Activist Short-termism, Managerial Myopia
and Biased Disclosure

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Abstract

This paper examines how threat of intervention by a short-term activist affects a myopic manager’s voluntary disclosure strategy when the manager can bias the disclosure at a cost. Since intervention by a short-term-oriented activist can decrease the firm’s liquidation value, the manager strategically discloses information about current firm value to deter intervention. When disclosing, the manager has an incentive to overstate current firm value, leading to an endogenous cost of voluntary disclosure. In equilibrium, only managers observing sufficiently high current firm value voluntarily disclose a biased report to the market. We find that as activist short-termism increases, the manager is less likely to disclose. However, increased managerial myopia may not always reduce voluntary disclosure. In equilibrium, how managerial myopia affects voluntary disclosure depends on the extent of activist short-termism. When activist short-termism is low, a less myopic manager is more likely to disclose, whereas when activist short-termism is high, a more myopic manager is more likely to disclose. This result suggests that increasing managerial horizon may not always be an effective way to reduce managerial myopic behavior induced by short-term shareholders.

Keywords: Active investor, Intervention, Voluntary disclosure, Managerial myopia.

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‡We would like to thank Mark Bagnoli, Tim Baldenius, Shane Dikolli, Ron Dye, Pingyang Gao, Ian Gow, Matt Pinnuck, Jack Stecher(discussant), Günter Strobl, Jeroen Suijs, Alfred Wagenhofer, Jacco Wielhouwer, Wan Wongsunwai, Gaoqing Zhang and seminar participants of Chinese University of Hong Kong, Frankfurt School of Finance and Management, Hong Kong Baptist University, Vrije Universiteit Amsterdam, Purdue Accounting Theory Conference, the Accounting Research Workshop in Basel for helpful comments and suggestions. All errors are our own.
1 Introduction

Over the past few years, shareholder activism has become increasingly prominent. While activists usually claim their intervention enhances firm value, firm management typically view activists as a threat and take actions to resist their intervention.\textsuperscript{1} Since information about the firm is vital to activists’ decisions, firm management might strategically adjust their disclosure strategies in response to the threat of intervention. Managers can voluntarily disclose information to reduce undervaluation in the market,\textsuperscript{2} and they might even bias the disclosed information (Khurana et al., 2018). Despite some empirical evidence on how managers respond to activists with their disclosure strategies (e.g., Bourveau and Schoenfeld, 2017; Chen and Jung, 2016; Khurana et al., 2018), theoretical work on this topic is rather limited. In this paper, we study the interaction between a firm’s voluntary disclosure strategy and the activist’s intervention, that is, how intervention affects a manager’s voluntary disclosure decision and how voluntary disclosure influences intervention by an activist.

A common complaint against activists is that they are short-term oriented, intervening to deliver a short-term boost to the stock price at the expense of long-term firm value.\textsuperscript{3} Short-term shareholders can breed managerial myopia, which in turn can cause managers to either reduce voluntary disclosures or bias the disclosed information (e.g., Cadman and Sunder, 2014; Kim et al., 2017; Stein, 1989). One often argued way to address the above problem

\textsuperscript{1}The evidence in Beyer et al. (2014) shows that 87\% of companies participated in the survey prefers non-active shareholders over active shareholders.

\textsuperscript{2}To prepare for activist intervention, companies are usually advised by consulting and law firms to initiate communication with their investors. As one example, see https://www.bain.com/insights/agitators-and-reformers/ for detailed advice from Bain & Company.

\textsuperscript{3}The 2016 NYSE Governance Services/Evercore/Spencer Stuart Survey report indicates that 85\% of directors consider activists to be too focused on short-term performance. See https://www.spencerstuart.com/research-and-insight/the-effect-of-shareholder-activism-on-corporate-strategy. Empirical evidence by Brav et al. (2009) suggests that the median and average holding periods of an active hedge fund are 266 days and 376 days, respectively. Practitioners have expressed concerns about activists’ short horizon and indicate that it might promote managerial myopia (Gallagher, 2015); however, the literature has not offered consistent evidence on this issue (e.g., Bebchuk et al., 2015; Cremers et al., 2015).
is to make the manager more long-term oriented (e.g., Pozen, 2014). Through this paper, we assess the above argument by examining how the activist’s and manager’s short-term incentives jointly affect the manager’s voluntary disclosure strategy.

Specifically, we aim to shed light on the following questions: (1) How does the threat of intervention by a short-term-oriented activist influence the manager’s voluntary disclosure strategy? (2) Is a long-term oriented (or less myopic) manager more likely to disclose information in the presence of a short-term activist? (3) How does the manager’s voluntary disclosure strategy affect the activist’s intervention?

To answer these questions, we consider a setting where a manager faces a threat of intervention by an activist and show that facing a short-term activist, a more long-term oriented manager is sometimes less likely to disclose information to the market. To capture the two key frictions, namely activist short-termism and managerial myopia, we assume both the activist’s and the manager’s utility depend on a weighted average of the short-term stock price and the long-term liquidation value. While the manager has private information about the current firm value and decides whether to disclose his private information to the market, the activist has private information about the value of her intervention strategy and determines whether to intervene in the firm based on the manager’s disclosure decision.

In our setting, the manager can bias his disclosure at a cost. Since intervention by an activist can send a negative signal about the firm, firm management might have incentives to disclose optimistic firm prospects (Khurana et al., 2018). Therefore, we relax the truthful disclosure assumption underlying a lot of the voluntary disclosure literature (e.g., Dye, 1985; Verrecchia, 1983). Instead, following Einhorn and Ziv (2012), we incorporate two layers of discretion in the manager’s voluntary disclosure decision: whether or not to voluntarily disclose the current firm value and how to bias the disclosed content.

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4In the paper, short-termism and myopia have the same meaning, with both indicating the player’s interest in the short-term stock price instead of the long-term firm value. We separate the two terms and use short-termism specifically for the activist and myopia specifically for the manager in our paper.
We find that in the presence of an activist, the manager’s disclosure decision affects the probability of intervention, the liquidation value given intervention, and the stock price when intervention does not happen. Disclosing a higher current firm value benefits the manager by reducing the probability of intervention, increasing the liquidation value given intervention, and also increasing the stock price given no intervention. Hence the manager always biases his report upwards when disclosing. This implies that the manager bears biasing costs if he discloses, but he can avoid these costs if he does not disclose.\(^5\) The manager decides on his voluntary disclosure strategy by trading off the benefits of disclosure against the costs of biasing. Such endogenous disclosure costs result in a partial disclosure equilibrium in our setting. In equilibrium, the threat of intervention leads the manager to follow an upper-tailed disclosure strategy whereby only sufficiently high realizations of current firm value are disclosed.

The activist decides her intervention based on the disclosure decision. Without information asymmetry about the activist’s intervention strategy, the market will correctly price the value from intervention. In this case, the activist cannot profit from a short-term mispricing of the firm’s shares. Hence activist short-termism can be disciplined by the market. However, when activist short-termism is coupled with her private information about intervention activities, the activist may intervene in the firm to increase the short-term stock price even when it decreases firm value. We name this as excessive intervention. Further analysis indicates that an increase in activist short-termism always raises the disclosure threshold and thus decreases the likelihood of disclosure. This is because activist short-termism increases excessive intervention as well as the likelihood of intervention. Both effects drive up the manager’s incentive to bias his disclosed information. This translates into higher costs of biasing and a higher disclosure threshold. Hence the manager is less likely to disclose when dealing with a more short-term-oriented activist.

\(^5\)We use the term disclosure bias and reporting bias interchangeably in the paper.
While the effect of activist short-termism on the manager’s incentive to disclose is straightforward, the effect of managerial myopia is less so. Our results suggest that the effect of managerial myopia on the disclosure equilibrium depends on the extent of activist short-termism. Interestingly, we find that when activist short-termism is low, a less myopic manager is more likely to disclose. However, when activist short-termism is high, a more myopic manager is more likely to disclose.

The intuition for the above result can be seen by observing the dual role of managerial myopia in the model. A more myopic manager cares more about the short-term stock price, but at the same time, he also cares less about the long-term liquidation value. As disclosure influences both the stock price and the activist’s intervention, the manager derives benefits of disclosure from two aspects. One aspect is influencing the stock price both with and without intervention. We name this as the price component. The other aspect is impacting the liquidation value given intervention. We name this as the liquidation value component. The manager always benefits from influencing the stock price regardless of activist intervention, but the benefits from influencing the liquidation value depends on the probability of intervention.

When activist short-termism is low, the probability of intervention is also low, leading to small benefits from influencing the liquidation value. Hence, the benefits of disclosure are mostly derived from the price component rather than the liquidation value component. In this case, since the more myopic manager cares more about the stock price, he derives greater benefits from biasing the report when disclosing. This results in higher disclosure costs and reduces the likelihood of disclosure. Therefore, for low activist short-termism, disclosure likelihood decreases with managerial myopia.

In contrast, when activist short-termism is high, the probability of intervention is also high, which increases the benefits from influencing the liquidation value. For sufficiently high activist short-termism, the benefits of disclosure in influencing the liquidation value are
higher than influencing the stock price. Therefore, a more myopic manager with a higher weight on the price component has lower benefits from biasing the report and chooses to bias less when disclosing. The lower disclosure costs in turn increase the likelihood of disclosure. This implies that for high activist short-termism, the disclosure likelihood increases with managerial myopia.

The above result has interesting implications for managerial incentive. Common wisdom might suggest that increasing managerial horizon can curb the incentive to withhold information created by the threat of short-term activists. However, as we show in this paper, this might not always be true. In our setting with a short-term activist, a manager with more long-term interests can sometimes further exacerbate, rather than curb, the reduction in voluntary disclosure created by activist short-termism. Stated differently, our results indicate that, in the presence of a highly short-term-oriented activist, a myopic manager can sometimes be better for market transparency.

Lastly, our model also provides several implications on how voluntary disclosure influences activist intervention. The results demonstrate that disclosing firms have a lower likelihood of intervention than non-disclosing firms, because disclosing firms have higher expected current firm value, which reduces their intervention likelihood. Besides, we find that by communicating the current firm value to the market and the activist, disclosing firms on average enjoy higher intervention efficiency than non-disclosing firms. These results highlight the role of the firm’s information environment on activist intervention.

The remainder of the paper is organized as follows. Section 1.1 discusses related literature. Section 2 summarizes the model. Section 3 performs the equilibrium analysis. Section 4 discusses how the interaction of activist short-termism and managerial myopia affects the disclosure equilibrium and Section 5 analyses how disclosure affects the activist’s intervention strategy. Section 6 concludes. The appendix contains proofs of the main results.
1.1 Related literature

This paper mainly relates and contributes to two streams of literature. First, the paper contributes to the literature on activist intervention and its effects on a firm’s policies. While some of the prior studies in this area have explored how and when activist intervention can change firm value (e.g. Admati et al., 1994; Aslan and Kumar, 2016; Bebchuk et al., 2015; Brav et al., 2015; Kahn and Winton, 1998; Maug, 1998; Shleifer and Vishny, 1986), a few other studies have also investigated the impact of activist intervention on the manager’s incentive (e.g. Baldenius and Meng, 2010; Burkart et al., 1997; Edmans and Manso, 2010; Keusch, 2018; Strobl and Zeng, 2016). In this paper, we study how the threat of intervention by a short-term activist affects the voluntary disclosure of a firm.

To the best of our knowledge, the only paper that has modeled how the presence of an activist affects the manager’s voluntary disclosure is Kumar et al. (2012). Kumar et al. (2012) considers a setting where the manager chooses the disclosure strategy to influence the investment chosen by an active shareholder. Our study differs from their setting in several aspects. First, the active shareholder in Kumar et al. (2012) plays a disciplinary role and thus always chooses the efficient level of investment given available information. Our model considers a setting with activist’s short-term incentive and information asymmetry about the value from intervention. Therefore, while Kumar et al. (2012) studies how a disciplinary active shareholder determines the firm’s voluntary disclosure, we analyse how potential excessive intervention from a short-term activist influences the manager’s voluntary disclosure strategy. Second, we allow the manager to make a biased voluntary disclosure decision. This generates an endogenous cost of voluntary disclosure and thus a different trade-offs from Kumar et al. (2012). While in Kumar et al. (2012), the manager trades off the short-term stock price and the long-term liquidation value determined by the active shareholder’s investment decision; in our setting, the manager weighs the benefits of biased disclosure from influencing the activist’s intervention and the stock price against the costs
Our paper also contributes to the literature on biased disclosure. Similar to the earnings management literature (e.g., Dye and Sridhar, 2004; Ewert and Wagenhofer, 2005; Fischer and Verrecchia, 2000; Guttman et al., 2006), the manager in our setting can bias his report at a cost. In addition, we allow the manager to decide on whether or not to issue the report, as assumed in Einhorn and Ziv (2012), Kwon et al. (2009) and Korn (2004). Compare to these three studies, this paper investigate a different issue related to biased voluntary disclosure. Specifically, Kwon et al. (2009) examines how quality of mandatory disclosure affects biased voluntary disclosure and finds that as the quality of mandatory disclosure increases, the bias given disclosure decreases and the likelihood of disclosure increases. Einhorn and Ziv (2012) proves that given costly biased disclosure possibility, the disclosure equilibrium remains to be an upper tailed equilibrium where good news about firm value is disclosed while bad news is withheld from the market. Korn (2004) considers a biased voluntary disclosure issue where misreporting will be punished with a certain probability and shows that high firm values will be disclosed. Differently, this paper studies how activist’s intervention influences the firm’s biased voluntary disclosure. In addition, our paper extends the above three papers on two dimensions. First of all, the liquidation value is exogenous in these papers while it is endogenously determined by the activist’s intervention in our setting. Second, in these papers, the manager only cares about the stock price after disclosure, while the manager in our model cares about a weighted average of the stock price and the liquidation value. These two extensions allow us to investigate how activist intervention and managerial myopia affect the manager’s disclosure strategy and provide several related empirical implications.
2 Model

We build a parsimonious model to study how the threat of intervention by an activist affects a manager’s disclosure strategy. We consider a firm with three types of risk-neutral agents: a manager, an activist and competitive investors. We refer to the manager as he and refer to the activist as she. In our model, the activist can choose to intervene in the firm’s operation, while competitive investors value the firm and reflect this value in the stock price.

The model contains five dates. At $t = 1$, the manager privately observes the current firm value, $v$. At $t = 2$, the manager decides whether to voluntarily disclose $v$ to the market. At $t = 3$, the activist privately observes the value from her intervention and decides whether to intervene in the firm. We assume the activist already owns a block of shares in the firm and thus has sufficient voting rights to intervene. At $t = 4$, competitive investors price the firm. Payoff from firm liquidation $V$ are realized at $t = 5$. Figure 1 shows the sequence of events, and each stage of the model is explained below.

At $t = 1$, the manager privately observes the current firm value $v$, which is the realization of a continuous random variable $\tilde{v}$ uniformly distributed over $[v, \bar{v}]$.

At $t = 2$, the manager decides whether to voluntarily disclose $v$ to the market. When facing threat of intervention by an activist, the manager might have an incentive to disclose good prospects of the firm and overstate current firm value (Khurana et al., 2018). Since a lot of voluntary disclosure is forward looking in nature, it is hard to verify the disclosed
content (Rogers and Stocken, 2005). Therefore, we relax the truthful disclosure assumption and allow the manager to bias his disclosure at a cost. Specifically, a manager privately observing firm value $v$ can voluntarily report $r$ to the market at a biasing cost of $\frac{C_b}{2}(r - v)^2$, where $C_b > 0$. We denote the manager’s possible disclosure choices by $D = \{ND\} \cup R$, where $ND$ denotes no disclosure and $r \in R$ denotes the contents of the voluntary report if provided. Moreover, we denote the manager’s disclosure strategy by $d(v)$ and his disclosure decision by $d \in D$.

After observing the manager’s disclosure decision, the activist privately observes the value $v_A$ of her strategy and chooses whether to intervene in the firm at $t = 3$. $v_A$ is the realization of a random variable $\tilde{v}_A$ uniformly distributed over $[0, \delta]$. If the activist intervenes, the liquidating firm value $V$ becomes $V = v_A$. Otherwise, the liquidating firm value $V$ is the original firm value $v$. Examples of such intervention activities include advising the firm on strategic direction or acquisitions, and proposing corporate governance changes to the firm (Gantchev, 2013). In practice, intervention involves finding a change in firm policy and then trying to implement the policy. It may include several stages, such as negotiation with the firm, requesting for board representation and proxy contest. Given our focus on how threat of intervention influences the firm’s voluntary disclosure, we abstract away from these details.

The activist’s intervention strategy is denoted by $a(v_A, d)$ and her intervention decision by $a \in \{0, 1\}$, with $a = 1$ when the activist intervenes and $a = 0$ otherwise. Thus, we have the liquidating firm value $V$ as

$$V = a \cdot v_A + (1 - a) \cdot v.$$  \hspace{1cm} (1)

The intervention decision $a$ is publicly observable, but the value $v_A$ remains the activist’s private information. The assumption reflects that the activist usually has better information
about the value of her strategy than other market participants.\footnote{We assume that the activist has better information about the value of her strategy than the manager. This assumption is valid if the activist has experience in implementing this strategy at other firms in the industry and hence can better assess how the strategy would work than the manager.}

After the intervention decision but before payoff is realized, risk-neutral investors price the firm at \( t = 4 \). The stock price \( P \) then equals the expected value of \( V \), that is,

\[
P(d, a) = E[V|d, a].
\]  

(2)

To reflect the horizon problem of activists, we assume that the activist cares about a weighted average of the stock price \( P \) and the liquidation value \( V \). The activist chooses her intervention strategy to maximize her payoff

\[
U_A(a) = \eta P + (1 - \eta)V,
\]

(3)

where \( \eta \in [0, 1] \) is exogenous and represents the extent to which the activist cares about the short-term stock price versus the long-term liquidation payoff. It captures the fact that activists may not stay in the firm long enough to internalize the full consequences of their intervention. Such an objective function can arise from liquidity constraints faced by the activist. In this case, we can interpret \( \eta \) as the probability that the activist faces the liquidity constraint and has to sell the firm’s shares.

The manager, in making his disclosure decision, maximizes his utility. When the manager chooses not to disclose, that is, \( d = ND \), his utility equals

\[
U_M(ND) = \gamma P + (1 - \gamma)V - a \cdot C_a.
\]

(4)

In contrast, when the manager discloses a report \( r \), his utility equals

\[
U_M(r) = \gamma P + (1 - \gamma)V - a \cdot C_a - \frac{C_b}{2}(r - v)^2.
\]

(5)

\( \gamma \in [0, 1] \) suggests that the manager not only cares about the liquidation value \( V \) but also
cares about the stock price $P$, therefore demonstrating managerial myopia.\(^7\) In addition, the manager incurs a personal cost $C_a > 0$ when the activist intervenes. The personal cost $C_a$ can be interpreted in a few different ways—such as the manager’s time and effort spent in negotiating with an activist, the manager’s loss of reputation due to activist intervention or the possibility of getting fired after intervention (e.g., Brav et al., 2008; Ertimur et al., 2010; Fos and Tsoutsoura, 2014; Gow et al., 2016).

To make activist intervention a non-trivial issue, we add the following two constraints on parameter values.

**Assumption 1:** $\frac{\delta}{2} < v < \bar{v} < \delta$

**Assumption 2:** $C_a > \frac{\delta}{2}$

Briefly, Assumption 1 ensures that the manager faces a non-zero probability of intervention for every possible realization of current firm value $v$, while Assumption 2 ensures that the manager always prefers no intervention by the activist. Detailed explanations about these two assumptions will be provided in Section 3.

Before proceeding to the equilibrium analysis, we would like to elaborate on a few implicit assumptions in the model. First, we model the short-termism of the activist in a reduced form without explicitly considering a trading game. This approach allows us to capture the horizon problem of activists in a simple and tractable manner without forgoing any intuition that might be obtained by including a detailed trading stage. Second, we implicitly assume that the activist holds a unit share in the firm. Since we do not model how the size of the activist’s stake can affect her ability to intervene in the firm’s operations, this assumption does not affect our analysis.\(^8\) Besides, the constant ownership in our model is consistent with empirical evidence showing that activists’ ownership remains stable after they complete the

\(^7\)Note that managerial myopia and activist short-termism both capture a focus on the short-term stock price instead of the long-term liquidation value.

\(^8\)For a similar argument, see Strobl and Zeng (2016).
initial filings of schedule 13D (Gantchev, 2013). Finally, one key component in our model is the information asymmetry about $v_A$ when the manager makes his voluntary disclosure decision. The extent of information asymmetry does not qualitatively change our results. Therefore, implications from the model can also be applied to a setting where the manager has imperfect information about the value of the activist’s intervention strategy.

3 Equilibrium analysis

The equilibrium consists of the manager’s disclosure strategy $d(v)$ and the activist’s intervention strategy $a(v_A, d)$ such that:

i) Given the manager’s belief about the activist’s intervention strategy, and given the activist’s conjecture of the manager’s disclosure strategy, $d(v)$ maximizes the manager’s expected utility;

ii) Given the manager’s disclosure strategy, $a(v_A, d)$ maximizes the activist’s expected payoff;

iii) Beliefs are rational in equilibrium.

The above definition of the equilibrium is straightforward. The manager chooses his disclosure strategy, taking into account how the activist will respond to his disclosure decision. The activist updates her belief about the current firm value based on the manager’s disclosure decision and then decides on her intervention strategy. In equilibrium, all beliefs are rational. We look for a linear equilibrium where the disclosure strategy $d(v)$ is a linear function of the manager’s private information $v$. We solve the model by backward induction and hence start with the intervention decision of the activist.

3.1 Intervention by the activist

Taking the manager’s disclosure strategy as given, we first solve for the activist’s intervention strategy. In this case, the liquidation value $V$ and the stock price $P$ depends on the activist’s
intervention decision. The activist chooses \( a(v_A, d) \) to maximize her expected payoff in equation (3), which is a weighted average of the stock price \( P \) and the liquidation value \( V \).

Given the manager’s disclosure decision \( d \), if the activist chooses not to intervene, \( V \) is determined by the current firm value \( v \). Similarly, the market price also depends on the current firm value. As the intervention decision \( a \) is publicly observable, the market will rationally price \( V \) at \( E[v|d] \) when there is no intervention. The activist’s payoff is thus equal to

\[
U_A(a = 0) = \eta E[P|d,a] + (1 - \eta) E[v|d] = E[v|d].
\]

If the activist intervenes, \( V \) is determined by the value \( v_A \) generated by the activist. As \( v_A \) is the private information of the activist, the stock price equals to the expected value of \( v_A \), that is, \( E[v_A|d,a = 1] \). In this case, we can write the activist’s payoff as

\[
U_A(a = 1) = \eta E[P|d,a] + (1 - \eta) v_A = \eta E[v_A|d,a = 1] + (1 - \eta) v_A.
\]

The activist intervenes if and only if \( U_A(a = 1) > U_A(a = 0) \), that is,

\[
\eta E[v_A|d,a = 1] + (1 - \eta) v_A \geq E[v|d].
\]

As the L.H.S. of the above inequality is increasing in \( v_A \) while the R.H.S. is independent of \( v_A \), the activist’s intervention strategy will be of the threshold type, where the activist intervenes if and only if \( v_A \) is larger than the threshold; otherwise, she does not intervene. At the intervention threshold \( v_A^*(d) \), the activist is indifferent between intervention and no intervention, that is

\[
\eta E[v_A|d,a = 1] + (1 - \eta) v_A^*(d) = E[v|d].
\]

Rewriting this indifference condition yields that \( v_A^*(d) = \frac{2E[v|d] - \eta \delta}{2 - \eta} \). We name \( v_A^*(d) \) as the intervention threshold. To simplify notation and analysis, we define \( \lambda = \frac{\eta}{2 - \eta} \) as a measure
of activist short-termism,\(^9\) with

\[
v^*_A(d) = \frac{2E[v|d] - \eta \delta}{2 - \eta} = (1 + \lambda)E[v|d] - \lambda \delta.
\]  

(6)

**Lemma 1** (Intervention strategy) Given the manager’s disclosure decision \(d\), the activist does not intervene when \(v_A \in [0, v^*_A(d))\), while the activist intervenes when \(v_A \in [v^*_A(d), \delta]\), with \(v^*_A(d) = (1 + \lambda)E[v|d] - \lambda \delta\).

We make a few observations about the intervention threshold \(v^*_A(d)\). First, the intervention threshold depends on the activist’s belief about \(v\) and thus the manager’s disclosure strategy. The intervention threshold given disclosure will be different from the threshold given no disclosure. Second, the intervention threshold increases with the market belief about \(v\), because a higher \(E[v|d]\) increases the activist’s payoff given no intervention. Third, the intervention threshold depends on \(\delta\), the maximum value that can be achieved by activist intervention. If \(\delta\) is so low such that the activist’s payoff from intervention is always lower than no intervention, the activist will never choose to intervene. Alternatively, if \(\delta\) is so high such that the activist’s payoff from intervention is always higher than no intervention for all values of \(v\), the activist will always intervene irrespective of the manager’s disclosure decision. In this case, the manager is indifferent between disclosure and no disclosure, because the stock price is always determined by the expected value of \(v_A\) and is independent of the current firm value \(v\).

Since we are interested in the threat of activist’s intervention on the manager’s disclosure strategy, we make an assumption about \(\delta\) to ensure a positive probability of intervention exists for all values of \(v\) and \(\lambda\), that is, \(0 < v^*_A(d) < \delta\) for all values of \(v\) and \(\lambda\). Equation (6) suggests that \(v^*_A(d)\) increases with \(E[v|d]\). Therefore, we assume that, for all values of \(\lambda\), \(v^*_A(d) > 0\) when \(v = \bar{v}\) and \(v^*_A(d) < \delta\) when \(v = \bar{v}\). Rewriting yields the following assumption.

\(^9\)Note that \(\lambda\) is a monotone transformation of \(\eta\). When \(\eta = 0\), \(\lambda = 0\), while when \(\eta = 1\), \(\lambda = 1\).
**Assumption 1:** The firm faces a non-zero probability of intervention, that is, $\frac{\delta}{2} < \underline{v} < \overline{v} < \delta$.

Finally, given that the firm faces a non-zero probability of intervention, $v^*_A(d) < E[v|d] < \delta$ always holds. It implies the existence of both a non-empty set of $v_A$ for which intervention increases firm value and also a non-empty set of $v_A$ for which intervention decreases firm value.

Such value decreasing intervention only arises when two conditions exist at the same time: one, the activist has myopic incentive (i.e., $\lambda > 0$), and two, there is information asymmetry regarding the value of $v_A$. If $\lambda = 0$ (i.e., the activist only cares about the liquidation value $V$), it holds that $v^*_A(d) = E[v|d]$. Intervention always improves firm value even if the market is uncertain about $v_A$. Similarly, if the market perfectly learns $v_A$, we have $P(d, a = 1) = v_A$ and $v^*_A(d) = E[v|d]$. Again, intervention only occurs when the activist can improve firm value. Information asymmetry about $v_A$ creates mispricing in the market.

On observing an intervention, the market rationally conjectures that $v_A > v^*_A(d)$. However, lacking further information about $v_A$, the market can only set the stock price at the expected value $E[v_A|v_A > v^*_A(d)]$, which is always higher than the intervention threshold $v^*_A(d)$. To the extent that the activist cares about the stock price, such information asymmetry allows activists with low values of $v_A$ to pool together with activists with high values of $v_A$, leading to the value decreasing intervention.

Anticipating the activist’s intervention strategy, the manager determines his disclosure strategy. We analyse the disclosure strategy in two steps: we first solve the manager’s reporting bias assuming the disclosure to be mandatory, then in the next subsection, we analyse the manager’s decision on whether to disclose to the market.
3.2 Reporting bias with mandatory disclosure

Suppose disclosure is mandatory. Given the privately observed current firm value \( v \), the manager chooses report \( r \) to maximize his expected utility \( E[U_M] \), that is,

\[
\max_r E \left[ \gamma \cdot P(r,a) + (1 - \gamma) \cdot V(a) - a \cdot C_a \right] - \frac{C_b}{2} (r - v)^2,
\]

with

\[
P(r,a) = a \cdot E[v_A|r,a] + (1 - a) \cdot E[v|r]
\]

and \( V(a) \) is defined by equation (1).

If the activist intervenes, the stock price \( P \) and the liquidation value \( V \) are determined by \( v_A \). The manager also incurs a personal cost \( C_a \) from intervention. Therefore, his expected utility given intervention is

\[
E \left[ \gamma \cdot P(r,a) + (1 - \gamma) \cdot V(a) - a \cdot C_a | a = 1 \right] = E[v_A|v_A > v_A^*(r)] - C_a.
\]

Note that when the personal cost from intervention is very low such that \( E[v_A|v_A > v_A^*(r)] - C_a > 0 \), the manager may have an incentive to free ride on the activist and seek intervention to increase firm value. However, given anecdotal and empirical evidence on managerial resistance to activism and the costs imposed on management by activists, this incentive to invite intervention from the activist does not seem consistent with existing evidence (e.g., Brav et al., 2008; George and Lorsch, 2014; Khurana et al., 2018). Therefore, in the equilibrium analysis, we assume that the personal cost \( C_a \) is sufficiently high such that the manager always prefers no intervention; that is, \( E[v_A|v_A > v_A^*(r)] - C_a < 0 \) holds for all values of \( v \) and \( \lambda \).

**Assumption 2:** The manager’s personal cost from intervention satisfies \( C_a > \frac{\delta}{2} \).
If the activist does not intervene, the stock price and the liquidation value depend on the value generated by the firm. The manager’s expected utility in this case is
\[
E[\gamma \cdot P(r, a) + (1 - \gamma) \cdot V(a) - a \cdot C_a | a = 0] = \gamma \cdot E[v| r] + (1 - \gamma) \cdot v.
\]

As the activist endogenously makes the intervention decision based on the manager’s disclosure, both the realized liquidation value \(V\) and the distribution of \(V\) are a function of the manager’s disclosure. Taking into account the probability of intervention, the manager solves the following problem to determine his disclosure \(r\) given that he observes \(v\):
\[
\max_r \ Pr(v_A > v_A^*(r)) \left( E[v_A| v_A > v_A^*(r)] - C_a \right) + Pr(v_A < v_A^*(r)) \left( \gamma \cdot E[v| r] + (1 - \gamma) \cdot v \right) - \frac{C_b}{2} (r - v)^2,
\]
with \(v_A^*(r) = (1 + \lambda)E[v| r] - \lambda \delta\).

Taking partial derivative of the above expression of \(E[U_M]\) with respect to \(r\) shows the manager’s marginal benefit and marginal cost trade-off in choosing \(r\).
\[
\frac{\partial E[U_M]}{\partial r} = \frac{\partial Pr(v_A > v_A^*(r))}{\partial r} \left[ E[v_A| v_A > v_A^*(r)] - C_a - \gamma E[v| r] - (1 - \gamma) v \right]
+ Pr(v_A > v_A^*(r)) \frac{\partial E[v_A| v_A > v_A^*(r)]}{\partial r} + Pr(v_A < v_A^*(r)) \gamma \frac{\partial E[v| r]}{\partial r} - C_b(r - v).
\] (8)

When the manager discloses \(r\), both the market and the activist infer the current firm value \(v\) from the manager’s disclosure. Therefore, the manager benefits from the report \(r\) by influencing the market and the activist’s beliefs about \(v\). If the report \(r\) is biased, the biasing cost represents the cost of disclosure. The last component of equation (8), \(C_b(r - v)\), captures this marginal cost from biasing the report. The more the report \(r\) overstates the current firm value \(v\), the higher the marginal cost of reporting \(r\).

The first three components of equation (8) correspond to the marginal benefits of reporting a higher \(r\). As the report can change the intervention threshold \(v_A^*(r)\), \(r\) can thus
influence the probability of intervention, captured by the first component, as well as the
market price and the expected liquidation value given intervention, captured by the second
component. Lastly, given no intervention, report $r$ can influence how the market prices $v$, which is the third component. In equilibrium, the report $r$ is chosen such that the marginal benefits equal to the marginal cost. The joint effects of these three disclosure benefits make the manager always report a value higher than the actual current firm value, that is, $r > v$.

This is because a higher report $r$ induces a higher intervention threshold $v_A^*(r)$, and thus a lower probability of intervention ($\frac{\partial Pr(v_A > v_A^*(r))}{\partial r} < 0$), a higher market price and liquidation value given intervention ($\frac{\partial E[v_A | v_A > v_A^*(r)]}{\partial r} > 0$), and a higher market belief of $v$ given no intervention ($\frac{\partial E[v | r]}{\partial r} > 0$). Note that the manager prefers a lower probability of intervention because Assumption 2 ensures that the manager incurs sufficiently high personal cost $C_a$ from intervention so as to always prefer no intervention.

We consider a linear disclosure strategy $r = \alpha + \beta v$, where $\alpha$ and $\beta$ are endogenously determined and correctly conjectured by the activist and the market in equilibrium. We summarize the manager’s linear disclosure strategy as follows.

**Lemma 2 (Mandatory disclosure strategy)** Suppose the manager always discloses to the market, then he discloses

$$r^m = \alpha^m + \beta^m v,$$

with

$$\alpha^m = \frac{1}{C_b \beta^m} \left[ \lambda (1 + \lambda - \gamma) + \frac{C_a (1 + \lambda)}{\delta} \right],$$

$$\beta^m = \frac{1}{2} \left[ 1 + \sqrt{1 + \frac{4}{C_b \delta} (1 + \lambda) (\gamma - \lambda)} \right].$$

The above linear disclosure strategy is sustainable for $\gamma \in [0, 1]$ and $\lambda \in [0, 1]$ provided

$$C_b \cdot \delta - 8 > 0.$$ The report is always higher than the current firm value, that is, $r^m > v$. 

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3.3 Disclosure equilibrium

In deciding whether to voluntarily disclose, the manager trades off the costs of biasing the report against the benefits of disclosure. When the manager discloses a report \( r \), his expected utility is as shown in equation (7). If the manager does not disclose, his expected utility is

\[
E[U_M(ND)|v] = Pr(v_A > v_A^*(ND)) \left( E[v_A|v_A > v_A^*(ND)] - C_a \right) \\
+ Pr(v_A < v_A^*(ND)) (\gamma \cdot E[v|ND] + (1 - \gamma) \cdot v).
\]

(12)

The disclosure decision affects the manager’s utility in two ways. On the one hand, if the manager voluntarily issues a biased report \( r \), he incurs the biasing costs \(
\frac{C_b}{2}(r - v)^2
\). On the other hand, the disclosure \( r \) provides a signal of \( v \) and benefits the manager through its effect on the stock price and the intervention by the activist. Specifically, compared to no disclosure, voluntarily disclosing \( r \) can influence three components of the manager’s utility: the probability of having intervention \((Pr(v_A > v_A^*(r)))\), the expected stock price and the expected liquidation value given intervention \((E[v_A|v_A > v_A^*(r)])\) and the stock price given no intervention \((E[v|r])\). Without disclosure, the market misprices the firm and intervention by the activist will be independent of the actual firm value. The manager discloses if and only if the benefits of disclosure outweigh the biasing costs. The proposition below describes the unique linear equilibrium of the model.

**Proposition 1 (Equilibrium)** There exists a unique equilibrium where

1. for \( v \in [v, v^*) \), the manager does not disclose; the activist does not intervene for \( v_A \in [0, v_A^*(ND)] \), while the activist intervenes for \( v_A \in [v_A^*(ND), \delta] \), with \( v_A^*(ND) = (1 + \lambda)E[v|ND] - \lambda \delta \).

2. for \( v \in [v^*, \bar{v}] \), the manager discloses \( r^* = \alpha^* + \beta^* v \), with \( \alpha^* = \frac{1}{C_b \beta^*} \left[ \lambda (1 + \lambda - \gamma) + \frac{C_a (1 + \lambda)}{\delta} \right] \) and \( \beta^* = \frac{1}{2} \left[ 1 + \sqrt{1 + \frac{4}{C_b \delta} (1 + \lambda)(\gamma - \lambda)} \right] \); the activist does not intervene for \( v_A \in \)
\[0, v^*_A(r)\), while the activist intervenes for \(v_A \in [v^*_A(r), \delta]\), with \(v^*_A(r) = (1 + \lambda)E[v|r] - \lambda \delta\).

The threshold \(v^*\) is determined by

\[
\left(\sqrt{\beta^* + \frac{(1-\gamma)(1+\lambda)}{C_b \delta}} + 1\right)(v^* - E[v|ND]) - (\alpha^* + (\beta^* - 1)E[v|ND]) = 0, \tag{13}
\]

with \(E[v|ND] = E[v|v < v^*]\).

The manager follows a threshold disclosure strategy whereby he issues a report \(r\) for only sufficiently high realizations of the current firm value. Given disclosed \(r\), the market can perfectly infer the firm’s underlying value in equilibrium and is thus not fooled by the manager. This is similar to the fully revealing equilibrium in Stein (1989). Hence, in the presence of activist short-termism and managerial myopia, the market is trapped in a bad equilibrium. The disclosing manager is induced to issue a biased report, which reduces his personal utility through the biasing costs. Such endogenous costs of voluntary disclosure prevent the firm with low current firm value from communicating private information to the market.

The upper-tailed disclosure strategy obtains as a result of three different effects of disclosure on the manager's utility explained before. First, a firm with a higher current firm value has a lower probability of intervention, reducing the manager’s likelihood of incurring the personal cost from intervention. A manager who observes a high current firm value will be able to deter intervention by disclosing the report. Secondly, the expected stock price and the expected liquidation value given intervention \(E[v_A|v_A > v^*_A(r)]\) increase with the expected current firm value \(E[v|r]\). Hence disclosing a high report \(r\) results in a higher stock price and a higher liquidation value after intervention. Finally, disclosure affects the stock price of the firm given no intervention. Clearly, a manager who observes a sufficiently high firm value will obtain a higher stock price from disclosing than from withholding informa-
tion. Overall, all three forces suggest that compared to the expected firm value given no disclosure \( E[v|ND] \), a manager observing sufficiently high values of \( v \) enjoys greater benefits from disclosing. Hence, such a manager would be more willing to incur the biasing costs in order to signal a high current firm value to the market and the activist.

Based on the above characterization of the equilibrium, we further explore two issues. In Section 4, we examine how the interaction of activist short-termism and managerial myopia changes the manager’s incentive to disclose. In Section 5, we discuss how voluntary disclosure influences intervention by a short-term-oriented activist.

4 Activist short-termism, managerial myopia and disclosure

We explain the role of activist short-termism and managerial myopia on the manager’s disclosure strategy in two steps. First, we investigate how these two frictions determine the reporting bias given disclosure. Then we summarize their impact on the disclosure equilibrium.

4.1 Effect on disclosure bias

Define the disclosure bias as \( r - v \). To better explain how activist short-termism and managerial myopia affect the disclosure bias, we rewrite the manager’s marginal benefits and marginal cost of disclosing \( r \) in equation (8) as follows:

\[
\frac{\partial E[U_M]}{\partial r} = \frac{1}{\delta} \left[ (1 + \lambda)C_a + \gamma [E[v|r] + \lambda (E[v|r] - v^*_A(r))] + (1 - \gamma)(1 + \lambda)(v - v^*_A(r))] 
- C_b(r - v), \right.
\]

(14)
where $\hat{\alpha}$ and $\hat{\beta}$ represent the disclosure strategy conjectured by the market and the activist.

The above simplified expression of marginal benefits has three key components: personal cost component $C_a$, price component $E[v|\mathcal{r}] + \lambda(E[v|\mathcal{r}] - v^*_A(\mathcal{r}))$ and liquidation value component $v - v^*_A(\mathcal{r})$. The first component is the manager’s personal cost $C_a$ when the activist intervenes. The higher the $C_a$, the higher the manager’s marginal benefit from biasing the report, the higher the reporting bias. The second price component, $E[v|\mathcal{r}] + \lambda(E[v|\mathcal{r}] - v^*_A(\mathcal{r}))$, captures the benefits of inflating the report to increase the stock price, including both stock price when there is no intervention and stock price when there is intervention. The third liquidation value component, $v - v^*_A(\mathcal{r})$, captures the effect on liquidation value as a result of excessive intervention by the activist. We define excessive intervention as intervention that decreases the firm’s liquidation value.

Managerial myopia $\gamma$ influences the marginal benefits of reporting $r$ by determining the managerial weight on the price component and his weight on the liquidation value component. A myopic manager with a higher $\gamma$ cares more about the marginal benefits of influencing the price component relative to the marginal benefits of influencing the liquidation value component.

Activist short-termism $\lambda$ has three effects on the activist’s intervention decision and hence the marginal benefits of disclosure. First of all, a higher $\lambda$ decreases the intervention threshold, increases excessive intervention and thus decreases the added value from intervention. We name this the valuation effect. To explain this valuation effect, note that

$$v - v^*_A(\mathcal{r}) = v - (1 + \lambda)E[v|\mathcal{r}] + \lambda \delta.$$  \hfill (15)

Given disclosure, the activist perfectly infers $v$ from disclosed $r$. When $\lambda > 0$, $v - v^*_A(\mathcal{r}) > 0$, that is, the activist intervenes excessively. Since $\delta > E[v|\mathcal{r}]$, excessive intervention increases with activist short-termism $\lambda$ and decreases with the expected firm value $E[v|\mathcal{r}]$.

**Lemma 3** (Excessive intervention given disclosure) When $\lambda > 0$, given disclosure, the ac-
tivist intervenes excessively, that is, \( v - v^*_A(r) > 0 \). Excessive intervention increases with activist short-termism \( \lambda \) and decreases with the expected current firm value \( E[v|r] \).

The above lemma suggests that excessive intervention is a more severe issue for firms with more short-term-oriented activists and also for firms with lower perceived value under the existing management. When the expected firm value \( E[v|r] \) is high, the market perceives limited benefit from intervention; that is, the difference between \( E[v_A|v_A > v^*_A(r)] \) and \( E[v|r] \) is low. This situation restricts the activist’s ability to gain from the stock price and thus curbs the excessive intervention.

When \( \lambda \) is high and the activist cares more about the stock price than the liquidation value, she has a stronger incentive to intervene and benefit from the higher stock price given intervention, instead of intervening to increase the liquidation value. Therefore, the greater the short-term incentive of the activist, the lower the intervention threshold \( v^*_A(r) \) and the larger the excessive intervention \( v - v^*_A(r) \). This increases the manager’s marginal benefits of disclosure.

Secondly, a higher \( \lambda \) induces a lower intervention threshold and hence influences the marginal benefits by raising the probability of intervention. We name this the probability effect. Thirdly, a higher \( \lambda \) makes the intervention threshold \( v^*_A(r) \) more sensitive to the report \( r \). This is because whereas activist’s intervention decision depends on both the expected current firm value \( E[v|r] \) and the activist’s intervention value \( v_A \), a more short-term-oriented activist cares more about the market perception of value from intervention and less about the actual intervention value \( v_A \). This increases the sensitivity of the intervention threshold to the manager’s report. We name this the sensitivity effect. All these three effects determine the role of \( \lambda \) on the manager’s disclosure strategy and its interaction with managerial myopia \( \gamma \).

To understand how \( \lambda \) and \( \gamma \) jointly determine the disclosure bias, it is useful to start with a benchmark case where \( \lambda = 0 \) and \( \gamma = 0 \) (i.e. both the activist and the manager care about
the long-term liquidation value), and then proceed to include either activist short-termism ($\lambda \in (0, 1]$) or managerial myopia ($\gamma \in (0, 1]$). This allows us to isolate the effects of the two frictions before presenting their joint effects.

**Benchmark:** $\lambda = 0$ and $\gamma = 0$. The manager with $\gamma = 0$ does not care about the stock price and thus enjoys no benefit from disclosing $r$ to increase the stock price. Then equation (14) becomes

$$\frac{1}{\delta \beta} [C_a + v - v^*_A(r)] - C_b(r - v).$$

When $\lambda = 0$, $v^*_A(r) = E[v|r]$. The manager’s marginal benefit of biasing $r$ is driven by the personal cost $C_a$ and the difference in liquidation value $v$ without intervention and the value $E[v|r]$ when intervention occurs.

**Activist short-termism:** $\lambda \in (0, 1]$ and $\gamma = 0$. Holding $\gamma$ at zero, as $\lambda$ increases, equation (14) becomes

$$\frac{1}{\delta \beta} [(1 + \lambda)C_a + (1 + \lambda)(v - v^*_A(r))] - C_b(r - v).$$

The manager does not care about the stock price. From the intervention side, a higher value of $\lambda$ decreases the intervention threshold $v^*_A(r)$. On the one hand, it intensifies the probability effect, implying a higher likelihood of incurring the personal cost $C_a$. On the other hand, it also increases the excessive intervention $v - v^*_A(r)$ and thus the valuation effect, decreasing the expected liquidation value given intervention. Both forces raise the marginal benefits of a higher report $r$ and motivate the manager to over-state current firm value to deter intervention. Hence, the higher the $\lambda$, the greater the disclosure bias.

Next we examine the impact of $\gamma$ by holding $\lambda$ at zero.

**Managerial myopia:** $\lambda = 0$ and $\gamma \in (0, 1]$. In this case, equation (14) becomes

$$\frac{1}{\delta \beta} [C_a + \gamma E[v|r] + (1 - \gamma)(v - v^*_A(r))] - C_b(r - v).$$
With $\lambda = 0$, intervention always improves the expected firm value. A change of $\gamma$ does not influence the marginal benefit related to the manager’s personal cost $C_a$, as $\gamma$ has no direct impact on whether the manager incurs the personal cost. $\gamma$ changes marginal benefits of $r$ only through the manager’s incentive to inflate the market expectation of the current firm value rather than improving the liquidation value. As $\gamma$ increases, the marginal benefits of inflating the report to get a higher price increases, leading to a higher disclosure bias. To sum up, without activist short-termism, the disclosure bias increases with managerial myopia.

Finally, we explore the interaction between $\lambda$ and $\gamma$. We first examine the role of $\lambda$ in the presence of a nonzero $\gamma$, and then we examine the role of $\gamma$ in the presence of a nonzero $\lambda$.

**The interaction:** $\lambda \in (0, 1]$ and $\gamma \in (0, 1]$. When $\gamma = 0$, the manager does not care about the stock price. Hence $\lambda$ affects the marginal benefits only via the personal cost and the liquidation value components. As explained before, a higher $\lambda$ increases the marginal benefits of biasing $r$ to influence both components. With $\gamma \in (0, 1]$, an increase in $\lambda$ also increases the marginal benefits related to the price component through the sensitivity effect and the valuation effect of $\lambda$. Specifically, a higher $\lambda$ increases the stock price sensitivity to the report $r$ and decreases the value of $v_A^*(r)$, both of which increase the marginal benefits of a higher report. Therefore, for a given value of $\gamma$, a higher $\lambda$ increases the marginal benefits of a higher report to influence all three components, inducing greater disclosure bias.

To understand the role of $\gamma$ on disclosure bias with a nonzero $\lambda$, once we allow for a nonzero $\lambda$, there is excessive intervention that decreases both the stock price and the liquidation value given intervention. With a nonzero $\lambda$, an increase in $\gamma$ has two countervailing effects on the incentive to bias. On the one hand, an increase in $\gamma$ increases the marginal benefits from the price component, as a higher $\gamma$ provides the manager with greater incentive to increase both the price given no intervention as well as the price conditional on intervention. On the other hand, it reduces the marginal benefits from the liquidation value component,
as the manager has less incentive to deter excessive intervention that reduces the liquidation value. Therefore, whether marginal benefits of disclosure increase or decrease with $\gamma$ depends on which component dominates. We find that when $\lambda$ is low, the price component dominates, making disclosure bias increase with $\gamma$. However, when $\lambda$ is high, the liquidation value component dominates, making disclosure bias decrease with $\gamma$.

This result is driven by the fact that the manager always has an incentive to increase the stock price regardless of intervention, but his marginal benefit from influencing the liquidation value component depends on the probability of intervention. When $\lambda$ is low, the probability of intervention is low. This indicates small marginal benefit of reducing excessive intervention to increase the liquidation value. However, the manager who cares about stock price still benefits from inflating the stock price given no intervention. Therefore, when $\lambda$ is low, the price component dominates the liquidation value component such that a more myopic manager enjoys higher marginal benefits from reporting a higher $r$, that is, disclosure bias increases with $\gamma$. In contrast, when $\lambda$ is high, the probability of intervention goes up, so do the marginal benefits of influencing the liquidation value component. The marginal benefit of influencing price do not change as much because the manager’s incentive mainly switches from inflating the stock price given no intervention to inflating the stock price given intervention. Hence, when $\lambda$ is high, the liquidation value component dominates, making a more myopic manager bias less, that is, disclosure bias decreases with $\gamma$.

In summary, while activist short-termism always raises the reporting bias given disclosure, the interaction between activist short-termism and managerial myopia can result in a non-monotonic relation between managerial myopia and the reporting bias. These effects of managerial myopia and activist short-termism on reporting bias in turn determine the endogenous cost of voluntary disclosure and thus the voluntary disclosure equilibrium.
4.2 Effect on disclosure equilibrium

For activist short-termism $\lambda$, as we saw in the earlier section with an exogenous disclosure strategy, it increases the reporting bias. Biasing the report is costly to the manager, hence, the high biasing costs can force the manager to choose not to disclose information. The following corollary describes how $\lambda$ affects the disclosure threshold and thus the likelihood of disclosure. In equilibrium, the threat of intervention by a short-term-oriented activist decreases the manager’s voluntary disclosure.

**Corollary 1** (Disclosure threshold and activist short-termism) The disclosure threshold $v^*$ increases as $\lambda$ increases, indicating the likelihood of disclosure decreases with $\lambda$.

Next we analyse the role of managerial myopia in the presence of activist short-termism. Common intuition might suggest that if activist short-termism forces a myopic manager to bias the report when disclosing and thus reduces the likelihood of voluntary disclosure, increasing the manager’s focus on long-term liquidation value might rebalance his myopic incentive. We find that, compared to a myopic manager, a long-term oriented manager may sometimes further reduce the likelihood of voluntary disclosure rather than increasing it.

**Corollary 2** (Disclosure threshold and managerial myopia) There exists a $\lambda^* \in [0, 1]$ such that for $\lambda \in [0, \lambda^*)$, $v^*$ increases as $\gamma$ increases, indicating the likelihood of disclosure decreases with $\gamma$, whereas for $\lambda \in [\lambda^*, 1]$, $v^*$ decreases as $\gamma$ increases, indicating the likelihood of disclosure increases with $\gamma$.

As explained before, when $\lambda$ is low, the marginal benefit of disclosure is driven by the price component instead of the liquidation value component. As $\gamma$ increases, the manager chooses a higher disclosure bias, leading to higher biasing costs. Hence, with low activist short-termism, disclosure likelihood decreases as $\gamma$ increases. As $\lambda$ increases, a higher likelihood of intervention raises the marginal benefit of disclosing to influence the liquidation value
component. When $\lambda$ is sufficiently high, the liquidation value component dominates the price component. Thus, a myopic manager with high $\gamma$ biases less when disclosing, leading to a higher likelihood of disclosure as $\gamma$ increases. We also conduct numerical analysis to demonstrate how the disclosure threshold changes with $\gamma$ and $\lambda$. The results are depicted in Figure 2.

This result along with corollary 2 also generates the following prediction: when activist short-termism is low, the activist is more likely to intervene in a firm run by a more myopic manager, whereas when activist short-termism is high, the activist is more likely to intervene in a firm run by a less myopic manager.

5 Voluntary disclosure and activist’s intervention

We now analyse the equilibrium effects of voluntary disclosure on the activist’s intervention and on the market perception of intervention.
5.1 Effect of disclosure on intervention

While our analysis so far demonstrates how the threat of intervention affects the manager’s incentives to disclose, disclosure also influences the activist’s intervention decision, including both the likelihood of intervention and the intervention efficiency.

For the former part, the upper-tailed disclosure equilibrium suggests that the expected current firm value \( v \) of a disclosing firm will always be higher than that of a non-disclosing firm. Together with the observation that intervention is more likely to occur when the expected current firm value is low, we get the following corollary.

**Corollary 3** (Disclosure and intervention threshold) A disclosing firm’s intervention threshold is always higher than a non-disclosing firm’s, that is, \( v^*_A(r) > v^*_A(ND) \). Intervention by the activist is more likely to occur in a non-disclosing firm than in a disclosing firm.

Hence, non-disclosure leads to a greater likelihood of activist intervention, while voluntary disclosure reduces the threat of intervention. This result can explain empirical evidence showing that activists are less likely to intervene in firms that disclose more information (e.g., Bourveau and Schoenfeld, 2017).

While a disclosing firm is less likely to face intervention, it is not clear whether disclosure also improves intervention efficiency. From the firm’s perspective, intervention is efficient when \( v^*_A(d) = v \), that is, any activist that can improve the liquidation value of the firm intervenes. \( v > v^*_A(d) \) suggests the existence of excessive intervention, that is, intervention may decrease the liquidation value. \( v - v^*_A(d) \) captures the extent of excessive intervention. Also we interpret \( v < v^*_A(d) \) as the existence of insufficient intervention, as some activists that can improve firm value do not intervene. In this case, \( v^*_A(d) - v \) indicates the extent of insufficient intervention. To capture both types of intervention inefficiencies, we define intervention inefficiency as \( |v - v^*_A(d)| \). Note that the above definition of intervention efficiency
is from the firm’s perspective and thus depends on the actual value of \( v \).

When the firm discloses, the activist learns the value of \( v \). As \( v > v^*_A(r) \), given disclosure, there is only excessive intervention. When the firm does not disclose, the activist intervenes based on the expected current firm value given no disclosure. We have \( E(v|ND) > v^*_A(ND) \). In this case, both excessive and insufficient intervention can occur in the non-disclosure region. Insufficient intervention occurs for firms with very low current firm value \( (v < v^*_A(ND)) \), while excessive intervention occurs for firms with relatively high current firm value \( (v^* > v > v^*_A(ND)) \). The following corollary describes the effect of disclosure on intervention efficiency.

**Corollary 4** (Disclosure and intervention efficiency) On average, intervention is more efficient for disclosing firms than for nondisclosing firms, that is, \( E[|v - v^*_A(r)||d = r] < E[|v - v^*_A(ND)||d = ND] \).

Disclosure improves intervention efficiency through two channels. First, it communicates the current firm value to the activist and thus avoids insufficient intervention. Secondly, it allows the market to more accurately price the value added by intervention, which curbs the extent of excessive intervention by the activist.

### 5.2 Effect of disclosure on market reaction to intervention

How does the market perceive intervention by an activist? Many empirical studies rely on market reaction to intervention to investigate the effect of activism (e.g., Bebchuk et al., 2015; Brav et al., 2008; Clifford, 2008; Greenwood and Schor, 2009; Klein and Zur, 2009). In order to study how stock price changes with activist intervention, we assume that a market price is also formed after the manager’s disclosure decision but before the activist’s
intervention decision.\textsuperscript{10} We define market reaction to intervention as follows:

\[ \Delta P = P(d, a = 1) - P(d), \]  

(16)

Where \( d \in D \) denotes the manager’s disclosure decision. This expression captures for firms with the same disclosure strategy, how stock price changes over time with activist intervention. Whether this market reaction to intervention is higher following disclosure or no disclosure depends on two opposing forces. On the one hand, as shown in Corollary 3, the market expects higher current firm value and thus a lower likelihood of intervention in a disclosing firm than in a non-disclosing firm. It, therefore, reacts more strongly to the news of an intervention in a disclosing firm. On the other hand, a non-disclosing firm has a lower expected current firm value than a disclosing firm. This leads the market to expect more adding value from intervention in a non-disclosing firm than in a disclosing firm, implying a larger market reaction to intervention in a non-disclosing firm. Specifically, for a given firm with a given disclosure strategy, the stock price difference \( P(d, a = 1) - P(d, a = 0) \) is higher when the firm does not disclose than when the firm discloses.

**Lemma 4** (Intervention and stock price) Given the firm’s disclosure decision, the stock price is higher with activist intervention than without intervention, that is, \( P(d, a = 1) > P(d, a = 0) \). The price difference \( P(d, a = 1) - P(d, a = 0) \) between firms that face intervention and firms that do not is larger for non-disclosing firms than for disclosing firms.

Interestingly, Lemma 4 together with Corollary 4 shows that for both disclosing and non-disclosing firms, intervention efficiency and expected benefits from intervention go in the opposite direction. Disclosing firms improve market transparency and thus enjoy higher intervention efficiency than non-disclosing firms. However, the added value from intervention are limited for disclosing firms as they have higher current firm value to start with.

\textsuperscript{10}This stock price is not considered in our main analysis. Note that adding this stock price in the manager’s objective function would not change his disclosure strategy because he receives no new information about the activist at this point of time.
Overall, market reaction to intervention can be either higher or lower for a disclosing firm than for a non-disclosing firm. As the market reaction to intervention in a disclosing firm depends on the value $v$, which is not directly observed, we compare the expected market reaction between disclosing firms and non-disclosing firms by taking expectation of $v$ given the firm’s disclosure decision. On average, the reaction to intervention is more positive for a non-disclosing firm than for a disclosing firm if the following condition holds:

$$\frac{E_r(v) - E_{ND}(v)}{Var_r(v)} < \frac{\frac{1}{1+2\delta}}{1 - \frac{1+\lambda}{1+2\delta} \left[ E_r(v) + E_{ND}(v) \right]},$$

(17)

where $E_d(v)$ and $Var_d(v)$ are the conditional expectation and conditional variance of $v$ given the firm’s disclosure decision. The following corollary describes when this condition holds.

**Corollary 5** *(Disclosure and market reaction to intervention)* There exists a threshold $\lambda^* \in (0, 1]$ such that the market reacts more positively to intervention in a non-disclosing firm vis-a-vis intervention in a disclosing firm when $\lambda < \lambda^*$.

The expected market reaction to intervention depends on both the expected likelihood of intervention and the expected benefits from intervention. While non-disclosing firms experience greater expected benefits from intervention, the market also expects a higher likelihood of intervention in these firms. When activist short-termism is low, expected benefits from intervention are sufficiently higher for non-disclosing firms than for disclosing firms. Even though the market anticipates a higher likelihood of intervention for non-disclosing firms, these firms still experience higher stock returns around intervention than disclosing firms. Above a given level of activist short-termism, the comparison of market reaction to intervention between disclosing and non-disclosing firms becomes ambiguous. We conduct numerical analysis to compare the market reaction to intervention in disclosing and non-disclosing firms. The results depicted in Figure 3 indicate that for sufficiently high values of $\lambda$, the market reaction can be higher in disclosing firms than in non-disclosing firms.
Figure 3: Numerical analysis of the market reaction to intervention. The market reaction is derived with the following parameter values: $\delta = 4$, $C_b = 2$, $C_a = 2$, $\nu = 4$, $\overline{v} = 8$, $\gamma = 0.5$.

The above results indicate that the market reaction to activist intervention depends on the firm’s information environment, as the firm’s disclosure strategy before intervention has an important impact on the market reaction. Also we highlight that the market reaction to intervention is not necessarily equivalent to the expected benefits from intervention, as both the expected likelihood and expected benefits of intervention play a role in determining the market reaction.

6 Empirical implications and conclusion

This paper examines how threat of intervention by a short-term-oriented activist affects the voluntary disclosure decision of a myopic manager. As intervention by a short-term oriented activist can decrease the firm’s liquidation value, the threat of intervention induces a disclosing manager to bias his disclosure in order to deter intervention. The disclosure bias, however, is costly to the manager and reduces his voluntary disclosure to the market. In equilibrium, only managers who observe high current firm value choose to voluntarily disclose an overstated firm value, while managers with low current firm value choose to withhold information from the market.
Our paper generates several empirical implications on the disclosure behavior of myopic managers confronted by short-term activists, as well as implications on how voluntary disclosure influences activist intervention and market reaction to intervention. We show that an increase in activist short-termism reduces voluntary disclosure. Interestingly, we also find that the informational inefficiencies created by activist short-termism can sometimes be curtailed by managers’ myopic incentive. In particular, when activist short-termism is high, a manager who cares more about the short-term stock price biases his disclosure less and thus is more likely to disclose information to the market. The result provides a new perspective on managerial myopia problem and indicates that increasing managers’ horizon may not always effectively reduce managerial myopic behavior created by short-term shareholders.

Moreover, our results demonstrate that disclosing firms are less likely to face activist intervention and on average have higher intervention efficiency relative to non-disclosing firms. For market reaction to activist intervention, it is jointly determined by expected likelihood and expected benefits of intervention, suggesting that strong market reaction to intervention does not necessarily imply higher expected benefits from intervention. In general, the market reacts positively to an activist intervention. However, the magnitude of this reaction decreases as activist short-termism increases. Lastly, we show that the market might sometimes react more positively to intervention in a disclosing firm, while at other times react more positively to intervention in a non-disclosing firm, highlighting the role of firms’ information environment on the market reaction is influenced by activist short-termism.
Appendix

Proof of Lemma 1

Proof is as explained in the paper.

Proof of Lemma 2

When the manager discloses $r$ and the activist conjectures the disclosure strategy to be of the form $r = \hat{\alpha} + \hat{\beta}v$, we have $E[\bar{v}|r] = \frac{r-\hat{\alpha}}{\hat{\beta}}$.

Replacing the expression of $E[\bar{v}|r]$ and $v_A^*$ into equation (7), the expected utility $E[U_M]$ can be simplified to

$$E[U_M] = \left[1 - \frac{1+\lambda}{\delta} \frac{r-\hat{\alpha}}{\hat{\beta}} + \lambda \right] \left( \frac{1}{2} \left( (1 + \lambda) \frac{r-\hat{\alpha}}{\hat{\beta}} + (1 - \lambda) \delta \right) - C_a \right)$$

$$+ \left[ \frac{1+\lambda}{\delta} \frac{r-\hat{\alpha}}{\hat{\beta}} - \lambda \right] \left( \gamma \frac{r-\hat{\alpha}}{\hat{\beta}} + (1 - \gamma) v \right) - \frac{C_b}{2} (r - v)^2.$$

Taking first order condition with respect to $r$ and rewriting the equation in the form of $r(v) = \alpha + \beta v$, we get that

$$\beta = 1 + \frac{(1+\lambda)(\gamma-\lambda)^2}{\delta C_b \beta},$$

$$\alpha = \frac{1}{C_b \beta} \left[ \lambda(1 + \lambda - \gamma) + (1 + \lambda) \frac{C_a}{\delta} \right].$$

Using the equilibrium conditions that $\alpha = \hat{\alpha}$ and $\beta = \hat{\beta}$ yield the expression of $\alpha^m$ in equation (10) and $\beta^m$ in equation (11). One can derive that $\alpha^m + \beta^m v - v > 0$ always holds, that is, the manager always overstates the current firm value $v$ when he discloses.

Proof of Proposition 1

Given $r(v)$, the manager’s expected payoff from disclosure can be written as

$$-\frac{1}{2} [\alpha + (\beta - 1)v]^2 + p_r \left( \frac{1}{2} [(1 + \lambda) v + (1 - \lambda) \delta] - C_a \right) + (1 - p_r) v,$$
where \( p_r = 1 - \frac{v_A(r)}{\delta} \) is the endogenous probability of intervention given disclosure.

When the manager does not disclose, the manager’s expected payoff can be written as

\[
p_N \left( \frac{1}{2}[(1 + \lambda)E(v|ND) + (1 - \lambda)\delta] - C_a \right) + (1 - p_N)[\gamma E(v|ND) + (1 - \gamma)v],
\]

where \( p_N = 1 - \frac{v^*_A(ND)}{\delta} \) is the endogenous probability of intervention given no disclosure.

Hence, the manager discloses if and only if

\[
- \frac{1}{2}[(\alpha + (\beta - 1)v) \delta + p_r \left( \frac{1}{2}[(1 + \lambda)v + (1 - \lambda)\delta] - C_a \right) + (1 - p_r)v > p_N \left( \frac{1}{2}[(1 + \lambda)E(v|ND) + (1 - \lambda)\delta] - C_a \right) + (1 - p_N)[\gamma E(v|ND) + (1 - \gamma)v].
\]

This condition can be rewritten as

\[
\Pi = [v - E(v|ND)] \left[ \frac{C_v}{\delta} (1 + \lambda) + \lambda (1 - \gamma + \lambda) + (1 + \lambda) [\frac{v}{\delta} (1 - \lambda) + \frac{E(v|ND)}{\delta} (\gamma - \frac{1 + \lambda}{2})] \right] - \frac{C_v}{2} [\alpha + (\beta - 1)v]^2 > 0.
\]

Taking the derivative of \( \Pi \) w.r.t. \( v \), using \( \alpha \beta C_b = \lambda (1 + \lambda - \gamma) + \frac{C_v}{\delta} (1 + \lambda) \) and rewriting yield

\[
\frac{\partial \Pi}{\partial v} = \left[ \frac{1}{2} (1 + \lambda)(1 - \lambda) - (\beta - 1)^2 C_b \right] v - \frac{1}{2} (1 + \lambda)(1 - \gamma)E(v|ND) + \alpha C_b.
\]

Using \( \frac{1}{2} (1 + \lambda)(\gamma - \lambda) = \beta (\beta - 1)C_b \) and \( \frac{1}{2} (1 + \lambda)(1 - \lambda) = \frac{1}{2} (1 + \lambda)(\gamma - \lambda) + \frac{1}{2} (1 + \lambda)(1 - \gamma) \), the above expression can be rewritten as

\[
\frac{\partial \Pi}{\partial v} = \frac{1}{2} (1 + \lambda)(1 - \gamma) [v - E(v|ND)] + (\alpha + (\beta - 1)v) C_b.
\]

Note that given the manager always biases when he discloses, \( \alpha + (\beta - 1)v > 0 \). Therefore, \( \frac{\partial \Pi}{\partial v} > 0 \) holds when \( v > E(v|ND) \). To show the existence of an upper-tailed disclosure equilibrium, we next prove that \( \frac{\partial \Pi}{\partial v} > 0 \) still holds when \( v < E(v|ND) \). Further rewriting
the expression with $\alpha \beta C_b = \lambda (1 + \lambda - \gamma) + \frac{C_b \alpha}{\delta} (1 + \lambda)$ yields

$$\frac{\partial \Pi}{\partial v} = \frac{1}{\beta} \left[ \frac{C_b \alpha}{\delta} (1 + \lambda) + \lambda (1 + \lambda - \gamma) + \frac{1}{\delta} (1 + \lambda) (\gamma - \lambda) v + \frac{\beta}{\delta} (1 + \lambda) (1 - \gamma) [v - E(v|ND)] \right].$$

By assumption, $C_a > \frac{\delta}{2}$, $v > \frac{\delta}{2}$, and $E(v|ND) < \delta$, therefore

$$\frac{\partial \Pi}{\partial v} > \frac{1}{\beta} \left[ \frac{C_a \delta}{\delta} (1 + \lambda) + \lambda (1 + \lambda - \gamma) + \frac{1}{2} (1 + \lambda) (\gamma - \lambda) - \frac{1}{2} \beta (1 + \lambda) (1 - \gamma) \right] > 0$$

holds for all values of $\lambda$ and $\gamma$. Hence, the disclosure strategy followed by the manager will be upper-tailed. This implies that we can find the threshold $v^*$ at which the net payoff $\Pi$ from disclosure equals to zero, i.e.

$$[v^* - E(v|ND)] \left[ \frac{C_a \delta}{\delta} (1 + \lambda) + \lambda (1 - \gamma + \lambda) + (1 + \lambda) \left[ \frac{v^*}{2 \delta} (1 - \lambda) + \frac{E(v|ND)}{\delta} (\gamma - \frac{1 + \lambda}{2}) \right] \right]$$

$$- \frac{C_a \alpha}{\delta} [\alpha + (\beta - 1) v^*] = 0.$$ 

This can be rewritten as

$$\beta [v^* - E(v|ND)] \left[ - \frac{1}{\beta C_b} (1 + \lambda) (\gamma - \frac{1 + \lambda}{2}) [v^* - E(v|ND)] + \alpha + (\beta - 1) v^* \right]$$

$$- \frac{1}{2} [\alpha + (\beta - 1) v^*]^2 = 0,$$

or

$$\frac{1}{2} \left( [v^* - E(v|ND)]^2 \left[ \beta + \frac{1}{\beta C_b} (1 - \gamma) (1 + \lambda) \right] - [\beta E(v|ND) + \alpha - v^*]^2 \right) = 0. \quad (18)$$

If $\alpha + \beta E(v|ND) > v^*$, then equation (18) is equivalent to

$$\sqrt{\beta + \frac{1}{\beta C_b} (1 - \gamma) (1 + \lambda) [v^* - E(v|ND)]} = \beta E(v|ND) + \alpha - v^*.$$

We can verify that the above solution satisfies $\alpha + \beta E(v|ND) > v^*$ and hence, is a feasible
solution with

$$v^* = \frac{\alpha + \left[ \beta + \sqrt{\beta + \frac{1}{\delta C_b} (1 + \lambda)(1 - \gamma)} \right] E(v|ND)}{1 + \sqrt{\beta + \frac{1}{\delta C_b} (1 + \lambda)(1 - \gamma)}}.$$  \hspace{1cm} (19)

To show $v < v^* < \bar{v}$ holds for at least some values of $\frac{\delta}{2} < v < \bar{v} < \delta$, we rewrite equation (19) as

$$\beta C_b (1 - \beta + 1 + \sqrt{\nu}) (v^* - \bar{v}) = 2 \left[ \frac{C_a (1 + \lambda)}{\delta} + \lambda (1 - \gamma + \lambda) \left( 1 - \frac{\nu}{\delta} \right) + \frac{\gamma \nu}{\delta} \right],$$

where $\nu = \beta + (1 - \gamma)(1 + \lambda) \frac{1}{\delta C_b}$. We can show that when $v^* = \bar{v}$, for the above equality, $L.H.S. < R.H.S.$ Moreover, as the L.H.S. is increasing in $v^*$ and the R.H.S. is independent of $v^*$, there exists a non-trivial disclosure threshold $v^* \in (\bar{v}, \bar{v})$ if $L.H.S. > R.H.S.$ holds for $v^* = \bar{v}$. Consider the case $\bar{v} = \delta$ and $\bar{v} = \frac{\delta}{2}$. Given these values, $L.H.S. > R.H.S.$ holds when

$$\beta (\sqrt{\nu} + 1) > \frac{1}{\delta C_b} \left[ \frac{4 C_a (1 + \lambda)}{\delta} + \lambda (1 - \gamma + \lambda) + 3 \gamma \right].$$ \hspace{1cm} (20)

Note that the L.H.S. of inequality (20) is independent of $C_a$, while its R.H.S. is increasing in $C_a$. Hence, if $C_a$ is sufficiently low, inequality (20) can hold, indicating the existence of an interior solution of the disclosure threshold. In addition, the L.H.S. of inequality (20) is decreasing in $\lambda$, while its R.H.S. is increasing in $\lambda$. One can show that when $C_a$ is sufficiently low and $\lambda = 1$, inequality (20) holds, implying that for all values of $\lambda$, we can ensure the existence of an interior disclosure threshold through the choice of a suitable threshold on $C_a$.

If $\alpha + \beta E(v|ND) < v^*$, then equation (18) is equivalent to

$$\sqrt{\beta + \frac{1}{\delta C_b} (1 - \gamma)(1 + \lambda)} [v^* - E(v|ND)] = -\beta E(v|ND) - \alpha + v^*,$$

implying

$$v^* = \frac{\alpha - \left[ \sqrt{\beta + \frac{1}{\delta C_b} (1 + \lambda)(1 - \gamma)} - \beta \right] E(v|ND)}{1 - \sqrt{\beta + \frac{1}{\delta C_b} (1 + \lambda)(1 - \gamma)}}.$$ \hspace{1cm} (21)
We can verify that when \( \sqrt{\beta + \frac{1}{\delta C_b}(1 + \lambda)(1 - \gamma) - 1} > 0 \), the above solution does not satisfy \( \alpha + \beta E(v|ND) < v^* \) and hence, is not a feasible solution. Therefore, \( \alpha + \beta E(v|ND) < v^* \) holds only when \( \beta + \frac{1}{\delta C_b}(1 - \gamma)(1 + \lambda) < 1 \), which also implies \( \beta - \sqrt{\beta + \frac{1}{\delta C_b}(1 - \gamma)(1 + \lambda)} < 0 \). In this case, the R.H.S. of equation (21) is decreasing in \( E(v|ND) \). Hence, proving that equation (21) is not a valid solution of the disclosure threshold is equivalent to showing when \( E(v|ND) = \delta \),

\[
v^* = \alpha - \frac{\alpha \left[ \sqrt{\beta + \frac{1}{\delta C_b}(1 - \gamma)(1 + \lambda)} \right] E(v|ND)}{1 - \sqrt{\beta + \frac{1}{\delta C_b}(1 - \gamma)(1 + \lambda)}} > \delta. \tag{22}
\]

Substituting \( E(v|ND) = \delta \) into inequality (22), it can be simplified to \( \alpha > (1 - \beta)\delta \). Replacing the expression of \( \alpha \) in equation (10) and using \( \frac{1}{\delta C_b}(1 + \lambda)(\lambda - \gamma) = \beta(1 - \beta) \), one can show that \( \alpha > (1 - \beta)\delta \) always holds, indicating equation (21) is not a valid solution of the disclosure threshold.

**Proof of Lemma 3**

Given \( E[v|r] < \delta \), it is easy to check that \( \lambda(\delta - E[v|r]) \) is increasing in \( \lambda \) and is decreasing in \( E[v|r] \).

**Proof of Corollary 1**

At the disclosure threshold, we have

\[
(1 + \sqrt{\beta + \frac{1}{\delta C_b}(1 - \gamma)(1 + \lambda)}) [v^* - E(v|ND)] = (\beta - 1)E(v|ND) + \alpha.
\]

Define \( \Gamma = (1 + \sqrt{\beta + \frac{1}{\delta C_b}(1 - \gamma)(1 + \lambda)}) [v^* - E(v|ND)] - [(\beta - 1)E(v|ND) + \alpha] \). Then by the Implicit Function Theorem, we have

\[
\frac{dv^*}{d\lambda} = -\frac{d\Gamma}{dv^*}.
\]

\[
\frac{d\Gamma}{dv^*} = 1 + \sqrt{\beta + \frac{1}{\delta C_b}(1 - \gamma)(1 + \lambda)} - \frac{dE(v|ND)}{dv^*} \left[ \sqrt{\beta + \frac{1}{\delta C_b}(1 - \gamma)(1 + \lambda)} + \beta \right] > 0. \text{ Hence, the}
\]

disclosure threshold is increasing in $\lambda$ if $\frac{d\Gamma}{d\lambda} < 0$. Define $\nu = \beta + \frac{1}{\delta c_b} (1 - \gamma)(1 + \lambda)$. One can show that

$$\frac{d\Gamma}{d\lambda} = \frac{1}{\sqrt{\nu}} [v^* - E(v|ND)] \frac{dv}{d\lambda} - \frac{d[\alpha + (\beta - 1)E(v|ND)]}{d\lambda}. $$

At the disclosure threshold, $v^* > E(v|ND)$. In addition, we can show that $\frac{dv}{d\lambda} < 0$ and $\frac{d[\alpha + (\beta - 1)E(v|ND)]}{d\lambda} > 0$, suggesting that $\frac{d\Gamma}{d\lambda} < 0$. Hence, $\frac{dv^*}{d\lambda} > 0$. The disclosure threshold $v^*$ increases as $\lambda$ increases.

**Proof of Corollary 2**

As $v$ is uniformly distributed over $[\underline{v}, \bar{v}]$, $E(v|ND) = \frac{1}{2} (\underline{v} + v^*)$. At the disclosure threshold, we have

$$\left[\sqrt{\beta + \frac{1}{\delta c_b} (1 - \gamma)(1 + \lambda)} - \beta + 2\right] (v^* - \bar{v}) = 2 [\alpha + (\beta - 1)v]. $$

Define $\Gamma = \left[\sqrt{\beta + \frac{1}{\delta c_b} (1 - \gamma)(1 + \lambda)} - \beta + 2\right] (v^* - \bar{v}) - 2 [\alpha + (\beta - 1)v]$. By the Implicit Function Theorem, we have

$$\frac{dv^*}{d\gamma} = - \frac{\frac{d\Gamma}{d\gamma}}{\frac{d\Gamma}{dv^*}}. $$

We already showed that $\frac{d\Gamma}{dv^*} > 0$. Hence the disclosure threshold is increasing in $\gamma$ if $\frac{d\Gamma}{d\gamma} < 0$. Taking the partial derivative and rearranging, one can show that $\frac{d\Gamma}{d\gamma} < 0$ if and only if

$$\frac{v}{[\beta - 1]^2 + \nu + \sqrt{\nu}} > \alpha \left[1 + \frac{(1 + \lambda)(1 - 2\gamma + \lambda)}{\beta \delta c_b} \right] + \frac{\delta \lambda (2\beta - 1)}{\beta (1 + \lambda)} \left[2 - \beta \right] \sqrt{\nu},$$

where $\nu = \beta + \frac{1}{\delta c_b} (1 - \gamma)(1 + \lambda)$. We can show that $(\beta - 1)^2 + \nu + \sqrt{\nu}$ is decreasing in $\lambda$ and hence, the L.H.S. of the above inequality is decreasing in $\lambda$. On the other hand, both $\alpha \left[1 + \frac{(1 + \lambda)(1 - 2\gamma + \lambda)}{\beta \delta c_b} \right]$ and $\frac{\delta \lambda (2\beta - 1)}{\beta (1 + \lambda)} \left[2 - \beta \right] \sqrt{\nu}$ are increasing in $\lambda$, suggesting that the R.H.S. of this inequality is increasing in $\lambda$.

To show there exists a value of $\lambda^* \leq \lambda$ under which the inequality holds for $\lambda < \lambda^*$ and does
not hold otherwise, we need to prove that the inequality (23) holds when \( \lambda = 0 \), while it does not hold when \( \lambda = 1 \). As analytically proving the existence of \( \lambda^* \) is not tractable, we prove the existence of \( \lambda^* \) with the following assumptions: \( \delta = \frac{8}{C_b} \), \( C_b = 1 \), \( \bar{v} = \frac{\delta}{2} \) and \( C_a = \frac{\delta}{2} \). Given these assumptions on parameter values, when \( \lambda = 0 \), inequality (23) is equivalent to

\[
8\beta \left( \sqrt{\beta + \frac{1 - \gamma}{8} + (\beta - 1)^2 + \beta + \frac{1 - \gamma}{8}} \right) > 1 + \frac{1 - 2\gamma}{8\beta}.
\]

When \( \lambda = 0 \), \( \beta > 1 \). Hence, inequality (23) holds. When \( \lambda = 1 \), if inequality (23) does not hold, it implies that

\[
\frac{1}{2\beta}(1 - \gamma)(8\beta - 5 + \gamma) + 2\sqrt{\bar{v}}(1 + \gamma - 2\sqrt{\gamma}) < 3 - \gamma,
\]

which is always satisfied. Therefore, we show the existence of a \( \lambda^* \) with the parameter values \( \delta = \frac{8}{C_b} \), \( C_b = 1 \), \( \bar{v} = \frac{\delta}{2} \) and \( C_a = \frac{\delta}{2} \).

**Proof of Corollary 3**

For a given \( v_A \), the activist intervenes when \( v_A > v_A^* \), where \( v_A^* = (1 + \lambda)E(v|d) - \lambda\delta \). Since the disclosure strategy is upper-tailed, \( E(v|r) > E(v|ND) \) holds for any \( v \) that is disclosed. This suggests that \( v_A^*(r) > v_A^*(ND) \). As activist intervention occurs with probability \( Pr(v_A > v_A^*) = 1 - \frac{v_A^*}{\delta} \), it implies that activist intervention occurs with a higher probability when the manager does not disclose vis-a-vis when he discloses.

**Proof of Corollary 4**

For disclosing firms, since \( v_A^*(r) < E[v|r] \) always holds, average intervention inefficiency equals to \( \frac{\int_0^{\bar{v}} (v - v_A^*(r))dv}{\int_0^{\bar{v}} dv} \), which can be simplified to

\[
E[|v - v_A^*(r)||d = r] = \lambda \left[ \delta - \frac{1}{2}(\bar{v} + v^*) \right].
\]

\[(24)\]
For non-disclosing firms, average intervention inefficiency equals to \[
\int_{v}^{v^*} \int_{v}^{v^* - v^* A(ND)} dv + \int_{v}^{v^*} \int_{v}^{v^* - v^* A(ND)} dv \frac{v^*}{v^* - v^* A(ND)} \text{,}
\]
be rewritten as \[
\frac{v^* A(ND)}{\int_{v}^{v^*} dv} \left[ \frac{v^*}{v^* - v^* A(ND)} - \int_{v}^{v^*} dv \right].
\]
This simplifies to \[
E[|v - v^* A(ND)||d = ND] = \frac{v^* - \delta}{4} + \frac{\lambda^2}{v^* - \frac{\delta}{2}} \left[ \delta^2 - \left( \frac{v^* + \delta}{2} \right)^2 \right].
\] (25)

We can show that the value of equation (25), suggesting that disclosure results in more efficient intervention.

**Proof of Lemma 4**

Given the manager’s disclosure decision \(d\), the market price following intervention is

\[
P(d, a = 1) = \frac{1}{2} \left[ (1 + \lambda)E(v|d) + (1 - \lambda)\delta \right],
\]

while the market price given no intervention is

\[
P(d, a = 0) = E(v|d).
\]

The price difference is

\[
P(d, a = 1) - P(d, a = 0) = \frac{1}{2} (1 - \lambda) [\delta - E(v|d)] > 0.
\] (26)

In equilibrium, \(E(v|ND) < E(v|r)\), hence, the price difference following non-disclosure is greater than that following disclosure.

When the manager discloses, \(E(v|r) = v\). It is straightforward to see that the price difference in equation (26) decreases as \(\lambda\) increases. When the manager does not disclose, \(E(v|ND) = \frac{v^* + \delta}{2}\). Taking the derivative of the price difference in equation (26) w.r.t. \(\lambda\) yields the
following expression

\[-\frac{1}{2}[\delta - E(v|ND)] - \frac{1}{4}(1 - \lambda) \frac{dv^*}{d\lambda}.

Since the disclosure threshold is increasing in \(\lambda\), the above expression is always negative. Therefore, when the manager does not disclose, the price difference also decreases with \(\lambda\).

**Proof of Corollary 5**

We assume that prices are formed both after the manager’s disclosure and after the activist intervention. In equilibrium, the price of the firm following disclosure is given by

\[ P(d = r) = \frac{\delta}{2}p_r(1 - \lambda) + v \left[ 1 + \frac{1}{2}p_r(1 + \lambda) - p_r \right], \]

where \(p_r = 1 - \frac{v^*_r(r)}{\delta}\) is the endogenous probability of intervention following disclosure. Given disclosure, the price of the firm following intervention is

\[ P(d = r; a = 1) = \frac{1}{2} \left[ (1 + \lambda)v + (1 - \lambda)\delta \right]. \]

Hence, the expected market reaction to intervention following disclosure is

\[ E[P(d = r; a = 1) - P(d = r)] = (1 - \lambda^2) \left[ \frac{E_r(v)}{2} - \frac{[E_r^2(v) + Var_r(v)]}{2\delta} \right] - \frac{\lambda(1-\lambda)[\delta - E_r(v)]}{2}, \quad (27) \]

where \(E_r(v) = \frac{1}{2}(v^* + \bar{v})\) is the expected value of \(v\) given the firm will disclose later on, and \(Var_r(v) = \frac{1}{12}(\bar{v} - v^*)^2\) is the expected variance of \(v\) given the firm will disclose later on. Similarly, we can also derive the expected market reaction to intervention following no disclosure. In equilibrium, the price of the firm following non-disclosure is given by

\[ P(d = ND) = \frac{\delta}{2}p_N(1 - \lambda) + E(v|ND) \left[ 1 + \frac{1}{2}p_N(1 + \lambda) - p_N \right]. \]

where \(p_N = 1 - \frac{v^*_N(ND)}{\delta}\) is the endogenous probability of intervention following no disclosure.
Given no disclosure, the price of the firm following intervention becomes

\[ P(d = ND; a = 1) = \frac{1}{2} [(1 + \lambda)E(v|ND) + (1 - \lambda)\delta]. \]

Hence, the expected market reaction to intervention following no disclosure is

\[ E[P(d = ND; a = 1) - P(d = ND)] = \frac{\delta - \text{E}_{ND}(v)}{2} (1 - \lambda) \left[ (1 + \lambda) \frac{\text{E}_{ND}(v)}{\delta} - \lambda \right], \quad (28) \]

where \( \text{E}_{ND}(v) = \frac{1}{2} (v + v^*) \) is the expected value of \( v \) given the firm will not disclose later on. The expected market reaction to intervention following no disclosure in equation (28) is greater than the market reaction to intervention following disclosure in equation (27) if and only if

\[ [E_r(v) - \text{E}_{ND}(v)] \left[ 1 - \frac{1 + \lambda}{1 + 2\lambda} \frac{1}{\delta} (E_r(v) + \text{E}_{ND}(v)) \right] < \frac{1 + \lambda}{1 + 2\lambda} \frac{1}{\delta} \text{Var}_r(v). \]

Note that \( E_r(v) - \text{E}_{ND}(v) = \frac{\delta - v}{2} \) and \( E_r(v) + \text{E}_{ND}(v) = v^* + \frac{\delta + v}{2} \).

Clearly when \( 1 - \frac{1 + \lambda}{1 + 2\lambda} \frac{1}{\delta} (E_r(v) + \text{E}_{ND}(v)) < 0 \), the inequality always holds. \( 1 - \frac{1 + \lambda}{1 + 2\lambda} \frac{1}{\delta} (E_r(v) + \text{E}_{ND}(v)) < 0 \) can be simplified to \( \lambda < \frac{\frac{1}{2}(E(v) + v^*) - 1}{2 - \frac{1}{2}\delta} \). Since \( \frac{\delta}{2} < \bar{v} < \delta \) and \( \frac{\frac{1}{2}(E(v) + v^*) - 1}{2 - \frac{1}{2}\delta} \) is increasing in \( E(v) \) and \( v^* \), we can show that it is always greater than zero by noting that at \( v^* = E(v) = \frac{\delta}{2} \), the expression becomes zero.
References


