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Managerial Disclosures and Shareholder Litigation

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Abstract. This paper explores the link between shareholder lawsuits brought under Rule 10b-5 of the Securities Exchange Act of 1934 and managerial disclosures of prospective information. When the manager's information is such that there is no affirmative duty to disclose under Rule 10b-5, previous research has shown that the manager will withhold his information if it is sufficiently unfavorable and will disclose it otherwise. When the manager's information is such that there exists an affirmative duty to disclose under Rule 10b-5, it is shown here that the manager will release either good news or news that is sufficiently bad. Further, the good news disclosures are expected to be more precise than those that reflect unfavorable information. It is also demonstrated that the probability of a disclosure will increase with both the precision of the manager's information and the variability of his firm's earnings.

Rule 10b-5 of the Securities Exchange Act of 1934 states that it is unlawful for any person "to make any untrue statement of a material fact or to omit to state a material fact necessary in order to make the statements made, in light of the circumstances under which they were made, not misleading." This rule has been used by investors as grounds for bringing lawsuits against corporate managers for allegedly issuing misleading disclosures or failing to publicly disclose value-relevant information. Recent empirical studies have found that the threat of these lawsuits has had an impact on the nature and extent of managerial disclosures.[1] This paper examines this interaction theoretically.

The study focuses on the disclosure of forward-looking information, other than that specifically required to be released under generally accepted accounting principles (such as estimates of bad debts and proven oil and gas reserves). This type of information includes managerial forecasts of earnings or sales and certain forward-looking information sometimes found in the Management Discussion and Analysis (MD&A) section of the annual report (as described below). This information is "soft" in that it cannot be verified ex-ante by auditors.

The extent to which Rule 10b-5 requires managers to disclose such prospective information has been the subject of numerous court cases and clarifying statements from the Securities and Exchange Commission (SEC).[2] It has been established that a duty to disclose "does not arise from the mere possession of nonpublic market information."[3,4] This means, for example, that management is generally not under any obligation to disclose an internally generated earnings forecast. However, management does have a duty to disclose prospective information which updates or corrects a prior announcement which is still "alive."[5] (An announcement is considered alive if it has "a forward intent and connotation upon which parties may be expected to rely."[6]) Consequently, if management previously disclosed an earnings forecast voluntarily, then it must revise that forecast upon receiving new information which makes the original forecast inaccurate. Further, Item 303 of SEC Regulation

S-K requires a company to disclose certain forward-looking information in its MD&A statement (regardless of whether that information updates or corrects a prior disclosure). In its interpretive release on the MD&A ("Management's Discussion and Analysis of Financial Condition and Results of Operations: Certain Investment Company Disclosure"), the SEC specified that a duty to disclose arises when a trend or event is known by management and is likely to affect materially the firm's future operating results.

When the manager's information is such that there is no affirmative duty to disclose, Rule 10b-5 does not affect the manager's disclosure strategy (as he cannot be sued successfully for withholding information). Assuming that there exists uncertainty on the part of investors as to whether the manager is in possession of private information, he will simply withhold any information he has if it is sufficiently unfavorable and disclose it otherwise.[7]

More interesting and complex is the case where an affirmative duty to disclose does exist (either because the manager's information pertains to the MD&A statement or would serve to update or correct a previous disclosure). In this scenario the manager can be sued successfully if he withholds information which, if released, would have caused a drop in the firm's stock price. Shareholders who purchased shares during the time that the information was withheld would be bringing the suit, alleging that these purchases were made at inflated prices. For most of the analysis the manager is given the choice either to reveal fully and truthfully his private information or withhold it. In the latter part of the analysis the manager's choice set is expanded to allow him to reveal fully his information, release a noisy version of it, or withhold it. Such an analysis is of interest given that Skinner (1994) finds the precision of bad news disclosures to be lower than that of good news disclosures while Kasznik and Lev (1995) show that firms with larger earnings surprises release more precise information.

In this setting it is demonstrated that a manager will release his information if it reflects either good news or news that is sufficiently bad.[8] This is supported by empirical results of Skinner. Good news disclosures are motivated by a desire to increase the firm's stock price while bad news disclosures are designed to reduce the probability of a lawsuit. This strategy differs significantly from that in the case where there is no affirmative duty to disclose. This difference highlights the importance of assessing the extent to which Rule 10b-5 imposes a duty to disclose before drawing conclusions as to its impact on the manager's voluntary disclosure strategy.

It is also shown that when there is an affirmative duty to disclose, the probability of disclosure increases with both the precision of the manager's information and the variability of earnings. This makes sense because as either parameter increases, it becomes more likely that, conditional on the manager observing and withholding unfavorable news, realized earnings will be bad and a lawsuit will be filed. The second of these results is consistent with the empirical finding of Kasznik and Lev that high tech firms (with presumably more volatile earnings) were more likely than non-high tech firms to give warnings of negative earnings surprises.

If the manager has the discretion to either fully disclose his information or release a noisy version of it, it is shown that he will choose full disclosure if his private information is either good or sufficiently bad, again consistent with findings of Kasznik and Lev. Further, bad news disclosures are demonstrated to be less precise, in general, than disclosures of good news, as Skinner finds. This result is reasonable given that bad news disclosures have both a positive effect (that of reducing the probability of a lawsuit) and a negative effect (that of decreasing the firm's stock price). The manager balances these effects by choosing an imprecise disclosure. Since there are only positive effects to the release of good news, the manager prefers full disclosure.

Two other papers which show the potential existence of disjoint disclosure and/or nondisclosure regions in settings where a manager chooses between truthfully revealing or withholding his information are Wagenhofer (1990) and Feltham and Xie (1992). These papers introduce an opponent who enters the firm's product market if the manager's disclosed information is sufficiently favorable. Both papers demonstrate that the manager's disclosure strategy may consist of two separate nondisclosure regions. One nondisclosure region will comprise the most unfavorable private information. This information is withheld so as to preclude a very negative capital market reaction. The other nondisclosure region consists of information sufficiently favorable that the opponent would enter the product market if revealed. If this information is withheld, the opponent chooses to stay out, since he knows that there is some chance that the manager's undisclosed information lies in the more unfavorable nondisclosure region.

The plan of this paper is as follows. Section 1 describes the economic setting. Sections 2 and 3 examine the equilibrium resulting when an affirmative duty to disclose under Rule 10b-5 exists. Section 4 extends the analysis to the case where the manager can choose to disclose a noisy version of his information. Section 5 summarizes and concludes the paper. All proofs not in the text appear in the Appendix.

1. Economic Setting

1.1. Preliminaries

Consider a multi-period economy with many firms, each run by a risk-neutral manager. Each firm's earnings during any period, e, take one of three values, v, 0, or $-v$. Earnings of 0 occur with probability t while earnings of v and $-v$ each occur with probability $(1-t)/2$. Consequently, the firm's earnings distribution is symmetric around a mean of zero. The parameter $1-t$ is a measure of earnings volatility; the greater its value, the more volatile are earnings. Without loss of generality, the firm's earnings each period are assumed equal to both the firm's cash flow and dividends for the period.[9] For simplicity, earnings are assumed to be independent across periods.[10]

Early in each period there is a round of trading in all firms' shares. All investors in the market are risk neutral and the one-period rate of interest equals zero. Since earnings are independent across periods and the expected value of future earnings is zero, the price of a firm during any period's trading will equal investors' expectation of its current-period earnings.[11]

Before the period's trading round each firm's manager receives, with probability r, a signal of the firm's earnings that period. Investors do not know whether the manager has received a signal. This signal, denoted by y, is uniformly distributed between 0 and 1. With probability

s the signal is informative and with complementary probability it is uninformative. The parameter s can, thus, be thought of as a measure of signal precision.

When informative, the relation between earnings and y is given as follows:

$$\text{prob}(v \mid y, I) = y(1-t) \tag{1}$$
$$\text{prob}(0 \mid y, I) = t \tag{2}$$
$$\text{prob}(-v \mid y, I) = (1-y)(1-t), \tag{3}$$

where I stands for the event that the signal is informative. The greater is y, the greater is the probability of earnings equaling v and the smaller is the probability of their equaling $-v$. When the signal is uninformative, the posterior distribution of earnings, conditional on y, is equal to the prior distribution. The values of both r and s are common knowledge to all market participants.

A manager observing y does not know whether his particular signal is informative. His distribution for earnings, given y, is therefore:

$$\text{prob}(v \mid y) = [sy + (1-s)/2](1-t) \tag{4}$$
$$\text{prob}(0 \mid y) = t \tag{5}$$
$$\text{prob}(-v \mid y) = [s(1-y) + (1-s)/2](1-t). \tag{6}$$

His posterior expectation for earnings, $E(e \mid y)$, then is:

$$E(e \mid y) = vs(1-t)(2y-1). \tag{7}$$

$E(e \mid y)$ is increasing in y. For values of $y > 1/2$, $E(e \mid y)$ is greater than the prior expectation of zero.

A manager receiving the signal y must decide whether to publicly release it (or, equivalently, disclose his expectation $E(e \mid y)$) before trading takes place. If he does make a disclosure, it is assumed to be truthful.[12] A manager receiving no signal makes no disclosure. Let n represent the event of nondisclosure and d the event of disclosure, with $E(e \mid n)$ denoting investors' expectation of the period's earnings given no disclosure. Further, let nsig represent the event where the manager does not observe a signal and $f(y \mid n)$ the density function for the event where the manager observes y, conditional on no disclosure. Then:

$$\begin{aligned} E(e \mid n) &= \int_0^1 E(e \mid y, n) \cdot f(y \mid n)\, dy + \int_0^1 E(e \mid \text{nsig}, n) \cdot \text{prob}(\text{nsig} \mid n)\, dy \\ &= \int_0^1 vs(1-t)(2y-1) \cdot f(y \mid n)\, dy, \end{aligned} \tag{8}$$

since $E(e \mid \text{nsig}, n) = 0$. As will be confirmed by Proposition 1, the manager will withhold his information if he observes a value of y between a lower bound, denoted by $y_L \geq 0$, and an upper bound, denoted by $y_U < 1/2$. Given this, expression (8) reduces to:[13]

$$E(e \mid n) = \frac{vs(1-t)(y_U^2 - y_L^2 - y_U + y_L)r}{(y_U - y_L)r + 1 - r}. \tag{9}$$

It is easy to verify that, with $y_U < 1/2$, $E(e \mid n)$ is negative.

Given that there exists an affirmative duty to disclose, the manager may be successfully sued by shareholders who purchased shares during the period if (1) the manager withheld a signal from the market and (2) the information, if released, would have caused a decline in the firm's stock price.[14] These shareholders suffer damages since they purchased shares at an inflated price. The extent of price inflation is equal to $\max\{0, E(e \mid n) - E(e \mid y)\}$.

Shareholders who want to sue the manager at the end of any period approach a risk-neutral lawyer who decides whether it is profitable for her to take on the suit. It is assumed that a necessary condition for her to agree to file a lawsuit is that realized earnings fall below investors' expectations.[15] With $E(e \mid n) < 0$, lawsuits will then only occur when realized earnings equal $-v$.

1.2. The Court System and the Lawyer's Objective Function

Given realized earnings of $-v$, the lawyer will proceed with the lawsuit if she expects her share of the court award to be greater than her costs, C. It is assumed that if a suit is brought against the manager and he did withhold information, the court discovers this with probability β, and, for simplicity, perfectly discerns the nature of that information (that is, the value of y). With probability $1-\beta$ the court incorrectly concludes that no information was withheld. If a suit is brought but the manager did not withhold information, the court discovers this with probability one and the manager suffers no penalty. If the manager has withheld a signal of y and a successful lawsuit is brought against him, shareholders' damage award is equal to a fraction, D, of the amount of price inflation.[16] For simplicity, the lawyer's share of this award is assumed to equal exactly shareholders' damages.[17] If the lawsuit is unsuccessful, the lawyer receives nothing.

When deciding whether to proceed with the suit the lawyer does not know whether the manager withheld information and, if he did, the nature of that information. With realized earnings of $-v$, the lawyer's expected profit from pursuing a lawsuit, π, is:

$$\pi = \int_{y_L}^{y_U} \beta D \cdot \max\{0, E(e \mid n) - E(e \mid y)\} \cdot g(y \mid -v, n)\, dy - C,$$

where $g(y \mid -v, n)$ is the density function for the event where the manager observes y, conditional on realized earnings of $-v$ and no disclosure. As verified below, $E(e \mid y_U) = E(e \mid n)$ and, therefore, $E(e \mid y) < E(e \mid n)$ for all y less than y_U. Given this and using Bayes' rule to solve for $g(y \mid -v, n)$, π becomes:

$$\pi = \beta D v s(1-t) \frac{\int_{y_L}^{y_U} (2y_U - 2y)[2s(1-y) + 1 - s]r\, dy}{s([1-y_L)^2 - (1-y_U)^2]r + (1-s)(y_U - y_L)r + 1 - r} - C. \tag{10}$$

The lawyer takes on the lawsuit when expression (10) is positive and foregoes it when it is negative. When it equals zero, the lawyer is indifferent between these two actions. In the subsequent analysis, it is assumed that there are values of y_L for which $\pi > 0$. If this were not so, then the lawyer would never find it profitable to sue the manager and the threat of shareholder lawsuits would not affect the manager's disclosure decision.

1.3. The Manager's Objective Function

The manager's disclosure decision impacts him along two dimensions. The first is through its effect on the firm's stock price subsequent to trading; all else equal, the manager prefers a higher price, possibly because he holds shares or options in the firm, or because his reputation is enhanced by a higher price, or possibly out of a concern for those current shareholders who might choose to sell their shares over the near-term.[18] The second is through its effect on both the probability he will be successfully sued under Rule 10b-5 and the size of any damage award; all else equal, he prefers lower expected litigation costs.

When the manager makes his disclosure decision he does not know whether he will be sued. Denoting by α the probability of a lawsuit, conditional on earnings of $-v$, and recalling that $\text{prob}(-v \mid y) = [s(1-y) + (1-s)/2](1-t)$, the manager's expectation of the damages awarded to shareholders if he withholds information is:

$$\alpha\beta D \cdot \max\{0, E(e \mid n) - E(e \mid y)\} \cdot [s(1-y) + (1-s)/2](1-t).$$

The manager's expected utility, denoted by $M_n(y)$ if he withholds his information and by $M_d(y)$ if he discloses it, is assumed to be a weighted average of the firm's share price subsequent to trading and the expected damage award. Formally:

$$\begin{aligned} M_n(y) &= E(e \mid n) - \alpha\beta DK \cdot \max\{0, E(e \mid n) - E(e \mid y)\} \\ &\quad \cdot [s(1-y) + (1-s)/2](1-t) \end{aligned} \tag{11}$$

and:

$$M_d(y) = E(e \mid y) \tag{12}$$

where $K > 0$ is the weight that the manager places on the damage award relative to the stock price. K will be higher the more the manager's reputation is harmed by a successful lawsuit, the greater the probability that he will be fired as a result, and the greater the proportion of any monetary damages he (rather than the firm's insurance company) is personally required to pay.

Letting $\Delta M(y)$ denote the difference between $M_n(y)$ and $M_d(y)$, the manager will withhold his information if $\Delta M(y) > 0$, disclose it if $\Delta M(y) < 0$, and will be indifferent between these actions if $\Delta M(y) = 0$. Using expressions (11) and (12), $\Delta M(y)$ can be written as:[19]

$$\begin{aligned} \Delta M(y) &= E(e \mid n) - E(e \mid y) - \alpha\beta DK \cdot \max\{0, E(e \mid n) - E(e \mid y)\} \\ &\quad \cdot [s(1-y) + (1-s)/2](1-t). \end{aligned} \tag{13}$$

2. Equilibrium

This section derives the manager's and lawyer's equilibrium strategies. As expression (13) reveals, the manager will withhold his signal if $1 - \alpha\beta DK[s(1-y) + (1-s)/2](1-t) > 0$ and $E(e \mid n) > E(e \mid y)$. Denote by y_L the maximum of zero and the y solving $1 - \alpha\beta DK[s(1-y) + (1-s)/2](1-t) = 0$:[20]

$$y_L = \max\left\{0, \frac{\alpha\beta DK(1-t)(1+s)/2 - 1}{\alpha\beta DKs(1-t)}\right\}. \tag{14}$$

Note that $1 - \alpha\beta DK[s(1-y) + (1-s)/2](1-t)$ is positive for $y > y_L$ and negative for $y < y_L$. In addition, for $y_L > 0$, y_L increases with the parameters α, β, D, K, s, and $1-t$. As verified subsequently in Proposition 2, $y_L < 1/2$ in equilibrium.

Denote by y_U the value of y for which $E(e \mid n) = E(e \mid y)$. For $y < y_U$, $E(e \mid n) > E(e \mid y)$, while for $y > y_U$, $E(e \mid n) < E(e \mid y)$. Equating $E(e \mid n)$ to $E(e \mid y)$ and rearranging yields the following expression for y_U:

$$2y_U - 1 = \frac{(y_U^2 - y_L^2 - y_U + y_L)r}{(y_U - y_L)r + 1 - r}. \tag{15}$$

It is simple to show that y_U increases with y_L. This is because an increase in y_L raises $E(e \mid n)$ and so increases the value of y at which $E(e \mid n) = E(e \mid y)$. In addition, (1) $dy_U/dy_L < 1$, (2) $y_U > y_L$ for all values of $y_L < 1/2$ and (3) $y_U = y_L$ at $y_L = 1/2$. Consequently, with $y_L < 1/2$ in equilibrium, y_U will also be less than $1/2$.

These results immediately lead to the following proposition:

Proposition 1 *In equilibrium, the manager will disclose his signal if* $0 \leq y < y_L$ *or if* $y_U < y \leq 1$. *He will withhold it if* $y_L < y < y_U$. *He will be indifferent between these two actions if* $y = y_L$ *or* y_U.[21]

The manager will disclose his information if it is sufficiently unfavorable ($y < y_L$) or if it is favorable relative to investors' expectation given no disclosure ($y > y_U$).[22] Favorable news is disclosed due to its positive impact on the firm's stock price, while sufficiently unfavorable news is disclosed due to the existence of a potentially large penalty for nondisclosure. These results are consistent with Skinner who finds that the stock price response to voluntary bad news disclosures is larger in magnitude than the response to disclosures of good news. As noted earlier, this strategy differs significantly from the one that arises if there is no affirmative duty to disclose; in that case, the manager will withhold his information if it is sufficiently unfavorable and will disclose it otherwise.

Consider, next, the determination of the probability, α, that the lawyer will sue, given realized earnings of $-v$. The following observation is useful:

Observation 1. The lawyer's expected profit, π, decreases with y_L.

It is straightforward to show that the higher is y_L, the less likely the manager withholds information and the smaller the expected level of mispricing if he does. Consequently, the lawyer's expected profit from a lawsuit decreases with y_L.

To determine the equilibrium α, note that for any set of parameter values, there is a value for y_L, denoted by $y_L^* < 1/2$, which makes the lawyer's expected profit, given by expression (10), zero. (This follows from Observation 1 and the fact that when $y_U = y_L = 1/2$, expected profits are negative.) If, at $\alpha = 1$, the manager's choice for y_L (given by expression (14)) is less than y_L^*, the lawyer's expected profit will be positive for all values of α;[23] consequently, in equilibrium the lawyer will sue with probability one. If, at $\alpha = 1$, $y_L > y_L^*$, then the equilibrium α must be less than one. (α could not equal 1 in equilibrium since the lawyer's expected profit would be negative and she would not sue.) The equilibrium α will be that value which equates y_L to y_L^* and causes the lawyer to be indifferent between taking on and declining the lawsuit. These results are summarized in the following proposition:[24]

Proposition 2 *Conditional on no disclosure by the manager and realized earnings of $-v$, the lawyer will sue with probability one if, by doing so, the manager's choice for y_L (as given by expression (14)) would be less than y_L^*; otherwise she will sue with a probability that equates y_L and y_L^*.*

3. The Probability of Voluntary Disclosure

This section examines the effect of changes in the economy's parameters on the probability of voluntary disclosure, $r[1 - (y_U - y_L)]$. The focus will be on economies where $y_L > 0$ and $\alpha = 1$. Attention is restricted to settings with a positive y_L since only in such cases does the threat of a lawsuit deter a manager observing the most unfavorable information ($y = 0$) from withholding it. If y_L were zero, then the threat of a lawsuit would have no effect on the manager's disclosure strategy, regardless of his information. Such a setting is clearly unrealistic. Attention is focused on the case of $\alpha = 1$ since it provides the most interesting comparative statics.[25,26]

The first set of results relates the probability of voluntary disclosure to the precision of the manager's information and the variability of the firm's earnings. The results follow directly given that (1) y_L is increasing in both s and $1 - t$ and (2) $dy_U/dy_L < 1$.

Observation 2. The probability of voluntary disclosure increases with both the precision of the manager's information, s, and the variability of the firm's earnings, $1 - t$.

To understand why y_L increases with precision, recall that the signals which are withheld are all unfavorable relative to prior beliefs. An increase in the precision of an unfavorable signal increases its unfavorableness, implying a higher probability that earnings will equal $-v$ and that the manager will be sued for withholding information. This increases the manager's incentive to disclose bad news, raising the threshold, y_L, below which there is disclosure. Similarly, as $1 - t$ increases and earnings become more variable, the probability of realized earnings equaling $-v$ will increase. This again causes an increase in y_L. That the probability of voluntary earnings disclosures increases with earnings variability is consistent with the finding in Kasznik and Lev that high tech companies (whose earnings are presumably of above-average volatility) are more likely to give warnings of negative earnings news than are other firms.

The next result relates the probability of voluntary disclosure to parameters which affect the costs of a lawsuit to the manager. It follows directly given that y_L is an increasing function of β, D, and K.

Observation 3. The probability of voluntary disclosure increases with the likelihood the court can discern that information is withheld, β, the damage award, D, and the weight the manager places on the expected damages, K.

Again, these results are intuitive; the greater the expected cost to withholding information, the greater the manager's incentive to disclose. Many factors affect the size of these costs. Prominent among them is the number of investors who purchased shares at the inflated price. The greater their number, the higher is the expected total damage award and, consequently, the greater is the probability of voluntary disclosure.

4. Allowing for a Choice of Disclosure Precision

Skinner finds that voluntary disclosures of favorable news are generally more precise than disclosures of unfavorable news while Kasznik and Lev show that announcements of large negative surprises are generally more precise than those of small negative surprises. This suggests that in making his disclosure decision, a manager chooses not only whether to release information, but also the precision of any disclosure. This section considers this expanded choice set.

For this analysis the precision of the manager's signal, s, is assumed to take one of two values, s_H or s_L, where $s_H > s_L$. The value of s is now assumed to be private information to the manager. A manager whose information has precision $s_i, i \in \{H, L\}$, will sometimes be referred to as a type i manager. In this setting a type L manager only chooses between revealing and withholding his information. In contrast, a type H manager chooses among three possibilities: making a more precise disclosure, a less precise disclosure, or no disclosure at all. A more precise announcement is one in which the manager reveals enough details so that investors can infer that the disclosure's precision is equal to s_H (identical to the precision of the manager's private information). A less precise announcement is one in which the manager reveals fewer details, so that investors infer the disclosure's precision to be just s_L. In the latter case investors are uncertain whether s_L is the true precision of the manager's private information or whether he is simply releasing a noisy version of his signal, which has precision s_H. In this setting it is again assumed that any disclosure is truthful, so that the value of the manager's signal, y, is revealed by his disclosure (whether the announcement has precision s_H or s_L). A disclosure of precision s_H will sometimes be referred to as a full disclosure, while one of precision s_L will sometimes be referred to as a partial, or noisy, disclosure.

To illustrate the distinction between full and partial disclosures, consider the example of a manager who has privately compiled a forecast of some earnings-relevant number for his firm as a whole as well as forecasts of that number broken down by geographical area. Publicly announcing all of these forecasts would constitute a full disclosure while releasing solely the forecast for his firm as a whole would be a partial disclosure. The full disclosure conveys to investors a higher level of precision to the manager's information than does the partial disclosure. (Note that the partial disclosure still reflects the manager's assessment of the future earnings-relevant number for the firm as a whole in an unbiased manner, consistent with the assumption that the manager releases his information truthfully.) This distinction between full and partial disclosures is in the spirit of the dichotomy used by Kasznik and Lev to divide their sample disclosures into "hard" and "soft" announcements. An example of a hard announcement in their paper is an explicit earnings forecast, while examples of soft announcements are those that give general operating information, such as selected components of earnings or monthly sales data. The hard announcements give more precise information about earnings to investors than do the soft announcements.

Denote by $E(e \mid y, s_i)$ investors' earnings expectation, conditional on a disclosure of y and knowledge that the manager's signal has precision s_i. It is given by expression (7) with s_i replacing s. If the manager reveals y in a disclosure with precision s_H, then, investors' earnings expectation will equal $E(e \mid y, s_H)$. However, if the manager reveals y in a disclosure with precision s_L, investors will be uncertain whether the manager's information is of precision s_L or s_H. Consequently, their earnings expectation will be a weighted average of $E(e \mid y, s_L)$ and $E(e \mid y, s_H)$, denoted by $E(e \mid y, \hat{s}_L)$ (where $\hat{s}_L$ represents the event that the disclosure's precision is s_L). For $y < 1/2$, $E(e \mid y, s_H) \leq E(e \mid y, \hat{s}_L) \leq E(e \mid y, s_L)$.

As before, the lawyer proceeds with a lawsuit only if earnings fall short of the market's expectation. As verified in the proof to the next proposition, the manager will fully disclose his information whenever his posterior expectation for earnings is nonnegative. This implies that, given either no disclosure or a disclosure of precision s_L, the market's earnings expectation will be negative. Consequently, lawsuits will only arise when realized earnings equal $-v$.

Similar to the previous setting, shareholders always win a lawsuit brought against a manager for withholding or only partially disclosing his information as long as (1) the court discovers this (which occurs with probability β) and (2) the information, if fully released, would have caused a share price drop. This implies, in particular, that a lawsuit brought against a manager who makes an announcement of precision s_L would be based on the claim that the manager did not fully disclose his negative information and that the price prevailing in the marketplace was too high; consequently, it can only be won if the manager's information actually has precision s_H. If he is a type L manager, then he has fully disclosed his information and cannot be successfully sued.

Denote by $M_i(y, n)$ the expected utility of a type i manager who observes a signal of y but makes no disclosure and by $M_i(y, \hat{s}_L)$ his expected utility if he makes a disclosure of precision s_L. Finally, denote by $M_H(y, s_H)$ the expected utility of a type H manager who makes a disclosure of precision s_H. In each case expected utility is again a weighted average of the firm's stock price subsequent to trading and the expected damage award to shareholders. Note that the expected award, given no disclosure, is higher for a type H than for a type L manager. This is because, for any $y < 1/2$, the extent of price inflation is higher for a type H manager (since $E(e \mid y, s_H) < E(e \mid y, s_L)$) and the probability of a lawsuit is higher (since the probability of realized earnings equaling $-v$ is greater with a more precise signal). To ensure that the potential for lawsuits has a meaningful effect on the manager in this setting, the expected damage award is assumed high enough to deter a manager with the most unfavorable information ($y = 0$) from withholding it.

In describing the manager's equilibrium behavior, four values of y are important. The first, denoted by $y_0 \geq 0$, is the smallest value of y for which the type H manager strictly prefers partial over full disclosure (so that $M_H(y_0, \hat{s}_L) > M_H(y_0, s_H)$). The second, denoted by $y_1 \geq y_0$, is the smallest y for which the type L manager is indifferent between disclosing and withholding his information (so that $M_L(y_1, n) = M_L(y_1, \hat{s}_L)$). The third, denoted by $y_2 > y_1$, is the point where the type H manager is indifferent between partial and no disclosure (so that $M_H(y_2, n) = M_H(y_2, \hat{s}_L)$). The fourth, denoted by $y_3 \geq y_2$, is the point where both manager types are again indifferent between disclosing y with precision s_L and not disclosing y at all.[27]

Equilibrium behavior for the manager is characterized in the following proposition:

Proposition 3 *The manager's disclosure strategies are depicted in figures 1 and 2 below.*[28]

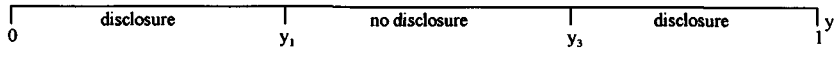

Figure 1. Disclosure strategy for type H manager.

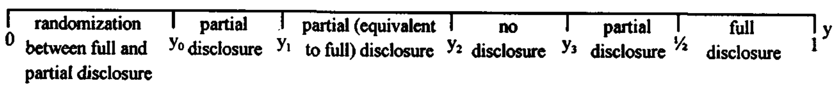

Figure 2. Disclosure strategy for type L manager.

That the type L manager discloses either favorable or very unfavorable information is consistent with the results of the previous sections. More interesting are the type H manager's disclosure decisions. As reflected in the proposition, he randomizes between full and partial disclosure for y sufficiently small. Full disclosure with probability one could not be an equilibrium strategy because (1) it would imply that the lawyer would not find it profitable to sue given a disclosure of y with precision s_L and (2) knowing that the lawyer would not sue, the type H manager would prefer partial disclosure.

As y increases above the point y_0 (but remains below y_1) the manager will strictly prefer partial over full disclosure. His preference for partial disclosure is a result of (1) the probability of an earnings realization of $-v$ becoming low enough that the manager perceives the probability of a lawsuit to be sufficiently low to forego full disclosure and/or (2) the extent of potential mispricing becoming sufficiently small that the lawyer chooses not to sue, conditional on observing a partial disclosure.

As y increases beyond the point y_1 (but remains below y_2) the expected damages, conditional on nondisclosure, will become sufficiently small that the type L manager will withhold his information. The type H manager will still prefer to make a disclosure since the expected damages are greater for him than for a type L manager. Since the type H manager is the only one making a disclosure, investors can infer his type from the act of disclosure and set the firm's price accordingly. Consequently, partial and full disclosure are equivalent for him.

It is reasonable to conjecture, though, that the type H manager will choose partial over full disclosure for y in this range. This is because investors' assessment of firm value for a type L manager, $E(e \mid y, s_L)$, is greater than their assessment of it for a type H manager, $E(e \mid y, s_H)$. Consequently, the manager benefits from partial disclosure as long as he thinks there is a positive probability investors will mistakenly believe a disclosure of precision s_L is coming from a type L manager.[29]

For sufficiently high y (above y_3) some form of disclosure is preferred to nondisclosure for both manager types because, by the definition of y_3, the stock price conditional on disclosure is greater than that conditional on no disclosure. For $y < 1/2$, the type H manager will still prefer partial disclosure, though, since his information remains unfavorable relative to prior beliefs. He prefers that investors place less weight on his information and more on their priors. This is not true for values of $y > 1/2$, where the manager prefers full disclosure.

These results are consistent with the empirical evidence in Skinner that bad news disclosures are likely to be less precise than good news announcements. That full disclosure occurs with positive probability for the more unfavorable news is consistent with the finding of Kasznik and Lev that announcements of large negative earnings surprises are, on average, more precise than those of small negative surprises.

5. Summary and Conclusions

This paper has examined the effect of Rule 10b-5 of the Securities Exchange Act of 1934 on managerial disclosures of prospective information. When the manager's information is such that there exists an affirmative duty to disclose under Rule 10b-5, it was shown that the manager will disclose either good news or news that is sufficiently bad. This result is supported by the empirical findings of Skinner (1994). It was also shown that the probability of the manager making a disclosure will increase with both the precision of his information and the variability of his firm's earnings. The second of these results is consistent with the empirical findings of Kasznik and Lev (1995).

If the manager has the discretion to either fully or partially disclose his information, it was demonstrated that the precision of an announcement of very unfavorable news will be higher, on average, than that of less unfavorable news. This is also supported by results of Kasznik and Lev. Further, bad news disclosures are expected to be less precise than those of good news, consistent with Skinner's empirical findings.

When the manager's information is such that an affirmative duty to disclose does not exist, his strategy will be very different; he will withhold his news if it is sufficiently unfavorable and will disclose it otherwise. These contrasting results highlight the sensitivity of the manager's voluntary disclosure decision to the extent to which Rule 10b-5 imposes an affirmative duty to disclose.

An interesting extension of the analysis is to consider a setting, mentioned at the outset, in which an affirmative duty to disclose arises with respect to updated information that is obtained subsequent to a voluntary initial disclosure (not subject to that duty to disclose). Preliminary results in Trueman (1996) show that for some parameterizations the manager will choose to withhold favorable information initially in order to preserve the flexibility to withhold subsequent unfavorable updates without fear of a lawsuit. It is also shown that the probability of a lawsuit will increase with the favorableness of the initial voluntary disclosure. This is because the more favorable that disclosure, the greater the damages shareholders can claim to have resulted from the withholding of subsequent bad news. These and further results along these lines would shed additional light on the impact of Rule 10b-5 on the manager's voluntary disclosure strategy.

Appendix

Derivation of Expression (9). Using Bayes' rule, $f(y \mid n)$ can be expressed as:

$$\begin{aligned} f(y \mid n) &= \frac{\text{prob}(n \mid y)r}{\int_{y_L}^{y_U} \text{prob}(n \mid y)r\,dy + 1 - r} \\ &= \frac{r}{(y_U - y_L)r + 1 - r}. \end{aligned}$$

With this, expression (8) becomes:

$$E(e \mid n) = \frac{\int_{y_L}^{y_U} vs(1-t)(2y-1)r\,dy}{(y_U - y_L)r + 1 - r}$$

which, upon integrating, yields expression (9) in the text.

Proof of Observation 1: With the use of expression (15), the lawyer's expected profit, π, can be rewritten as:

$$\pi = \beta D v s(1-t) \frac{\int_{y_L}^{y_U} (2y_U - 2y)[2s(1-y) + 1 - s]r\,dy}{[1 - s(2y_U - 1)][(y_U - y_L)r + 1 - r]} - C. \tag{16}$$

Integrating (16) over y reveals that π is proportional to:

$$\frac{(1+s)y_U(y_U - y_L) - s y_U(y_U^2 - y_L^2) - (1+s)(y_U^2 - y_L^2)/2 + 2s(y_U^3 - y_L^3)/3}{[1 - s(2y_U - 1)][(y_U - y_L)r + 1 - r]}. \tag{17}$$

Further, employing expression (15), dy_U/dy_L is given by:

$$\frac{dy_U}{dy_L} = \frac{(y_U - y_L)r}{(y_U - y_L)r + 1 - r}. \tag{18}$$

Differentiating (17) with respect to y_L, making use of expression (18), and rearranging reveals that $d\pi/dy_L$ has the same sign as:

$$\begin{aligned}
&-[sr(y_U - y_L)^2 - (1+s-2sy_L)(1-r)](1+s-2sy_U) \\
&\quad + [(1+s)(y_U - y_L)^2/2 + s(3y_L^2 y_U - y_U^3 - 2y_L^3)/3] \\
&\quad \times \left[2sr + \frac{r(1-r)(1+s-2sy_U)}{(y_U - y_L)[r(y_U - y_L) + 1 - r]}\right],
\end{aligned} \tag{19}$$

which is negative. ∎

Proof of Proposition 3: As a first step in the proof, note that:

$$\begin{aligned}
E(e \mid y, \hat{s}_L) &= vs_L(1-t)(2y-1)\,\mathrm{prob}(s_L \mid y, \hat{s}_L) \\
&\quad + vs_H(1-t)(2y-1)\,\mathrm{prob}(s_H \mid y, \hat{s}_L),
\end{aligned}$$

where $\mathrm{prob}(s_i \mid y, \hat{s}_L)$ is the probability that a disclosure of y with precision s_L has come from a type i manager, $i \in \{H, L\}$. Next, note that the lawyer's profit from suing, given a disclosure of y with precision s_L and realized earnings of $-v$, denoted by $\pi(y, \hat{s}_L)$, is:

$$\pi(y, \hat{s}_L) = \beta D[E(e \mid y, \hat{s}_L) - E(e \mid y, s_H)]\,\mathrm{prob}(s_H \mid y, \hat{s}_L) - C. \tag{20}$$

Denote by p the probability that a manager is of type L and by $p_H(y)$ the probability that a type H manager who observes y partially discloses it. Then, using Bayes' rule:

$$\mathrm{prob}(s_H \mid y, \hat{s}_L) = \frac{p_H(y)(1-p)}{p + p_H(y)(1-p)} \tag{21}$$

for all y where the type L manager discloses with certainty. Using (21), (20) becomes:

$$\pi(y, \hat{s}_L) = \frac{\beta Dv(s_H - s_L)(1-2y)(1-t)p_H(y)(1-p)}{[p + p_H(y)(1-p)]^2} - C. \tag{22}$$

It is useful for the remainder of the proof to have the explicit expressions for the manager's expected utility. They are as follows:

$$\begin{aligned}
M_i(y, n) &= E(e \mid n) - \alpha\beta DK \cdot \max\{0, E(e \mid n) - E(e \mid y, s_i)\} \\
&\quad \cdot [s_i(1-y) + (1-s_i)/2](1-t),
\end{aligned} \tag{23}$$

$$\begin{aligned}
M_i(y, \hat{s}_L) &= E(e \mid y, \hat{s}_L) - \alpha(y, \hat{s}_L)\beta DK \cdot \max\{0, E(e \mid y, \hat{s}_L) - E(e \mid y, s_i)\} \\
&\quad \cdot [s_i(1-y) + (1-s_i)/2](1-t),
\end{aligned} \tag{24}$$

$$M_H(y, s_H) = E(e \mid y, s_H), \tag{25}$$

where $\alpha(y, \hat{s}_L)$ is the probability of the lawyer suing, given a disclosure of y with precision s_L and realized earnings of $-v$.

Denote by $\text{prob}_i(\text{suit} \mid y, \hat{s}_L)$ the type i manager's assessment of the probability of a lawsuit, given a disclosure of y with precision s_L. Further, denote by $\text{prob}_i(-v \mid y)$ his assessment of the probability that realized earnings will be $-v$, given y. Recall that, by assumption, the type L manager will prefer disclosure at $y = 0$. This implies that the type H manager must either strictly prefer partial disclosure at $y = 0$ or be indifferent between full and partial disclosure at that point. (Comparison of $M_i(y, n)$ and $M_i(y, \hat{s}_L)$ reveals that for any $y < y_1$, where the type L manager prefers disclosure, the type H manager could not prefer to withhold his information with positive probability. Further, full disclosure with probability one could not be an equilibrium strategy because (1) it would imply that the lawyer would not find it profitable to sue given a disclosure of y with precision s_L and (2) knowing that the lawyer would not sue, the type H manager would prefer partial disclosure.)

It is possible that for certain parameter values and a given value of $y < y_1$, there exist two possible equilibrium strategies for the H type manager (and corresponding strategies for the lawyer): one involving indifference between full and partial disclosure and the other involving a strict preference for partial disclosure. Consequently, two cases will be considered below. In the first case (Case 1) it will be assumed that, when both equilibria are possible, the one which will result involves indifference between full and partial disclosure. In the second case (Case 2) it will be assumed that the resulting equilibrium involves a strict preference for partial disclosure.

Case 1. Consider, initially, that at $y = 0$ an equilibrium does, indeed, exist in which the type H manager is indifferent between full and partial disclosure. (The impact of relaxing this assumption will be discussed shortly.) This means that $1 - \beta DK \cdot \text{prob}_H(\text{suit} \mid 0, \hat{s}_L) = 0$ and that the lawyer will follow a randomized strategy upon observing $y = 0$ with precision s_L. ($\alpha(0, \hat{s}_L)$ will equal $1/\beta DK \cdot \text{prob}_H(-v \mid 0)$.) As y increases (but remains below y_1), $\pi(y, \hat{s}_L)$ would decrease if $p_H(y)$ were kept constant. For the lawyer to remain indifferent between proceeding with and declining a lawsuit, then, $p_H(y)$ must vary with y. It is straightforward to show that, for $\pi(y, \hat{s}_L)$ to continue to equal zero, $p_H(y)$ must increase with y if $p_H(y) < p/(1-p)$ and decrease with y if $p_H(y) > p/(1-p)$. For the manager to remain indifferent between full and partial disclosure, $\alpha(y, \hat{s}_L)$ must increase with y (since $\text{prob}_H(-v \mid y)$ decreases with y).

As y continues to increase, one of the following will occur first: (1) y_1 will be reached, (2) $\alpha(y, \hat{s}_L)$ will equal one, or (3) $\pi(y, \hat{s}_L)$ will become negative. If $\alpha(y, \hat{s}_L)$ equals one first, then $\alpha(y, \hat{s}_L)$ will remain at one for higher y, until either y_1 is reached or until $\pi(y, \hat{s}_L)$ becomes negative. As long as $\alpha(y, \hat{s}_L)$ equals one, $p_H(y)$ will equal one (since the gain to partial disclosure would be strictly positive). If $\pi(y, \hat{s}_L)$ becomes negative before y_1 is reached, then $\alpha(y, \hat{s}_L)$ will decrease to zero and $p_H(y)$ will equal one. $\alpha(y, \hat{s}_L)$ and $p_H(y)$ will remain at their respective values until y reaches y_1. For all values of y below y_1, the manager chooses full disclosure with probability $1 - p_H(y)$. The smallest value of y at which $p_H(y)$ equals one is denoted by y_0 in the text.

Now, relax the assumption that at $y = 0$ an equilibrium exists in which the manager is indifferent between full and partial disclosure. In this case equilibrium must involve the manager strictly preferring partial disclosure. Form the analysis in the previous paragraph, it is clear that $p_H(y)$ will remain equal to one for all y less than y_1. Further, $\alpha(y, \hat{s}_L)$ will either equal one for all y less than y_1, or will decrease to zero at some point and remain there until $y = y_1$.

Case 2. Consider, now, the case in which, if multiple equilibria exist, the equilibrium which will result is the one involving a strict preference for partial disclosure. It should be clear from the preceding two paragraphs that $p_H(y)$ will equal one for all $y < y_1$ and that either $\alpha(y, \hat{s}_L)$ will equal one for all such y or will decrease to zero at some point and remain there until $y = y_1$.

As y increases above y_1, the type L manager will withhold his information. (Above y_1 and below y_3, $M_L(y, n) > M_L(y, \hat{s}_L)$.) He will continue to withhold information for all values of $y > y_1$ such that $E(e \mid n) \geq E(e \mid y, \hat{s}_L)$. (The value of y such that $E(e \mid n) = E(e \mid y, \hat{s}_L)$ is y_3 and, like y_1, equates $M_L(y, n)$ and $M_L(y, \hat{s}_L)$.) This is because for the type L manager the difference between $M_L(y, n)$ and $M_L(y, \hat{s}_L)$ is a quadratic in y, holding $E(e \mid y, \hat{s}_L) = E(e \mid y, s_H)$, and has two positive roots, y_1 and y_3. For $y_1 < y < y_3$, the difference between $M_L(y, n)$ and $M_L(y, \hat{s}_L)$ is uniformly positive. (The reason for setting $E(e \mid y, \hat{s}_L)$ equal to $E(e \mid y, s_H)$ is explained below.)

For values of y between y_1 and y_3, there will be no lawsuits conditional on a disclosure of precision s_L. This is because investors know that any such disclosure is by a type H manager and so can price the firm's shares correctly. In this case, $E(e \mid y, \hat{s}_L)$ is equal to $E(e \mid y, s_H)$ and full and partial disclosure are identical for him. This manager, however, must still decide between full and partial disclosure. As discussed in the text, while both actions give the manager the same expected utility, it is reasonable that the manager would choose partial disclosure.

As y increases above y_1, the type H manager will choose partial disclosure unless and until $1 - \beta DK \cdot \text{prob}_H(\text{suit} \mid y, n) = 0$. The y where this equality holds is y_2. If there is such a point, then for y above y_2 and below y_3, the type H manager will prefer no disclosure to either full or partial disclosure since $M_H(y, n)$ is greater than both $M_H(y, \hat{s}_L)$ and $M_H(y, s_H)$.

For values of y between y_2 and y_3 (if any such values exist) both manager types prefer nondisclosure. Consequently, a disclosure of precision s_L represents an out-of-equilibrium action. It is assumed here that investors conjecture that such an action comes from a type H manager and so set $E(e \mid y, \hat{s}_L)$ equal to $E(e \mid y, s_H)$. The justification for this assumption is that, for any value of $E(e \mid y, \hat{s}_L)$ between $E(e \mid y, s_H)$ and $E(e \mid y, s_L)$, the gain from disclosing y with precision s_L rather than withholding it is greater for a type H than for a type L manager. (The nature of equilibrium would not change if it were instead assumed that investors conjecture that a disclosure of precision s_L comes from a type L manager with probability p.)

As y increases above y_3, the type L manager will prefer disclosure. The type H manager will choose partial disclosure for $y < 1/2$ and full disclosure for $y > 1/2$. This is because $E(e \mid y, \hat{s}_L) > E(e \mid y, s_H)$ for $y < 1/2$ and $E(e \mid y, \hat{s}_L) < E(e \mid y, s_H)$ for $y > 1/2$.

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Notes

1. See Francis, Philbrick, and Schipper (1994a, 1994b), Kasznik and Lev (1995), and Skinner (1994).
2. See Sonsini and Berger (1993) for an extensive review and discussion of Rule 10b-5.
3. *Chiarella v. United States*, 445 U.S. 222, 235 (1980).
4. The stock exchanges as well as NASDAQ, though, do impose a duty to disclose promptly all material information. Failure to comply may result in delisting. However, as noted by Bauman (1979, 941), investors are unlikely to be able to use this requirement successfully to sue a firm for withholding information:

   "... an investor could seek to develop an implied right of action for breach of the stock exchanges' existing duty to disclose. Such liability, premised on either a theory that a breach of the exchanges' duty to disclose constitutes a breach of a rule adopted pursuant to the federal securities laws or on the theory that investors are third-party beneficiaries under state common law contract principles, would be difficult to establish."

5. See *In re Phillips Petroleum Securities Litigation*, 881 F.2d 1236, 1245 (3d Cir. 1989): "There can be no doubt that a duty exists to correct prior statements, if the prior statements were true when made but misleading if left unrevised."; *Ross v. A. H. Robins Co.*, 465 F. Supp, 904, 908 (S.D.N.Y. 1979): "It is now clear that there is a duty to correct or revise a prior statement which was accurate when made but which has become misleading due to subsequent events. This duty exists so long as the prior statements remain 'alive.'" It is, of course, difficult in many cases to determine whether a statement is still alive.
6. See *Backman*, 910 F.2d at 17.
7. This is the equilibrium obtained by Dye (1985) in the absence of potential lawsuits.
8. In independent research, Cheng and Dontoh (1993) also obtain this result. Their setting, though, is more restrictive than that considered here, in two respects. First, they do not allow lawyers to choose whether to undertake a lawsuit. They assume that a lawsuit is automatically triggered whenever a firm's earnings surprise falls below some exogenously specified level. This assumption is inconsistent with empirical findings of Francis, Philbrick, and Schipper (1994a). Second, Cheng and Dontoh do not allow the manager to partially release his information.
9. This implies that the firm pays out negative dividends when earnings of $-v$ are realized. This is not problematic and can easily be overcome by rescaling the earnings levels so that they are all nonnegative.
10. This assumption allows each period to be analyzed separately. Relaxing it would make the mathematics slightly more involved without affecting the paper's results or providing additional insights.
11. As long as there is a positive probability that shareholders will win a lawsuit under Rule 10b-5 and collect damages, investors will pay somewhat more for the firm's shares than their expectation of earnings. This incremental amount is expected to be small though, relative to the firm's size. Allowing for this in the model would only serve to complicate the mathematics without providing additional insights; therefore, it is assumed away by setting the lawyer's fee equal to the entire amount of any court award (see Section 1.2). Dropping this assumption is not expected to change the nature of the manager's disclosure strategy. See note 22 for further comments.
12. Truthful release of private information is often assumed in the literature and is motivated by the existence of substantial penalties for fraudulent disclosures and the possibility that such disclosures will be discovered. This assumption is useful in that it allows the analysis to focus on the voluntary disclosure decision.
13. The derivation of expression (9) appears in the Appendix.
14. In practice, shareholders sue the firm and the manager. For simplicity, the analysis abstracts from firm lawsuits.

15. Although lawsuits could, in principle, be filed when realized earnings exceed investors' expectations and the firm's share price increases, such cases are rare. (See O'Brien and Hodges (1991).) In the setting of this paper, the reason for filing a lawsuit in such a circumstance would be the hope that it is discovered that the manager did, indeed, withhold unfavorable information. In reality, the lawyer would be very reluctant to file such a lawsuit, partly due to the likelihood that a judge would dismiss it as frivolous, believing it to constitute a "fishing expedition" (as the price rise provides disconfirming evidence that the manager withheld unfavorable information).
16. The model can easily be modified to reflect the possibility of an out-of-court settlement, rather than a trial. Such a settlement would be captured by setting β equal to one and D equal to the amount of any such award (as a fraction of the amount of price inflation).
17. Note 11 discusses the role of this assumption.
18. Miller and Rock (1985), as well as many others, make a similar argument.
19. This analysis abstracts from other disclosure incentives, such as the manager's desire to convey his ability to predict future earnings (Trueman (1986)).
20. If the form of the litigation cost to the manager were generalized to include a fixed component, F (reflecting, for example, the manager's legal costs or the cost of his time), then y_U and y_L would be the two values of y solving $[E(e \mid n) - E(e \mid y)] \cdot \{1 - \alpha\beta DK[s(1-y) + (1-s)/2](1-t)\} = \alpha K F[s(1-y) + (1-s)/2](1-t)$. The introduction of this fixed cost would, therefore, cause the equilibrium levels of y_U and y_L to change. However, it can be shown that the nature of the manager's equilibrium disclosure strategy, as described in Proposition 1, would not change.
21. If $y_L = 0$, then the lower disclosure region will be an empty set.
22. As the preceding analysis should make clear, the nature of the manager's disclosure strategy should not be affected by a relaxation of the assumption that the lawyer captures the entire damage award. The only effects of dropping this assumption would be to increase $E(e \mid n)$ (since shareholders would now expect to receive damages from any successful lawsuit) and to change the precise equilibrium value of y_U.
23. This follows given that (1) the lawyer's expected profits are positive at $y_L < y_L^*$ and (2) as α decreases, y_L decreases (and, therefore, π increases).
24. Before moving on to the next section, it is interesting to consider the effect on the analysis thus far of relaxing the assumption that earnings can take on only one of three distinct values. If the earnings variable were, instead, continuous, the manager would need to calculate the probability of occurrence of every earnings level that would cause a drop in the firm's stock price and potentially trigger a lawsuit. Further, for each of these possible realized earnings levels the lawyer would need to determine whether to proceed with a lawsuit. While this analysis would be significantly more complex mathematically, the underlying forces affecting the manager and lawyer would not change. Consequently, the nature of the manager's disclosure strategy is also expected to remain unchanged in this more general setting.
25. When $\alpha < 1$, changes in the economy's parameters do not affect either y_L or y_U.
26. To confirm that an equilibrium exists in which $\alpha = 1$, it is necessary to show that y_L (given by expression (14)) can be less than y_L^* (the value of y_L that equates expression (10) to zero). That this is possible can be verified by noting that y_L and y_L^* can be varied independently of each other through the choices of C and K. Consequently, y_L can be set arbitrarily close to zero, while y_L^* is set close to 1/2.
27. That $y_3 \geq y_2 > y_1 \geq y_0$ is verified in the proof to Proposition 3. It should be noted that for certain sets of parameter values one or more of the regions pictured in Proposition 3 may not exist.
28. At each of the cutoff points y_0 through y_3 the manager will be indifferent between taking the action appropriate to a slightly lower y and that appropriate to a slightly higher y.
29. Allowing for (at least) an infinitesimal probability that investors believe a disclosure of precision s_L is coming from an L type manager does not affect the equilibrium for $y < y_1$, as investors already believe this event is occurring with positive probability.

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