort and the manager's productivity/vision are not observable to the board, however, pursuing this first-best policy might require sharing a large rent with the manager.

The roadmap to solving the board's problem is as follows. Section 3.1 shows that the board will follow one of two strategies in any given season—(i) either pursue disclosure and replace managers if and only if there is disagreement or (ii) offer autonomy and replace a manager if and only if she produces low cash flows—and derives the manager's compensation needed to satisfy the relevant constraints for each of these strategies. Section 3.2 analyzes then the optimal dynamic disclosure/autonomy policy and its implementation.

3.1 Voluntary and Forced Turnover

Suppose, first, that the board offers incentives for truthful disclosure in some given season t and acts on the information by replacing the manager if she discloses θ_C, i.e., $\psi_1^2(\theta_C) =$ *replace*. The positive correlation of productivity/vision across seasons ($e_{t+1}(\theta_A) > e_1$) together with $\theta_A > \overline{\theta}$ imply that it would be ex post suboptimal to replace an incumbent who reveals herself as non-controversial. Thus, $\psi_t^1(\theta_A) =$ *keep* and, regardless of the subsequent cash flow realization x_t, we have $\psi_t^2(\theta_A, x_t) =$ *keep*, unless the season coincides with the manager's retirement age. Otherwise both parties would benefit from renegotiations in accordance with Assumption 1.

If the board follows this strategy, we can neglect $\widehat{\theta}_t$ from the compensation contract, as the manager only obtains $w_{s,t}$ if disclosing θ_C, and can obtain $\{w_t, \Delta w_t\}$ only if disclosing θ_A. Thus, the conditions that the manager discloses her information truthfully upon which she stays (if disclosing θ_A) or leaves with a severance package (if disclosing θ_C) are

$$\begin{aligned} w_t + \theta_A \Delta w_t + \delta \widehat{U}_{t+1}(\theta_A, \mathbf{w}_{t+1}) &\geq w_{s,t} + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j & (7) \\ w_{s,t} + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j &\geq w_t + \theta_C \Delta w_t + \delta \widehat{U}_{t+1}(\theta_C, \mathbf{w}_{t+1}). & (8) \end{aligned}$$

In expressions (7)–(8), the manager's continuation payoff is defined as

$$\widehat{U}_{t+1}(\theta_t, \mathbf{w}_{t+1}) = \max\left(w_{s,t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j, U_{t+1}(\theta_t, \mathbf{w}_{t+1}) \right), \quad (9)$$

The max-operator in (9) takes into account that, after getting paid in the end of season t, the manager could still decide to leave in season $t+1$ without exerting effort or stay and follow the envisaged equilibrium, which has an expected payoff $U_{t+1}(\theta_t, \mathbf{w}_{t+1})$.[14] Crucially, the manager's continuation payoff depends on her private information θ_t from season t.

To induce the manager to exert effort in season t, the contract must further satisfy

$$U_t(\theta_{t-1}, \mathbf{w}_t) = \begin{pmatrix} e_t(\theta_{t-1})(w_t + \theta_A \Delta w_t + \delta U_{t+1}(\theta_A, \mathbf{w}_{t+1})) \\ +(1 - e_t(\theta_{t-1}))\left(w_{s,t} + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j\right) - c \end{pmatrix} \geq w_{s,t} + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j, \quad (10)$$

where the right-hand-side of (10) captures that a manager who does not exert effort becomes controversial with certainty and is replaced in $\tau_t = 1$ of the season.

Conditions (7)–(10) illustrate the effect of costly effort on the manager's compensation contract. Absent costly effort, the board would pay the manager a fixed wage equal to her outside option, $w_t = \overline{U}$, and would set her bonus and severance pay to zero, $w_{s,t} = \Delta w_{,t} = 0$, in all seasons. This would satisfy (7) and (8) with equality. Thus, it would not only ensure participation, but it would also eliminate the manager's incentives to hide controversial information, making her private information inconsequential. However, because effort is costly, the board might need to set $\Delta w_t > 0$ or promise a continuation

[14] In what follows we use $U_{t+1}(\theta_A, \mathbf{w}_{t+1})$ instead of $\widehat{U}_{t+1}(\theta_A, \mathbf{w}_{t+1})$ in (7), as $U_{t+1}(\theta_A, \mathbf{w}_{t+1})$ will always be strictly larger than $\sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j + w_{s,t+1}$ in equilibrium. Clearly, the manager's continuation payoff in the final season is $\widehat{U}_{T+1}(\theta_T, \mathbf{w}_{t+1}) = 0$.

payoff above the manager's outside option to satisfy (10). This would make satisfying (8) more difficult, and the manager might need to be offered severance pay to truthfully disclose controversial productivity/vision. The latter effect will play a key role for the design of the optimal contract.

Offering the Manager Autonomy Suppose, next, that the board does not offer incentives for truthful disclosure at the interim stage of some season t.[15] In this case, the manager has autonomy. Given the board's information in that season, the only *ex post* optimal replacement strategies are $\psi_t^1 = keep$, $\psi_t^2(x) = replace$, and $\psi_t^2(x + \Delta x) = keep$. Below we show that these strategies will be optimal also *ex ante* before the cash flow realizations in a season with managerial autonomy. If the board follows this strategy, it is necessary to assume that it can commit not to renegotiate away the manager's autonomy upon reaching a season with autonomy. This assumption is relaxed in Section 3.2.2.

In a season in which the board follows such a replacement strategy, it needs to make sure that exerting effort is better for the manager than not exerting effort and becoming controversial or leaving the firm

$$\begin{aligned} & w_t + (\theta_C + e_t(\theta_{t-1})\Delta\theta)\Delta w_t + \delta E_{\theta_t}\left[U_{t+1}^e(\theta_t, \mathbf{w}_{t+1})\right] - c \\ \geq \quad & \max\left(w_t + \theta_C \Delta w_t + \delta U_{t+1}^e(\theta_C, \mathbf{w}_{t+1}), \sum_{j=t}^{T} \delta^{j-t}\overline{U}_j\right), \end{aligned} \tag{11}$$

where we have defined

$$\begin{aligned} E_{\theta_t}\left[U_{t+1}^e(\theta_t, \mathbf{w}_{t+1})\right] &= e_t(\theta_{t-1}) U_{t+1}^e(\theta_A, \mathbf{w}_{t+1}) + (1 - e_t(\theta_{t-1})) U_{t+1}^e(\theta_C, \mathbf{w}_{t+1}) \\ U_{t+1}^e(\theta_t, \mathbf{w}_{t+1}) &= \theta_t \widehat{U}_{t+1}(\theta_t, \mathbf{w}_{t+1}) + (1 - \theta_t) \sum_{j=t+1}^{T} \delta^{j-t-1}\overline{U}_j. \end{aligned}$$

as the manager's continuation payoffs before and after the realization of θ_t, respectively.

Since there is no voluntary turnover in $\tau_t = 1$, it must further hold

$$w_t + \theta_C \Delta w_t + \delta U_{t+1}^e(\theta_C, \mathbf{w}_{t+1}) \geq \sum_{j=t}^{T} \delta^{j-t}\overline{U}_j + w_{s,t}, \tag{12}$$

Condition (12) takes into account that the constraint is more difficult to satisfy when the manager's productivity/vision is controversial. It further implies that the larger term in

[15] Since the contract is not conditional on the manager's report $\widehat{\theta}_t$, it is again without loss to neglect $\widehat{\theta}_t$ from the notation.

the max-term in (11) is the first one. Summarizing:

Lemma 1 *(i) In a season with truthful disclosure, the board keeps the manager if and only if her productivity/vision is* θ_A *regardless of the subsequent cash flow performance in that season. In this case, the manager's compensation contract must satisfy (7)–(10). (ii) Suppose that the board does not offer incentives for truthful disclosure, in which case it keeps the manager at the interim stage,* $\psi^1 = keep$*, but replaces her upon a low cash flow realization,* $\psi^2(\theta_t, x) = replace$*. In this case, the manager's compensation contract must satisfy (11)–(12).*

Replacement Strategies and Compensation We now show that for every season, the board will, indeed, choose between the two strategies described in Lemma 1 and characterize the compensation contract needed to implement either of them. What complicates the analysis of conditions (7)–(12) is that they depend on the compensation and disclosure policy in future seasons as well as past history. The first question this raises is whether the board should try to learn the manager's information from season $t-1$ (if it has not done so already) at the beginning of the next season t. However, this would require offering the manager the same information rent as when learning the manager's information in season $t-1$, without allowing for the perceived benefit of replacing the manager earlier.

Lemma 2 *If the board seeks disclosure of* θ_t*, it does so at the earliest point in time* $\tau_t = 1$*.*

For such seasons it holds:

Lemma 3 *The board needs to promise a positive bonus* $\Delta w_t > 0$ *in seasons with information disclosure.*

The alternative to Lemma 3 would be to set $\Delta w_t = 0$ and promise the manager a higher pay in the future. This would follow the standard argument that a higher continuation payoff in season $t+1$ boosts the manager's effort incentives in season t, making it possible to reduce the manager's pay (Lazear, 1979). However, in a season with disclosure, the replacement decision is not based on the firm's cash flows, but on the manager's type. This changes things dramatically. Since, to minimize the cost of incentivizing disclosure, the manager's incentive constraint (8) will be satisfied with equality, her effort incentives will depend on the difference in her expected bonus and continuation payoffs in the cases in which she is controversial and not (to see this, plug in (8) into (10)). But then it would not be possible to incentivize effort if $\Delta w_t = 0$. This follows immediately if the difference between $e(\theta_A)$ and $e(\theta_C)$ (and, thus, between the continuation payoffs) is small, but it is also true in general within this setting (see Appendix). Thus, it must be that $\Delta w_t > 0$.

Consider now the case in which the manager is not offered incentives for truthful disclosure (and, thus, has autonomy) in a given season. In this case, the negative effect of promising the manager a higher continuation payoff is not present, and it is optimal to delay paying the manager a bonus until a season in which she discloses her private information or until she reaches the maximal tenure limit.

Lemma 4 *(i) The manager's bonus in seasons in which the board does not offer incentives for truthful disclosure is optimally set to zero* $\Delta w_t = 0$*. This is achieved by increasing the manager's continuation payoff. (ii) Furthermore, it is* ex ante *optimal to replace the manager following a low cash flow realization in seasons in which the board gives the manager autonomy,* $\psi_t^2(x) = replace$*, but not otherwise,* $\psi_t^2(x + \Delta x) = keep$*.*

The second part of Lemma 4 relies on the fact that low cash flows in season t are more likely if the manager has not exerted effort or has developed a controversial productivity/vision in the preceding season. Thus, punishing the manager upon bad performance in season t improves her effort incentives in the preceding season. Another beneficial effect is that if the board seeks disclosure in the preceding season, reducing the manager's continuation payoff makes it less attractive for the manager to hide controversial productivity/vision. Thus, if the board relies on the realized cash flows (rather than truthful information disclosure) to judge the manager's fit, it is ex ante optimal to replace a manager if and only if the firm produces low cash flows as dictated in the second part of Lemma 1. Assumption (2) guarantees that this policy is not only optimal ex ante, but also given the information at the board's disposal at the end of the season. Summarizing these results, we have:

Proposition 1 *The board will pursue one of two replacement strategies in any given season* t*. The first strategy is to provide incentives for truthful information revelation, in which case the manager is replaced (retires voluntarily) after developing controversial productivity/vision, but stays otherwise:* $\psi_t^1(\theta_A) = keep$*,* $\psi_t^1(\theta_C) = replace$*,* $\psi_t^2(\theta_A, x_t) = keep$*.*

Implementing this strategy in season t, requires offering

$$\begin{aligned}
\Delta w_t &= \begin{cases} \frac{c}{e_t(\theta_C)\Delta\theta} + \delta\frac{\widehat{U}_{t+1}(\theta_C,\mathbf{w}_{t+1}) - U_{t+1}(\theta_A,\mathbf{w}_{t+1})}{\Delta\theta} & \text{if disclosure in } t-1 \\ \max\begin{pmatrix} \Delta w_{t-n}^{-1}(0), \\ \frac{c}{e_t(\theta_C)\Delta\theta} + \delta\frac{\widehat{U}_{t+1}(\theta_C,\mathbf{w}_{t+1}) - U_{t+1}(\theta_A,\mathbf{w}_{t+1})}{\Delta\theta} \end{pmatrix} & \begin{array}{c} \text{if no disclosure} \\ \text{in } t-n \text{ to } t-1 \end{array} \end{cases} \quad (13) \\
w_t &= 0 \quad (14) \\
w_{s,t} &= \max\left(0, \theta_C\Delta w_t + \delta\widehat{U}_{t+1}(\theta_C,\mathbf{w}_{t+1}) - \sum_{j=t}^{T}\delta^{j-t}\overline{U}_j\right), \quad (15)
\end{aligned}$$

where $\Delta w_t = \Delta w_{t-n}^{-1}(0)$ is defined to mean that the manager's bonus following n seasons with managerial autonomy (i.e., without disclosure) is sufficiently high that the manager's bonus in the preceding n non-disclosure season(s) can be set to zero without violating (11)-(12). The board always pursues this strategy in the final season T.[16]

The second strategy is to leave the manager autonomy ($\psi_t^1 = keep$) and fire her only if observing the low cash flow x at the end of the season ($\psi_t^2(x) = replace$, $\psi_t^2(x+\Delta x) = keep$). Implementing this alternative requires

$$\begin{aligned}
\Delta w_t &= \begin{cases} \frac{c}{e_t(\theta_C)\Delta\theta} + \delta\frac{U_{t+1}^e(\theta_C,\mathbf{w}_{t+1}) - U_{t+1}^e(\theta_A,\mathbf{w}_{t+1})}{\Delta\theta} = 0 & \text{if disclosure in } t-1 \\ 0 & \text{if no disclosure in } t-1 \end{cases} \quad (16) \\
w_t &= \max\left(0, \sum_{j=t}^{T}\delta^{j-t}\overline{U}_j - \theta_C\Delta w_t - \delta U_{t+1}^e(\theta_C,\mathbf{w}_{t+1})\right) \quad (17) \\
w_{s,t} &= 0. \quad (18)
\end{aligned}$$

The board does not mix between these two strategies in any given season. In the first season $e_t(\theta_C)$ needs to be replaced by e_1.

[16]In the last season, the main cost comes from the need provide effort incentives, and incentivizing disclosure brings no further costs.

3.2 Managerial Autonomy, Tenure, and Turnover

Using Proposition 1, we can recursively derive the manager's payoff from

$$U_t(\theta_{t-1}, \mathbf{w}_t) = \begin{cases} \begin{pmatrix} e_t(\theta_{t-1})(w_t + \theta_A \Delta w_t + \delta U_{t+1}(\theta_A, \mathbf{w}_{t+1})) \\ +(1 - e_t(\theta_{t-1}))\left(w_{s,t} + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j\right) - c \end{pmatrix} & \text{if disclosure in } t \\ \begin{pmatrix} w_t + (\theta_C + e_t(\theta_{t-1})\Delta\theta)\Delta w_t \\ +\delta E_{\theta_t}\left[U^e_{t+1}(\theta_t, \mathbf{w}_{t+1})\right] - c \end{pmatrix} & \text{if no disclosure in } t \end{cases} \tag{19}$$

in every season for any disclosure/autonomy policy the board will choose from. Thus, the board's objective can be restated as choosing among these policies, so as to maximize (5).

The reason the board might refrain from the first-best replacement strategy is that this might require giving up too much information rent to the manager. This policy would require seeking information disclosure in every season and not setting upper tenure limits. Using from Proposition 1 that (10) is binding for $\theta_{t-1} = \theta_C$, the manager's expected payoff in a season with disclosure is

$$U_t\left(\theta_{t-1}, \mathbf{w}^d_t\right) = \left(\frac{e_t(\theta_{t-1})}{e_t(\theta_C)} - 1\right) c + w^d_{s,t} + \sum_{j=t}^{T} \delta^{j-t} \overline{U}, \tag{20}$$

where the superscript d stands for disclosure. Suppose that the board seeks disclosure in every season. Expression (20) implies that the manager's rent in any given season is simply $\nu_t\left(\theta_{t-1}, \mathbf{w}^d_t\right) = \left(\frac{e_t(\theta_{t-1})}{e_t(\theta_C)} - 1\right) c + w^d_{s,t}$. If this rent is positive in every season, plugging in for $w^d_{s,t}$, we can express the manager's rent in the first season when the board makes the contract offer as

$$\begin{aligned} \nu_1 &= \frac{\theta_C c}{e_1 \Delta\theta} + \delta \frac{\theta_A U_2\left(\theta_C, \mathbf{w}^d_2\right) - \theta_C U_2\left(\theta_A, \mathbf{w}^d_2\right)}{\Delta\theta} - \sum_{j=1}^{T} \delta^{j-1} \overline{U} \\ &= \frac{\theta_C c}{e_1 \Delta\theta} - \overline{U} - \delta \frac{\theta_C}{\Delta\theta}\left(\frac{\Delta e_2}{e_2(\theta_C)}\right) c + \delta w^d_{s,2} \\ &= \frac{\theta_C c}{e_1 \Delta\theta} - \overline{U} - \delta \frac{\theta_C}{\Delta\theta}\left(\frac{\Delta e_2}{e_2(\theta_C)}\right) c + \delta\left(\frac{\theta_C c}{e_2(\theta_C)\Delta\theta} - \overline{U} - \delta \frac{\theta_C}{\Delta\theta}\left(\frac{\Delta e_2}{e_3(\theta_C)}\right) c + \delta w^d_{s,3}\right) \\ &= \frac{\theta_C c}{e_1 \Delta\theta} - \overline{U} + \sum_{j=2}^{T} \delta^{j-1}\left(\frac{\theta_C}{\Delta\theta}\left(\frac{1 - \Delta e_j}{e_j(\theta_C)}\right) c - \overline{U}\right), \end{aligned} \tag{21}$$

where $\Delta e_t = e_t(\theta_A) - e_t(\theta_C)$ captures the positive correlation of productivity/vision across seasons. This correlation helps to reduce the rent that needs to be promised to the manager, since having non-controversial productivity/vision increases the likelihood of not being controversial also in the following season. Thus, if $\frac{\theta_C}{\Delta\theta}\left(\frac{1-\Delta e_t}{e_t(\theta_C)}\right)c < \overline{U}$, the manager's rent decreases towards zero as T increases.

Proposition 2 *The board follows the first-best policy of offering unlimited tenure, while incentivizing information disclosure in all seasons and relying only on voluntary turnover upon the disclosure of controversial productivity/vision if*

$$\frac{\theta_C}{\Delta\theta}\left(\frac{1-\Delta e_t}{e_t\left(\theta_C\right)}\right)c-\overline{U}<0 \text{ in all } t. \tag{22}$$

If the reverse inequality holds, the board might find it optimal to set a limit on maximal tenure and/or leave the manager autonomy in some seasons. This case features both voluntary and forced turnover.

If condition (22) does not hold, the benefit of positive correlation across seasons is not strong enough to offset the cost that the board needs to give up rent to the manager regardless of whether or not she agrees with the manager's productivity/vision. Discounting aside, the manager's severance pay (and, thus, her rent) increases linearly in the number of seasons the manager can stay with the firm. Intuitively, by hiding information to avoid disagreement, the manager can stay on the job even following underperformance and extract a high wage also in the future. The incentives to do so are stronger and, thus, her severance package must be higher to induce truth telling, the longer tenure she can look forward to—an insight in line with Rau and Xu's (2013) evidence.

An immediate implication is that the cost of offering truthful incentives in the future is incorporated in the manager's pay already at the contract's inception. This is in stark contrast to the board's potential gain from employing the manager, which is realized only if the manager stays with the firm. Since the likelihood that the manager remains non-controversial dwindles with his tenure, the expected benefit of an additional season is only a fraction of what the board could expect from the previous season. Thus, if (22) is not satisfied, the rent that needs to be promised to the manager will eventually increase faster than the board's expected benefit of learning the manager's private information in one more season. Hence, it becomes optimal to give the manager autonomy at least in some seasons (risking that the manager would have controversial productivity/vision) or set an upper limit on the manager's maximal tenure. Both of these distortions reduce the firm's cash flows from the board's point of view.

3.2.1 Offering Managers Autonomy

The downside of not learning the manager's information and leaving her autonomy is that the board could make the wrong retention and replacement decision. This introduces a distortion not only in season t, but also in season $t+1$, as the positive correlation between seasons implies that retaining a controversial manager in t increases the likelihood that she is controversial also in $t+1$. However, offering autonomy comes with the compelling advantage of reducing the rent that needs to be promised to the manager.

To illustrate this with an example, suppose that, following disclosure in $t-1$, the board gives the manager autonomy in season t, but otherwise follows the same policy as in the previous section. Plugging in from Proposition 1 for the case in which $w_t = 0$, the manager's expected payoff in season t can be stated as[17]

$$\begin{aligned} U_t\left(\theta_{t-1}, \mathbf{w}_t^{nd}\right) &= \frac{\theta_A \delta \left(U_{t+1}^e\left(\theta_C, \mathbf{w}_{t+1}^{nd}\right) - \theta_C U_{t+1}^e\left(\theta_A, \mathbf{w}_{t+1}^{nd}\right)\right)}{\Delta\theta} + \left(\frac{\frac{\theta_C}{\Delta\theta} + e_t\left(\theta_{t-1}\right)}{e_t\left(\theta_C\right)} - 1\right) c \\ &= \delta \frac{\theta_A \theta_C \left(U_{t+1}\left(\theta_C, \mathbf{w}_{t+1}^{nd}\right) - U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}^{nd}\right)\right)}{\Delta\theta} + \sum_{j=t+1}^{T} \delta^{j-t} \overline{U}_j \\ &\quad + \left(\frac{\frac{\theta_C}{\Delta\theta} + e_t\left(\theta_{t-1}\right)}{e_t\left(\theta_C\right)} - 1\right) c, \end{aligned} \tag{23}$$

where the superscript nd highlights that there is no disclosure in season t. We can compare now the manager's payoff in season t under disclosure and non-disclosure respectively. Subtracting (23) from (20), we obtain

$$\begin{aligned} &\delta \frac{\theta_A U_{t+1}\left(\theta_C, \mathbf{w}_{t+1}^{d}\right) - \theta_C U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}^{d}\right)}{\Delta\theta} \\ &- \left(\delta \frac{\theta_A \theta_C \left(U_{t+1}\left(\theta_C, \mathbf{w}_{t+1}^{nd}\right) - U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}^{nd}\right)\right)}{\Delta\theta} + \sum_{j=t+1}^{T} \delta^{j-t} \overline{U}_j\right) \qquad (24) \\ = &\ \delta \left(\frac{\theta_A \nu_{t+1}\left(\theta_C, \mathbf{w}_{t+1}^{d}\right) - \theta_C \nu_{t+1}\left(\theta_A, \mathbf{w}_{t+1}^{d}\right)}{\Delta\theta} - \frac{\theta_A \theta_C \left(\nu_{t+1}\left(\theta_C, \mathbf{w}_{t+1}^{nd}\right) - \nu_{t+1}\left(\theta_A, \mathbf{w}_{t+1}^{nd}\right)\right)}{\Delta\theta}\right) \\ \geq &\ \frac{\delta}{\Delta\theta} \left(\theta_A \left(1-\theta_C\right) \nu_{t+1}\left(\theta_C, \mathbf{w}_{t+1}^{d}\right) - \theta_C \left(1-\theta_A\right) \nu_{t+1}\left(\theta_A, \mathbf{w}_{t+1}^{d}\right)\right) \\ > &\ \frac{\delta}{\Delta\theta} \left(1-\theta_C\right) \left(\theta_A \nu_{t+1}\left(\theta_C, \mathbf{w}_{t+1}^{d}\right) - \theta_C \nu_{t+1}\left(\theta_A, \mathbf{w}_{t+1}^{d}\right)\right) > 0 \end{aligned}$$

where the first inequality follows from the fact that when there is disclosure in t, $\mathbf{w}_{t+1}^{nd}$

[17] If $w_t > 0$, the manager's rent is zero, and the result is immediate.

minimizes $\nu_{t+1}^{nd}(\theta_C, \mathbf{w}_{t+1}) - \nu_{t+1}^{nd}(\theta_A, \mathbf{w}_{t+1})$ (in expression 23), and the last inequality follows from the assumption that (22) is not satisfied. Hence, whenever the latter is the case, allowing the manager autonomy in some seasons leads to offering the manager less rent compared to when incentivizing both effort and disclosure. This illustrates the trade-off between maximizing efficiency and minimizing the manager's rent.

Figure 2 plots the manager's compensation when the board determines the optimal sequence of information disclosure seasons that maximize its expected payoff. The figure illustrates that the board will offer the manager autonomy in regular intervals, which will serve to keep the manager's severance pay (and, thus, rent) from growing too large. In particular, this rent is higher, the more seasons with information disclosure and, thus, rent extraction the manager has ahead of herself. The figure also illustrates that the manager obtains a non-trivial bonus conditional on achieving high cash flows in seasons with information disclosure.[18]

A point to note in Figure 2 is that it is suboptimal to elicit the manager's private information in every season even though the manager's wage is only a very small fraction of firm's value. The reason can be traced back to the discussion following Proposition 2. Adding an additional season with information disclosure, say in season $t+1$, increases almost linearly the manager's information rent in season one (see (21)). By contrast, the likelihood that the board will benefit from this policy in season $t+1$ is only $\Pi_{j=1}^{t} e_j(\theta_A)$, which is the likelihood that the board and manager keep agreeing until that season. Thus, the board's benefit from pursuing such policy quickly decreases with the length of the manager's prospective tenure.

INSERT FIGURE 2

While the optimal sequence of seasons with managerial autonomy and information disclosure cannot be derived in closed form, it is straightforward to show that contracts for which the manager's rent decreases more strongly in $\overline{U}$ become more attractive as $\overline{U}$ increases.

Proposition 3 *Take any two contracts giving a different level of autonomy to the manager over some maximal tenure length T. (i) The contract for which the manager's rent decreases more strongly in $\overline{U}$ becomes more attractive as $\overline{U}$ increases. (ii) The contract for which the firm's expected cash flows increase more strongly in Δx becomes more attractive as Δx increases.*

[18] Though this is outside the model, the manager's bonus could naturally be paid out over two years if for some reason this is needed to smooth consumption.

Focusing for now on the first part of Proposition 3, the natural question is when the manager's rent decreases more strongly in $\overline{U}$. An important insight that emerges from the numerical analysis is that the board opts more often for information disclosure when the manager's outside option $\overline{U}$ is higher. This is only natural, since a higher outside option makes the manager less reluctant to disclose information that would clash with the board and seek alternative employment. Hence, the rent that the board needs to promise her to reveal such information is lower, making this policy more attractive.

This intuition can be derived analytically for two special cases. The first is when a short-term shock affects the manager's outside option only in the first season of the employment relation. The second is when managers can be employed for at most two seasons (i.e., $T \leq 2$). In this case, it can also be derived that incentivizing truthful disclosure becomes more attractive as Δx increases, which parallels the second part of Proposition 3. This is because for larger firms and/or firms with higher growth prospects, there is more at stake from having the right manager in charge.

Proposition 4 *Factors affecting autonomy and disclosure:*
(i) Consider a short-term shock that increases the manager's outside option only in the first season. Such a shock makes giving autonomy in the first season less attractive, and stimulating truthful information disclosure more attractive.
(ii) Suppose that the manager can be employed for at most two seasons $T \leq 2$. Incentivizing truthful disclosure becomes more attractive for the board as $\overline{U}$ and Δx increase.

To the extent that managers' outside options are lower in industry downturns—e.g., because more firms are going bankrupt, fewer firms are being started, and there is more competition among the labor force for available positions—an immediate corollary is that:

Corollary 1 *(i) There is less disclosure in industry downturns. This implies less voluntary and more forced turnover in downturns, which might appear to an outsider as a lack of relative performance evaluation. (ii) Despite being ex post more likely to replace managers in downturns, the board is ex ante more likely to retain controversial managers due to offering less adequate incentives for truthful disclosure. This might exacerbate downturns.*

Discussion: Implementation A simple way to implement policies that alternate between providing incentives for information disclosure and giving the manager autonomy in regular intervals (Figure 2), is with renewable fixed-term contracts that trigger severance pay if the *board* prematurely terminates the CEO's contract. This implementation takes into account that in practice a contract either contains ex ante severance agreement or it doesn't, and that severance agreements are triggered by premature terminations by the board (i.e., managers cannot otherwise claim $w_{s,t}$ without a "good reason," such as a change of duty, diminution of pay, or relocation (Rau and Xu (2013)).

The feature that makes renewable fixed-term contracts suitable is that the board can choose the end of the contract to coincide with a season in which it would be optimal to offer the manager autonomy. Specifically, the manager would have no incentives to disclose truthfully controversial productivity/vision if she expects that the board would choose to forgo premature termination close to the renewal date in favor of waiting until renewal, at which point it can costlessly replace the manager.[19] In such cases, the board would have to judge the manager solely based on her performance, and would renew the CEO's contract only if it is happy with that performance. Thus, both the board's and the manager's strategies would mimic those in a season with autonomy.

About half of CEO contracts in practice are renewable fixed-term contracts (Gillan et al., 2009), containing ex ante severance agreements (Rau and Xu, 2013; Brown, 2015). In line with Proposition 1, these severance agreements are usually a multiple of managers' salary and bonus and can depend on their remaining tenure. Moreover, performance induced turnover is much more likely towards the contract's renewable term-end (Cziraki and Groen-Xu, 2015), which is in line with the prediction of Proposition 1 that the board relies on the firm's performance in seasons with managerial autonomy. Thus, the above results provide a simple intuition why managers will be offered renewable fixed-term contracts that become performance-sensitive close to renewal. Based on Propositions 3–4, we predict:

Corollary 2 *(i) The board sets shorter term limits in downturns. (ii) Larger firms will offer longer-term contracts.*

The implementation with renewable fixed-term contracts raises the related question of whether the board would choose to set (non-renewable) tenure limits beyond which it does not extend the manager's tenure.

3.2.2 Renegotiations and Setting Maximal Tenure Limits

The preceding results show that it might be optimal for the board to leave the manager autonomy in some seasons in order to limit her rent. However, once reaching such a season, the board could offer to renegotiate the existing contract and restructure it in a way that

[19] This would destroy her chance of contract renewal without compensating her with severance pay in return. Clearly, this is anticipated by both parties (see Lemma 2).

offers incentives for truthful disclosure, as this would increase the firm's cash flows from the board's point of view. There are several reasons why pursuing this strategy can become optimal ex post, even if it is not optimal ex ante. First, one benefit of offering autonomy in t is that it decreases the manager's rent not only in t, but also in all preceding seasons. However, the latter benefit ceases to exist once both parties arrive in t. Second, there is scope for renegotiations after the manager' effort cost c in season t is sunk, as at this point incentivizing effort is no longer an objective.[20]

When the potential for renegotiations forces the board to offer a contract that incentivizes the manager to disclose her information in all seasons, the board faces the same problem as discussed in Proposition 2. Thus, if (22) is not satisfied, the board might have to offer a shorter non-renewable contract, as the manager's rent might otherwise become too high. A commitment to such limits is credible, as T is chosen to coincide with the manager's retirement age.

To gain some intuition about the factors affecting the manager's maximal tenure limit, it is helpful to consider again condition (22). It suggests that a higher per-season outside option $\overline{U}$ decreases the manager's rent. A more attractive outside employment opportunity makes the manager less reluctant to leave the firm, which reduces the rent she needs to be promised to truthfully disclose her information. Thus, given that the cost of keeping the manager longer is lower, while the benefit is unchanged, the board finds it optimal to offer longer-term contracts. Also similar to before, longer contracts are optimal if Δx is higher, as there is more at stake from holding on longer to a non-controversial manager.

Proposition 5 *Suppose that the first-best condition (22) is not satisfied, and that the board incentivizes truthful information disclosure in all seasons, thereby leaving the manager no autonomy. Then, the upper limit on the manager's tenure is higher if her per-season outside option* $\overline{U}$ *and cash flow upside* Δx *are higher.*

Returning to the point that upper tenure limits could are implemented by choosing T to coincide with the manager's retirement age, Proposition 5 implies:

Corollary 3 *Suppose that the first-best condition (22) is not satisfied, and that the board incentivizes truthful information disclosure in all seasons, thereby leaving the manager no*

[20] Indeed, renegotiations leading to increases in managers' severance pay are common in practice. Among the cases in which there was a clear conflict with the board, in 42% of the time the original contracts were renegotiated and the departing manager received substantial severance pay (Goldman and Huang, 2011, 2015). For similar evidence from firms entering bankruptcy, see Eckbo et al. (2016). Both papers acknowledge the difficulty of distinguishing between forced and voluntary turnover and follow different classifications.

autonomy. (i) Then, the board needs to offer younger managers higher severance pay. (ii) Furthermore, the board prefers hiring an older manager (i.e., T is lower) if $\overline{U}$ and Δx are lower. This implies that older managers are preferred in industry downturns and by smaller firms or firms with low growth potential.

While the second part of Corollary 3 has not been tested, the first part finds empirical support in Rau and Xu (2013).

Simple extensions of the model yield also other implications. Specifically, suppose that managers differ according to the likelihood e_t of developing non-controversial productivity/vision (and potentially the upside Δx they can generate). In this case, a board seeking effective control as in Proposition 5 could try to compensate for the need of more generous pay by hiring a less disagreement-prone manager (higher e_t) even if it comes at the cost of a lower upside potential (Δx). To the extent that more generalist (as opposed to specialist) CEOs are more likely to be non-controversial, this selection effect could imply that higher compensation goes hand-in-hand with hiring more generalist CEOs (Custódio et al., 2013). Furthermore, it implies that generalist CEOs would be more likely to leave "voluntarily," taking a severance package, rather than being forced out.

Corollary 4 *(i) Higher CEO pay could go hand-in-hand with hiring CEOs that are more likely to think like the board, such as more generalist CEOs. (ii) Such CEOs are more likely to leave voluntarily rather than depart following underperformance.*

3.2.3 Extension: Hiring Managers with Better Outside Options

Suppose now that the pool of potential managers differs according to their success likelihood e_t and their outside options $\overline{U}$. Furthermore, assume that condition (22) is not satisfied for all $\overline{U}$ and e_t. All remaining parameters of the model remain the same.

Clearly, if all information was common knowledge, the board would prefer hiring the manager with the highest likelihood e_t of being non-controversial and with the lowest outside option $\overline{U}$. However, when information is private, and the board must offer incentives for information disclosure, it pays the manager an "efficiency wage," which is above her outside option. In this case, hiring a manager with a higher outside option could be beneficial, since it reduces the need for generous severance pay $w_{s,t}$. This can be seen especially clearly in the extreme case in which the board stimulates information disclosure in all seasons (as in Section 3.2.2). Then, the board strictly prefers hiring a manager with a higher outside option. Thus, if the board is faced with the choice of selecting between a manager that has a higher likelihood e_t of not being controversial or one with a higher outside option $\overline{U}$, it might prefer the manager with the higher outside option.

Proposition 6 *Take any given autonomy/disclosure policy the board is seeking to implement over a given maximal tenure length of* T*. If* $\left(p(T)-\delta^{T}\right) > (1-\delta)\frac{\partial}{\partial\overline{U}}U_1(T)$*, the board's payoff increases in* $\overline{U}$ *for that policy.*[21] *Under full information disclosure in all seasons (Section 3.2.2), the board always prefers hiring a manager with a higher outside option. Furthermore, the board might prefer a manager with a higher outside option* $\overline{U}$ *to one who is less likely to be controversial (higher* e_t*).*

4 Conclusion and Implications

The paper presents a model in which managers' productivity/vision evolves over time, and managers are better informed about such changes. The board can restrict managers' autonomy to follow a vision that it might disagree with, but this is not always in shareholders' best interest, as it would require paying managers generous incentive and severance packages. Thus, the board will sometimes judge the manager's productivity/vision based on the firm's performance. Though inefficient from the board's perspective, as it does not preempt bad performance and would lead to inefficient replacement and retention decisions, giving a manager autonomy and judging her only based on her performance could keep her compensation from growing too large.

The main predictions from the analysis are as follows. First, boards would seek to restrict managerial autonomy to prevent having a manager with a controversial productivity/vision in charge, but will offer such autonomy in regular intervals to keep down the manager's compensation. The resulting optimal contract can be implemented with renewable fixed-term contracts, stipulating ex ante severance pay as a multiple of the manager's wage, but allowing to costlessly replace the manager when her term expires—contracts which are widely used in practice (Gillan et al., 2009; Rau and Xu, 2013). Thus, seemingly voluntary turnover, accompanied with severance pay, is likely to be common, if not the more common, form of turnover, as boards would prefer providing adequate incentives that managers truthfully inform them about aspects the board might find controversial before bad performance occurs. This suggests that selection might be of concern in empirical studies of the effectiveness of CEO contracts, neglecting that CEOs appearing to leave voluntarily might do so because of conflicts with the board.

Second, when managers' outside options are low, they will have more autonomy at the expense that the board will be more likely to replace them with little severance pay upon underperformance. This is because in such cases managers will be especially reluctant to

[21] Note, however, that a higher $\overline{U}$ might lead the board to choose a different disclosure policy.

lose their job, making it expensive to offer incentives to disclose controversial productivity/vision that would lead to dismissal. One implication of this result is that managers will have less adequate incentives to disclose controversial information in industry downturns, which would result in less voluntary and more forced turnover. There is, indeed, evidence for this result, but it has hitherto been interpreted as a lack of relative performance evaluation (Jenter and Kanaan, 2015). Furthermore, the stronger reliance on performance-, rather than preemption-based turnover in downturns is more likely to leave firms with managers with whom the board disagrees, even if the board subsequently seems overly active to replace the manager in case of underperformance. This might exacerbate downturns. Another implication is that contracts will be of shorter length in downturns. The paper further derives predictions relating firms' growth prospects and size to the length of managers' contracts. Specifically, contract length will be longer for larger firms and firms with better growth potential.

Third, in some cases the board will not be able to commit to offering the manager autonomy. In such cases, it is optimal to set maximal tenure limits and/or respectively hire older managers whose retirement age coincides with such limits. Such strategy helps to keep the manager's pay from growing too large, as younger manager would need to be offered larger severance packages. An important factor that affects tenure limits is again the manager's outside option, suggesting that boards would be more likely to hire older CEOs in industry downturns. Another implication is that the board will seek to mitigate the need for high compensation by seeking to hire managers with whom it is less likely to disagree, such as generalist CEOs. Thus, high pay might go hand-in-hand with hiring generalist CEOs. Fourth, the paper outlines that there can be a trade-off between hiring a manager with a higher outside option and one who is likely to be less controversial. While such a trade-off would not exist in a world in which information is common knowledge, hiring a manager with a higher outside option could lower the incentive and severance pay firms need to offer to their managers. However, this insight—that a higher outside option helps to keep the manager honest—implies that firms might prefer hiring a manager with high outside options even if it is unlikely that she will be better at running the firm.

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Appendix

Proof of Lemma 1. For the proofs below, it will be useful to reformulate the constraints given by (7)–(12).

(i) The condition that the manager exerts effort can be restated as

$$\Delta w_t \geq \frac{\frac{c}{e_t(\theta_{t-1})} - w_t - \delta U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right) + w_{s,t} + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j}{\theta_A} \tag{25}$$

From (7) and (8) and the feasibility constraint that $\Delta w \geq 0$, we have

$$\begin{aligned} & \frac{w_{s,t} - w_t + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j - \delta \widehat{U}_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right)}{\theta_C} \\ \geq \quad & \Delta w_t \geq \max\left(0, \frac{w_{s,t} - w_t + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j - \delta U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right)}{\theta_A}\right) \end{aligned} \tag{26}$$

implying that if (25) is satisfied, then so is (7). Hence, it is possible to find a Δw_t that satisfies the above constraints if

$$\begin{aligned} & \frac{w_{s,t} - w_t + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j - \delta \widehat{U}_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right)}{\theta_C} \\ \geq \quad & \Delta w_t \geq \max\left(0, \frac{\frac{c}{e_t(\theta_{t-1})} + w_{s,t} - w_t - \delta U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right) + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j}{\theta_A}\right). \end{aligned} \tag{27}$$

Note that if if $\Delta w_t \geq 0$, the upper bound is positive, as (8) together with the feasibility constraint on $w_{s.t}$ require that

$$w_{s,t} \geq \max\left(0, w_t - \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j + \theta_C \Delta w_t + \delta \widehat{U}_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right)\right). \tag{28}$$

Thus, to incentivize disclosure, the board needs to offer the manager a bonus (27) and a severance pay (28).The claim that $\psi^2\left(\theta_A, x_t\right) = keep$ follows from the arguments in the main text.

(ii) From (11), (12), and feasibility, we have:

$$\Delta w_t \geq \max\left(0, \frac{\frac{c}{e_t(\theta_{t-1})} + \delta U^e_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) - \delta U^e_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right)}{\Delta\theta}\right) \tag{29}$$

$$w_t \geq \left(0, \sum_{j=t}^{T} \delta^{j-t}\overline{U}_j - w_{s,t} - \delta U^e_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) - \theta_C \Delta w_t\right). \tag{30}$$

Q.E.D.

Proof of Lemma 2. Let $\widetilde{w}_{s,t}$ be the severance pay paid to the manager for disclosing private information θ_C in season $t-1$. Information disclosure at the beginning of season t after no disclosure in season $t-1$ requires that

$$U_t\left(\theta_A, \mathbf{w}_t\right) \geq \sum_{j=t}^{T} \delta^{j-t}\overline{U}_j + \widetilde{w}_{s,t} \geq U_t\left(\theta_C, \mathbf{w}_t\right). \tag{31}$$

Suppose that $\{w_{t-1}, \Delta w_{t-1}\}$ is a part of a feasible contract that does not induce disclosure in season $t-1$, but induces truthful disclosure in the beginning of season t. Multiplying all sides of (31) with δ and adding $w_{t-1} + \theta_A \Delta w_{t-1}$ on both sides of the first inequality, we obtain

$$\begin{aligned} & w_{t-1} + \theta_A \Delta w_{t-1} + \delta U_t\left(\theta_A, \mathbf{w}_t\right) \\ \geq\ & w_{t-1} + \theta_A \Delta w_{t-1} + \delta\left(\sum_{j=t}^{T} \delta^{j-t}\overline{U}_j + \widetilde{w}_{s,t}\right) \\ =\ & w_{t-1} + \theta_C \Delta w_{t-1} + \delta\left(\sum_{j=t}^{T} \delta^{j-t}\overline{U}_j + \widetilde{w}_{s,t}\right) + \Delta\theta\Delta w_{t-1} \\ =\ & \sum_{j=t-1}^{T} \delta^{j-t+1}\overline{U}_j + w_{s,t-1} + \widetilde{\omega}_{t-1} + \Delta\theta\Delta w_{t-1} \end{aligned} \tag{32}$$

where the last equality follows from the season $t-1$ analogue of (12), where we use that $\widehat{U}_t\left(\theta_C, \mathbf{w}_t\right) = \sum_{j=t}^{T} \delta^{j-t}\overline{U}_j + \widetilde{w}_{s,t}$, and where we define $\widetilde{\omega}_{t-1}$ as the difference between the left- and the right-hand-side of the season $t-1$ analogue of (12).[22] Consider now the requirements for truth-telling in an equilibrium in which the manager discloses truthfully

[22] Note, that all subscripts are with respect to $t-1$ rather than t as in (12).

already in season $t-1$

$$w_{t-1}+\theta_A\Delta w_{t-1}+\delta U_t\left(\theta_A,\mathbf{w}_t\right)\geq w_{s,t-1}+\sum_{j=t-1}^{T}\delta^{j-t+1}\overline{U}_j\geq w_{t-1}+\theta_C\Delta w_{t-1}+\delta\widehat{U}_t\left(\theta_C,\mathbf{w}_t\right).$$

From the first and the last line of (32), we see that a manager with information θ_A would would not have mimicked a manager with information θ_C if she were asked to disclose that information in season $t-1$ (cf. (7)) given a severance pay offer of $\widehat{w}_{s,t-1}:=w_{s,t-1}+\widetilde{\omega}_{t-1}$. Furthermore, from the third and the fourth line of (32), we obtain that a manager with information θ_C would have been indifferent to disclosing her information also in season $t-1$ (cf. (8)) if she was compensated for doing so with $\widehat{w}_{s,t-1}=w_{s,t-1}+\widetilde{\omega}_{t-1}$. Thus, the manager's expected rent is the same regardless of whether she discloses in season $t-1$ or in the beginning of season t. However, learning the manager's type in season $t-1$ increases the board's payoff, proving the claim. **Q.E.D.**

Proof of Lemma 3. The proof of Proposition 1 is based on the proofs of Lemma 3 and Lemma 4. These lemmas derive the manager's compensation contract depending on whether or not the board seeks to implement truthful disclosure in any given season.

We show the claim of Proposition 1 by induction, arguing that it is always satisfied in season 1 (Step 1). We then argue that if it is satisfied for all seasons up to season t, then it must also be satisfied in season $t+1$ (Step 2).

Step 1: *The constraints are satisfied with equality in Season 1.* We argue to a contradiction. Suppose that the claim is not true and that the board seeks to implement information disclosure in season 1. Recall that $e_1\left(\theta_A|h_1\right)=e_1\left(\theta_C|h_1\right)=e_1$ in season $t=1$. Reducing w_1 to its minimal value of $w_1=0$ relaxes both (27) and (28). Furthermore, setting Δw_1 to its minimal value relaxes (8), implying that we can solve for $w_{s,1}$ by satisfying (28) with equality. All of this is optimal for the board, as setting $\{w_1,\Delta w_1,w_{s,1}\}$ to their minimal values maximizes its expected payoff: it minimizes the manager's payoff, without affecting her incentives in the following seasons.

Step 2: *If the claim is true for all seasons until t, it is also true for season $t+1$.* From the perspective of season $t+1$, it is optimal to minimize the manager's rent in that season, which would call for making $\{w_{t+1},\Delta w_{t+1},w_{s,t+1}\}$ minimal. However, these contract parameters also affect the manager's continuation payoff from the perspective of the preceding seasons. In particular, we need to consider eight cases depending on whether there is information disclosure in season $t-1$, t , and $t+1$. In cases 1-4 below (continued in Lemma 4), we assume that there is information disclosure in season $t-1$. We then show that the remaining four cases in which there is no information disclosure in season $t-1$ can be solved in an analogous way, leading to the same results.

Case 1: Truthful information disclosure in seasons t and $t+1$. Suppose, first, that the board seeks to implement information disclosure in season t. The question is how the contract $\{w_{t+1}, \Delta w_{t+1}, w_{s,t+1}\}$ affects the manager's expected payoff in season t

$$U_t(\theta_{t-1}, \mathbf{w}_t) = e_t(\theta_{t-1})(w_t + \theta_A \Delta w_t + \delta U_{t+1}(\theta_A, \mathbf{w}_{t+1})) + (1 - e(\theta_{t-1}))\left(w_{s,t} + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j\right) - c.$$

Using the induction hypothesis (13)–(15) to plug into w_t, Δw_t, and $w_{s,t}$, this payoff becomes

$$\begin{aligned} &e_t(\theta_{t-1})\left(w_t + \frac{\theta_A c}{e_t(\theta_C)\Delta\theta} + \frac{\theta_A \delta \widehat{U}_{t+1}(\theta_C, \mathbf{w}_{t+1}) - \theta_C \delta U_{t+1}(\theta_A, \mathbf{w}_{t+1})}{\Delta\theta}\right) \\ &+ (1 - e(\theta_{t-1})) \max\left(\sum_{j=t}^{T} \delta^{j-t} \overline{U}_j, \frac{\theta_C c}{e_t(\theta_C)\Delta\theta} + \delta \frac{\theta_A \widehat{U}_{t+1}(\theta_C, \mathbf{w}_{t+1}) - \theta_C U_{t+1}(\theta_A, \mathbf{w}_{t+1})}{\Delta\theta}\right) - c. \end{aligned}$$

In what follows, it is shown that choosing $\{w_{s,t+1}, w_{t+1}, \Delta w_{t+1}\}$ as dictated in Proposition 1 minimizes

$$A(\mathbf{w}_{t+1}) := \theta_A \widehat{U}_{t+1}(\theta_C, \mathbf{w}_{t+1}) - \theta_C U_{t+1}(\theta_A, \mathbf{w}_{t+1}), \tag{33}$$

and, thus, minimizes $U_t(\theta_{t-1}, \mathbf{w}_t)$. At the end of Lemma 4, it is shown that minimizing U_t helps to minimize U_{t-1} and, thus, preceding recursively, one minimizes the manager's expected payoff all the way to season one.

Observe that it cannot be that $w_{s,t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j > U_{t+1}(\theta_C, \mathbf{w}_{t+1})$, as this would imply $\widehat{U}_{t+1}(\theta_C, \mathbf{w}_{t+1}) = w_{s,t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j$. (If this were the case, a manager with controversial productivity/vision in season t would stay, exert no effort in season $t+1$, as a result, generate again controversial productivity/vision, and leave upon being paid $w_{s,t+1}$.) However, in this case, the board would be better off increasing w_{t+1} and/or Δw_{t+1}, as this would decrease (33) by only affecting $U_{t+1}(\theta_A, \mathbf{w}_{t+1})$. Hence, we must have $U_{t+1}(\theta_C, \mathbf{w}_{t+1}) \geq w_{s,t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j$, which is equivalent to

$$\Delta w_{t+1} \geq \frac{\frac{c}{e_{t+1}(\theta_C)} - w_{t+1} + w_{s,t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j - \delta U_{t+2}(\theta_A, \mathbf{w}_{t+2})}{\theta_A}, \tag{34}$$

which is the $t+1$ analogue of (27). Thus, (34) guarantees truthful disclosure of θ_A in $t+1$, as well as effort incentives regardless of θ_t. Recall that truthful disclosure in season $t+1$

would further require (analogous to (27)) that

$$\frac{w_{s,t+1} - w_{t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j - \delta \widehat{U}_{t+2}\left(\theta_C, \mathbf{w}_{t+2}\right)}{\theta_C} \geq \Delta w_{t+1}. \tag{35}$$

In what follows, we show that (34), (35), and $w_{s,t+1} \geq 0$ will be binding. This would prove the induction step for case 1.

To find the contract parameters $\{w_{s,t+1}, w_{t+1}, \Delta w_{t+1}\}$ that minimize (33), subject to (34), (35), and $w_{s,t+1}, w_{t+1}, \Delta w_{t+1} \geq 0$, we apply Kuhn Tucker's Theorem. Define the function

$$\begin{aligned}
& \mathcal{L}\left(\mathbf{w}_{t+1}, \Lambda\right) \\
= \; & -\left(\theta_A e_{t+1}\left(\theta_C\right) - \theta_C e_{t+1}\left(\theta_A\right)\right)\left(w_{t+1} + \theta_A \Delta w_{t+1} + \delta U_{t+2}\left(\theta_A, \mathbf{w}_{t+2}\right)\right) \\
& -\left(\theta_A\left(1 - e_{t+1}\left(\theta_C\right)\right) - \theta_C\left(1 - e_{t+1}\left(\theta_A\right)\right)\right)\left(w_{s,t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j\right) + \Delta\theta c \\
& +\lambda\left(\Delta w_{t+1} - \frac{\frac{c}{e_{t+1}(\theta_C)} - w_{t+1} + w_{s,t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j - \delta U_{t+2}\left(e_{t+2}\left(\theta_A\right), \mathbf{w}_{t+2}\right)}{\theta_A}\right) \\
& +\mu\left(\frac{w_{s,t+1} - w_{t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j - \delta \widehat{U}_{t+2}\left(\theta_C, \mathbf{w}_{t+2}\right)}{\theta_C} - \Delta w_{t+1}\right) \\
& +\kappa w_{s,t+1} + \rho w_{t+1} + \chi \Delta w_{t+1}
\end{aligned}$$

where the first two lines correspond to (33),[23] and $\Lambda = \{\lambda, \mu, \kappa, \rho, \chi\}$ is the set of weakly positive Kuhn Tucker multipliers. Taking the the first order conditions

$$\begin{aligned}
\frac{\partial \mathcal{L}\left(\mathbf{w}_{t+1}, \Lambda\right)}{\partial w_{s,t+1}} &= 0 = -\left(\theta_A\left(1 - e_{t+1}\left(\theta_C\right)\right) - \theta_C\left(1 - e_{t+1}\left(\theta_A\right)\right)\right) - \lambda \frac{1}{\theta_A} + \mu \frac{1}{\theta_C} + \kappa \\
\frac{\partial \mathcal{L}\left(\mathbf{w}_{t+1}, \Lambda\right)}{\partial \Delta w_{t+1}} &= 0 = -\left(\theta_A e_{t+1}\left(\theta_C\right) - \theta_C e_{t+1}\left(\theta_A\right)\right)\theta_A + \lambda - \mu + \chi \\
\frac{\partial \mathcal{L}\left(\mathbf{w}_{t+1}, \Lambda\right)}{\partial w_{t+1}} &= 0 = -\left(\theta_A e_{t+1}\left(\theta_C\right) - \theta_C e_{t+1}\left(\theta_A\right)\right) + \lambda \frac{1}{\theta_A} - \mu \frac{1}{\theta_C} + \rho,
\end{aligned}$$

we obtain from the second and third conditions that $\theta_A \rho = \mu \frac{\Delta\theta}{\theta_C} + \chi$. From the first and third conditions, we further have $\kappa + \rho = \Delta\theta$. Finally, from the second condition, we have

$$\lambda = \left(\theta_A e_{t+1}\left(\theta_C\right) - \theta_C e_{t+1}\left(\theta_A\right)\right)\theta_A + \mu - \chi.$$

[23] The first two lines are the negative of (33), since the objective is to minimize (33).

Assuming now that $\Delta w_{t+1} \geq 0$ and $w_{s,t+1} \geq 0$ are not binding—i.e., $\chi = 0$ and $\kappa = 0$—we have: $\rho = \Delta\theta$, $\mu = \theta_A \theta_C$, and $\lambda = ((\theta_A e_{t+1}(\theta_C) - \theta_C e_{t+1}(\theta_A)) + \theta_C)\,\theta_A > 0$. Thus, $\rho, \mu, \lambda > 0$, implying that (34), (35), $\Delta w_{t+1} \geq 0$ must be binding. It is now straightforward to verify that this implies

$$\begin{aligned}
\Delta w_{t+1} &= \frac{c}{e_{t+1}(\theta_C)\,\Delta\theta} + \frac{\delta U_{t+2}(\theta_C, \mathbf{w}_{t+2}) - \delta U_{t+2}(\theta_A, \mathbf{w}_{t+2})}{\Delta\theta} \\
w_{s,t+1} &= \max\left(0, \theta_C \Delta w_{t+1} + \delta \widehat{U}_{t+2}(\theta_C, \mathbf{w}_{t+2}) - \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j\right).
\end{aligned}$$

If, instead $w_{s,t+1} \geq 0$ is binding, the manager extracts no rent in season $t+1$. For this case we argue in the main text that this would also imply that she extracts no rent in season t and the board will incentivize information disclosure in all preceding seasons following Proposition 1. The same arguments will apply to Case 3 below. We verify below that $\Delta w_{t+1} > 0$.

Case 2: Truthful information disclosure in season t and no disclosure in season $t+1$. In the case of no disclosure in season $t+1$, it is clearly optimal to set $w_{s,t+1} = 0$. Similar to case 1, we can show that, the board would like to minimize (33), subject to $U_{t+1}(\theta_C, \mathbf{w}_{t+1}) \geq w_{s,t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j$. The difference is that, absent information disclosure in $t+1$, we have

$$\begin{aligned}
U_{t+1}(\theta_t, \mathbf{w}_{t+1}) &= w_{t+1} + (\theta_C + e_{t+1}(\theta_t)\,\Delta\theta)\,\Delta w_{t+1} \\
&\quad + e_{t+1}(\theta_t)\,\delta U^e_{t+2}(\theta_A, \mathbf{w}_{t+2}) + (1 - e_{t+1}(\theta_t))\,\delta U^e_{t+2}(\theta_C, \mathbf{w}_{t+2}) - c,
\end{aligned} \tag{36}$$

implying that $U_{t+1}(\theta_C, \mathbf{w}_{t+1}) \geq w_{s,t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j$ becomes

$$\begin{aligned}
& w_{t+1} + (\theta_C + e_{t+1}(\theta_t)\,\Delta\theta)\,\Delta w_{t+1} \\
& + e_{t+1}(\theta_t)\,\delta U^e_{t+2}(\theta_A, \mathbf{w}_{t+2}) + (1 - e_{t+1}(\theta_t))\,\delta U^e_{t+2}(\theta_C, \mathbf{w}_{t+2}) - c \geq w_{s,t+1} + \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j.
\end{aligned} \tag{37}$$

Plugging (36) into $A(\mathbf{w}_{t+1})$, we obtain that $A(\mathbf{w}_{t+1})$ increases in w_{t+1} and Δw_{t+1}, since $\frac{\partial A(\mathbf{w}_{t+1})}{\partial w_{t+1}} = \Delta\theta$ and

$$\begin{aligned}
\frac{\partial A(\mathbf{w}_{t+1})}{\partial \Delta w_{t+1}} &= (\theta_A(\theta_C + e_{t+1}(\theta_C)\,\Delta\theta) - \theta_C(\theta_C + e_{t+1}(\theta_A)\,\Delta\theta)) \\
&= \theta_C \Delta\theta - e_{t+1}(\theta_A)\,\theta_C \Delta\theta + e_{t+1}(\theta_C)\,\theta_A \Delta\theta > 0,
\end{aligned}$$

implying that it is optimal to set w_{t+1} and Δw_{t+1} minimal subject to the analogue of (29) and (30) for season $t+1$ and (37). The latter two conditions imply (16).

Finally, it can be verified that for the contract specified in the Lemma, we would always have $\Delta w_t > 0$ (and so $\chi = 0$). To see this plug into Δw_t from (20) in case of disclosure in $t+1$ to obtain

$$\Delta w_t = \left(\frac{1}{e_t(\theta_C)\,\Delta\theta} - \delta \frac{\Delta e_{t+1}}{e_{t+1}(\theta_C)\,\Delta\theta} \right) c > 0.$$

In case of no disclosure in $t+1$, we obtain the same expression by plugging in from (23). **Q.E.D.**

Proof of Lemma 4. We continue in the steps of Lemma 3. Suppose we have no disclosure in t. The aim is to minimize

$$\begin{aligned} U_t(\theta_{t-1}, \mathbf{w}_t) &= w_t + (\theta_C + e_t(\theta_{t-1})\,\Delta\theta)\,\Delta w_t - c \\ &\quad + e_t(\theta_{t-1})\,\delta U^e_{t+1}(\theta_A, \mathbf{w}_{t+1}) + (1 - e_t(\theta_{t-1}))\,\delta U^e_{t+1}(\theta_C, \mathbf{w}_{t+1}). \end{aligned}$$

subject to (29) and (30). Clearly, in $t = 1$, the choice of w_1, Δw_1, and $w_{s,1}$ does has no effect on the payoffs in neither previous (as there are none) nor following seasons. Thus, the aim is to minimize both Δw_1 and w_1, implying that conditions (29) and (30) will hold with equality. This proves the first induction step.

Case 3: No disclosure in season t ***and truthful information disclosure in season*** $t+1$***.*** Observe that if choosing the compensation contract both in season t and $t+1$ as dictated in Proposition 1, would imply that $w_t > 0$, the manager's participation constraint in season t is be binding—i.e., $U_t(\theta_{t-1}, \mathbf{w}_t) = \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j$. Thus, the $t+1$ choice must indeed have been optimal. Suppose, instead, that choosing the compensation contract both in season t and $t+1$ as dictated in Proposition 1 would imply the infeasible $w_t < 0$ (and thus that $w_t = 0$). We show that this $t+1$ choice is still be optimal. The manager's payoff in season t is

$$\begin{aligned} &(\theta_C + e_t(\theta_{t-1})\,\Delta\theta) \max\left(0, \frac{\frac{c}{e_t(\theta_C)} + \delta\left(U^e_{t+1}(\theta_C, \mathbf{w}_{t+1}) - U^e_{t+1}(\theta_A, \mathbf{w}_{t+1}) \right)}{\Delta\theta} \right) - c \\ &+ e_t(\theta_{t-1})\,\delta U^e_{t+1}(\theta_A, \mathbf{w}_{t+1}) + (1 - e_t(\theta_{t-1}))\,\delta U^e_{t+1}(\theta_C, \mathbf{w}_{t+1}) \\ = &\begin{cases} \frac{\theta_A \delta U^e_{t+1}(\theta_C, \mathbf{w}_{t+1}) - \theta_C U^e_{t+1}(\theta_A, \mathbf{w}_{t+1})}{\Delta\theta} + \left(\frac{e_t(\theta_{t-1})}{e(\theta_C)} - 1 + \frac{\theta_C}{e_t(\theta_C)\Delta\theta} \right) c & \text{if } \Delta w_t \geq 0 \\ e_t(\theta_{t-1})\,\delta U^e_{t+1}(\theta_A, \mathbf{w}_{t+1}) + (1 - e_t(\theta_{t-1}))\,\delta U^e_{t+1}(\theta_C, \mathbf{w}_{t+1}) - c & \text{if } \Delta w_t = 0 \end{cases} \end{aligned} \tag{38}$$

Clearly if $\Delta w_t = 0$, the objective would be to minimize all of $\{w_{s,t+1} w_{t+1}, \Delta w_{t+1}\}$ subject to (34), (35), and $w_{t+1} \geq 0$, which would prove the claim. Thus, it remains to consider the case in which $\Delta w_t \geq 0$. Observe that $\Delta w_t \geq 0$ would require that

$$
\begin{aligned}
0 &\leq \frac{\frac{c}{e_t(\theta_C)} + \delta\left(U^e_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) - U^e_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right)\right)}{\Delta\theta} \\
&= \frac{\frac{c}{e_t(\theta_C)} + \delta\left(\theta_C U_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) - \theta_A U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right) + \Delta\theta \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j\right)}{\Delta\theta} \qquad (39)
\end{aligned}
$$

and it is straightforward to verify that $\Delta w_t \geq 0$ implies that we must have $w_t = 0$ (i.e., if $\Delta w_t \geq 0$, the manager's rent in t is positive).[24] To minimize the first line of (38), we need to minimize

$$
\begin{aligned}
& \theta_A \delta U^e_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) - \theta_C U^e_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right) \qquad (41) \\
=\; & \theta_A \theta_C \left(U_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) - U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right)\right) + \Delta\theta \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j
\end{aligned}
$$

or, thus, equivalently

$$
U_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) - U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right) \qquad (42)
$$

---

[24] The contract parameters that would lead to $w_t < 0$ (implying by feasibility that w_t will be set to 0) demand that

$$
\begin{aligned}
& \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j \\
\leq\; & \theta_C \frac{\frac{c}{e(\theta_A)} + \delta\left(U^e_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) - U^e_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right)\right)}{\Delta\theta} + \delta U^e_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) \qquad (40) \\
=\; & \begin{cases} \frac{\theta_C}{\Delta\theta}\left(\frac{c}{e(\theta_A)} + \delta\left(\theta_A U_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) - \theta_A U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right) + \frac{\Delta\theta}{\theta_C} \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j\right)\right) & \text{if } \Delta w_t \geq 0 \\ \delta\left(\theta_C U_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) + (1-\theta_C) \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j\right) & \text{if } \Delta w_t = 0 \end{cases}
\end{aligned}
$$

implying that (39) is a stricter condition than (40).

subject to (34), (35), (39), and $w_{s,t+1}, w_{t+1}, \Delta w_{t+1} \geq 0$. Hence, define

$$\begin{aligned}
& \mathcal{L}\left(\mathbf{w}_{t+1}, \Lambda\right) \\
= \; & -\left(e_{t+1}\left(\theta_C\right)-e_{t+1}\left(\theta_A\right)\right)\left(w_{t+1}+\theta_A \Delta w_{t+1}+\delta U_{t+2}\left(\theta_A, \mathbf{w}_{t+2}\right)\right) \\
& -\left(\left(1-e_{t+1}\left(\theta_C\right)\right)-\left(1-e_{t+1}\left(\theta_A\right)\right)\right)\left(w_{s,t+1}+\sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j\right) \\
& +\lambda\left(\Delta w_{t+1}-\frac{\frac{c}{e_{t+1}\left(\theta_C\right)}-w_{t+1}+w_{s,t+1}+\sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j-\delta U_{t+2}\left(\theta_A, \mathbf{w}_{t+2}\right)}{\theta_A}\right) \\
& +\mu\left(\frac{w_{s,t+1}-w_{t+1}+\sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j-\delta \widehat{U}_{t+2}\left(\theta_C, \mathbf{w}_{t+2}\right)}{\theta_C}-\Delta w_{t+1}\right) \\
& +\kappa w_{s,t+1}+\rho w_{t+1}+\chi \Delta w_{t+1} \\
& +\sigma\left(\theta_C U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right)-\theta_A U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right)+\Delta \theta \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j+\frac{c}{\delta e\left(\theta_A\right)}\right),
\end{aligned}$$

where $\Lambda=\{\lambda, \mu, \kappa, \rho, \chi, \sigma\}$ is the set of weakly positive Kuhn Tucker multipliers. Taking the first order conditions

$$\begin{aligned}
\frac{\partial \mathcal{L}\left(\mathbf{w}_{t+1}, \Lambda\right)}{\partial w_{s,t+1}}=0= \quad & -\left(\left(1-e_{t+1}\left(\theta_C\right)\right)-\left(1-e_{t+1}\left(\theta_A\right)\right)\right) \\
& +\sigma\left(\theta_C\left(1-e_{t+1}\left(\theta_C\right)\right)-\theta_A\left(1-e_{t+1}\left(\theta_A\right)\right)\right)-\lambda \frac{1}{\theta_A}+\mu \frac{1}{\theta_C}+\kappa \\
\frac{\partial \mathcal{L}\left(\mathbf{w}_{t+1}, \Lambda\right)}{\partial \Delta w_{t+1}}=0= \quad & -\left(e_{t+1}\left(\theta_C\right)-e_{t+1}\left(\theta_A\right)\right) \theta_A \\
& +\sigma\left(\theta_C e_{t+1}\left(\theta_C\right)-\theta_A e_{t+1}\left(\theta_A\right)\right) \theta_A+\lambda-\mu+\chi \\
\frac{\partial \mathcal{L}\left(\mathbf{w}_{t+1}, \Lambda\right)}{\partial w_{t+1}}=0= \quad & -\left(e_{t+1}\left(\theta_C\right)-e_{t+1}\left(\theta_A\right)\right) \\
& +\sigma\left(\theta_C e_{t+1}\left(\theta_C\right)-\theta_A e_{t+1}\left(\theta_A\right)\right)+\lambda \frac{1}{\theta_A}-\mu \frac{1}{\theta_C}+\rho
\end{aligned}$$

we obtain from the second and third condition that $\mu \frac{\Delta \theta}{\theta_C}=\theta_A \rho-\chi$. From the first and third condition, we have $\sigma=\frac{\kappa+\rho}{\Delta \theta}$. Hence, if $\rho>0$ then $\sigma>0$, implying that (39) is binding and $\Delta w_t=0$. Otherwise, if $\Delta w_t>0$, (39) must be lax and we must have $\sigma=0$. However, this would imply that $\kappa=\rho=0$, and further that $\mu=\chi=0$. But then the RHS of the second first order condition would be strictly positive, leading to a contradiction. Hence, we must have $\Delta w_t=0$. Suppose now that $\kappa=0$. In this case, $\sigma=\frac{\kappa+\rho}{\Delta \theta}$ implies that $\rho>0$, which then implies that $\mu>0$. We can deal with the cases in which $\kappa>0$ (i.e., $w_{s,t+1}=0$, in which case the manager will extract no rent) and $\chi>0$ as in Case 1.

Case 4: No disclosure in seasons t **and** $t{+}1$**.** Observe that, if setting $\{w_{s,t+1} w_{t+1}, \Delta w_{t+1}\}$ as dictated by Proposition 1 would imply that $w_t > 0$, the manager extracts no rent. Hence, this is strategy is (weakly) optimal. Suppose now that these contract parameters would imply $w_t < 0$ (and thus by feasibility $w_t = 0$). In this case, (38) implies that the board's objective is to minimize

$$\begin{array}{cl} U_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) - U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right) & \text{if } \Delta w_t \geq 0 \\ e_t\left(\theta_{t-1}\right) \delta U^e_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right) + \left(1 - e_t\left(\theta_{t-1}\right)\right) \delta U^e_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) & \text{if } \Delta w_t = 0 \end{array},$$

subject to the $t+1$ equivalent of (29) and (30), (39), and the feasibility restrictions. In the latter case, it is clearly optimal to minimize w_{t+1} and Δw_{t+1} subject to the respective constraints. To show the former case, we now argue similar to case 3. Since

$$\begin{aligned} U_{t+1}\left(\theta_t, \mathbf{w}_{t+1}\right) &= w_{t+1} + \left(\theta_C + e_{t+1}\left(\theta_t\right) \Delta\theta\right) \Delta w_{t+1} \\ &\quad + e_t\left(\theta_t\right) \theta_A \delta U_{t+2}\left(\theta_A, \mathbf{w}_{t+2}\right) + \left(1 - e_{t+1}\left(\theta_t\right)\right) \theta_C \delta U_{t+2}\left(\theta_C, \mathbf{w}_{t+1}\right) \\ &\quad + \left(e_t\left(\theta_t\right)\left(1-\theta_A\right) + \left(1 - e_{t+1}\left(\theta_t\right)\right)\left(1-\theta_C\right)\right) \left(\sum_{j=t+2}^{T} \delta^{j-t-2} \overline{U}_j\right) - c, \end{aligned}$$

neglecting all terms that do not depend on $\{w_{s,t+1} w_{t+1}, \Delta w_{t+1}\}$ from this payoff, we can define

$$\begin{aligned} & \mathcal{L}\left(\mathbf{w}_{t+1}, \Lambda\right) \\ = \; & -\left(e_{t+1}\left(\theta_C\right) - e_{t+1}\left(\theta_A\right)\right) \Delta\theta \Delta w_{t+1} \\ & + \lambda \left(\Delta\theta \Delta w_{t+1} + \delta(e_t\left(\theta_t\right) U^e_{t+2}\left(\theta_A, \mathbf{w}_{t+2}\right) - U^e_{t+2}\left(\theta_C, \mathbf{w}_{t+2}\right)) - \frac{c}{e_t\left(\theta_t\right)}\right) \\ & + \mu \left(w_{t+1} + \theta_C \Delta w_{t+1} + \delta U^e_{t+2}\left(\theta_C, \mathbf{w}_{t+2}\right) - \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j - w_{s,t+1}\right) \\ & + \kappa w_{s,t+1} + \rho w_{t+1} + \chi \Delta w_{t+1} \\ & + \sigma \left(\theta_C U_{t+1}\left(\theta_A, \mathbf{w}_{t+1}\right) - \theta_A U_{t+1}\left(\theta_C, \mathbf{w}_{t+1}\right) + \Delta\theta \sum_{j=t+1}^{T} \delta^{j-t-1} \overline{U}_j + \frac{c}{\delta e\left(\theta_C\right)}\right). \end{aligned}$$

Taking the first order condition with respect to Δw_{t+1}, we have

$$\begin{aligned} \frac{\partial \mathcal{L}\left(\mathbf{w}_{t+1}, \Lambda\right)}{\partial \Delta w_{t+1}} = 0 = \quad & -\left(e_{t+1}\left(\theta_C\right) - e_{t+1}\left(\theta_A\right)\right) \Delta\theta + \lambda \Delta\theta + \mu \theta_C + \chi \\ & + \sigma \left(\theta_C \left(\theta_C + e_{t+1}\left(\theta_A\right) \Delta\theta\right) - \theta_A \left(\theta_C + e_{t+1}\left(\theta_C\right) \Delta\theta\right)\right). \end{aligned} \tag{43}$$

Since the first line in (43) is positive, it must be that $\sigma > 0$ as the term following σ can be rewritten as $-\theta_C (1 - e_{t+1}(\theta_A)) - e_{t+1}(\theta_C)\theta_A \Delta\theta$ and is strictly negative. Hence, both in Case 3 and 4, we have that $\sigma > 0$, implying that $\Delta w_t = 0$ as claimed in the first part of Lemma 4. For completeness, note that from (38), we know that it is optimal to minimize w_{t+1} and $w_{s,t+1}$, as it minimizes the manager's payoff, while relaxing the $t+1$ analogue of (30). This proves (16)–(18) of Proposition 1.

Cases 5–8. No information disclosure in season $t-1$**.** Finally, suppose that there is no information disclosure in season $t-1$. To see that the proof for the remaining four cases is identical to those above, it is sufficient to show that choosing $\{w_{t+1}, \Delta w_{t+1}, w_{s,t+1}\}$ to minimize the manager's payoff in t again boils down to minimizing (33) in the case of disclosure in season t and (42) in the case of non-disclosure in season $t-1$ respectively. This can be easily verified by using the induction hypothesis to plug in for the manager's payoff in season t. We omit the details, as the derivations are straightforward.

(ii) The proof is a straightforward modification of Cases 2 and 4. Let the probability of replacing a manager following a low cash flow realization be γ. Absent information disclosure in $t+1$, the manager's expected payoff becomes

$$\begin{aligned} U_{t+1}(\theta_t, \mathbf{w}_{t+1}) \quad = \quad & w_{t+1} + (\theta_C + e_{t+1}(\theta_t)\Delta\theta)\Delta w_{t+1} - c \\ & + e_{t+1}(\theta_t)\begin{pmatrix} (\theta_A + (1-\theta_A)(1-\gamma_{t+1}))\,\delta U_{t+2}(\theta_A, \mathbf{w}_{t+2}) \\ + (1-\theta_A)\gamma_{t+1}\delta \sum_{j=t+2}^{T} \delta^{j-t-2}\overline{U}_j \end{pmatrix} \\ & + (1 - e_{t+1}(\theta_t))\begin{pmatrix} (\theta_C + (1-\theta_C)(1-\gamma_{t+1}))\,\delta U_{t+2}(\theta_C, \mathbf{w}_{t+2}) \\ + (1-\theta_C)\gamma_{t+1}\delta \sum_{j=t+2}^{T} \delta^{j-t-2}\overline{U}_j \end{pmatrix}. \end{aligned} \tag{44}$$

We can now follow the same steps as in Cases 2 and 4 to argue that setting $\gamma_{t+1} = 1$ minimizes (33) and (38), respectively.

Finally, we show that minimizing U_t minimizes U_{t-1}, and thus, proceeding recursively, minimizes the manager's payoff all the way to season one. From (38), this is clearly the case in the case of autonomy in season $t-1$, as then $\Delta w_{t-1} = 0$. To see that this is true also in the case of truthful disclosure in season $t-1$, plug in for w_t, Δw_t and $w_{s,t}$ into the season $t-1$ analogue to (33)

$$\begin{aligned}
& \theta_A \widehat{U}_t(\theta_C, \mathbf{w}_t) - \theta_C U_t(\theta_A, \mathbf{w}_t) \\
= & (\theta_A e_t(\theta_C) - \theta_C e_t(\theta_A))(w_t + \theta_A \Delta w_t + \delta U_{t+1}(\theta_A, \mathbf{w}_{t+1})) \\
& + (\theta_A(1 - e_t(\theta_C)) - \theta_C(1 - e_t(\theta_A))) \left(w_{,st} + \sum_{j=t}^{T} \delta^{j-t} \overline{U}_j \right) - \Delta\theta c \\
= & \varrho + \Delta\theta\delta \frac{\theta_A \widehat{U}_{t+1}(\theta_C, \mathbf{w}_{t+1}) - \theta_C U_{t+1}(\theta_A, \mathbf{w}_{t+1})}{\Delta\theta}
\end{aligned}$$

where ϱ stands for terms that are not related to contract provisions. We can see now that minimizing (33) minimizes the last expression, proving the claim. **Q.E.D.**

Proof of Proposition 1. The proof follows from Lemma 3 and 4. It remains to argue that the board will always seek disclosure in season T and that the board will not mix between the two strategies

Observe, first, that if the board seeks disclosure in the final season, we have

$$\begin{aligned}
\Delta w_t &= \max\left(\Delta w_{T-n}^{-1}(0), \frac{c}{e_T(\theta_C)\Delta\theta} \right) \\
w_{s,T} &= \max\left(0, \theta_C \Delta w_T - \overline{U}\right).
\end{aligned}$$

Instead, if the board seeks no disclosure in the final season, she can no longer delay payments, and she must offer a payment that satisfies (29)–(30), while also making it optimal to set $\Delta w_t = 0$ in the immediately preceding seasons with autonomy (in case there are such seasons). Thus,

$$\begin{aligned}
\Delta w_t &= \max\left(\Delta w_{T-n}^{-1}(0), \frac{c}{e_T(\theta_C)\Delta\theta} \right) \\
w_t &\geq \max\left(0, \overline{U} - \theta_C \Delta w_T\right).
\end{aligned}$$

Plugging into the manager's payoff U_T, we obtain that this payoff is identical in both cases. Intuitively, this is because the manager's rent in the final season is defined by the need to offer effort incentives and that the board keeps her past promises. Thus, the board will seek disclosure given its belief that this would allow it to achieve higher expected cash flows.

To conclude the proof, we use some of the insights from Section 3.2. Suppose to a contradiction that it were optimal to offer a contract for which the board mixes between stimulating disclosure and offering autonomy in some season t. For this to be the case, the board needs to be indifferent between the two strategies in season t. However, the manager's rent in season t is lower in case of autonomy than under disclosure (cf. (24), which implies that the same must be true for season $t-1$ and all preceding seasons (cf. (19)) for any given disclosure policy for these seasons. But then, from the perspective of these seasons, offering autonomy in season t would be preferred. Hence, offering a contract in season one that stipulates mixing in season t cannot make the board strictly better off. **Q.E.D.**

Proof of Proposition 2. We, first, introduce some notation and then argue to a contradiction.

Step 1. *Notation.* Let the likelihood that the manager retains her job depending on whether there is information disclosure and depending on the manager's information from the previous season be defined as (with some abuse of notation regarding e_1)

$$e_t = \begin{cases} \begin{array}{ccc} \text{if } t=1 & \text{if } 1<t\leq T & \\ \begin{pmatrix} e_1 & 0 \end{pmatrix} & \begin{pmatrix} e_t(\theta_A) & 0 \\ e_t(\theta_C) & 0 \end{pmatrix} & \text{disclosure} \\ \begin{pmatrix} e_1\theta_A & (1-e_1)\theta_C \end{pmatrix} & \begin{pmatrix} e_t(\theta_A)\theta_A & (1-e_t(\theta_A))\theta_C \\ e_t(\theta_C)\theta_A & (1-e_t(\theta_C))\theta_C \end{pmatrix} & \text{no disclosure} \end{array} \end{cases}.$$

The vector/matrix representation will be useful to minimize notation. Analogously, let the probability of replacement in any given season be defined as

$$p_t = \begin{cases} \begin{array}{ccc} \text{if } t=1 & \text{if } 1<t\leq T & \\ 1-e_1 & \begin{pmatrix} 1-e_t(\theta_A) \\ 1-e_t(\theta_C) \end{pmatrix} & \text{disclosure} \\ \begin{array}{c} e_1(1-\theta_A) \\ +(1-e_1)(1-\theta_C) \end{array} & \begin{pmatrix} e_t(\theta_A)(1-\theta_A)+(1-e_t(\theta_A))(1-\theta_C) \\ e_t(\theta_C)(1-\theta_A)+(1-e_t(\theta_C))(1-\theta_C) \end{pmatrix} & \text{no disclosure} \end{array} \end{cases}.$$

We can define now the discounted likelihood of replacement (and, thus, of obtaining V^* from hiring a new manager) over the course of the entire potential employment relation as

$$p(T) := \delta p_1 + \sum_{j=2}^{T-1} \delta^j \Pi_{i=1}^{j-1} e_i p_j + \delta^T \Pi_{i=1}^{T-1} e_i \mathbf{1}, \tag{45}$$

where note that the replacement probability in the final season T is $\mathbf{1} = (1;1)$. Similarly, we can define the expected amount that the outgoing manager would be paid by the outside labor market upon her dismissal as[25]

$$h\left(\overline{U},T\right) := \delta p_1 \sum_{j=2}^{T} \delta^{j-2}\overline{U}_j + \sum_{j=2}^{T-1}\left(\delta^j \Pi_{i=1}^{j-1} e_i p_j \sum_{k=j+1}^{T} \delta^{k-j-1}\overline{U}_k\right) \tag{46}$$

Since $\overline{U}$ is constant in all seasons, we obtain

$$\begin{aligned} h\left(\overline{U},T\right) \quad : \quad &= \frac{\overline{U}}{1-\delta}\left(\delta p_1\left(1-\delta^{T-1}\right) + \sum_{j=2}^{T-1}\delta^j \Pi_{i=1}^{j-1} e_i p_j \left(1-\delta^{T-j}\right)\right) \\ &= \frac{\overline{U}}{1-\delta}\left(-p_1\delta^T + \underbrace{\delta p_1 + \sum_{j=2}^{T-1}\delta^j \Pi_{i=1}^{j-1} e_i p_j}_{p(T)-\delta^T \Pi_{i=1}^{T-1} e_i \mathbf{1}} - \delta^T \sum_{j=2}^{T-1}\Pi_{i=1}^{j-1} e_i p_j\right) \\ &= \frac{\overline{U}}{1-\delta}\left(-p_1\delta^T + p\left(T\right) - \delta^T \Pi_{i=1}^{T-1} e_i \mathbf{1} - \delta^T\left(e_1 - \Pi_{i=1}^{T-1} e_i\right)\mathbf{1}\right) \\ &= \frac{\overline{U}}{1-\delta}\left(-\delta^T + p\left(T\right)\right). \end{aligned} \tag{47}$$

Using this notation, the board's equilibrium expected payoff in season one can be stated as

$$V^* = s_1\left(T\right) + p\left(T\right)V^* + h\left(\overline{U},T\right) - \nu_1\left(T\right) - \sum_{j=1}^{T}\delta^{j-1}\overline{U}_j. \tag{48}$$

where $s_1\left(T\right)$ is the sum of expected discounted cash flows over the whole potential contract length T. The functional dependence on T makes explicit that the maximal tenure length is T. Using (47), we can simplify (48) to

$$V^*\left(T\right) = \frac{s_1\left(T\right) - v_1\left(T\right)}{1-p\left(T\right)} - \frac{\overline{U}}{1-\delta} \tag{49}$$

Consider an equilibrium candidate featuring n seasons with information disclosure. Let $V_n^*\left(T\right)$ and V_{n+1}^*

Step 2. *Optimality of Upper Tenure Limits and/or Autonomy.* We argue to a contradiction. Suppose that the board incentivizes information disclosure in all season, we

[25] To be precise, in case of disclosure of controversial vision, the manager receives $\overline{U}$ from the outside labour market in the season in which she is fired, but the firm hires a new manager for $\overline{U}$ for the remainder of the season, and the two terms cancel out in board's expected payoff.

have

$$
\begin{aligned}
s_1(T) \quad : \quad & = x + \left(\overline{\theta} + e_1\left(\theta_A - \overline{\theta}\right)\right)\Delta x - c \\
& + \left(\delta e_1 + \sum_{j=2}^{T-1} \delta^j e_1 \Pi_{i=2}^{j} e_i(\theta_A)\right)\left(x + \left(\overline{\theta} + e(\theta_A)\left(\theta_A - \overline{\theta}\right)\right)\Delta x - c\right) \\
= \quad & x + \left(\overline{\theta} + e_1\left(\theta_A - \overline{\theta}\right)\right)\Delta x - c \\
& + \left(\delta e_1 \frac{\left(1 - e(\theta_A)^{T-1}\delta^{T-1}\right)}{1 - e(\theta_A)\delta}\right)\left(x + \left(\overline{\theta} + e(\theta_A)\left(\theta_A - \overline{\theta}\right)\right)\Delta x - c\right)
\end{aligned}
$$

$$
\left(\delta + \sum_{j=2}^{T-1} \delta^j a^{j-1}\right)
$$

Furthermore

$$
\begin{aligned}
1 - p(T) \quad = \quad & 1 - \left(\delta(1 - e_1) + \sum_{j=2}^{T-1} \delta^j e_1 e(\theta_A)^{j-2}(1 - e(\theta_A)) + \delta^T e_1 e(\theta_A)^{T-2}\right) \\
= \quad & (1 - \delta)\left(1 + \frac{\delta e_1\left(1 - e(\theta_A)^{T-1}\delta^{T-1}\right)}{1 - e(\theta_A)\delta}\right) \qquad (50)
\end{aligned}
$$

Plugging in for $s_1(T)$, $p(T)$, as well as for $h(T)$ from (47) and $v_1(T)$ from (21), (49) becomes

$$
\begin{aligned}
V^* \quad = \quad & \frac{\left(\begin{array}{c} x + \left(\overline{\theta} + e_1\left(\theta_A - \overline{\theta}\right)\right)\Delta x - c + \left(\delta e_1 \frac{\left(1-e(\theta_A)^{T-1}\delta^{T-1}\right)}{1-e(\theta_A)\delta}\right)\left(x + \left(\overline{\theta} + e(\theta_A)\left(\theta_A - \overline{\theta}\right)\right)\Delta x - c\right) \\ - \left(\frac{\theta_C c}{e_1 \Delta\theta} - \overline{U} + \frac{\delta\left(1-\delta^T\right)}{1-\delta}\left(\frac{\theta_C}{\Delta\theta}\left(\frac{1-\Delta e_t}{e_t(\theta_C)}\right)c - \overline{U}\right)\right) \end{array}\right)}{(1-\delta)\left(1 + \frac{\delta e_1\left(1-e(\theta_A)^{T-1}\delta^{T-1}\right)}{1-e(\theta_A)\delta}\right)} \\
& - \frac{\overline{U}}{1-\delta}.
\end{aligned}
$$

It is now sufficient to show that for $T \to \infty$, V^* can become negative. This is the case if

$$
\left(\frac{\theta_C}{\Delta\theta}\left(\frac{1 - \Delta e_t}{e_t(\theta_C)}\right)c - \overline{U}\right) > \frac{1-\delta}{\delta}\left(\begin{array}{c} \left(x + \left(\overline{\theta} + e_1\left(\theta_A - \overline{\theta}\right)\right)\Delta x - c\right) - \frac{\theta_C c}{e_1 \Delta\theta} \\ + \frac{\delta e_1}{1-e(\theta_A)\delta}\left(x + \left(\overline{\theta} + e(\theta_A)\left(\theta_A - \overline{\theta}\right)\right)\Delta x - c - \overline{U}\right) \end{array}\right) \qquad (51)
$$

The key observation now is that the RHS of (51), and in particular the second term, decreases towards zero as δ increases towards one. This reflects that the manager's rent increases linearly in T (but for discounting) even though the likelihood that the manager stays one season longer (and, thus, that the board enjoys the benefit of offering longer employment) is only $e(\theta_A)$. By contrast, the LHS of (51) is independent of δ. Thus, for any parameter constellation, there is a threshold $\widehat{\delta}$ such that for $\delta > \widehat{\delta}$, this condition is satisfied. Hence, in these cases the board will always deviate from the policy of pursuing truthful information disclosure in all seasons without a maximum tenure limit. **Q.E.D.**

Proof of Proposition 3. Consider an equilibrium candidate featuring n seasons with information disclosure. Let $V_n^*(T)$ and $V_{n+1}^*(T)$ be of equal maximal tenure T with V_{n+1}^* featuring one more season of information disclosure. In what follows, it is sufficient to argue that

$$\frac{\partial}{\partial \overline{U}}\left(V_{n+1}^*(T) - V_n^*(T)\right) > 0 \tag{52}$$

$$\frac{\partial}{\partial \Delta x}\left(V_{n+1}^*(T) - V_n^*(T)\right) > 0. \tag{53}$$

The increasing differences will imply that the $V_{n+1}^*(T)$ offer becomes increasingly more attractive for the board as $\overline{U}$ and Δx increase. Plugging in from (49), (52) and (53) can be rewritten as

$$\frac{\partial}{\partial \overline{U}}\left(V_{n+1}^*(T) - V_n^*(T)\right) = \frac{\partial}{\partial \overline{U}}\left(\frac{-v_{1,n+1}(T)}{1-p_{n+1}(T)} - \frac{-v_{1,n}(T)}{1-p_n(T)}\right)$$

$$\frac{\partial}{\partial \Delta x}\left(V_{n+1}^*(T) - V_n^*(T)\right) = \frac{\partial}{\partial \Delta x}\left(\frac{s_{1,n+1}(T)}{1-p_{n+1}(T)} - \frac{s_{1,n}(T)}{1-p_n(T)}\right)$$

proving the claim. **Q.E.D.**

Proof of Proposition 4. (i) Consider a shock that only increases the manager's outside option in season one. Clearly, the board's preference for disclosure when hiring a new manager after this season is unchanged by this shock. Let the board's expected payoff when hiring a new manager after season one be V^*. For season one, the board's payoff is

$$V = s_1(T) + p(T)V^* + h\left(\overline{U}, T\right) - U_1(T, \mathbf{w}_1).$$

Since the manager's outside option in season one, $\overline{U}_1$, does not enter $h\left(\overline{U}, T\right)$, it only affects $U_1(T, \mathbf{w}_1)$ in this expression. Consider, thus, $U_1(T, \mathbf{w}_1)$. Plugging into the manager's expected payoff (20) in the case she has autonomy in season one and, respectively, no autonomy (23), we obtain that $U_1(T, \mathbf{w}_1)$ depends on $\overline{U}_1$ only if the manager extracts no rent in that season (i.e., if $w_{s,1} = 0$ in case of disclosure, and $w_1 > 0$ in case of no disclosure). In this case, a unit increase in $\overline{U}_1$ leads to a unit increase in $U_1(T, \mathbf{w}_1)$. Thus, when comparing the manager's payoff with and without autonomy in season one, an increase in $\overline{U}_1$ would not change their relative attractiveness (i) either if under both offers the manager extracts rent or (ii) if under both offers the manager does not extract rent after an increase in $\overline{U}_1$. However, the relative attractiveness changes if an increase in $\overline{U}_1$ leads the manager to stop extracting rent under one of the offers (and, thus, $U_1(T, \mathbf{w}_1)$ starts to increase with $\overline{U}_1$), but not under the other offer. In (24), we have shown that the manager's rent is lower if she is not incentivized to disclose information. Thus, an increase in $\overline{U}_1$ makes offering incentives for information disclosure in season one more attractive.

(ii) Suppose that the manager lives for at most two seasons and that the first-best condition (22) is not satisfied. If employed for one season only, the board always seeks disclosure by Proposition 1. Thus, the proposition is based on the case with $T = 2$. We start by deriving the separate components of (49) and then plug into (52) and (53).

In the final season, the board always seeks disclosure by Proposition 1, implying that

$$\begin{aligned} U_2(\theta_1, \mathbf{w}_2) &= e_2(\theta_1)(w_2 + \theta_A \Delta w_2) + (1 - e_2)\left(w_{s,2} + \overline{U}\right) - c \\ &= (\theta_C + e_2(\theta_1)\Delta\theta)\Delta w_2 - c. \end{aligned}$$

were we use that $w_{s,2} = \theta_C \Delta w_2 - \overline{U}$ and $w_2 = 0$. If the board does not seek disclosure in the first season, the manager's bonus in the second season must be such that her bonus in season one can be set to zero. Thus, Δw_2 must be at least

$$\begin{aligned} 0 &= \frac{c}{e_1 \Delta\theta} + \delta \frac{U_{t+1}^e(\theta_C, \mathbf{w}_{t+1}) - U_{t+1}^e(\theta_A, \mathbf{w}_{t+1})}{\Delta\theta} \\ &= \frac{c}{e_1 \Delta\theta} + \delta \frac{\begin{array}{c} \theta_C((\theta_C + e_2(\theta_C)\Delta\theta)\Delta w_2 - c) + (1 - \theta_C)\overline{U} \\ -\theta_A((\theta_C + e_2(\theta_A)\Delta\theta)\Delta w_2 - c) + (1 - \theta_A)\overline{U} \end{array}}{\Delta\theta}, \end{aligned}$$

implying that $\Delta w_2 = \max\left(\frac{\frac{c}{e_1\Delta\theta} + c + \overline{U}}{\delta(\theta_A e_2(\theta_A) + \theta_C - \theta_C e_2(\theta_C))}, \frac{c}{e_2(\theta_C)\Delta\theta}\right)$. If the second term is binding,

$U_1\left(\mathbf{w}^{nd}\right)$ is independent of $\overline{U}$. If the first term is larger, we have

$$\begin{aligned}
\nu_1\left(\mathbf{w}^{nd}\right) &= \delta E_{\theta_t}\left[U_2^e\left(\theta_t,\mathbf{w}_{t+1}\right)\right]-c-\overline{U}\left(1+\delta\right)\\
&= \delta\left(\frac{\theta_C\left(e_C\theta_A+\left(1-e_C\right)\theta_C\right)}{\delta\left(\theta_Ae_A+\left(1-e_A\right)\theta_C\right)}\left(\frac{c}{e_1\Delta\theta}+c+\overline{U}\right)-\theta_Cc+\left(1-\theta_C\right)\overline{U}\right)-\overline{U}\left(1+\delta\right)\\
&= \theta_C\left(\frac{\left(e_C\theta_A+\left(1-e_C\right)\theta_C\right)}{\delta\left(\theta_Ae_A+\left(1-e_A\right)\theta_C\right)}\left(\frac{1}{e_1\Delta\theta}+1\right)-\delta\right)c\\
&\quad+\left(\frac{\theta_C\left(e_C\theta_A+\left(1-e_C\right)\theta_C\right)}{\delta\left(\theta_Ae_A+\left(1-e_A\right)\theta_C\right)}-1-\delta\theta_C\right)\overline{U}.
\end{aligned}$$

If the board does not seek disclosure in the first season, then by (21) the manager's rent is simply

$$\nu_1\left(\mathbf{w}^d\right)=\frac{\theta_C}{\Delta\theta}\left(\frac{1}{e_1}+\delta\left(\frac{1-\Delta e_j}{e_C}\right)\right)c-\overline{U}\left(1+\delta\right).$$

By plugging into (52), we obtain that

$$\begin{aligned}
&\frac{\partial}{\partial\overline{U}}\left(\frac{-\nu_1^d\left(2\right)}{1-p^d\left(2\right)}-\frac{-\nu_1^{nd}\left(2\right)}{1-p^{nd}\left(2\right)}\right)\\
=&\ \frac{1+\delta}{1-\delta\left(1-e_1\right)-\delta^2e_1}-\frac{-\delta\left(\frac{\theta_C\left(e_C\theta_A+\left(1-e_C\right)\theta_C\right)}{\delta\left(\theta_Ae_A+\left(1-e_A\right)\theta_C\right)}+\left(1-\theta_C\right)\right)+\left(1+\delta\right)}{1-\delta\left(1-e_1\theta_A-\left(1-e_1\right)\theta_C\right)-\delta^2\left(e_1\theta_A+\left(1-e_1\right)\theta_C\right)}\\
=&\ \frac{\left(1+\delta\right)\left(\left(E\theta-e_1\right)\delta\right)+\left(\theta_C\frac{\left(e_C\theta_A+\left(1-e_C\right)\theta_C\right)}{\left(\theta_Ae_A+\left(1-e_A\right)\theta_C\right)}+\delta\left(1-\theta_C\right)\right)\left(1+\delta e_1\right)}{\left(1-\delta\right)\left(1+\delta e_1\right)\left(1+\delta E\theta\right)}\\
>&\ \delta\frac{\left(1+\delta\right)\left(E\theta-e_1\right)+\delta\left(1-\theta_C\right)\left(1+\delta e_1\right)}{\left(1-\delta\right)\left(1+\delta e_1\right)\left(1+\delta E\theta\right)}
\end{aligned}$$

where $E_1\theta:=e_1\theta_A+\left(1-e_1\right)\theta_C$. After some transformations, the last expression becomes

$$\delta\frac{\left(\left(1+\delta\theta_C\right)\left(1-e_1\right)+\left(1+\delta\right)e_1\left(\theta_A-\theta_C\right)\right)}{\left(1-\delta\right)\left(1+\delta e_1\right)\left(1+\delta E\theta\right)}>0$$

Hence, (52) is positive, proving the claim.

Furthermore, we have

$$
\begin{aligned}
& \frac{s_1^d(2)}{1-p^d(2)}-\frac{s_1^{nd}(2)}{1-p^{nd}(2)} \\
= & \frac{x+\left(e_1\theta_A+\left(1-e_1\right)\overline{\theta}\right)\Delta x-c+\delta e_1\left(x+\left(e_A\theta_A+\left(1-e_A\right)\overline{\theta}\right)\Delta x-c\right)}{(1-\delta)\left(1+\delta e_1\right)} \\
& -\frac{x+\left(e_1\theta_A+\left(1-e_1\right)\theta_C\right)\Delta x-c+\delta\left(\begin{array}{c} e_1\theta_A\left(x+\left(e_A\theta_A+\left(1-e_A\right)\overline{\theta}\right)\Delta x-c\right) \\ +\left(1-e_1\right)\theta_C\left(x+\left(e_C\theta_A+\left(1-e_C\right)\overline{\theta}\right)\Delta x-c\right)\end{array}\right)}{(1-\delta)(1+\delta E\theta)}
\end{aligned}
$$

which after some transformations becomes

$$
\frac{\Delta x}{(1-\delta)\left(1+e_1\delta\right)(1+\delta E\theta)}\left(\begin{array}{c}\delta\left(\theta_A-\overline{\theta}\right)\left(\left(e_A-e_1\right)\left(e_1-E\theta\right)+\theta_C\Delta e\left(1-e_1\right)\left(1+\delta e_1\right)\right) \\ +\left(\overline{\theta}-\theta_C\right)\left(1-e_1\right)\left(1+\delta e_1\right)\end{array}\right)
$$

which is strictly positive even if $e_1<E\theta$, as then

$$
\begin{aligned}
& \left(e_A-e_1\right)\left(e_1-E\theta\right)+\theta_C\Delta e\left(1-e_1\right)\left(1+\delta e_1\right) \\
> & \Delta e\left(\theta_C\left(1-e_1\right)\left(1+\delta e_1\right)-\left(E\theta-e_1\right)\right)=\Delta e\left(e_1-e_1\theta_A\right)>0
\end{aligned}
$$

Hence, expression (53) is positive, proving also the second statement. **Q.E.D.**

Proof of Proposition 5. First, we argue that

$$
\frac{\partial}{\partial\overline{U}}\left(V^*\left(T'\right)-V^*(T)\right)=\frac{\frac{\partial}{\partial\overline{U}}h\left(T'\right)(1-p(T))-\frac{\partial}{\partial\overline{U}}h(T)\left(1-p\left(T'\right)\right)}{(1-p(T))\left(1-p\left(T'\right)\right)}>0 \qquad (54)
$$

where $T'=T+1$, and where the board incentivizes the same level of disclosure in the first T seasons, and incentivizes disclosure also in the final season T'. To obtain the equality, we use that in the case in question $\nu_1>0$ implies that $U_1(T)=\sum_{j=1}^{T}\delta^{j-1}\left(\delta\overline{U}_j\right)+v_1(T)$ is independent of $\overline{U}$ (cf. (20)). The increasing difference in (54) will imply that the T' offer becomes increasingly more attractive as $\overline{U}$ increases.

Recalling from (47) that $h(T)=\frac{\overline{U}}{1-\delta}\left(-\delta^T+p(T)\right)=\frac{\overline{U}}{1-\delta}\left(1-\delta^T+p(T)-1\right)$ and plugging in from (50), we can express (54) as

$$\begin{aligned}
& \frac{1}{1-\delta}\left(\left(1-\delta^{T+1}+p\left(T'\right)-1\right)\left(1-p\left(T\right)\right)-\left(1-\delta^{T}+p\left(T\right)-1\right)\left(1-p\left(T'\right)\right)\right) \\
= & \frac{1}{1-\delta}\left(\left(1-\delta^{T+1}\right)\left(1-p\left(T\right)\right)-\left(1-\delta^{T}\right)\left(1-p\left(T'\right)\right)\right) \\
= & \left(1-\delta^{T+1}\right)\left(1+\frac{\delta e_1\left(1-\left(\delta e_A\right)^{T-1}\right)}{1-\delta e_A}\right)-\left(1-\delta^{T}\right)\left(1+\frac{\delta e_1\left(1-\left(\delta e_A\right)^{T}\right)}{1-\delta e_A}\right) \\
= & \delta^T-\delta^{T+1}+\frac{\delta e_1}{1-\delta e_A}\left(\left(1-\delta^{T+1}\right)\left(1-\left(\delta e_A\right)^{T-1}\right)-\left(1-\delta^{T}\right)\left(1-\left(\delta e_A\right)^{T}\right)\right) \\
= & \delta^T-\delta^{T+1}+\frac{\delta e_1}{1-\delta e_A}\left(\delta^T-\delta^{T+1}+\left(\delta e_A\right)^{T-1}\left(-1+\delta^{T+1}+\delta e_A-\delta^{T+1}e_A\right)\right) \\
= & \frac{\delta^T}{1-\delta e_A}\left(\left(1-\delta\right)\left(1-\delta e_A+\delta e_1\right)+e_1 e_A\left(\delta^{T+1}\left(1-e_A\right)-\left(1-\delta e_A\right)\right)\right) \\
= & \frac{\delta^T}{1-\delta e_A}\left(\left(1-\delta\right)\left(1-\delta e_A\right)+e_1\left(\delta\left(1-\delta\right)+\left(e_A\right)^{T-1}\left(\delta^{T+1}\left(1-e_A\right)-\left(1-\delta e_A\right)\right)\right)\right) \quad (55) \\
\geq & 0
\end{aligned}$$

To see the last inequality, observe that expression (55) is positive if the term in brackets following e_1 is positive. Suppose that this term is negative, for which we must have $\left(\delta^{T+1}\left(1-e_A\right)-\left(1-\delta e_A\right)\right)<0$. In this case, expression (55) decreases in both e_1 and e_A. Take therefore $e_1=e_A=1$. Plugging into (55), we obtain that this expression becomes zero. Thus, for any T, $\delta\in[0,1]$, $e_A\in[0,1]$, $e_1\in[0,e_A]$, (55) is (weakly) positive, and it is strictly positive for $e_A<1$ and $\delta<1$, implying that we have strictly increasing differences in (54).

Next, we argue that

$$\frac{\partial}{\partial\Delta x}\left(V^*\left(T'\right)-V^*\left(T\right)\right)=\frac{\frac{\partial}{\partial\Delta x}s_1\left(T'\right)\left(1-p\left(T\right)\right)-\frac{\partial}{\partial\Delta x}s_1\left(T\right)\left(1-p\left(T'\right)\right)}{\left(1-p\left(T\right)\right)\left(1-p\left(T'\right)\right)}>0. \qquad (56)$$

Observe first that

$$\frac{\partial}{\partial\Delta x}s_1\left(T\right)=\left(\overline{\theta}+e_1\left(\theta_A-\overline{\theta}\right)\right)+\delta e_1\frac{\left(1-e\left(\theta_A\right)^{T-1}\delta^{T-1}\right)}{1-e\left(\theta_A\right)\delta}\left(\overline{\theta}+e\left(\theta_A\right)\left(\theta_A-\overline{\theta}\right)\right)$$

Plugging in for $p(T)$, (56) becomes

$$\begin{aligned}
&\left(\left(\overline{\theta}+e_1\left(\theta_A-\overline{\theta}\right)\right)+\delta e_1\frac{\left(1-e_A^T\delta^T\right)}{1-e_A\delta}\left(\overline{\theta}+e_A\left(\theta_A-\overline{\theta}\right)\right)\right)(1-\delta)\left(1+\frac{\delta e_1\left(1-e_A^{T-1}\delta^{T-1}\right)}{1-e_A\delta}\right)\\
&-\left(\left(\overline{\theta}+e_1\left(\theta_A-\overline{\theta}\right)\right)+\delta e_1\frac{\left(1-e_A^{T-1}\delta^{T-1}\right)}{1-e_A\delta}\left(\overline{\theta}+e_A\left(\theta_A-\overline{\theta}\right)\right)\right)(1-\delta)\left(1+\frac{\delta e_1\left(1-e_A^T\delta^T\right)}{1-e_A\delta}\right)\\
=\;&\delta^T e_1\left(e_A-e_1\right)e^{T-1}(1-\delta e)(1-\delta)\frac{\theta_A-\overline{\theta}}{1-\delta e_A}>0
\end{aligned}$$

proving the claim. **Q.E.D.**

Proof of Proposition 6. Recall from Proposition 3 that we can express

$$V^*(T)=\frac{s_1(T)+\frac{\overline{U}}{1-\delta}\left(p(T)-\delta^T\right)-U_1(T)}{1-p(T)}.$$

Hence, $\frac{\partial}{\partial\overline{U}}V^*(T)>0$ as long as $\left(p(T)-\delta^T\right)>(1-\delta)\frac{\partial}{\partial\overline{U}}U_1(T)$. Finally, to see that the manager's payoff under full information disclosure is independent of her outside option, plug in from (21) into $U_1=\nu_1+\sum_{j=1}^{T}\delta^{j-1}\overline{U}$. **Q.E.D.**

Lemma 5 *A sufficient condition for (2) to hold is*

$$\begin{aligned}
&\frac{e_C\theta_A}{e_C\theta_A+(1-e_C)\theta_C}e_A+\frac{(1-e_C)\theta_C}{e_C\theta_A+(1-e_C)\theta_C}e_C \qquad (57)\\
>\;&e_1>\frac{e_A(1-\theta_A)}{e_A(1-\theta_A)+(1-e_A)(1-\theta_C)}e_A+\frac{(1-e_A)(1-\theta_C)}{e_A(1-\theta_A)+(1-e_A)(1-\theta_C)}e_C.
\end{aligned}$$

Proof of Lemma 5 The second inequality in (2) is most difficult to satisfy if underperformance in season t should (ex post) make it optimal to replace a manager even if her type in $t-1$ was θ_A. The first inequality is most difficult to satisfy if it should be ex post optimal to keep the manager after realizing the high cash flow in t even if her type in $t-1$ was θ_C. These conditions are captured by (57). Intuitively, they require that the board is willing to change her belief about the manager completely based on the firm's cash flows in season t. Note that for this sufficient condition to hold, the correlation between t and $t-1$ (which is captured by $\Delta e=e_A-e_C$) cannot be too large. **Q.E.D.**

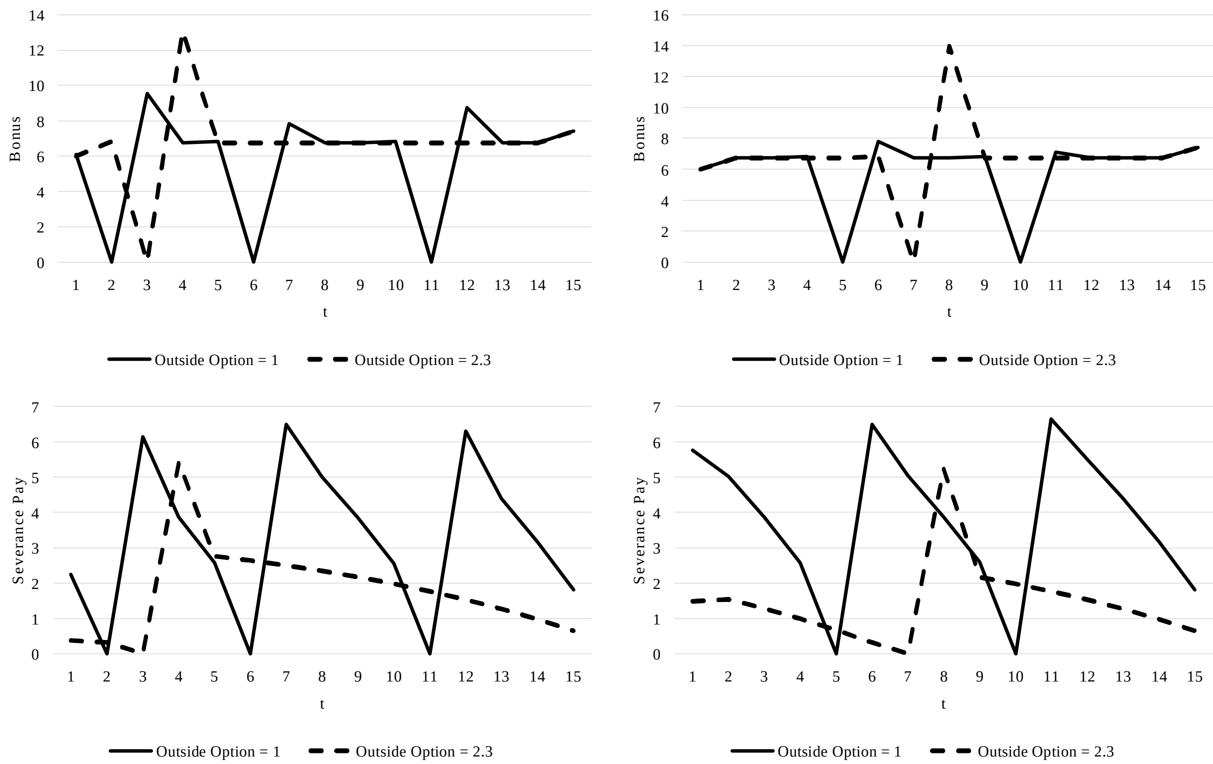

Figure 2: The figure presents the board's choice of optimal contract over a maximal tenure length of fifteen seasons. The dips in bonus and severance pay correspond to seasons in which the board does not offer incentives for truthful disclosure. In terms of implementation, the dips would correspond to the term-ends of renewable fixed-term contracts. The simulations are performed with $e_1 = 0.5$, $e(\theta_A) = 0.55$, $e(\theta_C) = 0.45$, $c = 1$, $\theta_A = 0.7$, $\theta_C = 0.4$, $\delta = 0.9$. The left panel uses $x = 100$, and $\Delta x = 50$, while the right panel uses $x = 1000$ and $\Delta x = 500$. The figure illustrates that, even though the manager's pay is small relative to the firm's size, the decision to elicit the manager's private information is not trivial.