Credibility of Financial Reporting and Auditor Independence Under Alternative Legal Systems – Theory and Experimental Evidence

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1. INTRODUCTION

During recent years, two critical issues have emerged that may be detrimental to the U.S. capital markets: one is the managers' fraudulent financial reporting and the other one is the auditor's independence. On one hand, financial accounting information is the product of corporate accounting and external reporting systems that measure and routinely disclose audited, quantitative data concerning the financial position and performance of publicly held companies. In essence, credible financial reporting enhances the efficient allocation of scare financial capital to promising investment opportunities, which in turn maximizes the shareholders' wealth. On the other hand, auditor independence not only increases the likelihood that firms' financial statements are in conformity with the GAAP, but also encourages investors to rely more on the financial statements. Therefore, companies' honest financial reporting and auditor independence have long been regarded as two cornerstones to the prosperity and success of the capital markets (Bushman and Smith 2003). However, due to recent many accounting scandals (e.g., Enron, WorldCom, Merck, Global Crossing), a call to restore public trust through improving the credibility of companies' financial reporting and auditor independence has been emphasized by regulators, accounting practitioners, and auditing academic (e.g., Abbott, Parker, Peters, and Raghunandan 2003; Citron 2003; Cote 2002; Craswell, Stokes, and Laughton 2002; Dopuch, King, and Schwartz 2003; Gerde and White 2003; Hodge 2003; Kaiser and Perris 2003; Kopel 2003; Lousteau and Reid 2003; SEC 2003).

In this study I examine how a well-designed legal system imposing on the auditor may serve as an effective mechanism to induce manager's credible reporting and improve auditor independence. Generally speaking, a complete *legal system* affecting the auditing profession consists of liability regimes and damage apportionment rules. In essence, *liability regimes* determine whether an auditor is held liable for damage losses incurred by investors; *damage apportionment rules* determine the share of the entire damages paid by each of the co-defendants, given they are solvent. I focus on two legal regimes that has been extensively explored by prior studies in auditor's legal liabilities: the *strict regime* (ST), in which the auditors are held liable, given that a loss occurred to the investors, regardless of the due care level, and the *negligence regime* (NE), in which the auditors are not liable if they have provided the due-care level of services. Obviously, under the ST regime the degree of auditors' due care does not eliminate qualified investors' or other parties' standing to sue but the NE regime does. I also analyze three damage apportionment rules: the joint-and-several rule (JS), the hybrid proportionate rule (HP), and the pure proportionate rule (PR). On one hand, the JS rule (which is still in use by the United Kingdom and several European countries) provides full insurance to the investors where the liable auditors are responsible for the full amount of unpaid damage losses, regardless of whether they have exerted due professional care. Under the PP rule (which is now used in Canada and New Zealand), on the other hand, the liable auditors are responsible for only the share of damages that the court holds them responsible for causing. The *Private Securities Reform Act of 1995* replaced the venerable JS rule with the HP rule, in which the auditors are responsible for paying up to 50% more in damages over their initially assessed share if there is an unpaid portion of the damages and investors satisfy certain net worth and loss conditions (King and Schwartz 1997). In other words, the HP rule provides investors with a limited amount of public companies' insolvency insurance while the PR rule does not (Hillegeist 1999). Because these three damage apportionment rules are currently used by different countries, a comparison of the effects of these three rules together with different legal regimes on managers' credible reporting and auditor independence should bear important policy implications from an international perspective.

My study further contributes to the literature in three other aspects. First, while prior analytical and experimental studies comparing the relative effectiveness of different legal systems have generally focused on the effects of liability regimes (e.g., Dopuch and King 1992; King and Schwartz 1999, 2000; Radhakrishnan 1999; Schwartz 1997)[1] or damage apportionment rules (e.g., Boritz and Zhang 1997; Chan and Pae 1998; Dopuch, King, and Schatzberg 1994; Dopuch, Ingerman, and King 1997; Hillegeist 1999; Narayanan 1994) *alone* on audit effort and firm's investments, few attempts, if any, have ever been made to incorporate both components in investigating manager's reporting and auditor's independence behavior. Second, my study separates audit failure into two types: a *technical* audit failure (resulting from the imperfection of audit technology or a lack of due professional care) and an *independence* audit failure (resulting from auditor's intentionally compromising his independence). This distinction is important because previous studies have generally assumed that the audit technology has one-sided error and defined audit failure as the probability that a firm with a high audited report is actually of low type (e.g., Dye 1993; Dye, Balachandran, and Magee 1990; Melumad and Thoman 1990; Hillegeist 1999; Pae and Yoo 2001; Schwartz 1997; Thoman 1996), but often overlook the possibility and existence of independence audit failure. More important, since a technical audit failure represents an *unknowing* violation of the securities laws, the 1995 Reform Act rules that the auditor is held liable for damage losses proportionately.[2] In contrast, an independence audit failure involves a situation in which the auditor *knowingly* commits a violation of the securities laws. Consequently, the 1995 Reform Act requires that the auditor be held liable for the total damages jointly and severally. Finally, a common feature of many prior auditor liability studies (e.g., Melumad and Thoman 1990; Hillegeist 1999; Pae and Yoo 2001; Schwartz 1997; Thoman 1996) is that the firm's type is determined exogenously by the nature. My study extends previous research by endogenizing firm type through manager's investment decision. That is, the firm's type is determined by the manager's investment and the resulting realized outcome. I emphasize on manager's investment decision because the regulators and accounting academic have argued that many firms in the U.S.

[1]Schwartz (1997) emphasizes the determination of damage loss *itself* and concludes that a damage measure that is independent of the actual investment together with a strict liability regime will motivate the auditors to exert the socially optimal effort level and induce the socially optimal level of investment. The damage apportionment rules are not considered in her study.

[2]See King and Schwartz (1997) for a detailed discussion about the 1995 Reform Act.

capital market strive only to meet their forecasts, but not to provide results that are in the shareholders' best interest (Kieso et al. 2004). I posit that undertaking appropriate investment projects should maximize firm's value, which is beneficial to the shareholders.

I adopt the experimental economics methodology to address the issues of interest because of several reasons. First, there is a lack of naturally occurring data on important variables (in the real world, for instance, it is impossible to vary auditors' damage apportionment rules and observe subsequent changes in manager's reporting behavior). Also, laboratory experiments provide a more precise measure of auditor independence than the empirical-archival studies (e.g., the use of proxies such as the ratio of nonaudit service fees to audit fees). Second, since the model to be tested in this study makes strong assumptions about manager and auditor (e.g., the ability to make rational and statistical inferences) and their strategic interactions (e.g., different equilibria), this study intends to test the *behavioral* validity of the model. If the experimental results support the model, this support may come in spite of *ex ante* behavioral considerations to the contrary. If the results do not support the model predictions, a theoretical basis of explaining why they are not should be pursued (Kachelmeier 1996a, 1996b; Smith 1989, 1994). As Swieringa and Weick (1982, p. 81) points out, deliberate artificiality "… allows for more direct tests of theory, and this more direct access to theoretical propositions may improve generalization, because it is the theoretical statements, not raw findings, that are used to explain or describe phenomena in the real world." Finally, it is impossible to vary the combinations of legal system in the real world and observe different players' corresponding behavior. Therefore, the ability of empirical-archival research to offer policy insights is inherently limited (Kachelmeier and King 2002). Since the policy-makers' perspective demands *ex ante* insights of manager's and auditor's likely responses that could exist, laboratory experiments provide a controlled environment to address auditing policy issues. In light of this, my purpose is to use the laboratory as a "wind tunnel" to study the potential effects of different legal systems for future regulatory and control uses.

The remainder of this research proposal is organized as follows. Section 2 describes the basic model setting. Section 3 explains the experimental procedures. Section 4 lists tasks to be finished if this research proposal is approved.

2. BASIC MODEL SETTING

2.1 Basic Model Setting:

Suppose a firm intends to expand its operations but does not have readily available internal funds. Therefore, its risk-neutral manager must seek to raise capital from outside investors. The scale of the expansion is flexible and can be adjusted to the amount of the investment I (Table 1 shows definitions of the variables and parameter values for the illustrative example). To simplify the model setting, I assume that the investors are willing to provide I to the firm for carrying out the expansion. After obtaining the money, however, the manager may choose to invest the whole amount of I on a *high-cost innovative* project (denoted by I_{high}) or only invest part of I on a *low-cost established* project (denoted by I_{low}) because the manager needs to exert a corresponding effort level e_M^i to undertake investment I_i (where $i \in \{high, low\}$) at an effort cost $C(e_M^i)$. The realized earnings ω is private information to the manager and can be either high (denoted by H) or low (denoted by L), depending on the dollar amount invested. Given the investment amount I_i, I define $\rho(I_i)$ to be the probability that the outcome is H, where $\rho(I_i)$ is increasing in I_i and $\rho(I_i) \in (0, 1)$. In the numerical example, if I_{low} is undertaken, the manager has a 0.80 probability of receiving L and a 0.20 probability of receiving H (i.e., $\rho(I_{low})$ = 0.2). In contrast, if I_{high} is undertaken, the manager would have a 0.80 probability of receiving H and a 0.20 probability of receiving L (i.e., $\rho(I_{high})$ = 0.8). To be responsible for the investors who provide the funds, the manager prepares a financial report R_k, where $k \in \{H, L\}$, and pays a flat audit fee F to hire an independent auditor to verify the credibility of his report R_k.[3] I assume that, if the actual outcome is H, the manager will always report R_H. If the actual outcome is L, however, the manager may report either R_H or R_L. The auditor chooses an effort level e_A at a cost $C(e_A)$ and obtains an audit signal ξ regarding the probable outcome of the earnings level. Let S^H (or S^L) denote the audit signal that the earnings level is high (or low), $\xi \in \{S^H, S^L\}$.

[Insert Table 1 and Figure 1 here]

Since the audit technology is imperfect, there is no audit evidence from which the auditor can infer the investment outcome with certainty. Following Schwartz (1997) and Hillegeist (1999), I assume that the audit technology has one-sided errors: If the true outcome is H, the auditor will not obtain S^L (i.e., $p(S^H|H) = 1$), no matter what effort level the auditor exerts. If the true output is L, however, the auditor will obtain a correct signal S^L with probability $q(e_A)$ (i.e., $p(S^L|L) = q(e_A)$) and obtain an incorrect signal S^H with probability $1-q(e_A)$ (i.e., $p(S^H|L) = 1-q(e_A)$). Consistent with Schwartz (1997), this $q(e_A)$ serves as a measure of audit quality, which is increasing in auditor's effort level. For simplicity and tractability purposes, I assume that the auditor has two effort level to choose: a low effort level (denoted by e_A^{low}) or a high effort level (denoted by e_A^{high}). In the numerical example, if the true outcome is H, the auditor will always obtain signal S^H with probability one. If the true outcome is L, on the other hand, the auditor will obtain signal S^L with probability 0.7 if he exerts e_A^{high} (i.e., $q(e_A^{high}) = 0.7$) but will obtain the correct signal with probability 0.3 if he only exerts e_A^{low} (i.e., $q(e_A^{low}) = 0.3$).

Based on the audit signal obtained, the auditor issues a report $r \in \{\hat{H}, \hat{L}\}$ to the investors. Following Dopuch, King, and Schwartz (2001), I also assume that the auditor's report affects

[3]Instead of incorporating a formal bidding process, a flat audit fee can simplify the experimental setting for the subjects. This setting also allows my model to focus cleanly on auditor's effort and independence strategies and manager's investment and reporting decisions without bringing in undue complexity into the model. Hillegeist's (1999) has indicated that the audit fee is fixed in the U.S. current audit environment.

manager's compensation: An $\hat{H}$ report results in a higher compensation for the manager than an $\hat{L}$ report (denoted by $M_{\hat{H}}$ and $M_{\hat{L}}$, respectively). If the audit signal is S^H, the auditor can only issue an $\hat{H}$ report. This setting is consistent with current auditing practice in which the auditor will issue an unqualified opinion when audit evidence shows that there is no material misstatement in client's financial statements. It should be noted, however, that signal S^H may come from three possible scenarios: (a) the true outcome is *H*, (b) the true outcome is *L* and the auditor has 0.3 probability of obtaining S^H when he exerts e_A^{high}, and (c) the true outcome is *L* and the auditor has 0.7 probability of obtaining S^H when he exerts e_A^{low}. I refer to scenarios (b) and (c) as *technical audit failures* (denoted by AF_{tec}) because the auditor cannot effectively discover the true outcome of the investment due to his imperfect audit technology. Therefore, the AF_{tec} rate can be defined as the conditional probability that the auditor receives an R_H report from the manager and obtains an audit signal S^H when the realized earnings level is *L* (i.e., $AF_{tec} \equiv p(L \mid S^H, R_H) \equiv p(R_H \mid L)(1-\rho(I_i))(1-q(e_A)) / [\rho(I_i) + p(R_H \mid L)(1-\rho(I_i))(1-q(e_A))]$, where $\partial AF_{tec} / \partial e_A < 0$ and $\partial AF_{tec} / \partial I_i < 0$, *ceteris paribus*). When an AF_{tec} occurs, the auditor's legal liability will depend on the state of the economy and the auditor's effort level. In particular, if the state of the economy is good (with probability $1-\delta$), I assume that the firm will not go bankrupt (even though the earnings level is *L*) and, therefore, the investors will not sue the auditor for damage compensations. In contrast, a lawsuit against the auditor will be triggered when the state of the economy is bad (with probability δ) because the firm cannot survive as a going-concern due to its low earnings level.[4] During its deliberations, the court compares its own (noisy) observation

[4] I assume that the manager will get zero payoff and is not liable for the bankruptcy because of two reasons. First, exclusion of a liability rule for the manager is consistent with the traditional notion of "deep pockets," where the auditor must pay all the damages in a number of security cases even though the manager is also guilty of negligence and fraud (Dopuch and King 1992). Second, Palmrose (1994) observes that about 58 percent of all the auditor litigation cases involve the financial failure (or distress) of the client. It should be noted, however, that the Sarbanes-Oxley Act has imposed new legal liabilities on the corporate management. For example, Section 305 rules that, if a public company is required to prepare a restatement due to "material noncompliance" with financial reporting requirements, the CEO and CFO shall reimburse the

of the audit's quality to its interpretation of the legally required "due care" level of audit quality in determining whether to hold the auditor liable for AF_{tec}. I assume that, in expectation, the court will find the auditor negligent with probability $\eta(e_A)$, where $\eta(e_A)$ is decreasing in auditor's effort level. In the numerical example, the auditor has 0.3 (or 0.7) probability of being held liable if he exerts e_A^{high} (or e_A^{low}). Note that in my model this $\eta(e_A)$ is manipulated to be less than one (either 0.3 or 0.7) under the negligence legal regime (denoted by NE) but is equal to one under the strict legal regime (denoted by ST) to reflect the fundamental difference between these two legal regimes. If the court holds the auditor liable, it then determines the relative fault of each co-defendant (i.e., the manager and auditor). This determination forms the fundamental basis of how the total damage losses D_{tec} should be split between the auditor and the manager. Since there is no well-defined formula or guidance on how the D_{tec} should be split, I assume that, in expectation, the auditor is held responsible for k percent of D_{tec}, where $k \in (0,1)$. To highlight the impacts of different damage apportionment rules in conjunction with legal regimes on manager's reporting and auditor independence, I create a game setting in which the auditor is always solvent but the manager is bankrupt by the end of the trial. Therefore, the auditor has to pay his share of the total damages $\alpha \cdot k \cdot D_{tec}$ to the investors. Following Hillegeist (1999), this α is the proportional damage multiplier which can characterize the three damage apportionment rule. More specific, $\alpha \cdot k = 1$ for the JS rule and $\alpha = 1$ (or > 1) for the PP (or HP) rule. The damages D_{tec} are set equal to the investors' economic losses resulting from their reliance on the fraudulent financial statements. Following Schwartz (1997), the damages D_{tec} are set to be independent of the actual investment I_i.

Alternatively, if the audit signal is S^L, the imperfect audit technology can ensure the auditor that the true investment outcome is L. In this situation, the auditor may issue either an $\hat{H}$ or $\hat{L}$ report,

company for any bonus or other compensation received during the twelve months following the issuance or filing of the non-compliant document and any profits realized from the sale of securities of the company during that period.

depending on his independence. Since the manager's compensation is influenced by auditor's report, the manager has strong motivation to induce the auditor to issue an $\hat{H}$ report. To create a setting in which the auditor will compromise his independence to the highest level, I assume that the manager provides two incentives (or threats) to the auditor: one is the present value of quasi rents accrued in *future* audit engagements (DeAngelo 1981), denoted by *ER*, and the other one is manager's side payment to the auditor in the *current* period (Lee and Gu 1998), denoted by *SP*. Under this setting, the auditor has two reporting strategies to choose. If he intends to keep *ER* and accepts the *SP*, the auditor will issue an $\hat{H}$ report. I refer to this scenario as an *independence audit failure* (denoted by AF_{ind}) because the auditor intentionally misrepresents the true outcome of the investment due to his lack of independence.[5] Therefore, the AF_{ind} rate is the conditional probability that the auditor issues an $\hat{H}$ report when the audit signal is S^L, i.e., $p(\hat{H} \mid S^L)$. When an AF_{ind} occurs, the auditor's legal liability will still depend on the state of the economy and his effort level. If the state of the economy turns out to be good, the investors will not sue the auditor for damage losses because the firm is not bankrupt. In contrast, the investors will file a lawsuit against the auditor when the state of the economy is bad because the firm cannot survive. Since the auditor commits a knowing violation of the securities laws, the 1995 Reform Act rules that he will be held liable for the AF_{ind} damages jointly and severally. Again, I assume that, in expectation, the court will find the auditor negligent with probability $\lambda(e_A)$. If the court holds the auditor liable, it then determines the total damages D_{ind} the auditor should pay to the investors.[6, 7]

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[5]In real audit failure cases, the issue of whether AF_{tec} (resulting from the imperfection of audit technology or a lack of professional care) and AF_{ind} (resulting from auditor's intentionally compromising independence) are independent is not clear and, therefore, I do not consider this issue explicitly. Instead, my model setting takes as given that AF_{tec} and AF_{ind} are independent because the ability to detect material misstatements is a function of auditor's competence (or audit technology) while the propensity to correct (or report) material misstatements is a function of auditor independence (Khurana and Raman 2004).

[6]Since the audit signal is S^L but the auditor issues a $\hat{H}$ report, I assume that the auditor will counterfeit the audit evidence to make it look like S^H in case he is sued by the investors. This assumption is reasonable and practical because otherwise the auditor will always be held liable when there is a lawsuit against him. By forging the audit evidence in support of S^H, the auditor has an opportunity to defend himself before the court that he has exerted high effort and, therefore, reduces the possibility of being held liable to an audit failure. A most recent case filed by the SEC on September 25, 2003, supports

If the auditor refuses the *SP* and insists on issuing an $\hat{L}$ report (i.e., the auditor is independent), the manager will have to restate his report and replace the auditor at an adjustment-and-switching cost (denoted by *ASC*). Because the auditor is dismissed, he will lose the present value of future quasi rents *ER*. This one-period game then ends. Appendix summarizes different players' payoffs under different game outcomes and legal environments.

2.2 Players' Equilibrium Strategies and Hypotheses:

The analysis of the above one-period two-player game proceeds by backward induction because of the game's sequential nature. However, the complexity of the model setting and the legion of endogenized variables introduce ambiguity into the analytical results due to some "high order" effects that may attenuate the comparisons and intuition among different legal environments. I will overcome this problem by solving the game using the parameter values specified in Table 1.

3. EXPERIMENTAL DESIGN AND PROCEDURES

To test the hypotheses of interest, I adopts a 2×3 factorial design, with two between-subject variables: *REGIME* (manipulated at two levels: NE vs. ST) and *RULE* (manipulated at three levels: JS vs. HP vs. PR). Each experiment consists of 70 periods. Each period simulates the one-period game between auditor and manager specified in section 2.1. Table 2 summaries the experimental design.

[Insert Table 2 here]

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my assumption. In this case, a former Ernst & Young partner, Thomas Trauger, asked Oliver Flanagan, a former senior manager of Ernst & Young, to alter the electronic workpapers for the NextCard's 2000 audit in fear of being investigated by the SEC. This is one of the first cases in the U.S. in which an auditor has been accused of destroying key audit documents in an effort to obstruct an investigation brought under the Sarbanes-Oxley Act of 2002.

[7] I set the probabilities that the auditor will be held liable for AF_{tec} and AF_{ind} to be different (i.e., $\eta(e_A)$ and $\lambda(e_A)$, respectively) because the merits of these two types of audit failure are not the same in real litigation cases. Also, they are subject to different damage apportionment rules (i.e., joint-and-several vs. proportionate). Note that: (a) I design $\lambda(e_A^{high})$ to be greater than $\eta(e_A^{high})$ under the NE legal regime because the auditor is less likely to be held liable for AF_{tec} due to the safe-harbor provision for forward-looking information specified in the 1995 Reform Act, and (b) I assume that the court is able to distinguish between these two types of audit failure once it determines that the auditor is held liable.

A notional currency called *Experimental Dollars* (EDs) will be used in the experiments. In each experiment, all communications and interactions between players will be handled by a system of networked personal computers. I will conduct a pilot test before the formal experiments to test the appropriateness of the experimental instructions. In the formal four experiments, the subject pool consists of 80 senior Business School students, with ten auditor-subjects and ten manager-subjects randomly assigned to each experiment. Students participate in two sessions. At the half-hour *training* session, subjects receive written instructions that are read aloud by the experimenter. After clarifying questions are answered, a quiz (consists of ten true-false questions) will be given to ensure that all subjects have understood the instructions and how their decisions might affect their cash payments. All subjects are paid US $0.10 for each question they answer correctly. The cash that each subject receives in the quiz is *in addition to* his or her cash earnings in the formal experiments. This training session is scheduled because of the relative complexity of the experiments.

Immediately following the training session will be the two-and-half-hour *experiment* session. All subjects should draw to determine the role they will play in the experiment and the experimental periods then commence. At the beginning of each period, each manager-subject will be endowed with 12,000 EDs and each auditor-subject will be endowed with 10,000 EDs. Each subject plays the same role throughout all 80 periods.

The steps for each experimental period are described below:

***Step 1*:** At the beginning of each period, the computer randomly assigns each auditor to a manager. Auditors are not informed of their assigned managers. This "manager-auditor" relation holds in that period only. This procedure is important to the experiments because my model does not consider auditor's and manager's reputation effect.

***Step 2*:** At the beginning of each period, each manager-subject is provided with two investment alternatives: a low-cost investment (with an effort cost of 2,500 EDs) and a high-cost investment (with an effort cost of 6,500 EDs). All manager-subjects know that if I_{low} is undertaken, there is a 0.70 probability of receiving *L* and a 0.30 probability of receiving *H*. In contrast, if I_{high} is undertaken, the manager would have a 0.70 probability of receiving *H* and a 0.30 probability of receiving *L*. Each manager-subject can only choose one investment project to undertake.

Step 3**:** The manager-subject privately determines the investment to be undertaken by choosing either "High Investment" or "Low Investment" on the computer screen. This becomes the manager-subject's private information.

Step 4**:** The manager-subject privately determines the investment to be undertaken by choosing either "High Investment" or "Low Investment" on the computer screen. This becomes the manager-subject's private information.

Step 5**:** The realized earnings is determined by the computer following the probability distribution specified in Step 2 and is shown on each manager-subject's screen. The manager-subject determines the earnings report by choosing either "High Earnings" or "Low Earnings" on the computer screen.

Step 6**:** The manager-subject pays a flat audit fee 4,500 EDs to hire an auditor-subject to credibly verify the outcome of the investment.

Step 7**:** Each auditor-subject privately determines the effort level to be exerted by choosing either "High Effort Level" (with an effort cost of 2,600 EDs) or "Low Effort Level" (with an effort cost of 1,000 EDs) on the computer screen. Each auditor-subject knows that if the realized earnings is *H*, he will always obtain a "High" audit signal S^H with probability one. If the realized earnings is *L*, the auditor-subjects will obtain a "Low" signal S^L with probability 0.7 if he exerts e_A^{high} but will obtain the correct signal with probability 0.3 if he only exerts e_A^{low}.

Step 8**:** Based on the auditor-subject's effort choice and the realized earnings, the computer determines the audit signal according to the probability distribution specified in Step 7.

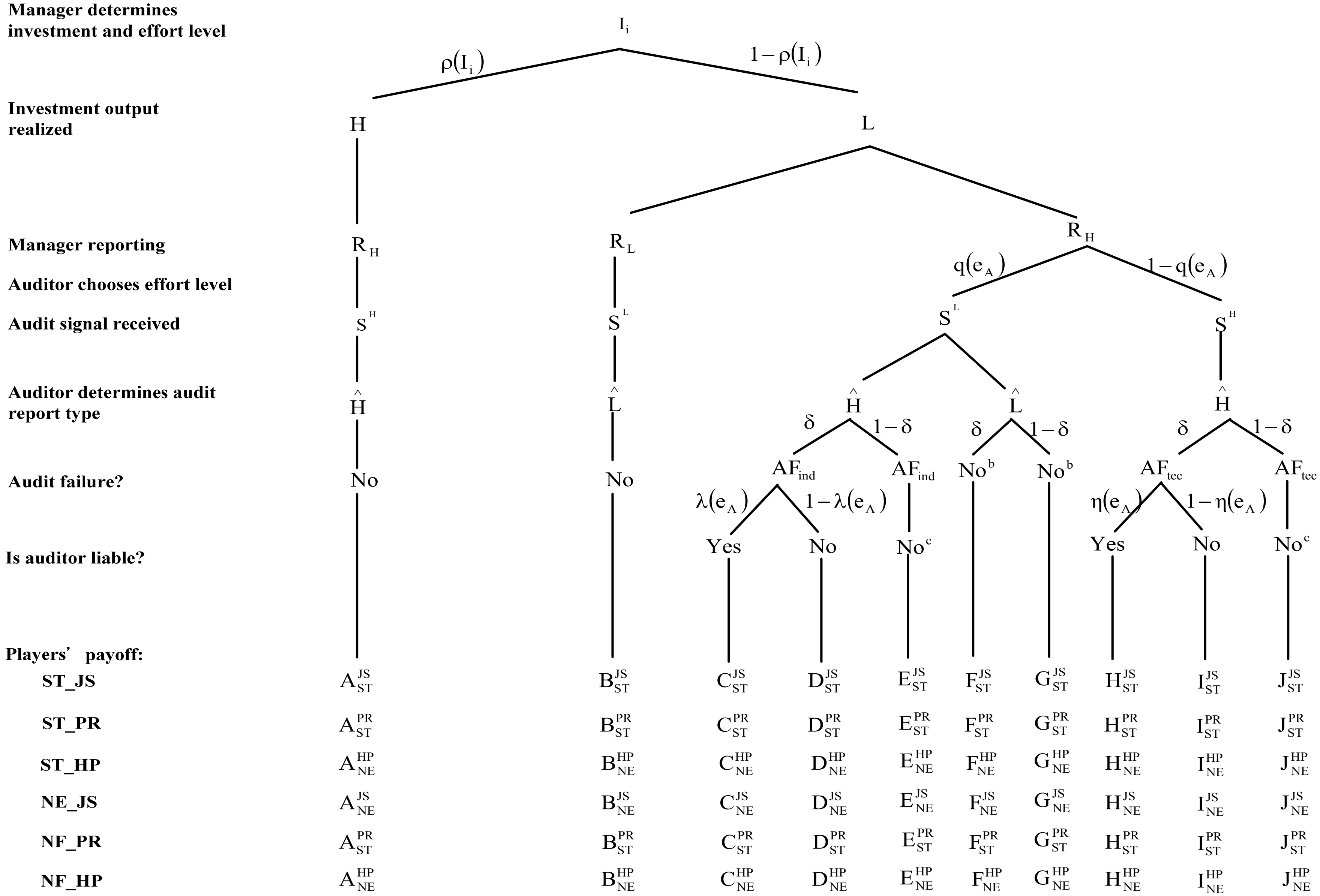
Step 9**:** Upon observing the audit signal, the auditor-subject privately determines the audit report by choosing either "High Earnings Report" or "Low Earnings Report" on the computer screen based on the reporting rules and the corresponding legal liabilities specified in section 3.1.

Step 10**:** Each player's payoff is determined and the experimental period terminates.

4. EXPERIMENTAL RESULTS

The experimental results from the preliminary analyses generally support the model predictions. Please contact the author for details.

FIGURE 1
Game Tree of the Model[a]



[a]The variables shown in this game tree are defined as follows: I_i denotes the manager's investment amount, where $i \in \{high, low\}$; H and L denote the high and low investment outcomes, respectively; $\rho(I_i)$ denotes the probability that the outcome is H when the manager invests I_i amount; R_k denotes the manager's financial report, where $k \in \{H, L\}$; $q(e_A)$ denotes the audit quality when the auditor's effort level is e_A; S^H and S^L denote the audit signals that the investment outcome is H and L, respectively; $\hat{H}$ and $\hat{L}$ denote the auditor's high-outcome and low-outcome report, respectively; δ denotes the probability that the state of the economy is bad; AF_{ind} and AF_{tec} denote auditor's independence and technical audit failure, respectively; $\lambda(e_A)$ denotes the probability that the auditor will be held liable by the court when an AF_{ind} occurs; $\eta(e_A)$ denotes the probability that the auditor will be held liable by the court when an AF_{tec} occurs; ST and NE denote the strict and negligence legal regimes, respectively. Letters A to J denote managers' and auditor's possible payoffs under different game outcomes (see Appendix for detailed descriptions).

[b]There is no audit failure under these two scenarios (no matter whether the state of economy is good or bad) because the auditor's report correctly informs the investors of the investment outcome and, thus, is not misleading.

[c]Even though an audit failure occurs under these two scenarios, the auditor is not held liable by the court because the state of economy is good and, therefore, the firm will not go bankrupt. In my model, only a violation of the going-concern will trigger a lawsuit against the auditor.

TABLE 1
Summary of Notations and Parameter Values

Variables	Definitions	Parameter Values
(1) Investment Parameters:		
I_i	Investment project	$i \in \{high, low\}$
ω	Outcome of the investment	$\omega \in \{H, L\}$
$\rho(I_i)$	Probability that the investment outcome is *H*	$\rho(I_{high}) = 0.7$, $\rho(I_{low}) = 0.3$
(2) Manager's Parameters:		
e_M^i	Manager's effort level for investment I_i	$i \in \{high, low\}$
$C(e_M^i)$	Manager's effort cost when his effort level is e_M^i	$C(e_M^{high}) = 6{,}500$, $C(e_M^{low}) = 4{,}200$
M_r	Manager's compensation when audit report is *r*	$M_{\hat{H}} = 24{,}000$, $M_{\hat{L}} = 16{,}000$
SP	Side payment paid by the manager to the auditor	2,800 EDs
ASC	Manager's restating cost plus switching cost because the auditor is dismissed	7,000 EDs
(3) Auditor's Parameters:		
F	Audit fees	5,500 EDs
e_A^j	Auditor's effort level	$j \in \{high, low\}$
$C(e_A^j)$	Auditor's effort cost when his effort level is e_A^j	$C(e_A^{high}) = 2{,}600$, $C(e_A^{low}) = 2{,}200$
ξ	Audit signal obtained	$\xi \in \{S^H, S^L\}$
$q(e_A^j)$	Audit quality	$q(e_A^{high}) = 0.7$, $q(e_A^{low}) = 0.3$
r	Audit report type	$r \in \{\hat{H}, \hat{L}\}$
ER	Present value of all future quasi rents	6,000 EDs
(4) Legal Liability Parameters:		
δ	Probability that the state of economy is bad	0.6
$\lambda(e_A^j)$	Probability (auditor is held liable for AF_{ind})	NE regime: $\lambda(e_A^{high}) = 0.4$, $\lambda(e_A^{low}) = 0.6$ ST regime: $\lambda(e_A^{high}) = 0.75$, $\lambda(e_A^{low}) = 1$
$\eta(e_A^j)$	Probability (auditor is held liable for AF_{tec})	NE regime: $\eta(e_A^{high}) = 0.3$, $\eta(e_A^{low}) = 0.7$ ST regime: $\eta(e_A^{high}) = 0.7$, $\eta(e_A^{low}) = 1$
D_{tec}	Total damage losses due to AF_{tec}	8,000 EDs
D_{ind}	Total damage losses due to AF_{ind}	14,500 EDs
k	The percent of D_{tec} or D_{ind} paid by the auditor	$k = 0.6$
α	The proportional damage multiplier	JS rule: $\alpha k = 1$ HP rule: $\alpha(e_A^{high}) = 1.25$, $\alpha(e_A^{low}) = 1.5$ PR rule: $\alpha = 1$

TABLE 2
Experimental Design

Experiments	*REGIME* [a]	*REGIME* parameter $\lambda(e_A)$ and $\eta(e_A)$ [b]	*RULE* [a]	*RULE* Parameter αk [c]	Number of Periods[a]	Number of Subjects[d]
1	NE	$\lambda(e_A)$ = 0.4 or 0.6 $\eta(e_A)$ = 0.3 or 0.7	JS	$\alpha k = 1$	70	10 Auditors 10 Managers
2	NE	$\lambda(e_A)$ = 0.4 or 0.6 $\eta(e_A)$ = 0.3 or 0.7	HP	$\alpha(e_A)k$ = 0.75 or 0.9	70	10 Auditors 10 Managers
3	NE	$\lambda(e_A)$ = 0.4 or 0.6 $\eta(e_A)$ = 0.3 or 0.7	PR	$\alpha k = k = 0.6$	70	10 Auditors 10 Managers
4	ST	$\lambda(e_A)$ = 0.75 or 1 $\eta(e_A)$ = 0.7 or 1	JS	$\alpha k = 1$	70	10 Auditors 10 Managers
5	ST	$\lambda(e_A)$ = 0.75 or 1 $\eta(e_A)$ = 0.7 or 1	HP	$\alpha(e_A)k$ = 0.75 or 0.9	70	10 Auditors 10 Managers
6	ST	$\lambda(e_A)$ = 0.75 or 1 $\eta(e_A)$ = 0.7 or 1	PR	$\alpha k = k = 0.6$	70	10 Auditors 10 Managers

[a] This study adopts a 2×3 factorial design, with two between-subject variables: *REGIME* (manipulated at two levels: NE vs. ST) and *RULE* (manipulated at three levels: JS vs. HP vs. PR). NE and ST denote negligence and strict legal regimes, respectively; JS, HP, and PR denote joint-and-several, hybrid, and proportionate damage apportionment rules, respectively. Each experiment consists of 70 periods.

[b] Under both the NE and ST regimes, the probabilities that the auditor will be held liable by the court when there is an AF_{ind} and AF_{tec} are $\lambda(e_A)$ and $\eta(e_A)$, respectively.

[c]In the experiment as well as in my model, the auditor has to pay αk percent of the total D_{tec} (or D_{ind}) when there is an AF_{tec} (or AF_{ind}), where k is the percent of D_{tec} or D_{ind} paid by the auditor and α is the proportional damage multiplier. In the experiments I manipulate αk to be 1, 0.75 or 0.9, and 0.6 under the JS, HP, and PR damage rules, respectively, to capture the basic difference among these three rules.

[d]The subject pool will consist of 120 senior Business School students, with 10 auditor-subjects and 10 manager-subjects randomly assigned to each experiment. All subjects shall draw to determine the role they will play in the experiments. At the beginning of each period, each manager-subject is endowed with 12,000 EDs and each auditor-subject is endowed with 10,000 EDs. Each subject plays the same role throughout all 70 periods.

REFERENCES

Abbott, L.J., S. Parker, G.F. Peters, and K. Raghunandan. 2003. An empirical investigation of audit fees, nonaudit fees, and audit committees. *Contemporary Accounting Research* 20 (Summer): 215-234.

Bloomfield, R.J. and T.J. Wilks. 2000. Disclosure effects in the laboratory: Liquidity, depth and the cost of capital. *The Accounting Review* 75 (January): 13-42.

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

Bushman, R.M. and A.J. Smith. 2001. Financial accounting information and corporate governance. *Journal of Accounting & Economics* 32: 237-333.

Bushman, R.M. and A.J. Smith. 2003. Transparency, financial accounting info5rmation, and corporate governance. *FRBNY Economic Policy Review* (April): 65-87.

Chan, D.K. and S. Pae. 1998. An analysis of the economic consequences of the proportionate liability rule. *Contemporary Accounting Research* 15 (Winter): 457-480.

Citron, D.B. 2003. The UK's framework approach to auditor independence and the commercialization of the accounting profession. *Accounting, Auditing & Accountability Journal* 16 (February): 244-274.

Cote, M. 2002. Auditor independence. *CA Magazine* 135 (September): 68.

Craswell, A., D.J. Stokes, and J. Laughton. 2002. Auditor independence and fee dependence. *Journal of Accounting & Economics* 33 (June): 253-275.

DeAngelo, L. 1981. Auditor size and audit quality. *Journal of Accounting and Economics* 3 (1): 183-199.

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 (3): 189–221.

Dopuch, N. and R. R. King. 1992. Negligence versus strict liability regimes in auditing: An experimental investigation. *The Accounting Review* 67 (January): 97-120.

Dopuch, N., R. R. King, and J. W. Schatzberg. 1994. An experimental investigation of alternative damage-sharing liability regimes with an auditing perspective. *Journal of Accounting Research* 32 (Supplement): 103-139.

Dopuch, N., R.R. King, and R. Schwartz. 2003. Independence in appearance and in fact: An experimental investigation. *Contemporary Accounting Research* 20 (Spring): 79-119.

Dye, R. 1993. Auditing standards, legal liability, and auditor wealth. *Journal of Political Economy* 101: 887-914.

Dye. R., B.V. Balachandran, and R. Magee. 1990. Contingent fees for audit firms. *Journal of Accounting Research* 28 (Autumn): 239-266.

Gerde, V.W. and C.G. White. 2003. Auditor independence, accounting firms, and the SEC. *Business and Society* 42 (March): 83-115.

Hillegeist, S. A. 1999. Financial reporting and auditing under alternative damage apportionment rules.

The Accounting Review 74 (July): 347-369.

Hodge, F.D. 2003. Investors' perceptions of earnings quality, auditor independence, and the usefulness of audited financial information. *Accounting Horizon* 17 (supplement): 37-48.

Kachelmeier, S. 1996a. Discussion of "Tax advice and reporting under uncertainty: Theory and experimental evidence." *Contemporary Accounting Research* 13 (Spring): 25-48.

Kachelmeier, S. 1996b. Do cosmetic reporting variations affect market behavior? A laboratory study of the accounting emphasis on unavoidable costs. *Review of Accounting Studies* 1 (2): 115-140.

Kachelmeier, S. and R.R. King. 2002. Using laboratory experiments to evaluate accounting policy issues. *Accounting Horizon* 16 (September): 219-232.

Kaiser, G.S. and T.G. Perris. 2003. Auditor independence. *National Law Journal* 25 (March): B8.

Khurana, I.K. and K.K. Raman. 2004. Litigation risk and the financial reporting credibility of Big 4 vs. Non-Big 4 audits: Evidence from Anglo-American countries. *The Accounting Review* 79 (April): 473-495.

Kieso, D.E., J.J. Weygandt, and T.D. Warfield. 2003. *Intermediate Accounting*. 11th edition. NY: John Wiley and Sons.

Kirk, R.E. 1982. *Experimental Design: Procedures for the Behavioral Science*. CA: Brooks/Cole Publishing Company.

King, R. R. and R. Schwartz. 1997. The Private Securities Litigation Reform Act of 1995: A discussion of three provisions. *Accounting Horizon* 11 (March): 92-106.

King, R.R. and R. Schwartz. 1999. Legal penalties and audit quality: An experimental investigation. *Contemporary Accounting Research* 16 (Winter): 685-710.

King, R.R. and R. Schwartz. 2000. An experimental investigation of auditors' liability: Implications for social welfare and exploration of deviation from theoretical predictions. *The Accounting Review* 75 (October): 429-451.

Kopel, J.L. 2003. The SEC's new auditor independence rules. *Insights: The Corporate & Securities Law Advisor* 17 (March): 18-30.

Lee, C.W. and Z.Y. Gu. 1998. Low balling, legal liability and auditor independence. *The Accounting Review* 73 (October): 533-555

Libby, R., R.J. Bloomfield, and M.W. Nelson. 2002. Experimental research in financial accounting. *Accounting, Organizations and Society* 27 (November): 775-810.

Lousteau, C.L. and M.E. Reid. 2003. Internal control systems for auditor independence. *The CPA Journal* 73 (January): 36-41.

Melumad, N.D. and L. Thoman. 1990. On auditors and the courts in an adverse selection setting. *Journal of Accounting Research* 28 (Spring): 77-120.

Narayanan, V. G. 1994. An analysis of auditor liability rules. *Journal of Accounting Research* 32 (Supplement): 39-64.

Pae, S. and S-W Yoo. 2001. Strategic interaction in auditing: An analysis of auditors' legal liability, internal control system quality, and audit effort. *The Accounting Review* 76 (July): 333-356.

Palmrose, Z-V. 1994. The joint & several vs. proportionate liability debate: An empirical investigation of audit-related litigation. *Stanford Journal of Law, Business & Finance* 1: 53-72.

Private Securities Litigation Reform Act of 1995. Public Law No. 104-167. Washington D.C.: US Government Printing Office.

Radhakrishnan, S. 1999. Investors' recovery friction and auditor liability rules. *The Accounting Review* 74 (April): 225-240.

Sarbanes-Oxley Act of 2002. Public Law No. 107-204. Washington D.C.: US Government Printing Office.

Schwartz, D. 1997. Legal regimes, audit quality and investment. *The Accounting Review* 72 (July): 385-406.

Securities and Exchange Commission (SEC). 2003. *Strengthening the Commission's Requirements Regarding Auditor Independence*. January. Washington, D.C.: Government Printing Office.

Smith, V. L. 1976. Experimental economics: Induced value theory. *American Economic Review* (May): 274-279.

Smith, V. L. 1989. Theory, experiment and economics. *Journal of Economic Perspectives* 3 (Winter): 151-169.

Smith, V. L. 1994. Economics in the laboratory. *Journal of Economic Perspectives* 8 (Winter): 113-131.

Swieringa, R. and K. Weick. 1982. An assessment of laboratory experiments in accounting. *Journal of Accounting Research* 20 (Supplement): 56-101.

Thoman, L. 1996. Legal damages and auditor efforts. *Contemporary Accounting Research* 13 (Spring): 275-306.

APPENDIX 1

Players' Payoffs under Different Legal Regime and Damage Apportionment Rule Combinations[a]

Panel A: ST_JS Setting

Game Outcomes	Manager	Auditor
A_{ST}^{JS}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$
B_{ST}^{JS}	$M_{\hat{L}} - C(e_M) - F$	$F - C(e_A) + ER$
C_{ST}^{JS}	0	$F - C(e_A) + SP - D_{ind}$
D_{ST}^{JS}	NA[b]	NA[b]
E_{ST}^{JS}	$M_{\hat{H}} - C(e_M) - SP - F$	$F - C(e_A) + SP + ER$
F_{ST}^{JS}	0	$F - C(e_A)$
G_{ST}^{JS}	$M_{\hat{L}} - C(e_M) - ASC - F$	$F - C(e_A)$
H_{ST}^{JS}	0	$F - C(e_A) - D_{tec}$
I_{ST}^{JS}	NA[b]	NA[b]
J_{ST}^{JS}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$

Panel B: ST_PR Setting

Game Outcomes	Manager	Auditor
A_{ST}^{PR}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$
B_{ST}^{PR}	$M_{\hat{L}} - C(e_M) - F$	$F - C(e_A) + ER$
C_{ST}^{PR}	0	$F - C(e_A) + SP - k \cdot D_{ind}$
D_{ST}^{PR}	NA[b]	NA[b]
E_{ST}^{PR}	$M_{\hat{H}} - C(e_M) - SP - F$	$F - C(e_A) + SP + ER$
F_{ST}^{PR}	0	$F - C(e_A)$
G_{ST}^{PR}	$M_{\hat{L}} - C(e_M) - ASC - F$	$F - C(e_A)$
H_{ST}^{PR}	0	$F - C(e_A) - k \cdot D_{tec}$
I_{ST}^{PR}	NA[b]	NA[b]
J_{ST}^{PR}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$

APPENDIX 1 (cont'd)
Players' Payoffs under Different Legal Regime and Damage Apportionment Rule Combinations (cont'd)

Panel C: ST_HP Setting

Game Outcomes	Manager	Auditor
A_{ST}^{HP}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$
B_{ST}^{HP}	$M_{\hat{L}} - C(e_M) - F$	$F - C(e_A) + ER$
C_{ST}^{HP}	0	$F - C(e_A) + SP - \alpha \cdot k \cdot D_{ind}$
D_{ST}^{HP}	NA[b]	NA[b]
E_{ST}^{HP}	$M_{\hat{H}} - C(e_M) - SP - F$	$F - C(e_A) + SP + ER$
F_{ST}^{HP}	0	$F - C(e_A)$
G_{ST}^{HP}	$M_{\hat{L}} - C(e_M) - ASC - F$	$F - C(e_A)$
H_{ST}^{HP}	0	$F - C(e_A) - \alpha \cdot k \cdot D_{tec}$
I_{ST}^{HP}	NA[b]	NA[b]
J_{ST}^{HP}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$

APPENDIX 1 (cont'd)
Players' Payoffs under Different Legal Regime and Damage Apportionment Rule Combinations (cont'd)

Panel D: NE_JS Setting

Game Outcomes	Manager	Auditor
A_{NE}^{JS}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$
B_{NE}^{JS}	$M_{\hat{L}} - C(e_M) - F$	$F - C(e_A) + ER$
C_{NE}^{JS}	0	$F - C(e_A) + SP - D_{ind}$
D_{NE}^{JS}	0	$F - C(e_A) + SP$
E_{NE}^{JS}	$M_{\hat{H}} - C(e_M) - SP - F$	$F - C(e_A) + ER + SP$
F_{NE}^{JS}	0	$F - C(e_A)$
G_{NE}^{JS}	$M_{\hat{L}} - C(e_M) - ASC - F$	$F - C(e_A)$
H_{NE}^{JS}	0	$F - C(e_A) - D_{tec}$
I_{NE}^{JS}	0	$F - C(e_A)$
J_{NE}^{JS}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$

Panel E: NE_PR Setting

Game Outcomes	Manager	Auditor
A_{NE}^{PR}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$
B_{NE}^{PR}	$M_{\hat{L}} - C(e_M) - F$	$F - C(e_A) + ER$
C_{NE}^{PR}	0	$F - C(e_A) + SP - k \cdot D_{ind}$
D_{NE}^{PR}	0	$F - C(e_A) + SP$
E_{NE}^{PR}	$M_{\hat{H}} - C(e_M) - SP - F$	$F - C(e_A) + ER + SP$
F_{NE}^{PR}	0	$F - C(e_A)$
G_{NE}^{PR}	$M_{\hat{L}} - C(e_M) - ASC - F$	$F - C(e_A)$
H_{NE}^{PR}	0	$F - C(e_A) - k \cdot D_{tec}$
I_{NE}^{PR}	0	$F - C(e_A)$
J_{NE}^{PR}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$

APPENDIX 1 (cont'd)
Players' Payoffs under Different Legal Regime and Damage Apportionment Rule Combinations (cont'd)

Panel F: NE_HP Setting

Game Outcomes	Manager	Auditor
A_{NE}^{HP}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$
B_{NE}^{HP}	$M_{\hat{L}} - C(e_M) - F$	$F - C(e_A) + ER$
C_{NE}^{HP}	0	$F - C(e_A) + SP - \alpha \cdot k \cdot D_{ind}$
D_{NE}^{HP}	0	$F - C(e_A) + SP$
E_{NE}^{HP}	$M_{\hat{H}} - C(e_M) - SP - F$	$F - C(e_A) + ER + SP$
F_{NE}^{HP}	0	$F - C(e_A)$
G_{NE}^{HP}	$M_{\hat{L}} - C(e_M) - ASC - F$	$F - C(e_A)$
H_{NE}^{HP}	0	$F - C(e_A) - \alpha \cdot k \cdot D_{tec}$
I_{NE}^{HP}	0	$F - C(e_A)$
J_{NE}^{HP}	$M_{\hat{H}} - C(e_M) - F$	$F - C(e_A) + ER$

[a]See Table 1 for the definitions and parameter values of all variables shown in this Appendix.
[b]Since $\lambda(e_A)$ and $\eta(e_A)$ equal one under the strict legal regime, game outcomes D and I in Panels A, B, and C do not exist.

APPENDIX 2
Numerical Solutions of the Game

The strategy spaces for the Auditor and the Manager, respectively, are as follows:

For the Auditor: {(Exert high effort, Report high when audit signal is low), (Exert low effort, Report low when audit signal is low), (Exert high effort, Report low when audit signal is low), (Exert low effort, Report high when audit signal is low)}

The Manager: {(High investment, Report High), (Low investment, Report High), (Invest Low, Report High), (Invest Low, Report Low)}

The payoff functions for both players are as follows:

1. Under NE_JS (or ST_JS):

Payoff functions for the Auditor:

$$U_A((e_A^j,\hat{H}),(H,I_i)) = (\rho(I_i) + (1-\rho(I_i)(1-\delta))\cdot ER + F - C(e_A^j) + (1-\rho(I_i))(-q(e_A^j)\cdot\delta\cdot D_{tec}\eta(e_A^j) + (1-q(e_A^j))(SP-\delta\cdot D_{ind}\cdot\lambda(e_A^j))$$

$$U_A((e_A^j,\hat{L}),(H,I_i)) = (\rho(I_i) + (1-\rho(I_i)(1-\delta)\cdot q(e_A^j))\cdot ER + F - C(e_A^j) - (1-\rho(I_i))(1-q(e_A^j))\cdot\delta\cdot D_{tec}\cdot\eta(e_A^j)$$

$$U_A((e_A^j,\hat{H}),(L,I_i)) = ER + F - C(e_A^j)$$

$$U_A((e_A^j,\hat{L}),(L,I_i)) = ER + F - C(e_A^j)$$

Payoff functions for the manager:

$$U_M((e_M^i,\hat{H}),(H,I_j)) = (\rho(I_j) + (1-\rho(I_j))(1-\delta))M_H - I_j - F - (1-\rho(I_j))(1-q(e_i))(1-\delta)SP$$

$$U_M((e_i,\hat{L}),(H,I_j)) = (\rho(I_j) + (1-\rho(I_j))q(e_i)(1-\delta))(M_H) - I_j - F + (1-\rho(I_j))(1-q(e_i))(M_L - ASC)$$

$$U_M((e_i,\hat{H}),(L,I_j)) = \rho(I_j)M_H + (1-\rho(I_j))M_L - I_j - F$$

$$U_M((e_i,\hat{L}),(L,I_j)) = \rho(I_j)M_H + (1-\rho(I_j))M_L - I_j - F$$

2. Under NE_PR (or ST_PR):

Payoff functions for the Auditor:

$$U_A((e_i,\hat{H}),(H,I_j)) = (\rho(I_j) + (1-\rho(I_j)(1-\delta))ER + F - e_i + (1-\rho(I_j))(-q(e_i)\delta D_{tec}\eta(e_i) + (1-q(e_i))(SP - k\delta D_{ind}\lambda(e_i))$$

$$U_A((e_i,\hat{L}),(H,I_j)) = (\rho(I_j) + (1-\rho(I_j)(1-\delta)q(e_i))ER + F - e_i - (1-\rho(I_j))(1-q(e_i))\delta k D_{tec}\eta(e_i)$$

$$U_A((e_i,\hat{H}),(L,I_j)) = ER + F - e_i$$

$$U_A((e_i,\hat{L}),(L,I_j)) = ER + F - e_i$$

Payoff functions for the manager:

$$U_M((e_i,\hat{H}),(H,I_j)) =$$

$$(\rho(I_j)+(1-\rho(I_j))(1-\delta))M_H - I_j - F - (1-\rho(I_j))(1-q(e_i))(1-\delta)SP$$

$$U_M((e_i,\hat{L}),(H,I_j))=$$

$$(\rho(I_j)+(1-\rho(I_j))q(e_i)(1-\delta))(M_H)-I_j-F+(1-\rho(I_j))(1-q(e_i))(M_L-ASC)$$

$$U_M((e_i,\hat{H}),(L,I_j))=\rho(I_j)M_H+(1-\rho(I_j))M_L-I_j-F$$

$$U_M((e_i,\hat{L}),(L,I_j))=\rho(I_j)M_H+(1-\rho(I_j))M_L-I_j-F$$

3. Under NE_HP (or ST_HP):

Payoff functions for the Auditor:

$$U_A((e_i,\hat{H}),(H,I_j))=(\rho(I_j)+(1-\rho(I_j)(1-\delta))ER+F-e_i+$$

$$(1-\rho(I_j))(-q(e_i)\delta D_{tec}\eta(e_i)+(1-q(e_i))(SP-\alpha(e_i)k\delta D_{ind}\lambda(e_i))$$

$$U_A((e_i,\hat{L}),(H,I_j))=(\rho(I_j)+(1-\rho(I_j)(1-\delta)q(e_i))ER+F-e_i$$

$$-(1-\rho(I_j))(1-q(e_i))\delta\alpha(e_i)kD_{tec}\eta(e_i)$$

$$U_A((e_i,\hat{H}),(L,I_j))=ER+F-e_i$$

$$U_A((e_i,\hat{L}),(L,I_j))=ER+F-e_i$$

Payoff functions for the manager:

$$U_M((e_i,\hat{H}),(H,I_j))=$$

$$(\rho(I_j)+(1-\rho(I_j))(1-\delta))M_H - I_j - F - (1-\rho(I_j))(1-q(e_i))(1-\delta)SP$$

$$U_M((e_i,\hat{L}),(H,I_j))=$$

$$(\rho(I_j)+(1-\rho(I_j))q(e_i)(1-\delta))(M_H)-I_j-F+(1-\rho(I_j))(1-q(e_i))(M_L-ASC)$$

$$U_M((e_i,\hat{H}),(L,I_j))=\rho(I_j)M_H+(1-\rho(I_j))M_L-I_j-F$$

$$U_M((e_i,\hat{L}),(L,I_j))=\rho(I_j)M_H+(1-\rho(I_j))M_L-I_j-F$$

(1) Under the Negligence (NE) legal regime ($\lambda(e_H) = 0.4$, $\lambda(e_L) = 0.6$, $\eta(e_H) = 0.3$, $\eta(e_L) = 0.7$):

(a) The ***JS_NE*** regulation system:

	Undertake I_{high}, report high when realized earnings is L	Undertake I_{high}, report low when realized earnings is L	Undertake I_{low}, report high when realized earnings is L	Undertake I_{low}, report low when realized earnings is L
Exert e^{high}, Report high when S^L	**(7547.6, 9604.8)**	(9020, 9600)	(5744.4, 7745.2)	(9180, 8700)
Exert e^{high}, Report low when S^L	(7186.4, 8580)	(9020, 9600)	(4901.6, 5354)	(9180, 8700)
Exert e^{low}, Report high when S^L	(7296.6, 9739.2)	(9300, 9600)	(4625.4, 8058.8)	(9300, 8700)
Exert e^{low}, Report low when S^L	(7298.4, 9300)	**(9300, 9600)**	(4629.6, 7034)	(9300, 8700)

(b) The ***PR_NE*** regulation system:

	Undertake I_{high}, report high when realized earnings is L	Undertake I_{high}, report low when realized earnings is L	Undertake I_{low}, report high when realized earnings is L	Undertake I_{low}, report low when realized earnings is L
Exert e^{high}, Report high when S^L	**(7891.76, 9604.8)**	(9020, 9600)	(6547.44, 7745.2)	(9180, 8700)
Exert e^{high}, Report low when S^L	(7238.24, 8580)	(9020, 9600)	(5022.56, 5354)	(9180, 8700)
Exert e^{low}, Report high when S^L	(7766.76, 9739.2)	(9300, 9600)	(5722.44, 8058.8)	(9300, 8700)
Exert e^{low}, Report low when S^L	(7580.64, 9300)	**(9300, 9600)**	(5288.16, 7034)	(9300, 8700)

(c) The ***HP_NE*** regulation system:

	Undertake I_{high}, report high when realized earnings is L	Undertake I_{high}, report low when realized earnings is L	Undertake I_{low}, report high when realized earnings is L	Undertake I_{low}, report low when realized earnings is L
Exert e^{high}, Report high when S^L	**(7762.7, 9604.8)**	(9020, 9600)	(6246.3, 7745.2)	(9180, 8700)
Exert e^{high}, Report low when S^L	(7218.8, 8580)	(9020, 9600)	(4977.2, 5354)	(9180, 8700)
Exert e^{low}, Report high when S^L	(7414.14, 9739.2)	(9300, 9600)	(4899.66, 8058.8)	(9300, 8700)
Exert e^{low}, Report low when S^L	(7368.96, 9300)	**(9300, 9600)**	(4794.24, 7034)	(9300, 8700)

(2) Under the Strict (ST) legal regime ($\lambda(e_H) = 0.75$, $\lambda(e_L) = 1$, $\eta(e_H) = 0.7$, $\eta(e_L) = 1$):

(a) The ***JS_ST*** regulation system:

	Undertake I_{high}, report high when realized earnings is L	Undertake I_{high}, report low when realized earnings is L	Undertake I_{low}, report high when realized earnings is L	Undertake I_{low}, report low when realized earnings is L
Exert e^{high}, Report high when S^L	(6735.35, 9604.8)	(9020, 9600)	(3849.15, 7745.2)	(9180, 8700)
Exert e^{high}, Report low when S^L	(7013.6, 8580)	(9020, 9600)	(4498.4, 5354)	(9180, 8700)
Exert e^{low}, Report high when S^L	(6681, 9739.2)	(9300, 9600)	(3189, 8058.8)	(9300, 8700)
Exert e^{low}, Report low when S^L	(6996, 9300)	**(9300, 9600)**	(3924, 7034)	(9300, 8700)

(b) The ***PR_ST*** regulation system:

	Undertake I_{high}, report high when realized earnings is L	Undertake I_{high}, report low when realized earnings is L	Undertake I_{low}, report high when realized earnings is L	Undertake I_{low}, report low when realized earnings is L
Exert e^{high}, Report high when S^L	**(7501.61, 9604.8)**	(9020, 9600)	(5637.09, 7745.2)	(9180, 8700)
Exert e^{high}, Report low when S^L	(7231.76, 8580)	(9020, 9600)	(5007.44, 5354)	(9180, 8700)
Exert e^{low}, Report high when S^L	(7397.4, 9739.2)	(9300, 9600)	(4860.6, 8058.8)	(9300, 8700)
Exert e^{low}, Report low when S^L	(7399.2, 9300)	**(9300, 9600)**	(4864.8, 7034)	(9300, 8700)

(c) The ***HP_ST*** regulation system:

	Undertake I_{high}, report high when realized earnings is L	Undertake I_{high}, report low when realized earnings is L	Undertake I_{low}, report high when realized earnings is L	Undertake I_{low}, report low when realized earnings is L
Exert e^{high}, Report high when S^L	**(7153.51, 9604.8)**	(9020, 9600)	(4824.86, 7745.2)	(9180, 8700)
Exert e^{high}, Report low when S^L	(7089.2, 8580)	(9020, 9600)	(4674.8, 5354)	(9180, 8700)
Exert e^{low}, Report high when S^L	(6860.1, 9739.2)	(9300, 9600)	(3606.9, 8058.8)	(9300, 8700)
Exert e^{low}, Report low when S^L	(7096.8, 9300)	**(9300, 9600)**	(4159.2, 7034)	(9300, 8700)