Managing Auditor Litigation Risk by Screening Clients and Forming a Strategy as a Litigator

by

Ella Mae Matsumura*
School of Business
University of Wisconsin-Madison
975 University Avenue
Madison, WI 53706-1323
Ematsumura@bus.wisc.edu
608-262-9731

Seung-Weon Yoo
Hong Kong University of Science and Technology

and

Robert Tucker
Fordham University

December 2001

*Corresponding author

Managing Auditor Litigation Risk by Screening Clients

SUMMARY

Previous models of auditor litigation have assumed that the auditor faces only one plaintiff in a single-period context. In such settings, auditors and plaintiffs who share common beliefs about the auditor's ability to prevail at trial will always settle out of court. We reach the opposite conclusion in situations where the auditor faces multiple plaintiffs in a multiperiod context and litigation outcomes affect outcomes in subsequent periods. Under our assumptions, the auditor will provoke a trial even though such behavior would be irrational in a single-period context, and the auditor is more likely to fight a suit the riskier the client pool and the higher the damage awards. We explicitly model an auditor's decision to make a long-term investment in a client screening technology and characterize the joint decision of client screening level and whether to fight or settle lawsuits.

Key Words: audit, client screening, managing risk, litigation, legal system, game theory.

INTRODUCTION

In its intense scrutiny of the accounting profession, the SEC has repeatedly cited several highly publicized legal cases involving audit failures. Beyond the effects of new regulatory constraints and reputation damage, the costs of these lawsuits are a significant line item on public accounting firms' income statements, averaging 19.4% of revenues in 1993 (The Public Accountant's Report 1994). Though the Private Securities Litigation Reform Act of 1995 offered some relief, Emerson (2000) reports the Big 5's legal costs are again on the rise. To avoid such costs, professional sanctions, loss of partners' time, and increases in malpractice premiums, the profession and firms must develop strategies for managing litigation risk.

The literature discusses several such strategies, including improving the quality or defensibility of auditing (Walo 1995; Johnstone and Bedard 2001), raising audit fees (Simunic and Stein 1990; Krishnan and Krishnan 1996; Johnstone and Bedard 2001), increasing insurance coverage, reporting conservatively (Lys and Watts 1994; Carcello and Palmrose 1994), increasing the size of in-house counsel to deter suits, educating users, lobbying legislators and accounting and auditing standard setters, and selecting and retaining clients more stringently (Huss and Jacobs 1991; Asare et al. 1994; Pratt and Stice 1994; Ayers and Kaplan 1998; Johnstone 2000). Audit firms might also develop reputations as tough litigators. In addition to judging each case based on its merits, a firm can promote and follow a policy of fighting or settling suits. Palmrose (1991) finds evidence consistent with a policy of fighting suits. Specifically, she finds that trial rates for independent auditors tend to be higher (about 10%) than trial rates for non-auditor defendants in securities actions (less than 5%). Since Palmrose (1988) finds trials negatively affect a firm's auditing reputation on average, this policy seems counterintuitive. A possible countervailing force is the desire to strike a tough litigation posture in an effort to deter future suits, thus preserving the firm's reputation for audit quality. One objective of our analysis is to develop theoretical support for this explanation. When auditors face multiple plaintiffs over multiple periods, we show that they fight suits, even though those suits, taken independently, would not justify adjudication.

The stream of models of litigation from which this research draws originated in the economics literature (Posner 1973; Gould 1973). Subsequent papers enhanced these models by incorporating out-of-court settlement offers (Shavell 1982; P'ng 1983; Bebchuk 1984; Reinganum and Wilde 1986; Polinsky and Rubinfeld 1988b; Cooter and Rubinfeld 1989) and, with the exception of Shavell (1982), employing a game-theoretic analysis. Papers specifically modeling auditor litigation include Balachandran and Nagarajan (1987), Dye (1993), Hillegeist (1999), Melumad and Thoman (1990), Narayanan (1994), Schwartz (1997, 1998), Thoman (1996), and Willekens, et al. (1996). Most of these papers examined the effects of alternative legal regimes. However, three papers are distinct in that they model the effect of the pre-trial settlement process on auditor litigation (Smith and Tidrick 1997, 2001; Boritz and Zhang 1997; Zhang and Thoman 1999). Our study differs from these models in at least two ways. First, like Che and Yi (1993), we examine a multiperiod context where the defendant faces multiple plaintiffs. In this setting, litigation occurs even though all beliefs and information are common knowledge. Second, we examine an audit setting in which the auditor must jointly determine the level of long-term investment in client screening and the decision to fight or settle.

This paper presents an analytical model demonstrating the interaction between client screening and settlement offer decisions and the effect on the current and subsequent cases. Prior empirical studies support the relationship between screening and litigation risk. Jones and Raghunandan (1998) find that over a period of increasing litigation risk (1988-1995), the Big 5 significantly reduced the likelihood that they would audit a financially distressed client or one in the high-tech industry. Krishnan and Krishnan (1997) and Shu (2000) both find evidence that litigation risk contributes to auditor resignations. Client screening decisions also have implications for society (Public Oversight Board 1993). As large firms (Jones and Raghunandan 1998; Andersen et al. 1992; Ricchuite 2001) decline to associate with high-growth but high-risk start-up companies, these companies lose their access to resources and capital markets, which can reduce the vigor of and innovation in the market.

Our results show that the decision to litigate depends on the level of investment in client screening. The dependence works in the opposite direction as well. For example, if an audit firm decides to fight all first-period lawsuits, then the auditor's optimal screening effort increases as 1) the probability of a bad outcome increases, 2) the probability of winning the suit decreases, 3) the damage award increases, and 4) the positive effect of the first trial's outcome on subsequent trials increases.

Section 2 introduces the basic model and Section 3 examines a benchmark two-period settlement decision without the ability to screen clients. Section 4 enhances the benchmark case by incorporating client screening. Section 5 concludes the study and the Appendix provides highlights of the proofs.

THE MODEL

To capture the effects on future periods of the auditor's behavior in the current period, we model a two-period world in which risk neutral investors and auditors interact as described below. Table 1 provides a summary of the variables and parameters, all of which we assume are commonly held beliefs by all parties. Table 2 and Figures 1 and 2 summarize the sequence of events.

[Insert Tables 1 and 2 and Figures 1 and 2 here]

Period One

In each period of the two-period model, a company, such as a high-tech start-up, seeks to obtain capital. A potential investor's decision to invest funds depends on whether the company is publicly listed, and thus the company must engage an audit firm by regulatory necessity. If the audit firm accepts the engagement, it will perform a standard audit for a net audit fee of K. Though the audit firm has quality control policies to achieve compliance with professional standards, auditors are not infallible. All audits undetected material errors are assumed to occur and litigation follows.

Auditors choose clients realizing that the potential client is either a risky (R) or non-risky (N) type with probabilities $(1 - q)$ and q, respectively. If the firm is a risky type, then despite a standard audit, a bad outcome occurs with probability b, and a good outcome occurs with probability $1 - b$. An outcome is classified as bad if 1) the client goes bankrupt, 2) its financial statements contain a material misstatement that the auditor failed to detect, and 3) the investor sues the auditor to recoup the loss. Otherwise, the outcome is classified as good. A good outcome from a risky client yields the same return as that of a non-risky business.

To minimize litigation risk, the auditor can make an initial long-term investment in a client screening mechanism before accepting the engagement. Such an investment is consistent with the recommendation of the Panel on Audit Effectiveness (2000), that is, "audit firms consider adopting sophisticated, computerized systems for identifying engagement risk that involve both quantitative and qualitative factors …". The decision model encompassed in such software could take many forms. Screening clients is a complex judgment involving an assessment of client business risk, audit risk, and auditor business risk (Johnstone 2000). Jones and Raghunandan (1998) find client size, industry, and financial distress to be statistically significant in explaining the client screening decisions of the Big 5. Similarly, Johnstone and Bedard (2001) find that auditors avoid clients with losses and high leverage and further tend to avoid clients that are publicly listed or have any fraud risk factors. The AICPA does not provide specific guidance on how to combine these risks to form a judgment, thus leaving firms considerable discretion.

Anticipating this diversity of approaches, the model presented below characterizes screening technology at a general level denoting the investment amount by $f \geq 0$. This screening effort determines the probability that the auditor correctly identifies the type of a firm. We assume that

$$\Pr[n \mid \mathrm{N}, f] = 1 \text{ and } \Pr[r \mid \mathrm{R}, f] = \alpha(f), \quad (1)$$

where n and r identify the firm as a non-risky (N) or risky (R) type through the screening process. It is assumed that the screening process never incorrectly identifies the non-risky firm as risky. Furthermore, we assume that α is increasing at a decreasing rate, that is, $\alpha' = \frac{\partial \alpha(f)}{\partial f} > 0$, and $\alpha'' = \frac{\partial^2 \alpha(f)}{\partial f^2} < 0$. Given these assumptions, if the screening process identifies a firm as risky, the auditor will reject the client. If the screening process indicates the firm is non-risky, the audit firm faces uncertainty as to the client's type and outcome. However, the auditor knows that a higher investment in client screening, f, decreases the probability of associating with risky clients. The auditor's posterior belief about the percentage of non-risky firms in his client pool is updated as[1]:

$$\lambda(f) \equiv \Pr[\mathrm{N} \mid f] = \Pr[\mathrm{N} \mid n, f] = \frac{q}{q + (1-q)(1-\alpha)}. \tag{2}$$

The decision to invest in client screening occurs in period one only; however, it affects the effectiveness of screening and thus the riskiness of the client pools in both periods.[2]

If the client, whether non-risky or risky, receives a good outcome, the period ends. If a bad outcome results, then the client's investors deduce that the client was risky and sue client management and the auditor. However, it is assumed that the management is also bankrupt; therefore, the auditor is the only solvent party. Though multiple plaintiffs might sue during the same period, we assume the auditor's defense strategy is consistent across cases. Consequently, the game is characterized as one pitting the auditor against a group of investor plaintiffs. Before going to trial, the auditor makes a take-or-leave-it settlement offer (s) to the investors.[3] The investors decide whether to accept the settlement offer, s. If the first-period investors accept the settlement offer, the period ends. If they reject it, the case goes to trial and the investors (auditor) incur litigation cost, l (m).

The model assumes no obvious violations of generally accepted auditing standards occurred. Nevertheless, given the materiality of the misstatement, it is uncertain whether a jury will deem the audit adequate. The jury may conclude, for example, that a different approach in a high-risk area would have uncovered the misrepresentation. For simplicity, we assume that both parties share a common belief about *p,* the auditor's probability of winning the litigation.[4] If the auditor loses, the court awards the plaintiff expected damages of *d*, which is positive. Recall that the first-period investors and the auditor are assumed to share common beliefs about *l*, *m*, *p*, and *d*. This is consistent with the notion that all evidence that is admissible will become available to both parties during the pre-trial discovery period.

Period Two

The audit firm anticipates that the cause of its legal dispute in period one will reoccur with similar clients in period two. For example, many dot.com clients might be using an aggressive revenue recognition recently decried by the former SEC chairman, Arthur Leavitt. The investment in client screening in period one dictates the probability of facing a lawsuit in both periods, $b(1-\lambda)$. In addition, the auditor's probability of winning a lawsuit, *p*, remains unchanged if the auditor settles in period one. However, we assume a trial outcome in period one will affect the probability of winning a similar lawsuit in period two for the following reasons.[5]

Suppose the plaintiff is casting aspersions on the firm's reputation for independence, competence (e.g., use of fresh college graduates, industry knowledge, audit approach), or accounting policies (e.g., revenue recognition method acquiesced to in the high-tech or savings and loan industry). Because the facts tried are in many cases firm specific and because they affect a broad range of cases against any plaintiff in period two, we model the auditor, more so than the plaintiff, as considering the implications of period one's precedent for period two.

If the auditor won the trial in period one, his winning probability for similar litigation in period two is $p + \delta$, where $\delta \geq 0$.[6] Conversely, if the auditor lost the trial in period one, his winning probability for similar litigation in period two is $p - \varepsilon$, where $\varepsilon \geq 0$. This probability structure implies that the outcome of the first trial can generate a positive (δ) or negative (ε) effect on the litigation outcome in period two. We also assume that $0 \leq p - \varepsilon \leq p \leq p + \delta \leq 1$.

TWO-PERIOD CASE WITHOUT CLIENT SCREENING

In this section, we provide the benchmark case in which the auditor is not allowed to invest in screening clients. This case allows us to illustrate how the existence of a second period influences the auditor's litigation decision in period one. We derive the equilibrium for this decision using backward induction. As we will show, the auditor always settles in the second period. Consequently, we move backward chronologically to the auditor's first-period settlement decision, which necessarily entails settling or litigating. We compare the total expected costs of litigating rather than settling to develop a decision rule. If the proportion of clients who are of risky type exceeds a certain level, then the auditor fights; otherwise, he settles. We then derive a corollary that provides comparative static predictions about the effect of changes in p, b, q, m, l, d, δ, and ε on the settlement decision. Finally, we provide an observation about the likelihood of trial under different legal regimes.

Auditor's Litigation Decision in Period Two

First, we characterize the second-period investor's (Investor 2's) settlement decision in period two. Investor 2's expected payoff from going to trial, denoted by Π^{I2}, depends on the first-period investor's (Investor 1's) settlement decision and the outcome of the trial in period one. That is,

$$\Pi^{I2} = \begin{cases} (1-p-\delta)d - l & \text{if the auditor won in period 1;} \\ (1-p+\varepsilon)d - l & \text{if the auditor lost in period 1;} \\ (1-p)d - l & \text{if the auditor settled in period 1.} \end{cases}$$

Let s^2 denote the auditor's second-period settlement offer. Then, Investor 2's decision rule is summarized as:

Auditor's Period 1 Trial Outcome	Conditions Leading to Settlement
Won	$s^2 \geq (1-p-\delta)d - l$
Lost	$s^2 \geq (1-p+\varepsilon)d - l$
Settled	$s^2 \geq (1-p)d - l$

If the auditor did not settle and prevailed in period one, the auditor's expected cost by going to trial in period two is $-(1-p-\delta)d - m$. Since the plaintiff will settle if $s^2 \geq (1-p-\delta)d - l$ and $(1-p-\delta)d - l < (1-p-\delta)d + m$, the auditor offers $s^{2*} = (1-p-\delta)d - l$ and no trial occurs. Similarly, we can characterize the auditor's settlement offer in period two given the other possible outcomes of the litigation game in period one. The following lemma summarizes the litigation decision in period two.[7]

LEMMA 1. *The auditor and Investor 2 always settle in period two. The auditor's settlement offer,* s^{2*}*, in period two is*

$s^{2*} =$ $(1 - p - \delta)d - l$ *if the auditor won in period one;*

$(1 - p + \varepsilon)d - l$ *if the auditor lost in period one;*

$(1 - p)d - l$ *if the auditor settled in period one.*

Since period two is the last period, no externalities affect future periods. Consequently, given the common knowledge assumption, both players know the other's decision rules and both find it advantageous in equilibrium to avoid the court costs. Consequently, no trial occurs in period two.[8]

Litigation Decision in Period One

Now we characterize the litigation decision in period one. Since Investor 1's expected payoff by going to trial is $(1 - p)d - l$, she settles if the auditor's settlement offer in period one, s, is greater than or equal to her expected payoff, $(1 - p)d - l$, and goes to trial otherwise. Therefore, no trial occurs in period one as long as the auditor offers $s^* = (1 - p)d - l$. However, the auditor might offer less than this amount and thereby intentionally provoke a trial, because of the effects on future (second-period) litigation. The auditor's decision will be based on her total litigation costs for the two periods, TLC.

Suppose the auditor offers $s^* = (1 - p)d - l$. Since Investor 1 will accept this offer, the cases will be settled in both periods. Therefore, the auditor's TLC in this benchmark case is the sum of his settlement offers in period one and two, which we denote, TLC^{BS}. Then, it follows from Lemma 1 that

$$\text{TLC}^{\text{BS}} = -[(1-p)d - l] - b(1-q)s^{2*}$$
$$= -[(1-p)d - l] - b(1-q)[(1-p)d - l] \quad (3)$$

Second, if the auditor offers $s^* < (1-p)d - l$ in period one, Investor 1 will reject this offer and a trial will ensue. The auditor will settle in period two; however, that settlement offer will depend on the trial outcome in period one. Let TLC^{BT} denote the TLC in this benchmark case assuming there is a trial in period one.[9]

$$\text{TLC}^{\text{BT}} = -p\{m + b(1-q)[(1-p-\delta)d - l]\} - (1-p)\{d + m + b(1-q)[(1-p+\varepsilon)d - l]\}$$
$$= -m - (1-p)d - b(1-q)[(1-p)d - l] + b(1-q)[p\delta - (1-p)\varepsilon]d \quad (4)$$

The part inside the first (second) curly brackets of Equation (4) represents the auditor's expected total costs when he wins (loses) the trial in period one. The four terms in the reduced equation are the auditor's cost of litigation, m; the expected damage award in period one, $(1-p)d$; the settlement cost in period two, $b(1-q)[(1-p)d-l]$; and the externality resulting from the outcome in period one, $b(1-q)[p\delta - (1-p)\varepsilon]d$.

Now, Proposition 1 characterizes the outcome of the litigation game in period one by comparing TLC^{BS} and TLC^{BT}.

PROPOSITION 1. *Suppose* $[p\delta - (1-p)\varepsilon] > 0$. *In period 1, the auditor offers settlement amount* $s^* = [(1-p)d - l]$ *and settles if and only if* $b(1-q) \le q^*$, *where*

$$q^* = \frac{m+l}{[p\delta - (1-p)\varepsilon]d}. \quad (5)$$

If $b(1-q) > q^*$*, the auditor offers* $s^* < [(1-p)d - l]$ *and goes to trial in period one.*[10]

PROOF: *The proof appears in the Appendix.*

In words, equation (5) compares the additional costs of fighting the suit in the numerator, with the benefits of fighting on the second-period outcome in the denominator. The auditor is more likely to provoke a trial when q^* is small as the condition $b(1-q) > q^*$ is more likely to be met. In equation (5), q^* becomes small when the damage award, d, increases relative to the costs of fighting the suit, $m + l$. The term $[p\delta - (1-p)\varepsilon]$ is constrained to be positive, implying that $p > \frac{\varepsilon}{\delta + \varepsilon}$. Consequently, p must be > .5 unless the positive externalities of first-period litigation exceed the negative, $\delta > \varepsilon$. Intuitively, an auditor should not pursue a trial unless they believe they have a better than average probability of winning. Nevertheless, if the positive implications of winning and setting a precedent, δ, sufficiently dominate the negative consequences of losing, ε, a trial is still more likely to result even though $p < .5$. Both p and δ increase the likelihood of trial; however, both terms are constrained since the probability of winning in the second period cannot exceed 1. Consequently, trial is more likely as $p + \delta$ approaches 1.

The following corollary further characterizes the auditor's settlement decision in period one by providing comparative statics with respect to the benchmark litigation game in period one.[11]

COROLLARY 1. *It is **less** likely to have a settlement in period 1 as:*

(1) *the probability that the auditor wins the trial* (p) *increases;*

(2) *the probability of a risky clients' bad outcome* (b) *increases;*

(3) *the ex-ante probability of non-risky clients* (q) *decreases;*

(4) *the trial costs* (m *or* l) *decrease;*

(5) *the court allocation of damage the auditor must pay* (d) *increases;*

(6) *the positive relationship* (δ) *between the outcome of the first trial and the second trial increases;*

(7) *the negative relationship* (ε) *between the trials' outcome decreases.*

PROOF. *The proof is straightforward given equation (5) and is therefore omitted.*

Some results in Corollary 1 are quite intuitive. For example, if the prior probability that the auditor will win the trial increases, the auditor is less likely to settle since a less risky trial (that is, one in which he is more likely to prevail in court) is likely to set a favorable precedent.

In contrast, other results in Corollary 1 seem counterintuitive. For example, the higher the expected damage award or the greater the probability of a bad outcome, the greater is the auditor's incentive to litigate. However, as Corollary 1 implies, this incentive arises in a multiperiod context. Intuitively, the screening process failed to reject all risky clients. Consequently, the client pool includes other clients like the one responsible for the auditor's litigation in period one. Taking the case to trial costs more than settling when one considers period one alone. Nevertheless, if the auditor wins, the auditor minimizes total expected litigation costs for both periods because the precedent effect decreases expected future litigation costs.

Zhang and Thoman (1999) also demonstrate that an auditor can have incentive to take a case to trial. However, their result is driven by the information asymmetry between the auditor and investor, a feature not present in this study. Furthermore, in Zhang and Thoman (1999), the auditor is more likely to go to trial as a result of a hostile legal environment, namely higher damage awards, whereas in this study, it is the potential for lower expected legal costs in the second period that drives the auditor to fight in the first period.

AUDITOR'S DECISION TO INVEST IN SCREENING EFFORT

In this section, we examine the level of screening effort, f, that is optimal for the auditor in period one. The auditor determines the level of this long-term investment in screening by minimizing his total expected costs over both periods. Again, the derivation of the auditor/plaintiff equilibrium strategy set relies on backward induction. Consequently, we analyze the auditor's decisions in the following reverse chronological order: 1) second-period litigation decision, 2) first-period litigation decision, and 3) first-period client screening decision. The analysis of the auditor's second-period decision to settle or fight is similar to that found in section 3. Lemma 1 still holds because the Investor's decision problem remains unchanged, and the auditor will always settle in period two in equilibrium. Consequently, we turn our attention toward establishing the auditor's first-period trial decision given his screening effort f. We obtain this decision rule by comparing the costs of trial with the costs of settling. Let TLC^S denote the auditor's total two-period expected liability costs if the auditor settles in period one, given the screening effort, *f*. Then

$$\begin{aligned} TLC^S &= -[(1-p)d - l] - b(1-\lambda)s^{2*} \\ &= -[(1-p)d - l] - b(1-\lambda)[(1-p)d - l] \qquad (6) \end{aligned}$$

Note that $(1-q)$ in equations (3) and (4) is replaced by $(1-\lambda)$, the auditor's posterior probability of a risky client after applying the screening technology, in equations (6) and (7). Let TLC^T denote the auditor's total two-period expected litigation costs if a trial occurs in period one and the auditor can choose the screening effort. Then,

$$TLC^T = -[(1-p)d + m] - b(1-\lambda)[(1-p)d - l] + b(1-\lambda)[p\delta - (1-p)\varepsilon]d \qquad (7)$$

In words, equation 7's three terms represent the expected legal costs of 1) period one, 2) period two, and 3) the expected externality of period one's outcome on period two. Lemma 2 below establishes the auditor's decision for settling or fighting given his screening effort *f*.

LEMMA 2. *Suppose* $[p\delta - (1-p)\varepsilon] > 0$. *In period one, the auditor offers settlement amount* $s^* = [(1-p)d - l]$ *and settles if and only if* $b(1-\lambda) \leq \lambda^*$, *where*

$$\lambda^* = \frac{m+l}{[p\delta - (1-p)\varepsilon]d}. \tag{8}$$

If $b(1-\lambda) > \lambda^*$, *the auditor offers* $s^* < [(1-p)d - l]$ *and goes to trial in period one.*[12]

PROOF: *The proof is similar to the proof of Proposition 1.*

Like equation (5) in Proposition 1, equation (8) compares the costs of litigating (numerator) with the benefits of litigating (denominator). The primary difference is that the prior probability of a risky client, $(1-q)$, is replaced by $(1-\lambda)$, which represents the posterior probability the client is a risky type after client screening. The critical value, λ^*, is derived by comparing TLC^S and TLC^T in an effort to minimize expected total legal costs.

We begin the analysis by first assuming that the auditor always goes to trial in period one. Let Π^{AT} denote the auditor's total expected payoff at the beginning of period one given that the auditor will go to trial in period one. Then, the auditor's screening effort investment decision is characterized as follows:

$$\begin{aligned}\max_f \ \Pi^{AT}(f) &= K + [q + (1-q)(1-\alpha)]\{b(1-\lambda)\mathrm{TLC}^T - \\ &\qquad [\lambda + (1-\lambda)(1-b)](1-\lambda)b[(1-p)d - l]\} - f \\ &= K + b(1-q)(1-\alpha)\{\mathrm{TLC}^T - [\lambda + (1-\lambda)(1-b)]\,[(1-p)d - l]\} - f\end{aligned}$$

$$= K + b(1-q)(1-\alpha)\{l + m - 2(1-p)d + b(1-\lambda)[p\delta - (1-p)\varepsilon]d\} - f,$$

[TR]

where the second equality follows from the definition of λ. Assuming that the interior solution of the problem [TR] exists, the first-order condition of the problem [TR] is

$$\frac{d\Pi^{AT}}{df} = -b(1-q)\alpha'\{l + m - 2(1-p)d + b(1-\lambda)[p\delta - (1-p)\varepsilon]d\}$$

$$+ b(1-q)(1-\alpha)\{-\tfrac{\partial\lambda}{\partial f} b[p\delta - (1-p)\varepsilon]d\} - 1$$

$$= -b(1-q)\alpha'[l + m - 2(1-p)d]$$

$$- b^2(1-q)[\alpha'(1-\lambda) + (1-\alpha)(\tfrac{\partial\lambda}{\partial f})][p\delta - (1-p)\varepsilon]d - 1$$

$$= -b(1-q)\alpha'[l + m - 2(1-p)d]$$

$$- b^2(1-q)\left\{\left(\frac{2q+(1-q)(1-\alpha)}{[q+(1-q)(1-\alpha)]^2}\right)(1-q)(1-\alpha)\alpha'\right\}[p\delta - (1-p)\varepsilon]d - 1$$

$$= -b(1-q)\alpha'[l + m - 2(1-p)d] - b^2(1-q)\alpha'(1-\lambda^2)[p\delta - (1-p)\varepsilon]d - 1$$

$$= 0, \tag{9}$$

Let f^T denote the optimal level of screening investment that solves equation (9).

Now, consider the auditor's screening decision assuming he will settle in the first period. Then, his screening effort investment decision is characterized as follows:

$$\max_f \ \Pi^{AS}(f) = K + [q + (1-q)(1-\alpha)]\{b(1-\lambda)\mathrm{TLC}^S -$$

$$[\lambda + (1-\lambda)(1-b)](1-\lambda)b\,[(1-p)d - l]\} - f$$

$$= K + b(1 - q)(1 - \alpha)\{\text{TLC}^{\text{S}} - [\lambda + (1 - \lambda)(1 - b)][(1 - p)d - l]\} - f$$

$$= K - 2b(1 - q)(1 - \alpha)[(1 - p)d - l] - f, \qquad \text{[ST]}$$

where Π^{AS} denote the auditor's total expected payoff at the beginning of period one given that the auditor will settle in period one.

Assuming that the interior solution of the problem [ST] exists, the first-order condition of the problem [ST] is

$$\frac{d\Pi^{AS}}{df} = 2b(1 - q)\alpha'[(1 - p)d - l] - 1 = 0. \qquad (10)$$

We use f^S to denote the optimal level of screening investment that solves equation (10).

PROPOSITION 2. *Let f^T and f^S denote the screening effort derived from* (*9*) and (10), *respectively. Then there exists $f^* < f^S$ such that the following strategy is optimal for the auditor:*

Invest f^T and always fight if $f^T < f^*$;

Invest f^S and always settle if $f^T \geq f^*$.

PROOF. *The proof appears in the Appendix.*

Intuitively, Proposition 2 suggests a tradeoff between client screening and litigating in managing litigation risk. In words, if trying the case and setting a precedent effectively reduces this risk, and this results in a sufficient savings in client screening investment

($f^T < f^* < f^S$), then the auditor will always litigate. Alternatively, if the precedent effect of trial is relatively small so that the firm experiences insufficient savings in client screening costs ($f^T - f^S < f^S - f^*$), then the firm will prefer to settle the case.

The following proposition characterizes the screening effort, f^T and f^S, derived from (9) and (10), respectively.

PROPOSITION 3. *The auditor's optimal screening efforts, f^T and f^S, increase as*

(1) the prior probability that the auditor wins the trial (p) *decreases;*

(2) the probability of risky client's bad outcome (b) *increases;*

(3) the damage award (d) *increases.*

The auditor's optimal screening effort with litigation, f^T, increases as:

(4) the positive externality of the first trial (δ) *decreases*;

(5) the negative externality of the first trial (ε) *increases*.

PROOF: *The proof appears in the Appendix.*

Proposition 3 shows that the auditor increases screening effort if his probability of winning litigation decreases or the probability of a bad outcome increases. In these cases, the auditor faces a higher risk in litigation, and hence tries to avoid the litigation by increasing his screening effort. The expected damage award also affects the auditor's screening effort decision in a similar way. Furthermore, Proposition 3 shows that the trial's positive (negative) externality on future lawsuits provides negative (positive) incentive for the auditor to invest in the screening of clients. The auditor facing a trial's large positive externality tends to decrease the screening effort because to realize the positive externality, the auditor should go to trial and hence has less incentive to screen out the bad clients.

Combining the results in Proposition 2 and Proposition 3 provides intuition on the auditor's settlement decision. For example, if the probability of winning is very low, then it is more likely for the auditor to settle than to go to trial.[13] We show in the proof of Proposition 2 that this happens if $f^S < f^T$ and that in this case, it is optimal for the auditor to choose f^S and settle whenever the investors sue the auditor. As the probability of winning increases, not only does the auditor's screening effort decrease (i.e., both f^T and f^S decrease), but also his incentive to go to trial increases. The only case in which the screening of f^T and a subsequent trial become optimal is when f^S is sufficiently large relative to f^T (i.e., $f^T < f^* < f^S$). This occurs only if p is sufficiently large. Hence, an increase in p increases the chance to go to trial and the auditor tends to invest f^T that is smaller than the investment level he should invest if settlement is optimal. Figure 3 graphically illustrates the above explanation.

[Insert Figure 3 here]

In Figure 3, the bold line represents the optimal path of the auditor's screening effort. The optimal screening effort decreases as the winning probability increases. Furthermore, it is closely related to the auditor's optimal decision on future litigation. Although the joint strategy of settling and investing f^S in screening is optimal when the probability of winning is low, as this probability becomes sufficiently high, the auditor switches to the joint strategy of fighting and investing a lower amount, f^T, in client screening. A similar effect can be observed with respect to the positive externality of the first trial (δ). As δ increases, the auditor chooses a lower screening effort and is more likely to go to trial than to settle. Intuitively, the auditor has more incentive to fight the litigation than to settle if there exists a large (positive) externality associated with the trial. This, in turn, decreases the auditor's incentive to invest in the screening effort.

On the contrary, as either the probability of a bad outcome (*b*) or the amount of damage award (*d*) increases, the auditor chooses a higher screening effort. Stated another way, increases in *d* or *b* increase the auditor's litigation risk, thus spurring investment in screening effort. An exception is worth noting. At sufficiently high risk levels (i.e., *b* or *d*), the auditor prefers to fight the suit and set a precedent so as to lessen the exposure to *b* or *d* in the second period. Concurrently, the cost of client screening, f^S, rises dramatically as the firm tries to avoid all risky clients. Recall from Proposition 2 that when $f^T < f^* < f^S$, the audit firm makes a smaller investment in client screening, f^T, and fights all lawsuits. Consequently, a decrease in client screening can occur at high level of litigation risk. The negative externality of the first trial affects the auditor's decision in a similar way.

Finally, we can compare the screening model to the benchmark case, which precluded screening. Corollary 1 summarizes the auditor's likelihood of settling given the environmental variables when the auditor cannot invest in screening effort. If we allow the auditor to invest in screening effort, some counterintuitive results in Corollary 1 are better explained. This is because the screening effort allows the auditor to blunt the impact of changes in environmental variables. Consequently, the relationship between environment variables on the auditor's settlement decision specified in Corollary 1 is no longer a simple, direct one.

OBSERVATION 3. *The auditor's ability to screen her clients mitigates the* *impact of the changes in the auditor's legal environment on her litigation strategy.*

CONCLUSION

This paper analyzes an auditor's attempt to manage litigation risk. The setting differs from prior studies in that the auditor must assess how client screening and the settle/fight decisions in period one will affect legal outcomes in future periods.

As a benchmark case, we first examine the auditor's litigation decision in the absence of client screening. As a result of its effect on future court cases, the auditor is more likely to litigate 1) the greater the likelihood of a bad outcome from associating with such a client and 2) the greater the damage award. This effect is accentuated by the net externality of this period's court decision on future periods. Intuitively, if the auditor faces many risky clients of a similar type (e.g., savings and loan institutions), then successfully litigating can deter future suits. Consequently, the auditor fights cases with risky clients and high damage awards to avoid more of the same. These predictions do not hold if we introduce client screening to the model. Client screening mitigates the impact of environmental changes on the auditor's decision to litigate.

If the auditor intends to fight the suit and can invest in client screening, then we find the auditor invests more 1) the higher the probability of a bad outcome, 2) the greater the damage award, 3) the worse the probability of winning in period one and 4) the smaller the net externality of the period one outcome on future litigation. Because 1) and 2) increase client screening, which in turn decreases the frequency of litigation, we reach a different result than in the benchmark case where 1) and 2) stimulated litigation.

These predictions suggest several professional implications. Where auditors are able to develop a reputation as tough litigators, they will litigate cases when they believe their client pool contains other such risky clients with similar attributes. The ability to screen clients provides an additional tool for managing risk. A joint strategy of investing in client screening and settling all lawsuits is preferred when the firm has a small probability of losing lawsuits, a small probability that risky clients will have bad outcomes, or a small damage award. As these three variables become large, we find the firm switches strategy and litigates all cases and invests less in client screening. The results provide one explanation why, empirically, auditors go to trial more often than other defendants in securities lawsuits.

REFERENCES

Alexander, J. C. 1991. Do the merits matter? A study of settlement in securities class actions. *Stanford Law Review* (February): 497-598.

Arthur Andersen & Co., Coopers & Lybrand, Deloitte & Touche, Ernst & Young, KPMG Peat Marwick, and Price Waterhouse (Big 6). 1992. *The Liability Crisis in the United States: Impact on the Accounting Profession – A Statement of Position.* (August 6).

Asare, S., K. Hackenbrack, and W. R. Kneckel. 1994. Client acceptance and continuation decisions. *Proceedings of the 1994 Deloitte & Touche/University of Kansas Symposium on Auditing Proble*ms, edited by R.P. Srivastava, 163-178. Lawrence, KS: University of Kansas.

Ayers, S., and S. Kaplan. 1998. Potential differences between engagement and risk review partners and their effect on client acceptance judgments. *Accounting Horizons* (June): 139-153.

Balachandran, B. V., and N. J. Nagarajan. 1987. Imperfect information, insurance, and auditors' legal liability. *Contemporary Accounting Research* 3 (Spring): 281-301.

Bebchuk, L. A. 1984. Litigation and settlement under imperfect information. *Rand Journal of Economics* 15 (Autumn): 404-415.

Berton, L. 1995. Big accounting firms weed out risky clients. *Wall Street Journal* (June 26): B1, B6.

Boritz, J. E., and P. Zhang. 1997. The implications of alternative litigation cost allocation systems for the value of audits. *Journal of Accounting, Auditing, & Finance* 12: 353-372.

Carcello, J. V., and Z. V. Palmrose, 1994. Auditor litigation and modified reporting on bankrupt clients. *Journal of Accounting Research* 32 (Supplement): 1-30.

Che, Y.-K., and J.-K. Yi. 1993. The role of precedents in repeated litigation. *Journal of Law, Economics, and Organization* 9 (2): 399-424.

Cooter, R. D., and D. L. Rubinfeld. 1989. Economic analysis of legal disputes and their resolution. *Journal of Economic Literature* 27 (September): 1067-1097.

Dopuch, N., D. E. Ingberman, and R. R. King. 1997. An experimental investigation of multi-defendant bargaining in 'joint and several' and proportionate liability regimes. *Journal of Accounting and Economics* (23): 189-221.

Dye, R. A. 1993. Auditing standards, legal liability, and auditor wealth*.* *Journal of Political Economics* 101 (5): 887-914.

Emerson Company. 2000. *Emerson's Big Five Annual Report*, Bellevue, Washington.

Gould, J. P. 1973. The economics of legal conflicts*.* *Journal of Legal Studies* 2 (2) (June): 279-300.

Hillegeist, S. A. 1999. Financial reporting and auditing under alternative damage apportionment rules. *The Accounting Review* (July): 347-370.

Huss, H. F., and F. A. Jacobs. 1991. Risk containment: Exploring auditor decisions in the engagement process. *Auditing: A Journal of Practice & Theory* (Fall): 16-32.

Johnstone, K. M. 2000. Client-acceptance decisions: Simultaneous effects of client business risk, audit risk, auditor business risk, and risk adaptation. *Auditing: A Journal of Practice & Theory* (Spring): 1-26.

Johnstone, K. M., and J. Bedard. 2001. Risk management and client acceptance decisions. University of Wisconsin working paper.

Jones, L. F., and K. Raghunandan. 1998. Client risk and recent changes in the market for audit services. *Journal of Accounting and Public Policy* 17: 169-181.

Krishnan, J., and J. Krishnan. 1996. The role of economic trade-offs in the audit opinion decision: An empirical analysis. *Journal of Accounting, Auditing & Finance*, 565-586.

Krishnan, J., and J. Krishnan. 1997. Litigation risk and auditor resignations. *The Accounting Review* (October): 539-560.

Lys, T. and R. L. Watts. 1994. Lawsuits against auditors. *Journal of Accounting Research* (Supplement): 65-94.

MacDonald, E. More accounting firms are dumping risky clients. *Wall Street Journal* (April 25): Section 3, 2.

Melumad, N., and L. Thoman. 1990. On auditors and the courts in an adverse selection setting. *Journal of Accounting Research* (Spring): 77-120.

Narayanan, V. G. 1994. An analysis of auditor liability rules. *Journal of Accounting Research* (Supplement): 39-64.

Palmrose, Z. 1988. An analysis of auditor litigation and audit service quality. *The Accounting Review* (January): 55-73.

Palmrose, Z. 1991. Trials of legal disputes involving independent auditors: Some empirical evidence. *Journal of Accounting Research* (Supplement).

Polinsky, A. M., and D. L. Rubinfeld. 1988b. The deterrent effects of settlements and trial. *International Review of Law and Economics*: 109-116.

Posner, R. 1973. An economic approach to legal procedure and judicial administration. *Journal of Legal Studies* 2: 399-458.

P'ng, I. P. L. 1983. Strategic behavior in suit, settlement, and trial, *Bell Journal of Economics* 14 (Autumn): 539-550.

Pratt, J., and J. D. Stice. 1994. The effects of client characteristics on auditor litigation risk judgments, required audit evidence, and recommended audit fees. *The Accounting Review* (October): 639-656.

Public Accountant's Report. 1994. Big six legal costs escalate. 18 (June 30): 3.

Public Oversight Board. 1993. *In the Public Interest: A Special Report by the Public Oversight Board of the SEC Practice Section*, AICPA. Public Oversight Board, Stamford, CT.

_________. 2000. *The Panel on Audit Effectiveness Report and Recommendations*. Public Oversight Board, Stamford, CT.

Ricchiute, D. N. 2001. *Auditing and Assurance Services 6 ed.* South-Western College Publishing, Thomson Learning, United States, p. 233.

Reinganum, J. F., and L. L. Wilde. 1986. Settlement, litigation, and the allocation of litigation costs. *Rand Journal of Economics* 17 (Winter): 557-566.

Schwartz, R. 1997. Legal regimes, audit quality and investment. *The Accounting Review:* 385-406.

________. 1998. Auditors' legal liability, vague due care and auditing standards. *Review of Quantitative Finance and Accounting* 11 (2) (September): 183-207.

Shavell, S. 1982. Suit, settlement, and trial: a theoretical analysis under alternative methods for the allocation of legal costs. *Journal of Legal Studies* 11 (January): 55-81.

Shu, S. Z. 2000. Auditor resignations: clientele effects and legal liability. *Journal of Accounting and Economics* 29: 173-205.

Simunic, D., and M. T. Stein. 1990. The pricing of audit services: theory and evidence. *Journal of Accounting Research* 18 (Spring): 161-190.

Smith, R., and D. Tidrick. 1997. The effect of alternative judicial systems and settlement on auditing. *Review of Accounting Studies* 2 (4): 253-281.

________. 2001. Auditor Settlement Strategy in a Multi-Period RICO Environment. Northern Illinois University Working Paper.

Thoman, L. 1996. Legal damages and auditor efforts. *Contemporary Accounting Research* (Spring): 275-306.

Walo, J. C. 1995. The effects of client characteristics on audit scope. *Auditing: A Journal of Practice & Theory* (Spring): 115-124.

Willekens, M., A. Steele, and D. Miltz. 1996. Audit standards and auditor liability: A theoretical model. *Accounting and Business Research* 26 (3): 249-264.

Zhang, P., and L. Thoman. 1999. Pre-trial settlement and the value of audits. *The Accounting Review* (October): 473-492.

APPENDIX

Proof of Proposition 1

From (3) and (4), we have

$$\text{TLC}^{\text{BT}} - \text{TLC}^{\text{BS}} = b(1-q)[p\delta - (1-p)\varepsilon]d - m - l. \qquad \text{(A1)}$$

Hence, $\text{TLC}^{\text{BT}} \leq \text{TLC}^{\text{BS}}$ if and only if $b(1-q) \leq q^*$. Because TLC^{BT} and TLC^{BS} are expressed as outflows (negative numbers), the auditor settles if and only if $b(1-q) \leq q^*$, and goes to trial otherwise.

Proof of Proposition 2

First, we show that $f^T = f^S$ if and only if $(m-l) + b(1-\lambda^2)[p\delta - (1-p)\varepsilon]d = 0$. To prove the "only if" part, we assume that $f^T = f^S$. Then, since $\frac{d\Pi^{AT}}{df} = \frac{d\Pi^{AS}}{df}$ from (9) and (10), the following should be true:

$$-b(1-q)\alpha'[l - m - 2(1-p)d] - b^2(1-q)\alpha'(1-\lambda^2)[p\delta - (1-p)\varepsilon]d$$

$$= 2b(1-q)\alpha'[(1-p)d - l],$$

or

$$b(1-q)\alpha'(l+m) - b^2(1-q)\alpha'(1-\lambda^2)[p\delta - (1-p)\varepsilon]d = 0,$$

or

$$(l+m) - b(1-\lambda^2)[p\delta - (1-p)\varepsilon]d = 0. \qquad \text{(A2)}$$

It is straightforward to show the "if" part, and hence is omitted.

Furthermore, if $f^T = f^S$, the auditor always chooses to invest f^S and settles. To see this, (A2) implies that

$$\lambda^* = \frac{l+m}{b[p\delta - (1-p)\varepsilon]d} = (1 - \lambda(f^T)^2) > (1 - \lambda(f^T)), \qquad \text{(A3)}$$

where the first equality from the definition of λ^* in Lemma 2, the second equality from (A2), and the final inequality from the fact that $\lambda \in (0, 1)$. Therefore, from Lemma 2, we show that if $f^T = f^S$, the auditor always chooses to invest f^S and settles.

Now assume that $f^T > f^S$. Then, from (9) and (10), the following should be true:

$$-b(1-q)\alpha(f^T)\,[l - m - 2(1-p)d] - b^2(1-q)\alpha'(f^T)(1-\lambda^2(f^T))\,[p\delta - (1-p)\varepsilon]d$$

$$= 2b(1-q)\alpha(f^S)\,[(1-p)d - l],$$

or

$$(l + m) - b(1 - \lambda(f^T)^2)[p\delta - (1-p)\varepsilon]d > 0, \tag{A4}$$

where $\lambda(f^T)$ denotes λ when the level of screening effort is f^T. Again, using (A4) and the reasoning in (A3), we can show

$$\lambda^* = \frac{l+m}{b[p\delta - (1-p)\varepsilon]d} > (1 - \lambda(f^T)^2) > (1 - \lambda(f^T)),$$

where the first equality follows from the definition of λ^* in Lemma 2, the second from (A4), and the final inequality from the fact that $\lambda \in (0, 1)$. Therefore, from Lemma 2, we show that if $f^T > f^S$, the auditor always chooses to invest f^S and settles. This proves that the auditor never invests f^T and always settles if $f^T \geq f^S$. The only case in which the auditor actually invests f^T and fights is when f^T is sufficiently small relative to f^S, i.e., $f^T \leq f^* < f^S$.

Proof of Proposition 3

Let $\pi \equiv \frac{d\Pi^{AT}}{df}$. First, we totally differentiate π with respect to p. Then, we have

$$\frac{d^2\Pi^{AT}}{dfdp} = \frac{\partial\pi}{\partial f}\frac{df^T}{dp} + \frac{\partial\pi}{\partial p} = 0. \tag{A5}$$

First, $\frac{\partial \pi}{\partial f} = \frac{d^2 \Pi^{AT}}{df^2} < 0$ since we assume that the second-order condition is satisfied. Therefore, from (A5), the sign of $\frac{df^T}{dp}$ should be the same as the sign of $\frac{\partial \pi}{\partial p}$.

Now we summarize $\frac{\partial \pi}{\partial p}$ as follows:

$$\frac{\partial \pi}{\partial p} = -b(1-q)\alpha'(2d) - b^2(1-q)\alpha'(1-\lambda^2)(\delta + \varepsilon)d < 0.$$

Hence, we show that $\frac{\partial \pi}{\partial p} < 0$, which implies that $\frac{df^T}{dp} < 0$. This proves the first part of Proposition 3 associated with f^T. The other parts of the proposition can be proved similarly, and hence are omitted.

TABLE 1
Summary of Variables and Parameters

Panel A: Parameters

K	risk-adjusted net audit fee
R	A risky type client, that is, one that has the potential to result in litigation
N	A non-risky client, which is any client that will not result in litigation.
f	The size of the auditor's investment in client screening.
f^T	The optimal size of the auditor's investment in client screening when the auditor's optimal litigation strategy is going to trial in period one.
f^S	The optimal size of the auditor's investment in client screening when the auditor's optimal litigation strategy is settlement in period one.
r, n	Output from the auditor's client screening process indicating that the client is either a risky (R) or non-risky (N) type client.
m, l	The legal costs of the auditor and client, respectively.
d	The expected share of damage awards that the auditor must pay.
s,s^2	The auditor's settlement offers in the first and second period, respectively
TLC^{BS}	The total expected legal costs for two periods in the benchmark case (no client screening) based on a first-period settlement.
TLC^{BT}	The total expected legal costs for two periods in the benchmark case (no client screening) assuming a trial in the first period.
TLC^{S}	The total expected legal costs for two periods based on a first-period settlement (with client screening).
TLC^{T}	The total expected legal costs for two periods assuming a trial in the first period (with client screening).

Π^{I2}	The second-period investor's expected payoff from going to trial.
Π^{AT}	The auditor's total expected payoff at the beginning of period one when the auditor's optimal litigation strategy is going to trial in period one.
Π^{AS}	The auditor's total expected payoff at the beginning of period one when the auditor's optimal litigation strategy is settlement in period one.

Panel B: Probabilities

p	The commonly held prior probability that the auditor will win if the case is tried.
q	The commonly held prior probability that the client is a nonrisky type.
b	The percentage of risky clients that go bankrupt with an undetected material misstatement in the audited financial statement
$\alpha(f) = P[r\|R,f]$	The conditional probability that the auditor correctly identifies a risky type client given the investment in screening effort, f.
$\lambda(f)=P[N\|f]$	The auditor's posterior belief as to the proportion of non-risky firms in his or her client pool.
δ	The positive effect of the winning in the first period on the probability of winning in the second period.
ε	The negative effect of losing in the first period on the probability of winning in the second period.

TABLE 2
Time Line, Game with Auditor Screening

Panel A: Period One

1. The auditor makes a long-term investment in a mechanism that imperfectly screens risky clients.
2. Nature decides whether the client is a risky or non-risky type.
3. The auditor's client-screening technology imperfectly signals that the client is risky or non-risky. The auditor updates the probability that the client is nonrisky.
4. Investors invest in the client firm if it becomes publicly listed and thus the client firm must engage an auditor.
5. For risky clients, Nature decides whether the outcome will be good or bad. A bad outcome occurs if a (risky) client goes bankrupt with an undetected material misstatement in the audited financial statements; otherwise, the outcome is good.
6. If a risky client receives a bad outcome, then investors sue the auditor to recover damages. If the auditor is sued, the auditor chooses the level of settlement offer, which determines whether the client fights or settles. The outcome of the suit is assumed to affect the probability of winning in period two.

Panel B: Period Two

1. The auditor faces a similar pool of clients so that the proportions of risky and non-risky clients in the auditor's portfolio remain the same.

Steps 2 through 6 occur as in period one; however, the probability that the auditor wins in step 6 is higher (lower) as a result of winning (losing) in period one.

FIGURE 1
Period 1 Game Tree with No Screening Technology

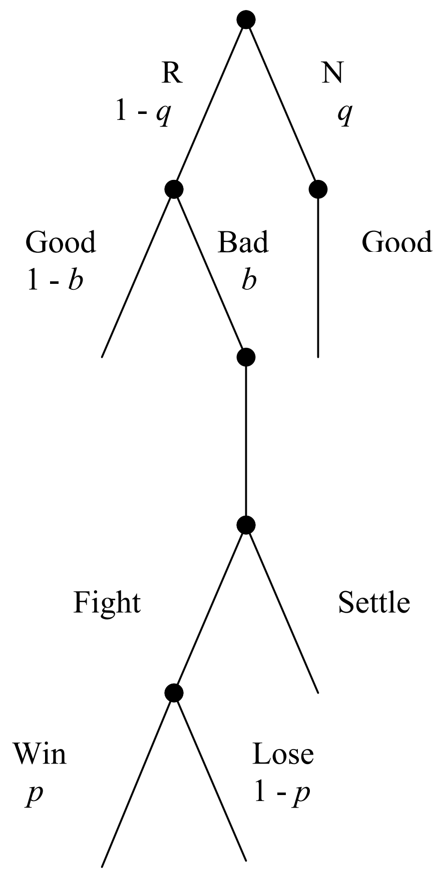
Nature decides proportion of risky (R) and non-risky (N) clients in auditor's client pool: P(R) = 1 – *q*.

Investor invests in audited clients. Good or bad outcome occurs.

Investor sues if outcome is bad.

Auditor chooses to fight or settle the suit.

Auditor wins at trial with probability *p*



The sequence in period 2 is the same, except that the auditor's probability of winning at trial is affected by whether the auditor won in period 1.

FIGURE 2
Period 1 Game Tree with Screening Technology

Auditor invests in
screening technology, f.

Nature decides proportion
of risky (R) and non-risky (N) clients:
prior P(R) = $1 - q$.

Auditor's screening technology
provides imperfect signal r (n)
suggesting client is R (N).

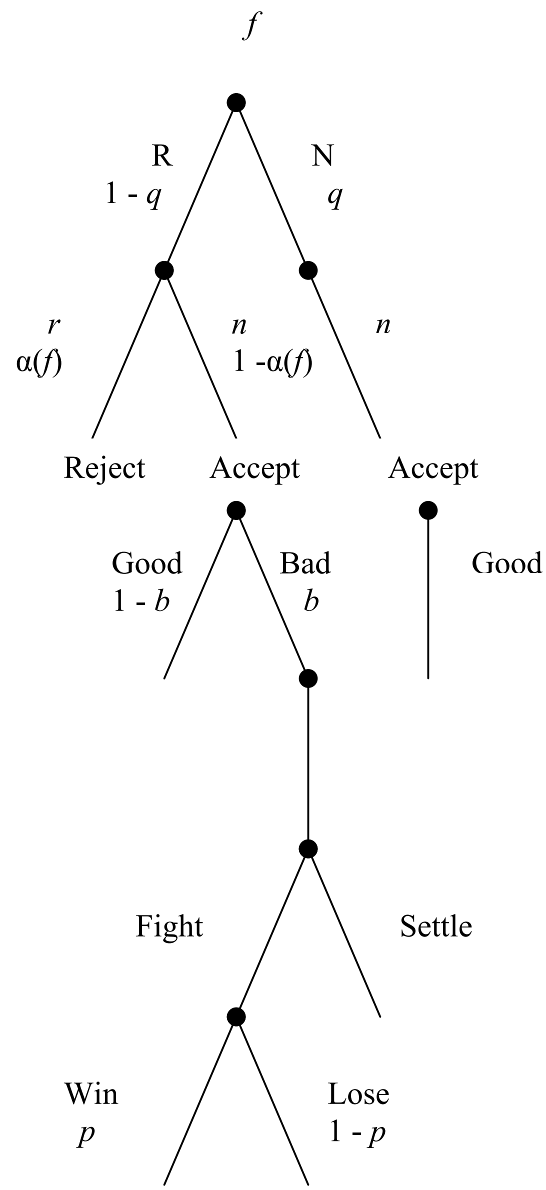
Auditor accepts or
rejects client and updates the
probability of N:
$\lambda(f) = \Pr[N \mid f] = \Pr[N \mid n, f]$

Investor invests in audited clients.
Good or bad outcome occurs.

Investor sues if outcome is bad.

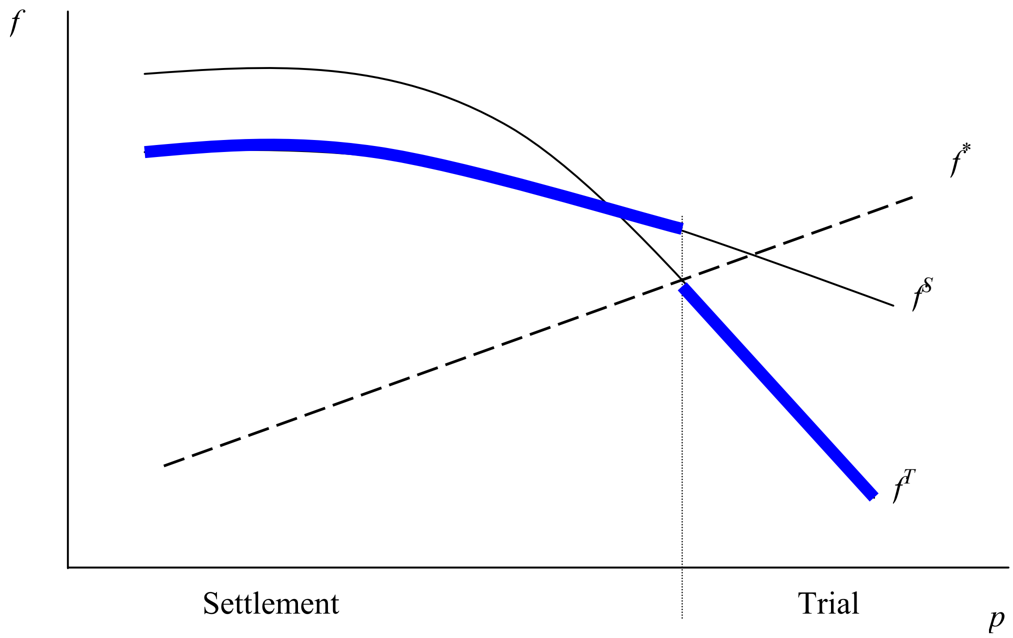
Auditor chooses to fight or settle
the suit.

Auditor wins at trial
with probability p



The sequence in period 2 is the same, except that the auditor does not make a further investment in screening technology and the auditor's probability of winning at trial is affected by whether the auditor won in period 1.

FIGURE 3
Optimal Screening Effort and Settlement Decision



ENDNOTES

[1] Recall that the auditor rejects firms that the screening technology identifies as risky.

[2] Risky clients typically comprise a minority of the auditor's client portfolio. That subset of risky clients that go bankrupt and issue materially misstated financial statements which result in audit failure and which plaintiffs learn of and sue during a particular period, is an even smaller yet important portion of this minority. We assume that the attrition of this subset of bankrupt clients, coupled with the normal turnover of clients, leaves the client mix of risky and non-risky clients largely unchanged in the second period.

[3] If the plaintiff makes a take-or-leave-it offer, he will try to extract the auditor's litigation cost. This is an interesting issue since it relates to the nuisance suit issue. However, our assumption of the auditor's take-or leave-it settlement offer allows us to focus only on the auditor's strategic behavior facing multiple non-nuisance lawsuits in the future. Furthermore, we can generalize this settlement stage by introducing a negotiation between the two players without changing our results qualitatively.

[4] It is common to assume that the auditor has better information about p (e.g., Zhang and Thoman, 1999). However, assuming one party's better information allows two sources of a trial without settlement, i.e., information asymmetry between the two players and precedence effect of a trial. Our model focuses on the second effect, and therefore we assume information symmetry between the two players. Furthermore, our assumption is not unreasonable because the plaintiff's lawyer can, through pretrial interrogatories and depositions, obtain data relevant to infer the audit effort from the auditor without significant cost to the plaintiff. See Alexander (1991, pp. 548-549).

[5] The engagement partner in the second period need not be the same, as long as two different auditors can cooperate to minimize their joint legal costs. Since our paper's focus is not on their cooperation, we simply assume the same auditor.

[6] In most of our analysis and discussion, we assume both δ and ε are strictly greater than zero.

[7] Instead, we may assume that the auditor and investors negotiate over the settlement amount. For example, suppose the auditor fought and won in the first period. The maximum amount the auditor is willing to accept as a settlement amount in the second period is $(1 - p - \delta)d + m$. The minimum amount the investors are willing to accept is $(1 - p - \delta)d - l$. Hence, the exact settlement amount in the second period will be determined based on each party's relative bargaining power. Suppose the investors' bargaining power is $\tau \in (0, 1)$ and the auditor's bargaining power is $(1 - \tau)$. Then, the exact settlement amount in the second period is $(1 - p - \delta)d - l + \tau(m + l)$. However, this does not change the qualitative implications we derive from the analysis.

[8] Extending the analysis to more than two periods is straightforward, although doing so

complicates the analysis. To the extent that the auditor knows the effect of the trial outcome in period one on future litigation in period n >1, our analysis can be applied without loss of generality.

[9] Instead of two-period assumption, we can assume the infinite time horizon. In this case, the auditor's decision in the first period will be based on the present value of the subsequent-period's payoffs. Suppose the auditor's time horizon is infinite. If the auditor decided to fight and won in the first period, her expected payoffs in each of the subsequent periods will be $b(1 - q)[(1 - p - \delta)d - l]$. Assuming a discount rate $r \in (0, 1)$, the present value of the infinite expected payoff stream of $b(1 - q)[(1 - p - \delta)d - l]$ is $\rho b(1 - q)[(1 - p - \delta)d - l]$, where $\rho = r/(1 - r)$. However, this modification does not change our qualitative results.

[10] The exact amount of the offer does not matter in this case (i.e., $s^* < (1 - p)d - l$) since the plaintiff in period one (Plaintiff 1) will not accept it anyway.

[11] Note again that the auditor always settles in period two, and therefore we do not explore the results.

[12] The exact amount of the offer does not matter in this case (i.e., $s^* < [1 - p]d - l$) since Plaintiff 1 will not accept it anyway.

[13] As we show in Proposition 2, the auditor goes to the trial if f^T is sufficiently lower than f^S such that $(1 - \lambda(f^T)) > \lambda^*$. This case can occur only if p is sufficiently high since $\partial\lambda^* / \partial p < 0$. We refer the reader to the proof of Proposition 2 for detailed analysis.