INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

UMI

A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor MI 48106-1346 USA
313/761-4700 800/521-0600

DEMAND FOR AUDIT SERVICES, AND THE EFFECTS OF AUDITOR'S LEGAL LIABILITY ON THE AUDIT QUALITY AND THE FIRM'S PRODUCTION DECISIONS

A THESIS
SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
OF THE UNIVERSITY OF MINNESOTA
BY

DEOKHEON LEE

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

CHANDRA S. KANODIA, ADVISOR

SEPTEMBER, 1997

UNIVERSITY OF MINNESOTA

This is to certify that I have examined this copy of a doctoral thesis by

DEOKHEON LEE

and have found that it is complete and satisfactory in all respects, and that any and all revisions required by the final examining committee have been made.

CHANDRA S. KANODIA

Name of Faculty Adviser(s)

C. S. Kanodia

Signature of Faculty Adviser(s)

8/14/97

Date

GRADUATE SCHOOL

Abstract

Auditors have argued that legal damage awards are excessive, and advocated legal reform. Legal liability is imposed on auditors because the users of audited financial statements cannot observe audit quality. Apparently, a larger award will induce higher audit quality, and larger benefit of auditing. What then is the socially optimal audit quality? This paper will help policy makers assess the following issues. What are the tradeoffs determining the socially optimal audit quality? How do the optimal quality, and economic decisions of client firms, investors, and auditors vary with alternative liability regimes?

I construct a model where audit report influences the client firm's production decisions, and the costs and benefits of audit quality are explicit. The audit technology is such that the auditor's report could be in error even without deliberate attempt to mislead. However, the probability of audit error can be decreased by putting more resources into the audit. Three alternative liability regimes are analyzed; a 'misstatement' regime, a 'negligence' regime, and a 'strict liability' regime. In the misstatement regime, the auditor incurs legal liability if his report was misleading. In the negligence regime, the auditor is liable when his report was misleading *and* that he was negligent. In the strict liability regime, the auditor is liable when the firm suffers some publicly observable catastrophic event like bankruptcy. I derive the optimal audit quality, the optimal damage award, and the equilibrium audit fee, and compare welfare consequences for each regime.

TABLE OF CONTENTS

I. Introduction

Auditors have long argued that legal damage awards are excessive, and have pushed for legal reform to address such excesses. Ostensibly the need for imposing legal liability on auditors arises from the non-observability of audit quality by the users of audited financial statements. If such legal liability is effective, it would seem that the greater the size of damage awards the higher will be the induced audit quality, and consequently the higher will be the benefits of auditing. What then is the socially optimal audit quality? This paper provides a framework in which policy makers can assess the following kinds of issues. What are the tradeoffs determining the socially optimal audit quality? How does the optimal audit quality vary with alternative liability regimes, and what are the welfare consequences of such regimes? Are actual damage awards excessive? How do the economic decisions of client firms, investors and auditors change in response to alternative liability regimes?

In order to address these issues, I model a situation where audit report influences the client firm's production decisions, and the costs and benefits of audit quality can be made explicit. I assume that the audit technology is inherently imperfect so that the auditor's report could be in error even though there is no deliberate attempt by the auditor to mislead. However, the probability of audit error can be decreased by putting more resources into the audit and thereby increasing the audit quality. Three alternative liability regimes are analyzed; a 'misstatement' regime, a 'negligence' regime, and a 'strict liability' regime. In

the misstatement regime, the auditor incurs legal liability if the auditor is sued by investors and the court finds that the auditor's report was misleading. In the negligence regime, the auditor is liable when the court finds that the audit report is misleading *and* that the auditor failed to exercise 'Due Diligence'. In the strict liability regime, there is no 'Due Diligence' standard, nor is there any verification of audit reports; the auditor incurs legal liability only when there is some publicly observable catastrophic set back to the firm, such as insolvency. For each regime, I derive the socially optimal audit quality, the optimal size of damage award, and the equilibrium audit fee.

In the misstatement regime, I show that an equilibrium with auditing can exist only if the induced audit quality lies between some upper and lower bound. If the audit quality is below the lower bound, I show that the audit report does not influence any of the client firm's economic decisions and thus does not add sufficient value to justify its cost. Consequently the auditor would not be hired. On the other hand, if the audit quality is too high outside investors would lose all incentives to sue the auditor; consequently legal liability would be ineffective and once again the auditor would not be hired. These upper and lower bounds depend on exogenous parameters. Hence, for some parameter values an equilibrium with auditing would not even exist. If an audit is sustainable, I show that the court induces the socially optimal audit quality by setting the auditor's legal liability commensurate with the ex ante social loss, born by the investors, from a misleading audit report. In this sense, the optimal damage award is compensatory to the investors.

In the negligence regime, I assume that the litigation costs born by investors is larger than those in the misstatement regime since the burden of proof is larger. I find that, if auditing is sustainable, the socially optimal audit quality is strictly higher, and the damage award is also strictly bigger. The effect on the audit fee is ambiguous. The reason is that even though both the direct audit cost and the damage award are larger, the probability of incurring legal liability is smaller. However, I show that social welfare is unambiguously smaller in comparison to the misstatement regime.

In the strict liability regime there is no burden of proof, so I assume that litigation costs are zero. It might seem that there would be no role for auditing. However, I show that auditing still provides the same benefits as in the other two liability regimes because it continues to affect the opportunities and decisions of the client firm. In fact, there is no upper bound constraint on audit quality and auditing can be sustained for a larger set of parameter values than is the case for the other two liability regimes. I show that the socially optimal audit quality is strictly smaller than for the previous two regimes. The damage award is also strictly smaller, but it is awarded with greater frequency. I show that social welfare is the highest in this strict liability regime.

Thus, the three liability regimes studied here can be unambiguously ordered in terms of social welfare. The strict liability regime attains the highest social welfare, the misstatement regime is next, and the negligence regime attains the lowest welfare. This result is surprising, because the negligence regime is the one that the auditor prefers and the court has adopted in practice.

A common argument for the negligence regime is as follows. The auditor should not be required to achieve the perfect audit quality because such an audit would be prohibitively costly. Thus, the court should choose a reasonable 'Due Diligence' level of audit quality[1], and set the damage award to induce the auditor's compliance. The auditor, however, seeks to achieve not the perfect audit quality but a quality which minimizes the sum of his audit costs and his expected legal liability. Therefore, the court in the misstatement regime and in the strict liability regime could still induce any desired audit quality by choosing an appropriate damage award and thus influencing the auditor's expected legal liability. Further, I show that the 'Due Diligence' level of audit quality itself becomes excessive because bigger litigation costs are incurred in the verification of the compliance; the effect of the negligence regime is precisely opposite to one claimed in this line of argument.

An alternative argument I investigate is that the negligence regime may provide some protection to the auditor from a run-a-way damage that the jury may award without adequately taking into account the implicit prior contract with the auditor. This protection would be socially desirable because if the damage award becomes excessive, the audit quality becomes inefficiently high. Surprisingly, I find that a larger litigation costs incurred in the verification of the 'Due Diligence' rather pushes the equilibrium quality even higher. This result also contradicts the auditor's allegation that the jury awards an excessive damage; if it is the case, the auditor should not prefer the negligence regime.

[1] One that maximizes social welfare. Audit textbooks usually call it 'reasonable assurance' that the financial statements are free of misstatement.

My conjecture is that the actual damage award in the negligence regime, which is up to three times the investors' loss, may be less than the optimal damage amount.

The investors in the strict liability regime collects legal damage if the firm fails. Thus, the agents in the strict liability regime must foresee all future events, indicative of likely business failure, and specify when the investors can legally declare the firm a failure. Writing such a complete contract would be prohibitively costly. The court in the misstatement regime, however, verifies whether or not the financial statements were misstated in light of the evidence the auditor acquired and the events subsequent to the audit. Because it does not require writing a complete contract and attains a higher social welfare than the negligence regime does, the misstatement regime is the best among the three liability regimes considered in this paper.

Previous research on auditing has examined issues different from the ones studied here. Antle [1982], and Baiman, Evans and Noel [1987] study auditing in a principal agent context in which the information provided by the audit is used to write compensation contracts with the agent. Issues of legal liability for auditors are not studied. Titman and Trueman [1986], and Datar, Feltham and Hughes [1991] study auditing from the perspective of minimizing signaling costs associated with initial purchase offerings. Palmrose [1994] and Narayanan [1994] compare the joint and several liability rule with the proportional liability rule. Melumad and Thoman [1990] study auditing in the context of a credit market with the audit report serving to separate good credit types from bad credit types. However, damage awards by the court are exogenously specified and there is no

analysis of different liability regimes. Dye [1993] studies the effect of auditor wealth on audit standards. Fellingham and Newman [1985] address issues of strategic choice of sampling plans by auditors.

My paper is closely related to Shavell [1980], Becker [1968], Kaplow [1993], and Schwartz [1995]. Shavell [1980] investigates efficiency of damage measures for breach of contract. He considers the expectation measure, the reliance measure, and two other measures. The expectation measure puts the victim of the breach in a position that he would have been in if the contract had been performed. The reliance measure puts the victim where he was before he made a contract. Shavell [1980] finds that the expectation measure is Pareto Superior to the reliance measure because the reliance measure insures the relier and thus induces excessive reliance. Schwartz [1995] finds a similar result in the context of the auditing service contract; if they can recover their initial investment from the auditor, the investors will make an excessive investment. Becker [1968] finds that a higher punishment imposed with a lower probability can induce the same level of deterrence. Kaplow [1993] operationalize this concept with a multiplier for the damage in his study of plaintiffs' fees and damage awards. He finds that the court can shift the victorious plaintiffs' fees to the defendants, or award a larger multiple of an exgoneously given amount to induce the same level of deterrence.

I endogenously derive the socially optimal damage award, the investors' loss from an inefficient production decision plus expected litigation costs divided by the probability of winning the award: the investors' loss from an inefficient production is the expectation

measure in Shavell [1980]; the court in Kaplow [1993] should shift the victorious plaintiffs' fees to the defendants, instead of using a higher multiplier; the optimal multiplier is the inverse of the probability that the investors win the damage award. Thus, my result integrates the results of Shavell [1980], Becker [1968], and Kaplow [1993].

Schwartz [1995] compares the negligence regime and the strict liability regime[2]. She finds that the equilibrium combination of audit quality and investment in the negligence regime with the out-of-pocket damage measure is not socially optimal and that social optimum is attainable under the strict liability regime if the damage measure is set at not the actual but the socially optimal investment. I find that the strict liability regime attains the highest social welfare, the misstatement regime is next, and the negligence regime attains the lowest welfare. But the underlying force is different. If Schwartz [1995] had employed the damage measure set at the socially optimal investment divided by the probability of the negligence verdict, the negligence regime would have also attained social optimum. My finding is due to the effects of the litigation costs on the damage award and the audit quality.

The remainder of the paper is organized as follows: The model underlying my analysis is described in section II. Section III describes the equilibria that would prevail if there was no auditing. Section IV studies the misstatement regime. Section V examines the strict liability regime. Section VI analyzes the negligence regime. The conclusion follows in section VII.

---

[2] She does not make the distinction between the strict liability regime and the misstatement regime by effectively assuming that the return on investment is zero if and only if the state is Bad.

II. Model

The economy consists of an entrepreneur, outside investors represented by a competitive capital market, an auditor, and a court. The court has no preferences of its own, and is represented by a noisy verification technology. Each of the other agents in the economy is risk neutral. The entrepreneur is endowed with a risky investment project that produces outcomes at two dates, an interim date and a final date. However, he has a short consumption horizon that requires him to consume entirely at the interim date. To meet this consumption need, the entrepreneur can either liquidate his firm or sell it to capital market investors at the interim date.

The entrepreneur's project requires an initial investment of K, and I assume that the entrepreneur has sufficient of his own resources to make this investment. At the interim date the outcome from the project could be either U or D, with $0 < D < U$. The probability of U is θ. I assume that final and interim outcomes are correlated in such a manner that if the interim outcome is D the project's future is bleak, while if the interim outcome is U the project is likely to pay handsomely. Formally, I assume that the final outcome could be either L or H, with:

$$\text{Prob}(H|D) = P_D,$$

$$\text{Prob}(H|U) = P_U, \text{ and}$$

$$P_U > P_D.$$

Without loss of generality, and to economize on notation, I assume $L = 0$. In order to capture the idea that the project's future could be bleak or rosy depending on the interim outcome, I assume:

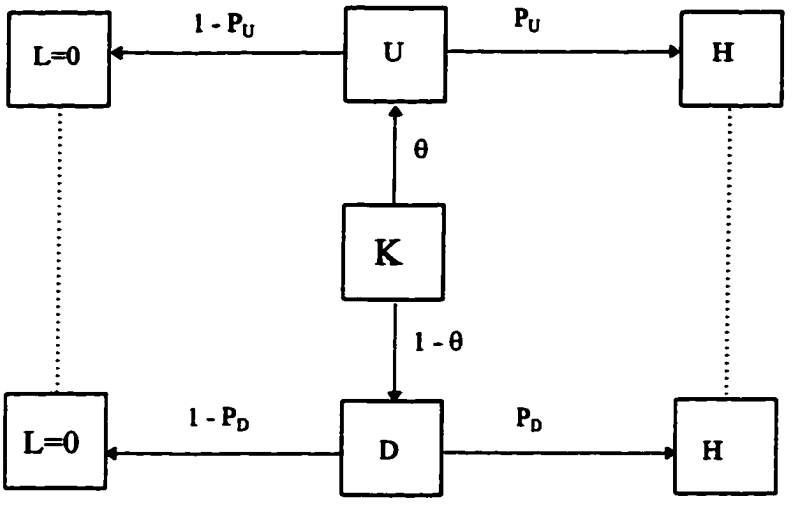
(1) $P_D H < D$, and

(2) $P_U H > U$.

If the firm is liquidated at the interim date, the entrepreneur can consume the interim outcome that is realized (U or D), and there are no further cash flows at the final date. If the firm continues operations to the final date, the interim outcome is not available for consumption and only the final outcome, either $L = 0$ or H, can be consumed. The assumptions in (1) and (2) imply that if the interim outcome is D, the expected final outcome is less than D, while if the interim outcome is U the expected final outcome is even higher. Thus, the socially optimal decision is to liquidate the firm if the interim outcome is D and continue operations only if the interim outcome is U. To guarantee that it is in the entrepreneurs best interest to make the investment, regardless of the price he can obtain in the capital market, I assume:

(3) $\theta U + (1-\theta)D > K$.

The only remaining decisions to be made by the entrepreneur are whether or not to hire an auditor, and whether to sell or liquidate the firm at the interim date. The decision to hire the auditor is made at the initial date of investment, before the entrepreneur observes the firm's interim outcome.

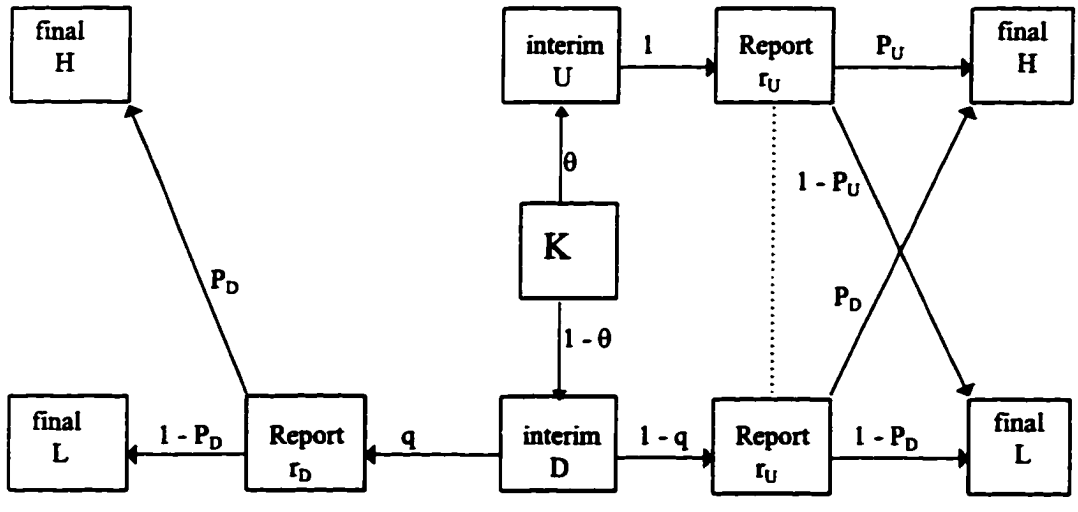


In order to motivate the need for auditing, I assume that the interim outcome is observed only by the entrepreneur. Information about this interim outcome can be credibly communicated to the capital market only via an audit report. The auditor has a noisy audit technology that produces one of two signals, r_U or r_D. I assume:

$$\text{Prob}(r_U|U) = 1, \text{ and}$$

$$\text{Prob}(r_D|D) = q,$$

where $0 \leq q \leq 1$. Thus, a good outcome is verified with certainty, but there is noise in the verification of a bad outcome. The probability q can also be interpreted as the 'quality' of the audit. The auditor can influence this quality by putting more or less resources into the audit. The cost of an audit of quality q is c(q), where $c'(q) > 0$, $c''(q) > 0$. For technical reasons, I also assume that $c'''(q) > 0$, $c(0) = 0$, $c'(q)$ approaches 0 as q approaches 0 and $c'(q)$ approaches infinity as q approaches 1. The actual resources devoted to the audit is unobservable to all parties except the auditor. If the auditor is hired, he receives a non-contingent fee, and has only one decision to make, the choice of q, i.e. the choice of resources to be devoted to the audit. The objective of the auditor is to minimize his total expected costs, which consist of his direct audit cost c(q) and possible legal damage.

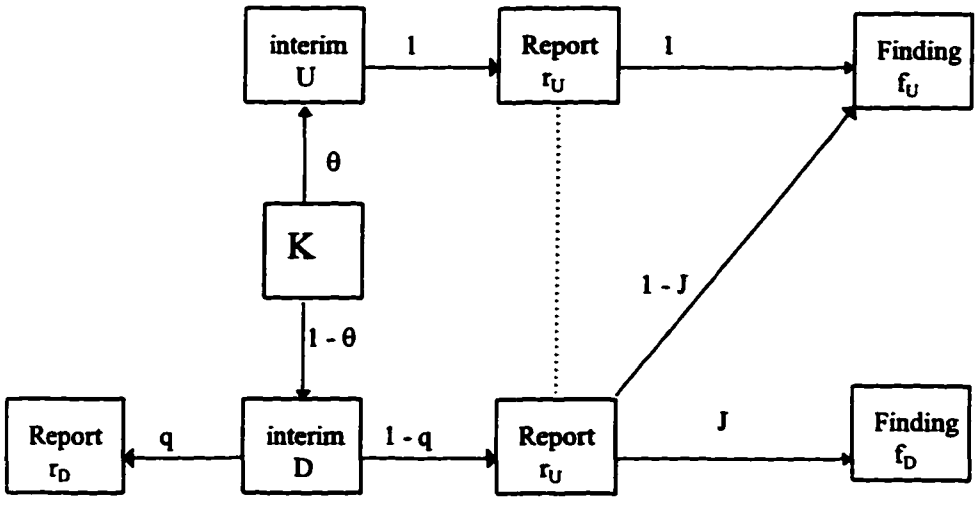


If the firm is sold to capital market investors, and if subsequently these investors take the auditor to the court, the court reviews all of the evidence collected by the auditor and gathers additional evidence. Thus, I assume that the court's finding is more accurate than the auditor's finding, but it is not necessarily perfect. Specifically, the court could find either f_U or f_D, with

$$\text{Prob}(f_U|U) = 1, \text{ and}$$

$$\text{Prob}(f_D|D) = J \in (q, 1).$$

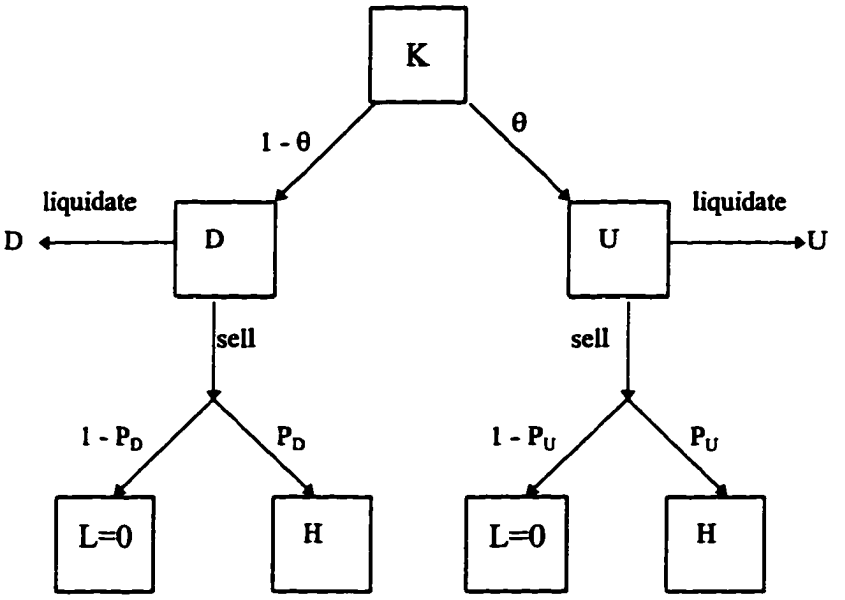
The legal damage to be awarded to the investors will depend on the legal liability regime in place and the court's findings. For each liability regime, the size of the award is chosen to maximize social welfare. At this point, I will use T to generically denote the legal damage the court awards.



Given that all agents in the economy are risk neutral, capital market prices will equal the expectation of future cash flows to outside investors, where the expectation is conditional on the information available to them. These future cash flows consist of the final cash flow of the firm and the legal damage awarded by the courts less the cost of litigation. Investors in the capital market must decide whether or not to sue the auditor. Since these investors never observe the interim outcome, they base this decision on the observed auditor's report and the observed final cash flow of the firm. I assume they know the probabilities describing the noisy nature of the auditor's and court's findings, and the legal damage to be awarded. If they decide to sue the auditor, they must collectively incur a litigation cost of β, which may vary with the liability regime.

III. Equilibria in the Absence of Auditing

If the interim outcome from the firm's investment is publicly observed, there is no scope for auditing or litigation. As a useful benchmark, I first describe the equilibrium for this simple first best case.



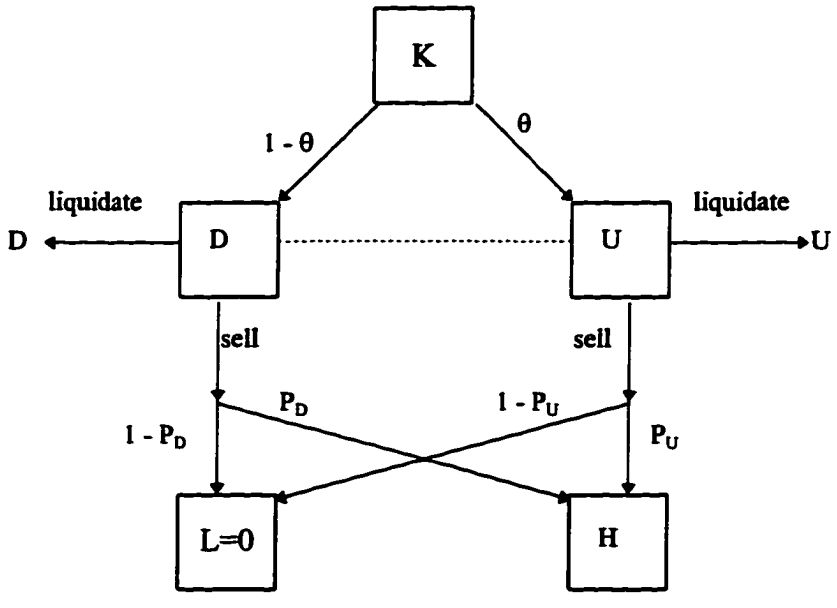
Let φ(.) be the equilibrium capital market price. Then,

$$\varphi(D) = P_D H < D,$$

$$\varphi(U) = P_U H > U.$$

Thus, the entrepreneur liquidates the firm when he observes D and sells the firm when he observes U, so all decisions are efficient. His expected consumption is $\theta D + (1 - \theta)P_U H$ gross of the investment cost. The expected consumption of capital market investors is zero.

Now, suppose the interim outcome is privately observed by the entrepreneur and there is no auditing in the economy. The only information available to the capital market is the entrepreneurs decision to sell the firm. I show that, in this situation, the only equilibrium is one of the two inefficient pooling equilibria.



Case (I) $\theta P_U H + (1-\theta)P_D H \geq U$

In this case, the following is the only plausible equilibrium:

$\varphi = \theta P_U H + (1-\theta)P_D H$, and

The entrepreneur sells the firm regardless of the interim outcome.

To see why this is the only reasonable equilibrium, consider $\varphi = P_D H$. Given this price, the entrepreneur will liquidate the firm regardless of the interim outcome, and there is no trade in the capital market. Even though this is an equilibrium, it is clearly Pareto inefficient. The entrepreneur's expected utility in this equilibrium is $\theta U + (1-\theta)D$, which is strictly less than his expected utility in the previous equilibrium since,

$$\theta U + (1-\theta)D < U < \theta P_U H + (1-\theta)P_D H,$$

and investors in the capital market break even in both equilibria.

Now, consider $\varphi = P_U H$. Since $D < U < P_U H = \varphi$, the entrepreneur will sell the firm regardless of the firm's interim outcome. Thus, the entrepreneur's decision to sell contains no information, and the expected profits of investors in the capital market would be negative because $\theta P_U H + (1-\theta)P_D H < P_U H$.

Case(II) $\theta P_U H + (1-\theta)P_D H < U$

In this case, the only equilibrium is:

$\varphi = P_D H$, and

The entrepreneur liquidates the firm regardless of the interim outcome.

$\varphi = \theta P_U H + (1-\theta)P_D H$ cannot be sustained as an equilibrium price, since at this price the entrepreneur would sell the firm only when the interim outcome is D, and would liquidate the firm when the interim outcome is U, and investors would make a loss whenever the firm is sold. Similarly $\varphi = P_U H$ cannot be sustained in equilibrium.

I have shown that in both cases, the economy achieves a pooling equilibrium. In the first case, the firm continues operations regardless of the interim outcome, which is inefficient because a firm with interim outcome D should really be liquidated. In the second case, the firm is always liquidated, which is inefficient because a firm with interim outcome U should really continue operations. This identifies the inefficiencies that are potentially correctable by the auditor.

IV. Equilibrium for the Misstatement Regime

In this regime, I assume that the investors receive a damage award when the auditor's report is r_U and the court's finding is f_D. The court will endogenously determine the size of the damage award T_M. I denote the litigation cost β_M. Given $\{T_M, \beta_M\}$, an equilibrium will consist of market prices $\varphi_M(r_U)$ and $\varphi_M(r_D)$, the auditor's choice of audit quality q_M, the entrepreneur's sell-liquidate strategy, and a suing strategy for capital market investors. The equilibrium conditions to be satisfied are developed below.

First, consider the suing strategy of outside investors. Given that the court never awards damages when the auditor's report is r_D, there is no incentive for investors to sue the auditor conditional on such a report[3]. Therefore, the equilibrium market price $\varphi_M(r_D)$ must equal the expected final cash flow from the firm's project, conditional on project continuation. Because a report of r_D communicates that the interim outcome is D for certain,

$$\varphi_M(r_D) = P_D H. \tag{4}$$

Now suppose that the audit report is r_U, that the firm is sold at some price $\varphi_M(r_U)$, and that the observed final outcome from the firm is $L = 0$. The investors must assess:

[3] It might seem, in this case, that if the auditor had a choice of reports he would always report r_D. But then, the auditor's report would be uninformative and the entrepreneur would not hire him.

$$Prob\left(D \middle| r_U, L\right) = \frac{(1-q_M)(1-P_D)(1-\theta)}{(1-q_M)(1-P_D)(1-\theta)+(1-P_U)\theta}, \text{ and}$$

$$Prob(f_D \mid r_U, L) = Prob(f_D \mid D) = J.$$

I assume, for the time being, that the investors are not allowed to sue the auditor if the observed final outcome from the project is H. I will show later that the equilibrium social welfare is higher when this restriction is imposed. Now the investors sue the auditor if:

$$(5) \qquad \frac{(1-q_M)(1-P_D)(1-\theta)JT_M}{(1-q_M)(1-P_D)(1-\theta)+(1-P_U)\theta} > \beta_M.$$

If it is not satisfied, legal liability would become ineffective and the equilibrium would be one of the two inefficient pooling equilibria described earlier. Therefore, the court will choose a damage award T_M so that the inequality is satisfied. Given that investors sue the auditor conditional only on observing (r_U, L), the price $\varphi_M(r_U)$, which is determined before the final outcome from the project is observed, must satisfy:

$\varphi_M(r_U)$ = Prob(U|r_U)P_UH + Prob(D|r_U)[P_DH + (1 - P_D)(expected damage - litigation costs)],

i.e.

$$(6) \qquad \varphi_M(r_U) = \frac{\theta}{\theta + (1-\theta)(1-q_M)} P_U H + \frac{(1-\theta)(1-q_M)}{\theta + (1-\theta)(1-q_M)} \left[P_D H + (1-P_D)(JT_M - \beta_M) \right].$$

In specifying the suing strategy of the investors and the price $\varphi_M(r_U)$, I have assumed that the investors know the auditor's choice of q_M even though this choice is not observed. This is justified because all agents in the economy know the nature of the problem that the auditor solves when determining audit quality.

Now consider the auditor's decision problem. Because the audit fee is non-contingent, the auditor chooses q_M to minimize the sum of his audit costs and his expected legal liability. Thus q_M satisfies:

$$q_M = \text{Arg min } c(q) + (1-\theta)(1-q)(1-P_D)JT_M.$$

Thus, the audit quality optimal to the auditor is described by:

$$(7) \qquad c'(q_M) = (1-\theta)(1-P_D)JT_M.$$

This implies that the auditor's choice of audit quality, $q_M(T_M)$, is an increasing function of the damage award T_M.

I assume that the audit market is competitive, and the auditor earns zero expected profits in equilibrium. Thus, the non-contingent audit fee, F_M, is described by:

(8) $$F_M = c[q_M(T_M)] + (1 - \theta)[1 - q_M(T_M)](1 - P_D)JT_M.$$

Since the audit quality is a function of T_M and the expected legal damage is also a function of T_M, (8) implies that the audit fee, $F_M(T_M)$, is a function of T_M alone. Because the audit cost function is convex, one would expect the audit fee $F_M(T_M)$ to increase disproportionately as the damage award T_M increases. However, the following theorem shows that the opposite is the case.

Theorem 1

(i) The audit quality $q_M(T_M)$ is strictly increasing and strictly concave in T_M.

(ii) The audit fee $F_M(T_M)$ is strictly increasing and strictly concave in T_M.

Theorem 1 indicates that as the damage award increases, the audit quality improves but at a decreasing rate. The audit fee depends both on the auditor's induced choice of the audit quality and on the size of the legal damage. At the margin, however, the induced audit quality does not affect the audit fee because the increase in the cost of the audit is exactly offset by the induced decrease in the probability of incurring legal liability. The audit fee is influenced only by the direct effect of having to pay a larger legal damage when the damage is awarded.

The entrepreneur's sell-liquidate choice is contingent on his private observation of the interim outcome (U, or D), on the auditor's report (r_U, r_D), and the market prices contingent on these audit reports. Suppose that the interim outcome is D. In this case, the audit report could be either r_U or r_D. If the audit report is r_D, the equilibrium price in the market will be $\varphi_M(r_D) = P_DH$ as described in (4). Since D is bigger than P_DH, the entrepreneur will choose to liquidate the firm. If the audit report is r_U, the entrepreneur will sell the firm if the market price $\varphi_M(r_U)$ is bigger than D.

Now, suppose that the interim outcome is U. In this case, the audit report is r_U for certain. The entrepreneur will sell the firm if the market price $\varphi_M(r_U)$ is bigger than U. In pricing rule (6), I have shown that $\varphi_M(r_U)$ is a weighted average of:

P_UH, and

$P_DH + (1-P_D)(JT_M - \beta_M)$.

Since P_UH is bigger than U and $P_DH < D < U$, the entrepreneur's equilibrium strategy depends crucially on the size of the damage award T_M. I will show that it is socially optimal to choose T_M in such a way that $\varphi_M(r_U)$ is bigger than U. Anticipating this result, I claim that the entrepreneur's equilibrium strategy is to sell the firm when the audit report is r_U regardless of the interim outcome.

The court chooses the size of the damage award T_M in order to maximize social welfare. Because each agent is risk neutral, and the auditor as well as the capital market

investors exactly break even, social welfare is equivalent to the expected payoff to the entrepreneur. Given the entrepreneur's strategy discussed above, his expected payoff is:

$$\pi_M = \text{Prob}(r_D)D + \text{Prob}(r_U)\varphi_M(r_U) - F_M(T_M),$$

i.e.

$$\pi_M = (1-\theta)q_M(T_M)D + \left\{\theta+(1-\theta)\left[1-q_M(T_M)\right]\right\}\varphi_M(r_U) - F_M(T_M). \tag{9}$$

Substituting the pricing rule (6) and the audit fee (8), the court's objective becomes:

$$\text{Max} \quad \pi_M = (1-\theta)q_M(T_M)D + \left\{\theta P_U H+(1-\theta)\left[1-q_M(T_M)\right]P_D H\right\}$$
$$- c[q_M(T_M)] - (1-\theta)[1-q_M(T_M)](1-P_D)\beta_M.$$

The legal damage does not change social welfare at all for the following reasons. Because the auditor breaks even in equilibrium, the entrepreneur pays the auditor the direct audit cost and the auditor's expected legal liability as the audit fee. The auditor's expected legal liability is $(1-\theta)(1-q)(1-P_D)JT_M$. Because they also break even in equilibrium, the investors pay the entrepreneur the expected final cash flow and the expected legal damage award as the market price when they purchase the firm. The

investors' expected damage award is $\text{Prob}(D|r_U)(1 - P_D)JT_M$. Because he receives the market price only when he sells the firm, the entrepreneur expects to receive $\text{Prob}(r_U)\text{Prob}(D|r_U)(1 - P_D)JT_M$ from the investors as the expected legal damage portion of the market price. The amount the entrepreneur pays to the auditor as the expected legal liability is exactly offset by that he expects to receive from the investors as the expected legal damage award, because:

$$\text{Prob}(r_U)\text{Prob}(D|r_U)(1 - P_D)JT_M = [\theta + (1 - \theta)(1-q)]\frac{(1-\theta)(1-q)}{\theta + (1-\theta)(1-q)}(1 - P_D)JT_M$$

$$= (1 - \theta)(1-q)(1 - P_D)JT_M.$$

Thus, the socially optimal size of the damage award T_M° is characterized by the first order condition:

$$(10) \qquad (1 - \theta)[D - P_D H + (1 - P_D)\beta_M] = c'\left[q_M\left(T_M^\circ\right)\right].$$

The right hand side of (10) describes the marginal direct cost of the audit. Term $D - P_D H$ in the left hand side of (10) is the social loss when a firm with the interim outcome D is allowed to continue its operations due to a misleading audit report r_U. Term $(1 - P_D)\beta_M$ in the left hand side of (10) describes the expected litigation costs given that the investors sue the auditor when the final outcome turns out to be L. Thus, the left hand side of (10)

represents the marginal expected costs of such inefficiencies caused by a misleading audit report r_U.

The suing condition (5) may or may not be satisfied at this damage award $T_M°$. If not, the court has to choose a damage award T_M so that the suing condition holds with equality as follows:

$$\frac{(1-q_M)(1-P_D)(1-\theta)JT_M}{(1-q_M)(1-P_D)(1-\theta)+(1-P_U)\theta} = \beta_M.$$

This T_M is a corner solution and its properties are not interesting. Thus, I will assume that there is an interior solution $T_M°$ to the court's problem. Because the auditor's choice of q_M is described by (7), (10) is equivalent to:

$$(1 - \theta)[D - P_D H + (1 - P_D)\beta_M] = (1 - \theta)(1 - P_D)JT_M°.$$

Thus, the socially optimal damage award:

(11) $$T_M° = \frac{D - P_D H + (1 - P_D)\beta_M}{(1 - P_D)J}.$$

The intuition underlying this result is as follows. The auditor chooses his audit quality to balance his legal liability with the direct cost of the audit, ignoring the costs born by the investors from a misleading audit report r_U. By setting the auditor's legal liability

commensurate with the investors' costs, the court induces the auditor to choose the socially optimal audit quality. The numerator in (11) describes the investors' expected loss due to a misleading audit report r_U when the interim outcome is D. The denominator, $(1 - P_D)J$, represents the probability of winning the damage award. This implies that given the equilibrium damage award, the investors are purchasing a fair gamble. In this sense, the equilibrium damage award is compensatory to the investors.

The equilibrium audit quality q_M^* is characterized by:

$$(12) \qquad c'(q_M^*) = (1-\theta)(D - P_D H) + (1 - \theta)(1 - P_D)\beta_M.$$

Now inserting the socially optimal damage award (11) into (8) yields the equilibrium audit fee:

$$(13) \qquad F_M^* = c(q_M^*) + (1 - \theta)(1 - q_M^*)[(D - P_D H) + (1 - P_D)\beta_M].$$

Theorem 2:

(i) The equilibrium market price $\varphi_M(r_U)$ is:

$$(14) \qquad \varphi_M(r_U) = \frac{\theta}{\theta+(1-\theta)(1-q_M^*)} P_U H + \frac{(1-\theta)(1-q_M^*)}{\theta+(1-\theta)(1-q_M^*)} D.$$

(ii) q_M^* is decreasing in P_D, decreasing in θ, but increasing in β_M.

(iii) F_M^* is decreasing in P_D, decreasing in θ, but increasing in β_M.

(iv) The investors sue when they observe audit report r_U and final outcome L, and

$$(15) \qquad (1-q_M^*)\frac{(1-\theta)(D-P_D H)}{\theta(1-P_U)} \rangle \beta_M.$$

An important implication of (12), (13) and theorem 2 is that in equilibrium the accuracy of the court's finding as described by the parameter J plays no role in determining the audit quality, the audit fee, the prices, and investors' suing decisions. The key variables that determine the equilibrium are the litigation costs β_M, social loss $D - P_D H$, and the probability $1 - \theta$ of incurring these costs. The inequality (15) gives a surprising result

that the equilibrium audit quality q_M^* cannot be too high if an equilibrium with auditing is to be sustained. The reason is that if the audit quality is sufficiently high, the investors lose all incentives to sue the auditor. On the other hand, equation (14) indicates that the price $\varphi_M(r_U)$ declines as the audit quality decreases. If the audit quality falls below some critical level, the price $\varphi_M(r_U)$ will be smaller than U. In such case, the entrepreneur will always liquidate his firm at the interim date. Consequently, the entrepreneur will not hire the auditor. Thus, in the misstatement regime, an equilibrium with auditing can be sustained only if the audit quality lies between some lower and upper bounds.

Equation (12) indicates that these bounds depend in a complex way on the social costs associated with a misleading audit report and how rapidly marginal audit cost, $c'(q)$, is increasing. It is unambiguously true that if P_D or θ is sufficiently high, the audit quality q_M^* declines below the lower bound and there will be no demand for auditing. It is also unambiguously true that if the litigation costs β_M are sufficiently high, there will be no demand for auditing. This is because an increase in β_M would result in an increase in q_M^*, which in turn would result in a decrease in the left hand side of (15). It is conceivable that for many parameter values a misstatement regime would result in a situation where the auditor is not hired at all and the equilibrium would be one of the two inefficient pooling equilibria described earlier.

In the preceding analysis, I assumed that the investors are not allowed to sue the auditor if the observed final outcome from the project is H. Now I will relax this

assumption. Suppose that the auditor's report is r_U, that the observed final outcome from the firm is $x \in \{H, L\}$, that the investors sue the auditor, that the court's finding is f_D, and that the damage award is T_x. The auditor's choice q_M satisfies:

$$q_M = \text{Arg min}\ \ c(q) + (1 - \theta)(1 - q)J\{(1 - P_D)T_L + P_D T_H\}.$$

Thus, the audit quality optimal to the auditor is described by:

$$c'(q_M) = (1-\theta)J\{(1 - P_D)T_L + P_D T_H\}.$$

This implies that the auditor's choice of audit quality is increasing in the weighted average of T_L and T_H. Therefore, the court can set $T_H = 0$ and rely solely on T_L to induce any level of audit quality. This arrangement reduces litigation costs by $(1 - \theta)(1 - q_M)P_D\beta_M$.

Theorem 3:

The court can rely solely on T_L to induce any desired level of audit quality, while saving litigation costs.

V. Equilibrium for the Strict Liability Regime

In this regime, I assume that the investors receive a damage award when the auditor reports r_U but the firm subsequently fails. The court does not verify whether the audit report was actually misleading, and thus there are no litigation costs in this regime. The court will endogenously determine the size of the damage award T_S. Given T_S, an equilibrium will consist of market prices $\varphi_S(r_U)$ and $\varphi_S(r_D)$, the auditor's choice of audit quality q_S, the entrepreneur's sell-liquidate strategy, and a suing strategy for the investors.

In addition to the usual role of verifier, the auditor in this regime 'accidentally' plays a role of an insurer for a business failure. As will be shown shortly, this insurance aspect has no significance in my model. Only the legal liability imposed on him when the audit report was actually misleading motivates the auditor to provide a quality audit. The legal liability imposed on him when the report was accurate inflates both the market price $\varphi_S(r_U)$ and the audit fee, but does not alter the auditor's choice of audit quality. In my model, the court imposes legal liability without verifying the audit report only to save litigation costs. The equilibrium conditions to be satisfied are developed below.

Because the court never awards damages when the auditor's report is r_D, the equilibrium market price $\varphi_S(r_D)$ in the strict liability regime is the same as $\varphi_M(r_D)$ in the misstatement regime.

(16) $$\varphi_S(r_D) = P_D H.$$

Now suppose that the auditor's report is r_U, that the firm is sold at some price $\varphi_S(r_U)$, and that the observed final outcome from the firm is L = 0. Then the investors will sue the auditor and the court will award T_S. The price $\varphi_S(r_U)$ is:

$$(17)\quad \varphi_S(r_U) = \frac{\theta}{\theta + (1-\theta)(1-q_S)}\left[P_U H + (1-P_U)T_S\right] + \frac{(1-\theta)(1-q_S)}{\theta + (1-\theta)(1-q_S)}\left[P_D H + (1-P_D)T_S\right].$$

Because the auditor pays T_S even when the report was accurate, the market price $\varphi_S(r_U)$ is inflated by $\frac{\theta}{\theta + (1-\theta)(1-q_S)}(1-P_U)T_S$.

Now consider the auditor's decision problem. The auditor chooses q_S to minimize the sum of his audit costs and his expected legal liability. Thus q_S satisfies:

$$q_S = \text{Arg min}\ \ c(q) + [\theta(1 - P_U) + (1 - \theta)(1-q)(1 - P_D)]T_S.$$

Thus, the audit quality optimal to the auditor is described by:

$$(18)\qquad c'(q_S) = (1 - \theta)(1 - P_D)T_S.$$

This implies that only the legal liability imposed on him when the audit report was actually misleading motivates the auditor to provide a quality audit. The liability imposed on him when the report was accurate does not alter the auditor's choice of audit quality q_S because his choice cannot reduce such liability. The equation (18) also implies that the auditor's choice of audit quality, $q_S(T_S)$, is an increasing function of the damage T_S.

The non-contingent audit fee F_S is described by:

$$(19) \qquad F_S = c[q_S(T_S)] + \theta(1 - P_U)T_S + (1 - \theta)[1 - q_S(T_S)](1 - P_D)T_S.$$

The legal liability imposed on the auditor when the report was accurate inflates the audit fee by $\theta(1 - P_U)T_S$. Since the audit quality is a function of T_S and the expected legal damage is also a function of T_S, (19) implies that the audit fee, $F_S(T_S)$, is a function of T_S alone. The following theorem on the strict concavity of $q_S(T_S)$ and $F_S(T_S)$ is essentially the same as theorem 1.

Theorem 4

(i) The audit quality $q_S(T_S)$ is strictly increasing and strictly concave in T_S.

(ii) The audit fee $F_S(T_S)$ is strictly increasing and strictly concave in T_S.

Proof: similar to the proof of theorem 1. ♣

As I discussed in the misstatement regime, I will show that it is socially optimal to choose T_S in such a way that $\varphi_S(r_U)$ is bigger than U. Anticipating this result, I claim that the entrepreneur's equilibrium strategy is to sell the firm when the audit report is r_U regardless of the interim outcome. Next, consider the court's problem. The court chooses the size of the damage award T_S in order to maximize the expected payoff to the entrepreneur:

$$(20) \qquad \pi_S = (1-\theta)q_S(T_S)D + \left\{\theta + (1-\theta)\left[1-q_S(T_S)\right]\right\}\varphi_S(r_U) - F_S(T_S).$$

Substituting the pricing rule (17) and the audit fee (19), the court's objective becomes:

$$\text{Max} \quad \pi_S = (1-\theta)q_S(T_S)D + \left\{\theta P_U H + (1-\theta)\left[1-q_S(T_S)\right]P_D H\right\} - c[q_S(T_S)].$$

Thus, the socially optimal size of the legal damage award T_S° is characterized by:

$$(21) \qquad (1-\theta)(D - P_D H) = c'\left[q_S(T_S^\circ)\right].$$

The right hand side of (21) describes the marginal direct cost of the audit. The left hand side of (21) is the marginal expected social loss when a firm with the interim outcome D

is allowed to continue its operations due to a misleading audit report r_U. In the strict liability regime, there is no term of litigation costs in the left hand side of (21).

Because the auditor's choice of q_S is described by (18), (21) is equivalent to:

$$(1 - \theta)(D - P_D H) = (1 - \theta)(1 - P_D)T_S^{\circ}.$$

Thus, the socially optimal damage award:

$$(22) \qquad T_S^{\circ} = \frac{D - P_D H}{1 - P_D}.$$

The numerator and the denominator in (22) describe the investors' expected loss and the probability of winning the damage award due to a misleading audit report r_U when the interim outcome is D. The investors can receive this damage award, however, even when the audit report was accurate. In this sense, the equilibrium damage award is more than compensatory to the investors.

The equilibrium audit quality $q_S^{\bullet}$ is characterized by:

$$(23) \qquad c'(q_S^{\bullet}) = (1-\theta)(D - P_D H).$$

Now inserting the socially optimal damage award (22) into (19) yields the equilibrium audit fee:

$$(24) \qquad F_S^{\bullet} = c(q_S^{\bullet}) + \theta(1 - P_U)\frac{D - P_D H}{1 - P_D} + (1 - \theta)(1 - q_M^{\bullet})(D - P_D H).$$

Theorem 5:

(i) The equilibrium market price $\varphi_S(r_U)$ is:

$$(25) \qquad \varphi_S(r_U) = \frac{\theta}{\theta + (1-\theta)(1-q_S^{\bullet})}\left[P_U H + (1 - P_U)\frac{D - P_D H}{1 - P_D}\right] + \frac{(1-\theta)(1-q_S^{\bullet})}{\theta + (1-\theta)(1-q_S^{\bullet})} D.$$

(ii) $q_S^{\bullet}$ is decreasing in P_D and θ.

(iii) $F_S^{\bullet}$ is decreasing in P_D.

As discussed in the misstatement regime, the pricing rule (25) indicates that in the strict liability regime, an equilibrium with auditing can be sustained only if the audit quality lies above some lower bound. Because there are no litigation costs, there is no upper bound in the strict liability regime. Thus, the set of parameter values for which a strict

liability regime would result in one of the two inefficient pooling equilibria described earlier will be a proper subset of its counterpart in the misstatement regime.

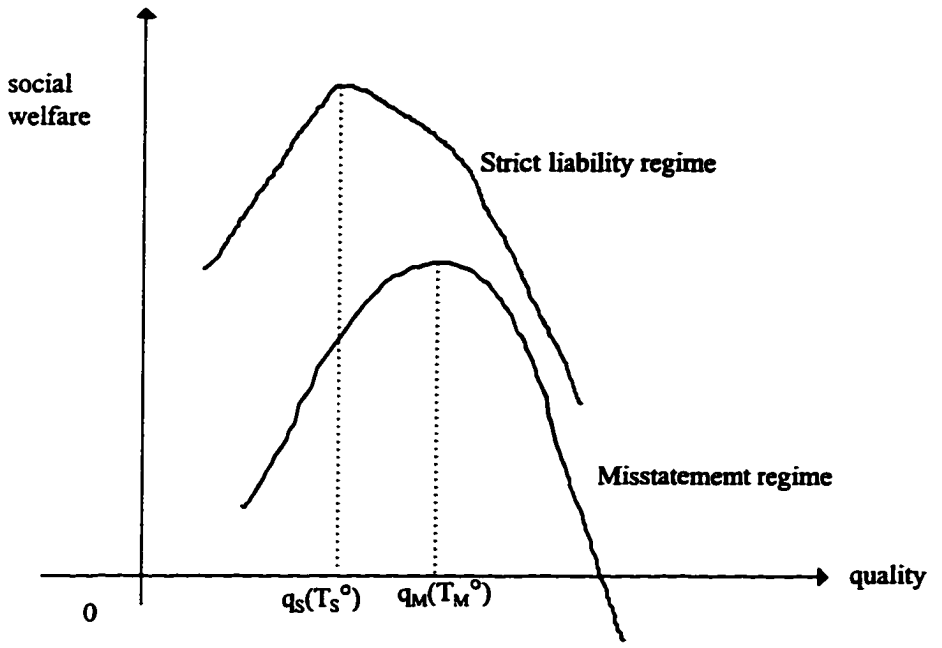
Now I compare the audit quality and social welfare in the strict liability regime with their counterparts in the misstatement regime. The court sets the size of the damage award so that auditor's legal liability is commensurate with the investors' costs from a misleading audit report. Because there are no litigation costs in the strict liability regime, the size of the equilibrium damage award is smaller than that in the misstatement regime, but social welfare is strictly larger than that in the misstatement regime at every audit quality level.

Theorem 6:

(i) Audit quality and thus the cost of the audit in the strict liability regime are smaller.

(ii) Social welfare in the strict liability regime is strictly bigger at every quality level.

Theorem 6 implies the following graph.



In summary, the court skips the verification process to save litigation costs. This relief encourages the investors to sue the auditor when they observe a good audit report and a bad final outcome. Thus, there is no upper bound for the audit quality. In the strict liability regime, therefore, an equilibrium with auditing can be sustained for a larger set of parameter values. On the other hand, the auditor pays damages even when the audit report is accurate. This insurance effect, however, plays no role in determining the audit quality.

VI. Equilibrium for the Negligence Regime

In this regime, I assume that the investors receive a damage award when the auditor's report is r_U, and the court finds that the audit report was misleading (f_D) and that the auditor failed to exercise 'Due Diligence' in his audit. The court will endogenously determine the 'Due Diligence' level audit quality η and the size of the damage award T_N. I denote the litigation cost β_N. Because the court verifies the audit quality in addition to the interim outcome:

$$\beta_N > \beta_M.$$

The verification of the actual audit quality is noisy, however. Let $z_\eta(q)$ be the probability that the court finds that the auditor failed to meet the negligence standard $\eta \in (0, 1)$ when the actual audit quality is q. The auditor can reduce the probability of a non-compliance verdict by improving the audit quality, but it cannot entirely eliminate such a possibility. I also assume that the auditor cannot reduce his legal liability by increasing his audit quality beyond the negligence standard. Thus, $z_\eta(q)$ becomes flat as the actual quality q approaches the negligence standard η. If the court sets a more demanding standard γ, the probability $z_\gamma(q)$ of non-compliance verdict is higher at every level of q. Formally, I assume:

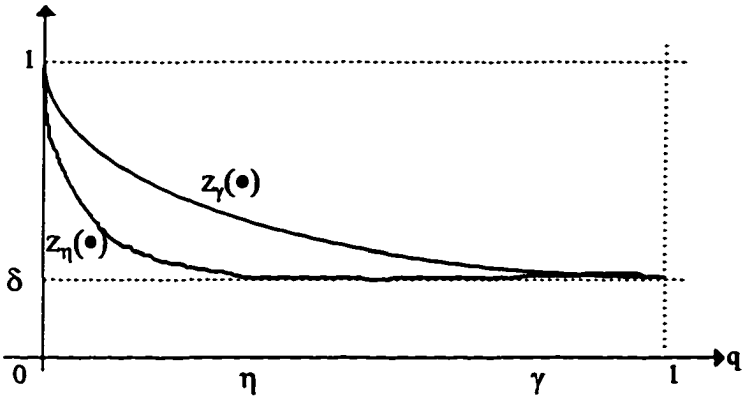
$z'_\eta(q) \; \langle \; 0,$

$z''_\eta(q) \; \rangle \; 0,$

$\underset{q \to 1}{Lim} \; z_\eta(q) \; = \; \delta, \qquad$ *where* $\delta \; \rangle \; 0,$

$\underset{q \to \eta}{Lim} \; z'_\eta(q) \; = \; 0, \qquad$ *and*

If $\eta < \gamma$, $z_\eta(q) < z_\gamma(q)$ for every q.



Given $\{\eta, T_N, \beta_N\}$, an equilibrium will consist of market prices $\varphi_N(r_U)$ and $\varphi_N(r_D)$, the auditor's choice of audit quality q_N, the entrepreneur's sell-liquidate strategy, and a suing strategy for capital market investors. The equilibrium conditions to be satisfied are developed below. First, consider the suing strategy of outside investors. Because the court

never awards damages when the auditor's report is r_D, the equilibrium market price $\varphi_N(r_D)$ in the negligence regime is the same as its counterparts in the other two regimes.

(26) $$\varphi_N(r_D) = P_D H.$$

Now suppose that the auditor's report is r_U, that the firm is sold at some price $\varphi_N(r_U)$, and that the observed final outcome from the firm is L = 0. As in the misstatement regime, the investors must assess:

$$Prob(D \mid r_U, L) = \frac{(1-q_N)(1-P_D)(1-\theta)}{(1-q_N)(1-P_D)(1-\theta)+(1-P_U)\theta}, \text{ and}$$

$$Prob(f_D \mid r_U, L) = Prob(f_D \mid D) = J.$$

As I did in the misstatement regime, the investors are not allowed to sue the auditor if the observed final outcome from the project is H. Now the investors sue the auditor if:

(27) $$\frac{(1-q_N)(1-P_D)(1-\theta)}{(1-q_N)(1-P_D)(1-\theta)+(1-P_U)\theta} J z_\eta(q_N) T_N > \beta_N.$$

Again, the court will choose the negligence standard η and the damage award T_N so that the inequality is satisfied. The price $\varphi_N(r_U)$ must satisfy:

$$\varphi_N(r_U) = \text{Prob}(U|r_U)P_U H + \text{Prob}(D|r_U)\left[P_D H + (1-P_D)\left(J z_\eta(q_N) T_N - \beta_N\right)\right],$$

i.e.

$$(28) \qquad \varphi_N(r_U) = \frac{\theta}{\theta + (1-\theta)(1-q_N)} P_U H + \frac{(1-\theta)(1-q_N)}{\theta + (1-\theta)(1-q_N)}\left[P_D H + (1-P_D)\left(J z_\eta(q_N) T_N - \beta_N\right)\right].$$

Now consider the auditor's decision problem. The auditor chooses q_N to minimize the sum of his audit costs and his expected legal liability. Thus q_N satisfies:

$$q_N = \text{Arg min } c(q) + (1-\theta)(1-q)(1-P_D)Jz_\eta(q)T_N.$$

Thus, the audit quality optimal to the auditor is described by:

$$(29) \qquad c'(q_N) = (1-\theta)(1-P_D)JT_N\left\{z_\eta(q_N) - (1-q_N)z'_\eta(q_N)\right\}.$$

This quality optimal to the auditor is unique because of the second order condition:

$$c''(q_N) - (1-\theta)(1-P_D)JT_N\left\{2z'_\eta(q_N) - (1-q_N)z''_\eta(q_N)\right\} > 0.$$

The non-contingent audit fee F_N is described by:

(30) $$F_N = c(q_N) + (1 - \theta)(1 - q)(1 - P_D)Jz_\eta(q_N)T_N.$$

As I did in the two previous regimes, I will show that it is socially optimal to choose η and T_N in such a way that $\varphi_N(r_U)$ is bigger than U. Anticipating this result, I claim that the entrepreneur's equilibrium strategy is to sell the firm when the audit report is r_U regardless of the interim outcome. Next, consider the court's problem. The court first determines an audit quality η, which maximizes the entrepreneur's expected payoff. Then, it chooses the size of the damage award T_N. The expected payoff to the entrepreneur is:

(31) $$\pi_N = (1 - \theta)q_N D + \left\{\theta + (1-\theta)\left(1 - q_N\right)\right\}\varphi_N(r_U) - F_N.$$

Substituting the pricing rule (28) and the audit fee (30), the court's objective becomes:

$$\text{Max } \pi_N = (1 - \theta)q_N D + \left\{\theta P_U H + (1 - \theta)\left(1 - q_N\right)P_D H\right\} - c(q_N) - (1 - \theta)(1 - q_N)(1 - P_D)\beta_N.$$

Thus, the socially optimal negligence standard is described by:

(32) $$(1 - \theta)[(D - P_D H) + (1 - P_D)\beta_N] = c'(\eta).$$

The court next chooses the size of the damage award T_N, which will induce the auditor to choose $q_N = \eta$. The following theorem shows that the auditor's choice of the audit quality is strictly increasing in his legal damage T_N. Therefore, the court can induce the auditor to choose $q_N = \eta$ by choosing a suitable damage award.

Theorem 7

(i) The auditor's choice of the audit quality $q_N(T_N;\eta)$ is strictly increasing in T_N.

(ii) The following T_N° induces the auditor to choose $q_N = \eta$.

(33) $$T_N^\circ = \frac{(D - P_D H) + (1 - P_D)\beta_N}{(1 - P_D) J z_\eta(\eta)}.$$

(iii) Because $z'_\eta(\eta) = 0$:

(34) $$q'_N(T_N^\circ;\eta) = z_\eta(\eta)\frac{(1-\theta)(1-P_D)J}{c''(\eta)}.$$

Theorem 7 implies that the court and the investors can conjecture that given $T_N°$, the auditor will choose quality $q_N(T_N°;\eta) = \eta$ even though this choice is not observed. Nevertheless, the court must verify the actual quality of the audit if the investors sue the auditor. If the court found that the auditor was diligent without verification, the investors would lose all incentives to sue the auditor; consequently legal liability would become ineffective and the entrepreneur would not hire the auditor. The court may randomly verify the audit quality, but I assume that it always verifies the quality. Again, if the investors' suing condition (27) is not satisfied at the negligence standard η and the damage award $T_N°$, the court has to choose a corner solution. As I did in the misstatement regime, however, I will assume that there is an interior solution η and $T_N°$ to the court's problem. The numerator in (33) describes the investors' expected loss due to a misleading audit report r_U when the interim outcome is D. The denominator is the probability of winning the damage award $(1-P_D)Jz_\eta(\eta)$. In this sense, the equilibrium damage award is compensatory to the investors.

The socially optimal level quality η is characterized by (32):

$$(1 - \theta)[(D - P_D H) + (1 - P_D)\beta_N] = c'(\eta).$$

Now, inserting the socially optimal damage award (33) into (30) yields the equilibrium audit fee:

$$F_N^* = c(\eta) + (1-\theta)(1-\eta)\left[(D - P_D H) + (1 - P_D)\beta_N\right]. \tag{35}$$

Theorem 8:

(i) The equilibrium market price $\varphi_N(r_U)$ is:

$$\varphi_N(r_U) = \frac{\theta}{\theta + (1-\theta)(1-\eta)} P_U H + \frac{(1-\theta)(1-\eta)}{\theta + (1-\theta)(1-\eta)} D. \tag{36}$$

(ii) η is decreasing in P_D, decreasing in θ, but increasing in β_N.

(iii) The investors sue when they observe r_U and final outcome L, and:

$$(1-\eta)\frac{(1-\theta)(D - P_D H)}{\theta(1 - P_U)} \rangle \beta_N . \tag{37}$$

Just as in the misstatement regime, (36) and (37) establish some lower and upper bounds for the induced audit quality, and equation (32) indicates that these bounds depend in a complex way on the social costs associated with a misleading audit report and how rapidly marginal audit cost, $c'(q)$, is increasing. It is unambiguously true that if P_D or

θ is sufficiently high, the audit quality η declines below the lower bound and there will be no demand for auditing. It is also unambiguously true that if the litigation costs β_N are sufficiently high, there will be no demand for auditing. This is because an increase in β_N would result in an increase in η , which in turn would result in a decrease in the left hand side of (37). The set of parameter values for which a negligence regime would result in one of the two inefficient pooling equilibria described earlier will be approximately equal to its counterpart in the misstatement regime.

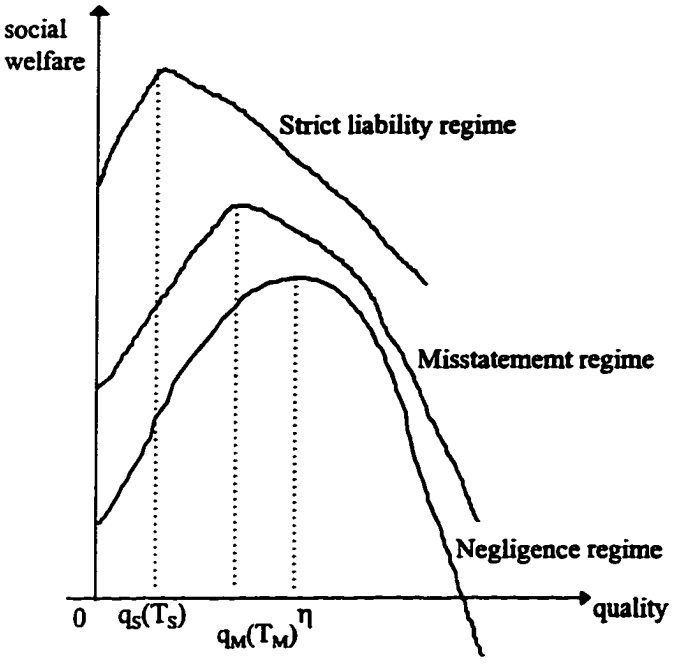
Now I compare the audit quality and social welfare in the negligence regime with their counterparts in the misstatement regime. Because the litigation costs is bigger in the negligence regime, the audit quality is larger than that in the misstatement regime and social welfare strictly smaller than that in the misstatement regime at every audit quality.

Theorem 9:

(i) Audit quality and thus the cost of audit in negligence regime are larger.

(ii) Social welfare in negligence regime is strictly smaller for every quality level.

Theorem 9 and theorem 6 imply the following graph.



The results can be summarized as follows. For every quality level, social welfare in the strict liability regime is strictly bigger than that in the misstatement regime, which in turn is strictly bigger than that in the negligence regime. In the strict liability regime, moreover, an equilibrium with auditing can exist for a larger set of parameter values. Yet, the negligence regime is the one that the auditor prefers and the court has adopted in the real world.

Such prevalence of the negligence regime may be due to the notion that the auditor cannot and should not be expected to achieve the perfect audit quality. If he were

to seek absolute assurance that the audited financial statements are free of misstatement, the cost of audit would become so large that the resultant audit fee would far exceed any benefit of the audit to the entrepreneur. Thus, it may be argued that the court should choose the 'Due Diligence' level audit quality, which maximizes social welfare, and set the damage award that would implement it.

The auditor will not seek to achieve the perfect audit quality either in the misstatement regime or in the strict liability regime, however. He will choose an audit quality which minimizes the sum of his audit costs and his expected legal liability. Therefore, the court can still induce any desired level of audit quality by choosing an appropriate damage award and thus influencing the auditor's expected legal liability. Further, if the negligence regime is used in practice to relieve the auditor of the pressure to pursue excessive audit quality, such an attempt would be self-defeating. To see this, recall the equations (12), (23), and (32) which characterize the equilibrium audit quality in each of the three liability regimes:

(12) $$c'(q_M^*) = (1-\theta)[(D - P_D H) + (1 - P_D)\beta_M],$$

(23) $$c'(q_S^*) = (1-\theta)(D - P_D H), \text{ and}$$

(32) $$c'(\eta) = (1 - \theta)[(D - P_D H) + (1 - P_D)\beta_N].$$

The 'Due Diligence' level audit quality η in the negligence regime is the highest among the three equilibrium audit qualities solely due to the highest litigation cost β_N, In an attempt to verify whether the auditor exercised 'Due Diligence' in his audit, the court in the negligence regime introduces a very large dead weight loss β_N and ends up putting more pressure on the auditor to seek excessive audit quality.

It is possible that the 'Due Diligence' defense in the negligence regime may provide the auditor with partial protection against alleged excessive damage awards, however. This protection would be socially desirable because if the damage award becomes excessive, the audit quality becomes inefficiently high. The following equations seem to show that the presence of the 'Due Diligence' defense in the negligence regime indeed attenuates such inefficiency:

$$q'_M(T_M) = \frac{(1-\theta)(1-P_D)J}{c''[q_M(T_M)]},$$

$$q'_S(T_S) = \frac{(1-\theta)(1-P_D)}{c''[q_S(T_S)]}, \quad \text{and}$$

$$q'_N(T_N^{\circ};\eta) = z_\eta(\eta)\frac{(1-\theta)(1-P_D)J}{c''(\eta)}.$$

The above analysis, however, is based on the excesses of the same amount in each of the three regimes. Because the equilibrium damage amounts in the three regimes are

different in magnitude, the analysis should be based on the excesses of the same proportion. Now consider:

$T_M°(1+\alpha)$,

$T_S°(1+\alpha)$, and

$T_N°(1+\alpha)$,

where α could be positive or negative but bigger than -1. A positive α means excessive damage awards and a negative α means inadequate awards. Then the equilibrium audit quality in each of the three liability regimes are characterized as follows:

$$c'(q_M^*) = (1-\theta)[(D - P_D H) + (1 - P_D)\beta_M](1+\alpha),$$

$$c'(q_S^*) = (1-\theta)(D - P_D H)(1+\alpha), \text{ and}$$

$$c'(\eta) = (1 - \theta)[(D - P_D H) + (1 - P_D)\beta_N](1+\alpha).$$

Instead of attenuating the inefficiency in the equilibrium audit quality, the 'Due Diligence' defense intensifies the inefficiency. Again the reason is the presence of a very large dead weight loss β_N.

This result also contradicts the auditor's allegation that the damage award is excessive; if it is the case, the auditor should not prefer the negligence regime. My

conjecture is that the actual damage award in the negligence regime, which is up to three times the investors' loss, is larger than the social loss from a misleading audit report

$$(D - P_D H) + (1 - P_D)\beta_N$$

but smaller than the optimal award amount

$$\frac{(D - P_D H) + (1 - P_D)\beta_N}{(1 - P_D) J z_\eta(\eta)}.$$

If the court system is well functioning, J should be close to 1 but $z_\eta(\eta)$ should be much smaller than 1/3.

Even though it attains the highest social welfare, the strict liability regime lacks flexibility. In my model, the auditor in the strict liability regime incurs legal liability if the firm fails in such a publicly observable catastrophic event as outright bankruptcy or default on loans. However, there are many other forms of trouble short of outright business failure such as major customers' bankruptcy, bogus customers, channel loading, etc. If some events indicative of likely business failure occur, the investors should be allowed to liquidate the firm, receive whatever left of the firm as liquidating dividends, and sue the auditor for damages, instead of waiting until the firm eventually fails. Thus, the agents in the strict liability regime must foresee all future events, indicative of likely

business failure, and specify when the investors can legally declare the firm a failure. Writing such a complete contract would be prohibitively costly.

In the misstatement regime, however, the court will verify whether or not the financial statements are indeed misstated in light of the evidence the auditor acquired and the events subsequent to the audit. Because it does not require writing a complete contract and attains a higher social welfare than the negligence regime does, the misstatement regime is the best among the three liability regimes considered in this paper.

VII. Concluding Remarks

I investigate how the auditor's legal liability affects his choice of audit quality, which in turn influences the firm's production decisions. My first finding is that the socially optimal size of the legal damage is social loss from a misleading audit report divided by the probability of the investors' winning the damage award. The second finding is that the strict liability regime attains the highest social welfare, the misstatement regime is next, and the negligence regime attains the lowest welfare.

The strict liability regime attains the highest social welfare because this regime eliminates litigation costs by skipping verification process. However, there should be

very detailed provisions in the auditor's contract when the investors can legally declare the firm a failure and collect damages. Writing such a complete contract would be prohibitively costly. The court in the misstatement regime, however, verifies whether or not the financial statements were misstated in light of the evidence the auditor acquired and the events subsequent to the audit. Because it does not require writing a complete contract and attains a higher social welfare than the negligence regime does, the misstatement regime is the best among the three liability regimes considered in this paper.

Appendix

Proof of theorem 1:

First, I prove part (i) of the theorem. Differentiation of (7) with respect to T_M yields:

$$q'_M(T_M) = \frac{(1-\theta)(1-P_D)J}{c''[q_M(T_M)]} \quad \rangle \quad 0,$$

from which it follows that:

$$q''_M(T_M) = -\frac{c'''[q_M(T_M)]}{c''[q_M(T_M)]}[q'_M(T_M)]^2 \quad \langle \quad 0.$$

Next, I prove part (ii) of the theorem. Differentiation of (8) with respect to T_M yields:

$$F'_M(T_M) = \{c'[q_M(T_M)] - (1-\theta)(1-P_D)J T_M\} q'_M(T_M) + (1-\theta)[1-q_M(T_M)](1-P_D)J.$$

But $c'[q_M(T_M)] - (1-\theta)(1-P_D)JT_M = 0$ from auditor's first order condition. Therefore,

$$F'_M(T_M) = (1-\theta)[1-q_M(T_M)](1-P_D)J > 0,$$

from which it follows that:

$$F''_M(T_M) = -(1-\theta)(1-P_D)Jq'_M(T_M) < 0. \quad \clubsuit$$

Proof of theorem 2:

To prove the part (i), insert the equilibrium damage award (11) into pricing rule (6).

Next, I prove part (ii) of the theorem. Differentiation of (12) with respect to P_D, θ, and β_M yields:

$$\frac{d}{dP_D}q^*_M = -\frac{(1-\theta)(1-q^*_M)(H+\beta_M)}{c''(q^*_M)} < 0,$$

$$\frac{d}{d\theta}q^*_M = -\frac{(1-q^*_M)((D-P_DH)+(1-P_D)\beta_M)}{c''(q^*_M)} < 0, \text{ and}$$

$$\frac{d}{d\beta_M}q^*_M = \frac{(1-\theta)(1-P_D)}{c''(q^*_M)} > 0.$$

Now, part (iii). Differentiation of (13) with respect to P_D, θ, and β_M yields:

$$\frac{d}{dP_D}F_M^* = -(1-\theta)(1-q_M^*)(H+\beta_M) < 0,$$

$$\frac{d}{d\theta}F_M^* = -(1-q_M^*)[(D-P_DH)+(1-P_D)\beta_M] < 0, \text{ and}$$

$$\frac{d}{d\beta_M}F_M^* = (1-\theta)(1-q_M^*)(1-P_D) > 0$$

because $c'(q_M^*) - (1 - \theta)[(D - P_DH) + (1 - P_D)\beta_M] = 0.$

The proof of the part (iv): Multiply both sides of the inequality (5) with the denominator,

$$(1 - q_M)(1 - P_D)(1 - \theta)JT_M > \beta_M(1 - q_M)(1 - P_D)(1 - \theta) + \beta_M(1 - P_U)\theta.$$

Inserting the equilibrium damage (11) and audit quality q_M^*, the inequality becomes:

$$(1-q_M^*)\{(1-\theta)(D-P_DH)+(1-\theta)(1-P_D)\beta_M\}$$

$$> \beta_M(1 - q_M^*)(1 - P_D)(1 - \theta) + \beta_M(1 - P_U)\theta.$$

Cancellation and rearrangement yield (15). ♣

Proof of theorem 5:

To prove part (i), insert the equilibrium damage award (22) into pricing rule (17). The proof of part (ii) is essentially the same as the proof of part (ii) in theorem 2. Now, I prove part (iii) of the theorem. Differentiation of (24) with respect to P_D yields:

$$\frac{d}{dP_D}F_S^* = \left\{c'\left(q_S^*\right) - (1-\theta)(D - P_D H)\right\}\frac{d}{dP_D}q_S^* - (1-\theta)(1-q_S^*)H - \theta(1-P_U)\frac{H-D}{(1-P_D)^2}.$$

But $c'\left(q_S^*\right) - (1-\theta)(D - P_D H) = 0$ from auditor's first order condition. Therefore,

$$\frac{d}{dP_D}F_S^* = -(1-\theta)(1-q_S^*)H - \theta(1-P_U)\frac{H-D}{(1-P_D)^2} < 0. \quad \clubsuit$$

Proof of theorem 6:

First, I prove part (i) of the theorem. From (7) and (18):

$$q_S(JT) = q_M(T).$$

From (11) and (22):

$$T_S^\circ < JT_M^\circ.$$

Because $q_S(.)$ is strictly increasing:

$$q(T_S^\circ) < q(JT_M^\circ).$$

Because $q_S(JT_M^\circ) = q_M(T_M^\circ)$:

$$q_S(T_S^\circ) < q_M(T_M^\circ),$$

i.e.

$$q_S^* < q_M^*.$$

The direct cost of the audit is smaller because of a smaller audit quality $q_S(T_S^\circ)$.

Next, I prove part (ii) of the theorem. In the strict liability regime, the social welfare is:

$$\pi_S = (1 - \theta)qD + \{\theta P_U H + (1-\theta)(1-q)P_D H\} - c(q).$$

In the misstatement regime, the social welfare is:

$$\pi_M = (1 - \theta)qD + \left\{\theta P_U H + (1-\theta)(1-q)P_D H\right\} - c(q) - (1 - \theta)(1 - q)(1 - P_D)\beta_M.$$

Because the strict liability regime eliminates the litigation costs,

$$\pi_S > \pi_M \quad \text{at every quality level.} \quad \clubsuit$$

Proof of theorem 7:

I first prove part (i) of the theorem. Differentiation of (29) with respect to T_N yields:

$$c''\left[q_N(T_N;\eta)\right]q_N'(T_N;\eta)$$

$$= (1 - \theta)(1 - P_D)J\left\{z_\eta\left[q_N(T_N;\eta)\right] - \left[1 - q_N(T_N;\eta)\right]z_N'\left[q_N(T_N;\eta)\right]\right\}$$

$$+ (1 - \theta)(1 - P_D)J\,T_N\left\{2z_\eta'\left[q_N(T_N;\eta)\right] - \left[1 - q_N(T_N;\eta)\right]z_\eta''\left[q_N(T_N;\eta)\right]\right\}q_N'(T_N;\eta).$$

By rearrangements,

(38) $q'_N(T_N;\eta)$

$$= \frac{(1 - \theta)(1 - P_D)J\{z_\eta[q_N(T_N;\eta)] - [1 - q_N(T_N;\eta)]z'_\eta[q_N(T_N;\eta)]\}}{c''[q_N(T_N;\eta)] + (1 - \theta)(1 - P_D)JT_N\{[1 - q_N(T_N;\eta)]z''_\eta[q_N(T_N;\eta)] - 2z'_\eta[q_N(T_N;\eta)]\}} \rangle 0.$$

Next, part (ii) of the theorem. Insert the damage award (33) into (29). The auditor's uniquely optimal choice $q_N(T_N°;\eta)$ is described by:

$$c'[q_N(T_N°;\eta)] = \frac{(1 - \theta)[(D - P_D H) + (1 - P_D)\beta_N]\{z_\eta[q_N(T_N°;\eta)] - [1 - q_N(T_N°;\eta)]z'_\eta(q_N)\}}{z_\eta(\eta)}.$$

Because $z'_\eta(\eta) = 0$, $q_N(T_N°;\eta) = \eta$ satisfies the above equation. Thus, the court can induce the auditor to choose $q_N = \eta$ by setting legal damage to $T_N°$.

Finally, part (iii) of the theorem. Insert $q_N(T_N°;\eta) = \eta$ into (38):

$$q'_N(T_N°;\eta) = \frac{(1 - \theta)(1 - P_D)J\{z_\eta(\eta) - (1 - \eta)z'_\eta(\eta)\}}{c''(\eta) + (1 - \theta)(1 - P_D)JT_N°\{(1 - \eta)z''_\eta(\eta) - 2z'_\eta(\eta)\}} \rangle 0.$$

Because $z'_\eta(\eta) = 0$ and $z''_\eta(\eta) = 0$:

$$q'_N(T_N°;\eta) = z_\eta(\eta)\frac{(1 - \theta)(1 - P_D)J}{c''(\eta)}. \quad \clubsuit$$

Proof of theorem 8:

First, I prove part (i) of the theorem. Insert the equilibrium damage award (33) in the pricing rule (28).

The proof of part (ii) is essentially the same as the proof of part (ii) of theorem 2.

The proof of the part (iii) is as follows. By multiplying both sides of the inequality (27) with its own denominator,

$$(1 - q_N)(1 - P_D)(1 - \theta)Jz_\eta(q_N)T_N > \beta_N(1 - q_N)(1 - P_D)(1 - \theta) + \beta_N(1 - P_U)\theta.$$

Inserting the equilibrium damage (33) and audit quality η, the inequality becomes:

$$(1 - \eta)(1 - \theta)\left[\left(D - P_D H\right) + \left(1 - P_D\right)\beta_N\right] > \beta_N(1 - \eta)(1 - P_D)(1 - \theta) + \beta_N(1 - P_U)\theta.$$

By canceling and rearranging proves (37). ♣

Proof of theorem 9:

First, I prove part (i) of the theorem. The equilibrium audit quality in the negligence regime is described by:

$$c'(\eta) = (1 - \theta)(D - P_D H) + (1 - \theta)(1 - P_D)\beta_N.$$

The equilibrium audit quality in the misstatement regime is described by:

$$c'(q_M^*) = (1-\theta)(D - P_D H) + (1 - \theta)(1 - P_D)\beta_M.$$

Because $\beta_N > \beta_M$, $\eta > q_M^*$.

It follows that $c(\eta) > c(q_M^*)$.

Next, I prove part (ii) of the theorem. In the negligence regime, the social welfare is:

$$\pi_N = (1 - \theta)qD + \{\theta P_U H + (1 - \theta)(1 - q)P_D H\} - c(q) \ (1 - \theta)(1 - q)(1 - P_D)\beta_N.$$

In the misstatement regime, the social welfare is:

$$\pi_M = (1 - \theta)qD + \{\theta P_U H + (1 - \theta)(1 - q)P_D H\} - c(q) - (1 - \theta)(1 - q)(1 - P_D)\beta_M.$$

Because $\beta_N > \beta_M$, $\pi_S > \pi_M$ at every quality level. ♣

References

Antle, R. "The Auditor as an Economic Agent." *Journal of Accounting Research* (Autumn 1982): 503-27.

Baiman, S., J. Evans, and J. Noel. "Optimal Contracts with a Utility-Maximizing Auditor." *Journal of Accounting Research* (Autumn 1987):217-44.

Becker, G. S. "Crime and Punishment: An Economic Approach." *Journal of Political Economy* (1968): 169-217.

Datar, S.M., G.A. Feltham, and J.S. Hughes. "The role of Audits and Audit Quality in Valuing New Issues." *Journal of Accounting and Economics* (1991): 3-49.

Dye, R.A. "Auditing Standards, Legal Liability, and Auditor Wealth." *Journal of Political Economy* 101 (1993): 887-914.

Fellingham, J., and P. Newman. "Strategic Considerations in Auditing." *The Accounting Review* (October 1985): 634-50.

Kaplow, L. "Shifting Plaintiffs' Fees Versus Increasing Damage Awards." *RAND Journal of Economics* (1993): 625-630.

Melumad, N.D., and L., Thoman. "On auditors and the Courts in an Adverse Selection Setting." *Journal of Accounting Research* 28 (Spring 1990): 77-120.

Narayanan, V.G. "an Analysis of Auditor Liability rules." *Journal of Accounting Research* (Supplement 1994): 39-59.

Palmrose, Z. "The Joint and Several vs. Proportionate Liability Debate: An empirical Investigation of Audit-Related Litigation." *Stanford Journal of Law, Business, and Finance* (Fall, 1994): 53-72.

Schwartz, R. "Auditors' Liability--A Broader Perspective: Is a High quality audit sufficient to Guarantee an Efficient Investment?", Working Paper, Washington University, January 1995.

Shavell, S. "Damage Measures for Breach of Contract", *Bell Journal of Economics* (1980): 466-490.

Titman, S. and B. Trueman. "Information quality and Valuation New Issues." *Journal of Accounting and Economics* 8 (1986): 159-172.