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Legal Regimes, Damage Apportionment Rules, and Auditor Independence – Theory and Experimental Evidence

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Abstract

This study analytically and experimentally examines how different combinations of legal regimes (strict vs. negligence) and damage apportionment rules (joint-and-several vs. proportionate) may affect auditor's effort and independence decisions and firm's investment level. I adopt the laboratory experiments to test a series of economic and behavioral hypotheses derived from a one-period game theoretic model in which (a) the manager provides quasi-rents and side payment to induce the auditor to compromise his independence, and (b) the auditor may commit either a technical audit failure (due to imperfect audit technology and audit effort) or an independence audit failure (due to the impairment of independence). I distinguish these two types of audit failure because they are subject to different damage apportionment rules stipulated in the 1995 Reform Act. The experimental results reveal several important findings. First, no single legal system (i.e., combination of legal regime and damage apportionment rule) can induce higher audit quality, improve auditor independence, and encourage firm's investments simultaneously. Therefore, the policy makers have to carefully consider what regulatory goals they want to achieve in determining the appropriate legal system imposing on the auditors. If improving auditor independence and encouraging more investments are the main purposes, the experimental evidence suggests that a legal system that consists of a strict legal regime with a proportionate damage rule can induce the highest level of auditor independence and firm's investments. Second, the auditors' independence is impaired less often than the model prediction because they recognize the compromise of independence to be unethical. In addition, the auditors exert more high effort under the proportionate rule than under the joint-and-several rule because they perceive the former to be relatively fair in the occurrence of a technical audit failure. These results suggest the importance of considering human's psychological factors such as ethics and fairness in examining auditor's legal liability, audit quality, and independence. Finally, from a regulation's perspective, an emphasis on damage apportionment rule is by itself not enough to improve auditor independence and motivate firm's investment. A switch of legal regime seems to be more useful than a switch of damage apportionment rule. This result not only partially explains why Arthur Andersen impairs its independence with Enron after the enactment of the 1995 Reform Act (whose focus is on the switching of damage apportionment rules), but also provides support for recent trends of moving auditor's legal liability toward a strict regime after the passage of the Sarbanes-Oxley Act of 2002.

JEL classification: C72, C91, K40, M42

Keywords: Audit failure, Auditor independence, Damage apportionment rule, Legal liability, Legal regime

Data Availability: The experimental data are available from the author upon request

1. INTRODUCTION

Independence requires the auditor to act with integrity and objectivity both in mental attitude and in appearance (Dopuch, King, and Schwartz 2003; SEC 2000). In operational term, independence ensures that the auditors be mentally objective in collecting, evaluating, and reporting on financial information. The Public Oversight Board's *Panel on Audit Effectiveness* emphasizes that independence is "fundamental to the reliability of auditor's reports." (POB 2000, 109). Because auditor independence not only increases the likelihood that firms' financial statements are in conformity with the generally accepted accounting principles (GAAP), but also encourages investors to rely more on the financial statements, independence has long been regarded as a cornerstone to the public accounting profession (Mednick 1997; AICPA 1999; Levitt 2000; SEC 2000). However, since many recent audit failures have been attributed to a lack of independence (e.g., Arthur Andersen vs. Enron 2001; Ernst & Young vs. PeopleSoft 2003),[1] a call to restore public confidence through improving auditors' independence has been emphasized by regulators, accounting practitioners, and auditing academic (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).

The Sarbanes-Oxley Act of 2002 has proposed two *ex ante* mechanisms to enhance auditor's independence: the *prohibition of providing nonaudit services* (section 201) and *mandatory auditor rotation* (section 207).[2] Regulators' concerns about nonaudit services are based on the assumption that auditors are willing to sacrifice their independence in exchange for retaining clients that pay large nonaudit service fees. Several recent studies use the newly available audit fee data and factors associated with earnings management or auditor's propensity to issue going-concern reports to empirically examine whether nonaudit services adversely affect auditor independence (Ashbaugh, LaFond, and Mayhew 2003; DeFond, Raghunandan, and Subramanyam 2002; Frankel, Johnson, and Nelson 2002; Whisenant, Sankaraguruswamy, and

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[1]According to a special report in the *Business Week* (1/28/2002, "Accounting in Crisis"), Andersen has provided both external and internal audits since the middle of 1990s. Moreover, Andersen was working on the accounting systems and controls with one hand and attesting to the numbers they produced with the other. An even worse thing is that Enron's own in-house financial team was dominated by former Andersen partners. This special report further cites one former Andersen staff's statement: "There were so many people in the Houston office who had their fingers in the Enron pie… If they had somebody who said we can't sign this audit, that person would get fired." In a more recent case, the SEC filed a proposed sanction to Ernst & Young on May 23, 2003, because of the alleged independence violation between Ernst & Young and its client PeopleSoft. At issue is the four-year relationship during which Ernst & Young not only audited the company's financial statements, but also generated over $450 million of revenues in helping other companies adopt and implement PropleSoft products.

[2]According to Section 207 of the Sarbanes-Oxley Act of 2002, mandatory rotation refers to the "imposition of a limit on the period of years in which a particular registered public accounting firm may be the auditor of record for a particular issuer." While the Act does not impose mandatory rotation on audit firms, it does mandate a study of mandatory rotation by the Comptroller General of the U.S. to be completed within one year of the passage of the Act.

Raghunandan 2003). The results, however, provide mixed support for the contention that nonaudit services do threaten auditor independence. On the other hand, mandatory auditor rotation has been frequently discussed by regulators as an alternative mechanism of improving auditor independence and reducing audit failures (U.S. Senate's Metcalf Report 1977; AICPA's Cohen Report 1978; SEC 1994; POB 2002).[3] While the public practice has debated over mandatory rotation since the 1970s (Bates, Ingram, and Reckers 1982; Brody and Moscove 1998; Hoyle 1978; Petty and Cuganesan 1996; Stevens 1990; Vanasco 1996; Winters 1976;),[4] the academic lagged in this issue until recent years. Similar to the nonaudit service studies, however, most of the current research generates mixed results to support the adoption of mandatory rotation (Arrunada and Paz-Ares 1997; Dopuch, King, and Schwartz 2001; Elitzur and Falk 1996; Geiger and Raghunandan 2002; Johnson, Khurana, and Reynolds 2002; Myers, Myers, and Omer 2003; Summer 1998). In light of these and other anecdotal evidence, the efficacy of these two proposed mechanisms is still in debate. Therefore, more research should continue to shed light on other mechanisms that may improve auditor independence for regulatory purposes.

In this study, I propose an *ex post* mechanism that has already existed for many decades but may effectively improve auditor's independence: the legal system imposing on the auditors. In general, a complete *legal system* affecting the auditing profession consists of liability regimes (negligence vs. strict) and damage apportionment rules (joint-and-several vs. proportionate). 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. While prior analytical and experimental studies comparing the relative effectiveness of different legal systems have generally focused on the effects of legal regimes (Dopuch and King 1992; King and Schwartz 1999, 2000; Radhakrishnan 1999; Schwartz 1997)[5] or damage apportionment rules (Boritz and Zhang 1997; Chan and Pae 1998; Dopuch, King, and

[3]The *Business Week*'s (1/28/2002) special report also proposes that mandate rotation of auditors should be one way to re-establish the public confidence after the Enron scandal. In a testimony before the House of Representatives Committee on Energy and Commerce on February 6, 2002, Professor Baruch Lev points out that "…Auditors' rotation is very low; quite frequently auditors serve the same company 10-20 years, or more (much of the auditors' rotation, as is, is due to frequent mergers and acquisitions by companies rather than to inadequate service.)…Such close arrangements and relationships between auditors and auditees are manifestly inconsistent with independent, effective and high quality auditing services." In fact, many European countries have adopted mandatory auditor rotation as a solution to independence (Buijink, Maijoor, Meiwissen, and Witteloostuijn 1996).

[4]See Catanach and Walker (1999) for a detailed discussion about the world-wide debate of mandatory auditor rotation. Catanach and Walker (1999) also proposes that a complete examination of auditor rotation should consider the interactions among auditor tenure, audit quality (which is further affected by auditor's ability to detect misstatements and fraud and professional ethics in performing audit procedures), the economic incentives of providing auditing services, and audit market structure. See Dopuch, King, and Schwartz (2001) for a discussion of the current debate of mandatory rotation and auditor independence in the U.S.

[5]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.

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 auditor's independence behavior. Since these prior studies look at legal regimes and damage apportionment rules in isolation, their results are limited and may not provide a sufficiently confirmatory foundation upon which to predict or describe auditor's optimal strategies and responses. In light of this deficiency, my study contributes to the literature by linking studies in auditor independence and auditor's legal liability to analytically and experimentally examine how different legal systems may affect auditor's independence.

My study also extends the auditor's liability literature that focuses on audit quality by separating audit failure into two types: a *technical* and an *independence* audit failure. This distinction is important for three reasons. First, the Enron scandal reveals the fact that an audit failure resulting from auditor's compromising his independence may entail huge losses[6] to the capital markets and deteriorate public trust to the auditing profession that is much higher than an audit failure resulting from auditor's imperfect audit technology or lower audit effort. 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 (Dye 1993; Dye, Balachandran, and Magee 1990; Melumad and Thoman 1990; Hillegeist 1999; Pae and Yoo 2001; Schwartz 1997; Thoman 1996), but have often overlooked the possibility and existence of independence audit failure. Second, the Sarbanes-Oxley Act of 2002 (Title II) and the SEC's 2003 final rules on auditor independence[7] are more likely to be concerned with the incidence of independence audit failure rather than with technical audit failure. Finally, 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.[8] Therefore, the auditor can minimize damage payments due to technical audit failure by varying his audit effort. 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. Note that a technical audit failure results from the imperfection of audit technology or a lack of due professional care, but an independence audit failure results from auditor's intentionally compromising his independence. Without distinguishing between these two types of audit failure, prior studies in auditor's

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[6]According to *Business Week*'s (1/28/2002) special report, the Enron debacle results in a $50 billion bankruptcy, $32 billion lost in market cap, and employee retirement accounts drained of more than $1 billion.

[7]On January 22, 2003, the SEC approved new rules intended to strengthen the independence of external auditors. The new rule, entitled *Strengthening the Commission's Requirements Regarding Auditor Independence*, are mandated by Title II of the Sarbanes-Oxley Act of 2002, which requires the SEC to adopt by January 26, 2002, final rules under which certain nonaudit services are prohibited; conflict of interest standards are strengthened; auditor rotation requirements are enhanced, and reports by the auditors to audit committees will be expanded and clarified. The final rules can be found on the SEC's Website at: *http://www.sec.gov/rules/final/33-8183.htm*.

[8]See King and Schwartz (1997) for a detailed discussion about the key provisions in the 1995 Reform Act.

legal liability could not fully examine the interactive effects among auditor's effort level (which affects the technical audit failure), auditor's independence decision (which affects the independence audit failure), and firm's new investments under a setting that incorporates the salient features of the 1995 Reform Act. In this regard, my study also complements recent empirical studies that explore the economic and regulatory consequences of the 1995 Reform Act. For example, Ali and Kallapur (2001) investigates the security prices surrounding the Act-related events. Johnson, Kasznik, and Nelson (2002) tests the impacts of this Act's safe harbor provision on high-technology firms' voluntary disclosure of forward-looking information. Lee and Mande (2003) examines whether the Act's elimination of joint and several rule affects auditors' incentives to curtail client managers' income-increasing discretionary accruals. Different from these papers, my study focuses mainly on how the applications of the damage apportionment rules stipulated in the Act may affect auditor's effort and independence decisions and firm's investment under different legal regimes.

In general, there are two potential benefits (beyond normal audit fees) an auditor may gain from compromising his independence: the *quasi rents* accrued in future engagements and manager's *side payment* to the auditor in the current period.[9] DeAngelo (1981) indicates that client-specific quasi rents an incumbent auditor can earn in future periods will lessen independence. In other words, the existence of future quasi rents constitutes an incentive to induce the auditor to compromise his independence. In contrast, Lee and Gu (1998) argues that if the board of directors, rather than the managers, has the right to hire or dismiss the auditor, then even though the auditor may sacrifice his independence to earn a side payment in the current period, he may also be dismissed by the board of directors and, therefore, lose all future quasi rents. To create a setting in which the auditor will compromise his independence to the highest level, I assume that the manager provides the above two benefits to the auditor. The basic model setting involves a one-period, two-player game in which a firm's risk-neutral manager intends to expand the operations by undertaking either a *high-cost innovative* project (which yields a high outcome) or a *low-cost established* project (which yields a low outcome). Due to the lack of internal funds, the manager must immediately raise the money from outside investors; otherwise the investment opportunity will be lost. The manager privately pays a fixed audit fee to hire a risk-neutral auditor to attest the credibility of the investment outcome. The auditor chooses an effort level at a cost and obtains an audit signal regarding the probable outcome of the investment. Based on the audit signal, the auditor issues a report to the investors. To provide the manager with strong motivation to induce the auditor to issue a favorable report, I follow Dopuch

[9]Even though the manager's side payments are generally prohibited, Lee and Gu (1998) indicates that side payment can take several forms, some of which are *prima facie* legal (e.g., the auditor is appointed by the manager on behalf of the shareholders and the manager can use the appointment itself as a side payment to sway auditor) and some of which may be legally justified (e.g., grant the auditor with consulting contracts). Generally speaking, preventing or detecting side payments can be legally difficult and expensive. See footnote 5 (p.536) of Lee and Gu (1998) for detailed discussions about potential side payment between the manager and auditor.

et al. (2001) by assuming that the manager's compensation is influenced by auditor's report. The auditor may commit either a technical audit failure (resulting from the imperfect audit technology and the audit effort level chosen) or an independence audit failure (resulting from compromising his independence to earn the above two benefits offered by the manager). Finally, the true investment outcome is realized. If the investors suffer damages, they will sue the auditor for compensation. The auditor will be subjected to a legal system in determining whether he is liable and the share of damages he has to pay.

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' liability levels and observe subsequent changes in firms' new investments). Also, laboratory experiments provide a more precise measure of auditor independence than prior empirical-archival studies (e.g., the use of proxies such as the ratio of nonaudit service fees to audit fees or the magnitude of discretionary accruals). Second, because my model predicts multiple equilibria about manager's and auditor's strategic behavior, experimentation provides a useful means to explore actual behavior and equilibrium selection. Third, for an experimental investigation to make an incremental contribution beyond the analytical models, we need to learn something from actual behavior that is not obvious in the model. My experiments achieve this goal by explicitly testing how auditor's ethical concerns and fairness perception may affect his independence decision and effort level. An investigation (rather than demonstration) of the predictive ability of economic models using behavioral and psychological factors has been emphasized by Camerer (1997), Dopuch et al. (2001), Kachelmeier (1996a, 1996b), and King and Schwartz (2000). Finally, it is impossible to vary the legal systems 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 to different legal systems that could exist, laboratory experiments provide a controlled environment to address the independence and other related issues that may bear policy implications. In light of this, my study uses the laboratory as a "wind tunnel" to investigate the relative efficacy of different legal systems for future regulatory and control uses.

Briefly, I find a trade-off among technical audit failure, independence audit failure, and firm's new investments under different legal systems, suggesting that no single legal system can provoke higher audit quality, improve auditor independence, and encourage firm's investments concurrently. If improving auditor independence and encouraging firm's investment are emphasized by the policy makers and regulators, the experimental evidence indicates that a legal system that consists of a strict legal regime with a proportionate damage rule can induce the highest level of auditor independence and investments. In addition, I investigate possible behavioral reasons that may explain the deviations of the experimental results from model predictions and find that auditors' ethical concerns about compromising independence and their fairness perception about the two damage apportionment rules significantly affect their decisions. This result suggests the importance of incorporating human's psychological factors into the investigation of auditor's legal liability and independence behavior. Finally, I find that an emphasis on damage apportionment rule (as is the case in the 1995 Reform Act) is by itself not enough to improve auditor independence and motivate firms' investments. More important, I find that a switch of legal regime seems to be more useful than a switch of damage apportionment rule in achieving these goals. This result provides support for recent trends of moving auditor's legal liability toward a strict regime after the enactment of the Sarbanes-Oxley Act of 2002.[10]

The remainder of this study is organized as follows. Section 2 presents the model setting, different players' strategic behaviors, and hypotheses. Section 3 describes the experimental design, the procedures, and the methods. Section 4 discusses the experimental results. The paper concludes with a summary of findings in section 5.

2. BASIC MODEL AND HYPOTHESIS DEVELOPMENT

2.1 Basic Model Setting:

Suppose a firm intends to expand its operations. Because the firm does not have readily available internal funds, 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

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[10]This new Act imposes many new regulations on the CPA profession. For example, the newly-established Public Company Accounting Oversight Board (PCAOB) is empowered to regularly inspect CPA firms' operations and will investigate potential violations of securities laws, standards, competency and conduct. Sanctions such as revocation or suspension of a CPA firm's registration, prohibition from auditing public companies, and imposition of civil penalties may be imposed for non-cooperation, violations, or failure to supervise a partner or employee in a CPA firm. Investigations can be referred to the SEC, or with the SEC's approval, to the Department of Justice, state attorneys general or state boards of accountancy under certain circumstances. Second, it is now a felony with penalties of up to 10 years to willfully fail to maintain all audit or review workpapers for at least five years, or up to 20 years to destroy documents in a federal or bankruptcy investigation. Finally, the statute of limitations for the discovery of fraud is extended to two years from the date of discovery and five years after the act (it was previously one year from discovery and three from the act). On October 7, 2003, the PCAOB adopted final rules relating to inspections of registered CPA firms. These new rules are based on Section 104(a) of the Sarbanes-Oxley Act, which directs the PCAOB to conduct a continuing program of inspections to assess the degree to which each registered CPA firm complies with the Act, the Board's and the SEC's rules, and professional standards in connection with audits, audit reports, and related matters involving U.S. public companies. The PCAOB's final rules would (1) establish a schedule for regular inspections that is consistent with Section 104 (b)(1) of the Act, including annual inspections for firms that do the largest volume of audit work and at least triennial inspections for other firms that do some volume of audit work, and (2) implement the authority and responsibility to report information indicating possible violations of law or professional standards to the SEC, appropriate state regulatory authorities, and other regulators and law enforcement authorities.

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 (where $i \in$ {*high*, *low*}) at an effort cost $C(e_M^i)$. While the manager privately undertakes the investment selected, the realized outcome of the investment ω is publicly available 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 0.70 probability of receiving *L* and a 0.30 probability of receiving *H* (i.e., $\rho(I_{low}) = 0.3$). 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* (i.e., $\rho(I_{high}) = 0.7$). To be responsible for the investors who provide the funds, the manager pays a flat audit fee *F* to hire a risk-neutral independent auditor to credibly verify the outcome of the investment.[11] Note that the manager's reporting decision is exogenous because my model focuses on auditor's independence decision, as reflected by his reporting strategy. The auditor chooses an effort level e_A at a cost $C(e_A)$ and obtains a signal ξ regarding the probable outcome of the investment. Let S^H (or S^L) denote the audit signal that the outcome is high (or low), $\xi \in \{S^H, S^L\}$.

[Insert Table 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

[11] The use of flat audit fees can be justified by several reasons. First, this setting is consistent with the rules that prohibit contingent fees. Therefore, if the investors suffer losses due to misstatements in the financial statements, their only remedy is to sue the auditors for compensation. Second, instead of incorporating a formal bidding process, a flat audit fee can simplify the experimental setting for the subjects. This also allows my model to focus cleanly on auditor's effort and reporting strategies without introducing undue complexity to the environment. Finally, Simunic and Stein (1996) finds that upward adjustment of audit fees is "made almost exclusively through higher levels of auditor effort, rather than through a pure price premium." (p.120). This finding contradicts with the general belief that the auditor will raise audit fee to cover the increased auditing and litigation costs. In fact, high competition in the public accounting profession and price elastic demand arising from an excess supply of audits may prevent CPA firms from simply raising their audit fees to cover the potential litigation risk. This is consistent with Hillegeist's (1999) argument that the audit fee is fixed in the U.S. current audit environment.

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. To provide the manager with strong impetus to induce the auditor to issue a favorable audit report, I follow Dopuch et al. (2001) by assuming that the auditor's report affects 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). Since this study focuses on auditor's independence, a more detailed discussion of auditor's reporting strategy is given below. First, if the audit signal is S^H, the auditor can only issue an $\hat{H}$ report (i.e., the auditor's reporting strategy is $p(\hat{H} \mid S^H) = 1$). 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 a *technical audit failure* (denoted by AF_{tec}) because the auditor cannot effectively discover the true outcome of the investment due to his imperfect audit technology and effort level. Therefore, the AF_{tec} rate can be defined as the conditional probability that the auditor obtains an audit signal S^L when the true investment outcome is *L* (i.e., $AF_{tec} \equiv p(S^L \mid L)$). 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 investment outcome 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 investment outcome. Since the auditor does not commit a knowing violation of the securities laws, the 1995 Reform Act stipulates that the auditor be held liable for the AF_{tec} damages proportionately. During its deliberations, the court compares its own (noisy) observation 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 $\lambda(e_A)$, where $\lambda(e_A)$ 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 as well as in the experiments, this $\lambda(e_A)$ is manipulated to be less than one (either 0.3 or 0.7) under the negligence legal regime (denoted by NE) and equal 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 portion k (equals 0.4 in the numerical example) of the total damages D_{tec} that will be paid by the auditor. 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 ensures the auditor that the true investment outcome is *L*. In this situation, the auditor may issue either an $\hat{H}$ or $\hat{L}$ report, depending on his independence decision. 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 to the auditor: one is the present value of quasi rents accrued in future audit engagements (denoted by *ER*), and the other one is manager's side payment to the auditor in the current period (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. The AF_{ind} rate is thus equal to the conditional probability that the auditor issues an $\hat{H}$ report when the audit signal is S^L (i.e., $AF_{ind} \equiv p(\hat{H} \mid S^L)$). 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 will go bankrupt. 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 $\lambda(e_A)$.[12] If

[12]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 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.

the court holds the auditor liable, it then determines the total damages D_{ind} (which is also set to be independent of the actual investment I_i) the auditor should pay to the investors. Note that the auditor only has to pay *k* percent of the total D_{tec} when there is an AF_{tec} (in which the proportionate damage rule is applied), but has to pay the full amount of D_{ind} when an AF_{ind} occurs (in which the joint-and-several damage rule is applied). In my model as well as in the experiments, this damage portion *k* is manipulated at two levels (i.e., $k = 0.4$ vs. 1) to capture the basic difference between the joint-and-several (denoted by JS) and proportionate (denoted by PR) damage apportionment rules.

If the auditor refuses the *SP* and insists on issuing an $\hat{L}$ report (i.e., the auditor is independent or $p(\hat{L} \mid S^L) = 1$), the manager will replace the auditor at a switching cost (denoted by *SC*). Because the auditor is dismissed, he will lose the present value of future quasi rents *ER*. This one-period game then ends. Figure 1 presents the game tree of the interactions between manager and auditor. Appendix 1 summarizes different players' payoffs under different game outcomes and legal systems.

[Insert Figure 1 here]

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 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 systems. I overcome this problem by solving the game using the parameter values specified in Table 1. Table 2 summarizes the manager's and auditor's equilibrium strategies and payoffs under different legal systems (see Appendix 2 for the numerical solutions of the game).

[Insert Table 2 here]

As depicted in Table 2, under the NE regime there are two competing equilibria for each of the two damage apportionment rules. For example, columns (A) and (C) predict that the manager will undertake I_{low} and the auditor will exert e_A^{high} and always report $\hat{H}$ when he observes a low signal S^L, resulting in an expected AF_{ind} rate of one and an AF_{tec} rate of 0.3. The intuition of this equilibrium is straightforward: Since the manager expects that the auditor will compromise his independence, the manager's can be sure that he will earn the high compensation $M_{\hat{H}}$ = 1,820 EDs. Therefore, the profit-maximizing manager has no incentive to undertake I_{high} because it requires a higher effort cost $C(e_M^{high})$ = 650 EDs. On the other hand, because the auditor anticipates that the manager will undertake I_{low} (with only 0.3 probability of generating a high outcome *H*) and he decides to compromise his independence (i.e., the AF_{ind} rate equals one), the auditor's exerting e_A^{high} not only reduces the AF_{tec} rate, but also reduces the probability of being held liable when the investors file a lawsuit against the auditor due to a bad state of economy and the occurrence of either an AF_{ind} or AF_{tec} (remember that $\lambda(e_A)$ is decreasing in e_A). The auditor has incentive to compromise his independence because the expected benefit of doing this $(1-\rho(I_i))\cdot q(e_A^{high})\cdot[(1-\delta)\cdot(SP+ER)]$ is larger than its expected cost $(1-\rho(I_i))\cdot q(e_A^{high})\cdot\delta\cdot\lambda(e_A^{high})\cdot D_{ind}$. In contrast, columns (B) and (D) predicts that the manager will undertake I_{high} and the auditor will respond by exerting e_A^{low} and reporting $\hat{L}$ when he observes S^L, resulting in an expected AF_{ind} rate of zero and an AF_{tec} rate of 0.7. Since the manager's compensation depends on auditor's report and he expects that the auditor will not compromise his independence, the manager's best strategy is to choose I_{high} to increase the probability of receiving an $\hat{H}$ report. Because I_{high} will generate a high outcome H with probability 0.7, the auditor's *ex ante* expected probability of committing an AF_{tec} decreases substantially. In addition, maintaining independent reduces the AF_{ind} rate to zero. Therefore, the profit-maximizing auditor will choose to exert e_A^{low} to minimize his effort cost. The auditor has incentive to remain independent because the expected benefit of compromising independence $(1-\rho(I_i))\cdot q(e_A^{low})\cdot[(1-\delta)\cdot(SP+ER)]$ is smaller than its expected cost $(1-\rho(I_i))\cdot q(e_A^{low})\cdot\delta\cdot\lambda(e_A^{low})\cdot D_{ind}$. Note that the manager's expected payoffs are the same under both the JS and PR rules (i.e., 571 EDs for equilibria (A) and (C) and 543 EDs for equilibria (B) and (D)) but the auditor's payoffs are higher under the PR rule than under the JS rule (i.e., 536 vs. 518 EDs for equilibria (C) and (A), respectively, and 714 vs. 671 EDs for equilibria (D) and (B), respectively). This is because my model assumes that the firm has been bankrupt during a lawsuit and the auditor is the sole defendant who is responsible for k = 0.40 (k = 1) portion of the damages D_{tec} under the PR (JS) rule. To facilitate the discussion and presentation of the hypotheses, let $p(\bullet)$ represent the probability that a specific event occurs. For example, $p(I_i)$ denotes the probability that the manager undertakes investment I_i and $p(e_A^i)$ denotes the probability that the auditor exerts an effort level e_A^i. The above discussions lead to the following two sets of competing hypotheses:

Hypothesis 1: *Under an NE regime together with a JS rule, the manager's and auditor's equilibrium strategies will be one of the following:*

(a) $p(I_{low})$ *= 1,* $p(e_A^{high})$ *= 1 (which results in an* AF_{tec} *rate of 0.3), and* $p(\hat{H}\mid S^L)$ *=1 (which results in an* AF_{ind} *rate of 1); or*

(b) $p(I_{high})$ *= 1,* $p(e_A^{low})$ *= 1 (which results in an* AF_{tec} *rate of 0.7), and* $p(\hat{L}\mid S^L)$ *=1 (which results in an* AF_{ind} *rate of 0).*

Hypothesis 2: *Under an NE regime together with a PR rule, the manager's and auditor's equilibrium strategies will be one of the following:*

(a) $p(I_{low}) = 1, p(e_A^{high}) = 1$ *(which results in an* AF_{tec} *rate of 0.3), and* $p(\hat{H} \mid S^L) = 1$ *(which results in an* AF_{ind} *rate of 1); or*

(b) $p(I_{high}) = 1, p(e_A^{low}) = 1$ *(which results in an* AF_{tec} *rate of 0.7), and* $p(\hat{L} \mid S^L) = 1$ *(which results in an* AF_{ind} *rate of 0).*

Even though prior experimental research in auditing has shown that game models can generally provide reasonable predictions of players' behavior (Dopuch et al. 2001), Kachelmeier (1996a, 1996b) argue that human behavior is likely case-specific and experimental research should consider both economic and psychological factors in understanding human behavior. In response to Kachelmeier's comments, I examine one possible behavioral factor that may affect the predictive accuracy of my model: the auditor's ethical concerns.[13] This factor is important for two reasons. First, after several recent accounting scandals (e.g., Enron, WorldCom, and Merck), ethics has been emphasized by various professional communities as a key to facilitate and encourage public trust (Arnott 2003; Grace and Haupert 2003). Smith (2002) further claims that public confidence in the capital market can be restored only by ethical leadership from the auditing profession, business enterprises, and the regulators. Second, accounting research has described ethics as an *internally mediated* control for individual's self-interested and opportunistic behavior (Dees 1992; DeGeorge 1992; Koford and Penno 1992; Luft 1997; Noreen 1988; Stevens 2002). Since ethics concerns are jointly determined by characteristics of the situation and the individual (Jones 1991) and typically arise in situations where self-interest conflicts with a moral duty to others (Bowie and Duska 1990), my model provides an eligible setting to examine the auditor's contemplation to do the right thing when he is facing strong incentives of compromising his independence. Based on these discussions, I posit that the auditor may drive his utility not only from his expected payoffs, but also from his ethical concerns. This leads to the following behavioral hypothesis:

HYPOTHESIS 3: *If the auditor follows the reporting strategy specified in part (a) of Hypotheses 1 and 2, the auditor will tend to compromise his independence less often than the model prediction because of his ethical concerns.*

Columns (E) and (F) of Table 2 indicates that under the ST regime there is only one unique equilibrium for both damage apportionment rules. In particular, the model predicts that the manager will undertake I_{high} and the auditor will react accordingly by exerting e_A^{low} and issuing an $\hat{L}$ report when he observes S^L, resulting in an expected AF_{ind} rate of zero and an AF_{tec} rate of 0.7. This equilibrium is sustained because the auditor's probability of being held liable $\lambda(e_A)$ always

[13] According to Stevens (2002), ethical concerns differ from reputation concerns in that the former are internally mediated but the latter are socially mediated to social norms.

equals one under the ST regime, *no matter what effort level the auditor exerts*. Therefore, the auditor's potential legal liability increases considerably. Since the magnitude of D_{ind} is set relatively large (i.e., 1,450 EDs), the auditor has no incentive to compromise his independence because the expected benefit of compromising independence $(1-\rho(I_i))\cdot q(e_A^j)\cdot[(1-\delta)\cdot(SP+ER)]$ is smaller than its expected cost $(1-\rho(I_i))\cdot q(e_A^j)\cdot\delta\cdot D_{ind}$. In expectation of this, the manager's best strategy is to choose I_{high} to increase the probability of receiving an $\hat{H}$ report so that he can earn a high compensation $M_{\hat{H}}$. Because I_{high} leads to high outcome H with probability 0.7, the auditor's *ex ante* expected probability of committing an AF_{tec} decreases substantially. Thus, the auditor will choose e_A^{low} to minimize his effort cost. Again, due to the basic difference between the two damage apportionment rules (i.e., k = 0.40 vs. 1), the auditor's expected payoffs are higher under the PR rule than under the JS rule (i.e., 702 vs. 641 EDs). The above discussions lead to the following two hypotheses:

Hypothesis 4: *Under a ST regime together with a JS rule,* $p(I_{high})=1, p(e_A^{low})=1$ *(which results in an* AF_{tec} *rate of 0.7), and* $p(\hat{L}\mid S^L)=1$ *(which results in an* AF_{ind} *rate of 0).*

Hypothesis 5: *Under a ST regime together with a PR rule,* $p(I_{high})=1, p(e_A^{low})=1$ *(which results in an* AF_{tec} *rate of 0.7), and* $p(\hat{L}\mid S^L)=1$ *(which results in an* AF_{ind} *rate of 0).*

In a tax compliance game setting, Erard and Feinstein (1994) points out that one important behavioral factor that may affect a taxpayer's decision to report the pre-tax income truthfully is his / her perceptions about the fairness of the tax system. Several economists have also emphasized the importance of fairness in regulation and public policy issues (e.g., Akerlof 1979, 1982; Arrow 1973; Hirschman 1970; Okun 1981; Solow 1980; Zajac 1978, 1985, 1995). In fact, many recent economic and psychological experiments show that individual's fairness concerns may diminish self-interested behavior in ways that are both statistically and practically significant (Forsythe, Horowitz, Savin, and Sefton 1994; Greenberg 1990; Kachelmeier, Limberg, Schadewald 1991; Kahneman, Knetsch, and Thaler 1986a, 1986b; Rabin 1993).[14] Since the 1995 Reform Act replaces the joint-and-several rule with a "fair share" proportionate rule for allocating damages (King and Schwartz 1997), I posit that the auditor may perceive the PR rule to be relatively fair than the JS rule and, therefore, exert e_A^{high} more often under the PR rule. This leads to the following behavioral hypothesis:

Hypothesis 6: *Under both the NE and ST regimes, the auditor will tend to exert* e_A^{high} *more often under the PR rule than under the JS rule because he perceives the former to be relatively fair than the latter.*

[14]See Luft (1997) for a brief review of fairness studies in management accounting and transaction costs.

3. EXPERIMENTAL DESIGN AND PROCEDURES

To test the hypotheses of interest, I adopts the split-plot factorial design, with one between-subject variable, *REGIME* (manipulated at two levels: NE vs. ST), and one within-subject variable, *RULE* (manipulated at two levels: JS vs. PR), leading to four experiments. The split-plot factorial design is used not only to facilitate the test of hypothesis H6 (which requires the auditor-subjects to participate in two damage apportionment rules), but also to reduce noises in the experimental data, which is often high in early periods of the experiments because of the complexity of the experimental environment (Bloomfield and Wilks 2000; Libby, Bloomfield, and Nelson 2002). Each experiment consists of 35 periods of treatment JS and 35 periods of treatment PR. To minimize the carryover effect, two *RULE* orders are manipulated for each *REGIME* level: JS_PR (labeled "Order #1") and PR_JS (labeled "Order #2"). Each period simulates the one-period game between auditor and manager specified in section 3.1. Table 3 summaries the experimental design.

[Insert Table 3 here]

A notional currency called *Experimental Dollars* (EDs) is used in the experiments. In each experiment, all communications and interactions between players are handled by a system of networked personal computers. I 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.[15] Students participate in two sessions. At the half-hour *training* session, subjects receive written instructions that are read aloud by the experimenter.[16] After clarifying questions are answered, a quiz (consists of ten true-false questions) is 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 average cash paid to the subjects is US$0.98, with the range being from US$0.87 to US$1). 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 is the two-and-half-hour *experiment* session. All subjects 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 is endowed with 1,200 EDs and each auditor-subject is endowed with 1,000 EDs. Each subject plays the same role throughout all 70 periods. Upon completion of all experimental periods (the steps for each experimental period are described below), subjects are asked to complete a post-experimental questionnaire, paid their

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[15]A series of Kruskal-Wallis one-way ANOVAs using subjects' demographic data obtained from the post-experimental questionnaires indicate that random assignment to experimental treatments is successful.

[16]The experimental instructions and all related materials are available from the author upon request.

earnings privately in cash, and dismissed. The main purposes of this questionnaire are: (a) to obtain subjects' background information, (b) to gain an understanding of whether participants are adequately compensated, and (3) to understand how participants make their decisions in the experiments. The average cash earnings paid to the students is US$22.76 (ranging from US$18.96 to US$27.56). All four experiments take about three hours to finish.

The steps for each experimental period are described below:[17]

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 I_{low} (with an effort cost of 250 EDs) and a high-cost investment I_{high} (with an effort cost of 650 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*. Manager-subjects can only choose one investment 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 true outcome of the investment is determined by the computer and shown on each manager-subject's screen. The manager-subject pays a flat audit fee 450 EDs to hire an auditor-subject to credibly verify the outcome of the investment.

Step 5: Each auditor-subject privately determines the effort level to be exerted by choosing either "High Effort Level" (with an effort cost of 260 EDs) or "Low Effort Level" (with an effort cost of 100 EDs) on the computer screen. Because of the imperfection of the audit technology, each auditor-subject knows that if the true outcome is *H*, he will always obtain a "High" audit signal S^H with probability one. If the true outcome 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}.

[17]In accordance with the *theory of induced value* (Smith 1976) and to minimize the effects of role-playing by subjects, the experiments are made as generic as possible. Therefore, auditor, manger, and investors are denoted as "Player A," "Player M," and "lenders," respectively. In addition, the audit signal and auditor's report are denoted by "verification signal" and "verification report," respectively. While the auditor's technical audit failure is labeled by "verification failure," I cannot find any neutral term to denote auditor's independence audit failure. Therefore, I describe in the experimental instructions how an auditor-subject may earn (or lose) the quasi-rents and manager's side payment if he / she issues an $\hat{H}$ (or $\hat{L}$) report when the audit signal is S^L and the corresponding penalties.

Step 6**:** Based on the auditor-subject's effort choice and the true investment outcome, the computer determines the audit signal according to the probability distribution specified in Step 5.

Step 7**:** Upon observing the audit signal, the auditor-subject privately determines the audit report to be issued by choosing either "High Report" $\hat{H}$ or "Low Report" $\hat{L}$ on the computer screen. The auditor-subject is informed of the reporting rules and the corresponding legal liabilities specified in section 3.1.

Step 8**:** Each player's payoff is determined and the experimental period terminates. If the firm remains as a going-concern, the manager-subject will earn a compensation of 1,820 EDs (or 1,000 EDs) when the auditor-subject's report is $\hat{H}$ (or $\hat{L}$). A side payment of 400 EDs will be subtracted from the manager-subject's payoff if the matched auditor-subject compromises his / her independence. The auditor-subject will earn an audit fee of 450 EDs plus 500 EDs of quasi rents accrued in future audit engagements and 400 EDs of side payment. If the auditor-subject remains independent, a switching cost of 500 EDs will be subtracted from the manager-subject's payoff and the auditor-subject will lose the total quasi rents and the side payment. Conversely, if the firm goes bankrupt, the manager-subject will earn zero payoff. When an AF_{tec} occurs and the auditor-subject is held liable by the computer court (depending on the legal regime), he / she is responsible for part or total of the total damages 800 EDs, depending on the damage apportionment rules. In contrast, when an AF_{ind} occurs and the auditor-subject is held liable (depending on the legal regime), he / she is responsible for the total damages 1,450 EDs.

4. EXPERIMENTAL RESULTS

Several points related to the experimental results are worth noting. First, the data set of 80 observations compromises 20 independent replications of each of the four experiments. One observation represents the *average* behavior of the overall 35 periods played by the same auditor- or manager-subject under either the JS or PR rule. Second, since subjects in my experiments make their decisions across two damage apportionment rules, the observations cannot be regarded as independent. Accordingly, I employ the paired two-tailed *t* tests to examine whether subjects' decisions differ under different damage rules. A nonparametric bootstrap method is also used to verify the paired *t* test results because of the relatively small number of observations in each experiment.[18] Since the bootstrap results are similar to those obtained from

[18] Prior laboratory market studies in accounting and auditing have generally used the approximate randomization test for statistical analyses (Dopuch and King 1992; Dopuch, King, and Schatzberg 1994; Dopuch, Ingberman, and King 1997; King and Schwartz 1999, 2000; Dopuch, King, and Schwartz 2001). However, Romano (1989) shows that, under reasonably general conditions, randomization and bootstrap tests are asymptotically equivalent in the sense that the resulting critical values and power functions are appropriately close. In addition, Yu (2001) also adopts the nonparametric bootstrap method to handle the small sample size problem in laboratory market experiments. Therefore, I use the

the paired t tests, the experimental results reported in this section are based mainly on the paired t tests. Third, in analyzing the data, the AF_{ind} rate is measured by the conditional probability that the auditor issues an $\hat{L}$ report when he observes an S^L signal, *no matter whether there is a lawsuit against the auditor due to a bad state of economy*. This measurement is more relevant to the policy makers because it is the violation of independence *per se* that is of particular interests for regulation purposes. Similarly, the AF_{tec} rate is measured by the conditional probability that the auditor obtains an S^H signal when the true investment outcome is L, no matter whether there is a lawsuit against the auditor. Finally, to assist the discussions of the experimental results, I use NE_JS, NE_PR, ST_JS, and ST_PR to denote the four legal systems examined.

4.1 Players' Behavior under Different Legal Regimes (tests of Hypotheses H1, H2, H4, and H5):

Hypotheses H1 and H2 predict two competing equilibrium strategies for the manager and auditor under the NE_JS and NE_PR legal systems, respectively. Columns (A) and (B) on Panel A of Table 4 show that the average frequencies of auditor's exerting e_A^{high} are 73.14 and 81.86 percent for the NE_JS and NE_PR systems, respectively. Two t tests indicate that both percentages are significantly closer to one rather than zero (t = 43.1345 and 21.2851, respectively, two-tailed $p <$ 0.0000). As depicted in columns (E) and (F), these relatively high frequencies of e_A^{high} give rise to 34.72 and 29.25 percent of AF_{tec} rate under the NE_JS and NE_PR systems, respectively. Besides, columns (C) and (D) indicate that the average frequencies of AF_{ind} rates are 85.07 and 84.64 percent for the NE_JS and NE_PR systems, respectively, which are also significantly closer to one rather than zero (t = 23.9846 and 16.8901, respectively, two-tailed p < 0.0000). Conversely, columns (G) and (H) demonstrate that the average frequencies of manager-subjects' undertaking I_{high} are 21.00 and 23.14 percent under the NE_JS and NE_PR systems, respectively, which are significantly closer to zero rather than one (t = −18.2714 and −14.5828, respectively, two-tailed p < 0.0000). Obviously, these experimental results show that, given the NE regime, the manager-subjects tend to undertake I_{low} and the auditor-subjects tend to exert e_A^{high} and compromise their independence more often under both damage apportionment rules. Therefore, hypotheses H1-(a) and H2-(a) seem to be the prevailing equilibrium in the experiments.

[Insert Table 4 here]

In contrast, hypotheses H4 and H5 predict that both the ST_JS and ST_PR legal systems will induce the manager to

nonparametric bootstrap tests to verify the parametric t test analyses. The two-sample bootstrap t statistic is computed by calculating the t statistic from the original data; the data are then resampled 30,000 times with replacement and the t statistic is computed for each bootstrap sample. The bootstrap p value measures the *achieved significance level* (ASL) using the percentage of times the t test statistic from the bootstrap samples is less than the t test statistic from the original data. See Efron and Tibshirani (1993) for detailed discussions about bootstrap t tests.

undertake I_{high} and motivate the auditor to exert e_A^{low} and remain independent. Panel B of Table 4 qualitatively supports these two hypotheses. For example, columns (I) and (J) show that the average frequencies of auditor's exerting e_A^{high} are 15.29 and 20.14 percent under the ST_JS and ST_PR legal systems, respectively, which are significantly closer to zero rather than one (t = –41.0591 and −66.1787, two-tailed p < 0.0000). These relatively low frequencies of e_A^{high} lead to higher AF_{tec} rates of 62.01 percent in column (M) and 55.12 percent in column (N). Conversely, columns (K) and (L) indicate that the average frequencies of AF_{ind} rates are 20.75 and 19.23 percent under the ST_JS and ST_PR legal systems, respectively, which are also significantly closer to zero rather than one (t = −10.1716 and −18.5382, two-tailed p < 0.0000). Finally, columns (O) and (P) report that the manager-subjects undertake I_{high} with an average frequency of 71.86 and 76.43 percent under the ST_JS and ST_PR legal systems, respectively. These percentages are significantly closer to one rather than zero (t = 14.7458 and 11.8160, two-tailed p < 0.0000). Taken together, these experimental results support hypotheses H4 and H5.

The experimental results reported in Table 4 have important implications to the auditing literature in auditor's legal liability. First, columns (E) and (F) in Panel A show that the overall average AF_{tec} rate decreases significantly from 34.72 percent under the JS rule to 29.25 percent under the PR rule (paired t = 3.4788, p < 0.0000). On the other hand, columns (A) and (B) in Panel A reveal that the overall average frequency of auditor-subjects' exerting e_A^{high} increases significantly from 73.14 percent under the JS rule to 81.86 percent under the PR rule (paired t = −3.6120, p < 0.0000). These two results suggest that audit quality (which is strictly increasing in audit effort) also increases under the PR rule through inducing more audit effort. Note that Hillegeist (1999) analytically shows that a switch from JS to PR under a NE regime decreases audit failure rate despite the fact that audit quality has also declined. Since my AF_{tec} rate is equivalent to Hillegeist's (1999) definition of audit failure rate (i.e., the probability that a firm with a high audited report is actually of low type), the experimental results support Hillegeist's (1999) prediction of audit failure rate but contradict with his prediction of audit quality. One possible reason underlying this inconsistency is that in Hillegeist (1999) the audit quality decreases because the owner plays a mixed reporting strategy about firm's type, which is not considered in my model and experiments. Intuitively speaking, under the NE_PR legal system the auditor pays only his share of the damages D_{tec} and this share k and the probability of being held liable $\lambda(e_A)$ are both sensitive to his effort. Therefore, the auditor should have greater incentive to minimize his litigation cost by working harder (Narayanan 1994).

Second, while columns (E) and (F) in Panel A and columns (M) and (N) in Panel B have shown that damage apportionment rule significantly affects the overall average AF_{tec} rate under both liability regimes (paired t = 3.4788 and

2.9841, two-tailed $p < 0.0000$ and 0.0076, respectively), columns (C) and (D) in Panel A and columns (K) and (L) in Panel B indicate that there is no significant differences in the overall average AF_{ind} rate between the two damage apportionment rules (paired $t = 0.1009$ and 0.2750, two-tailed $p < 0.9206$ and 0.7863, respectively). These results accentuate the importance of separating audit failure into technical and independence components: Since AF_{tec} represents an unknowing violation of securities laws, the 1995 Reform Act rules that the auditor be held liable for D_{tec} proportionately. Because the probability of being held liable $\lambda(e_A)$ and the damage share k are both decreasing in audit effort, the auditor can minimize legal costs due to technical audit failure by exerting more effort. This is why damage apportionment rule makes a difference to the AF_{tec} rate. In contrast, because AF_{ind} involves a situation in which the auditor knowingly commits a violation of securities laws, the 1995 Reform Act requires that the auditor be held liable for the total damages D_{ind} jointly and severally. Due to this feature, JS and PR rules indeed impose equivalent AF_{ind} liability on the auditor. This is why damage apportionment rule is trivial to the AF_{ind} rate.

Third, the experimental results reported in Table 4 imply a trade-off among AF_{tec}, AF_{ind}, and firm's new investment. In particular, under the NE (ST) regime, both damage apportionment rules motivate higher (lower) auditor effort, which in turn increases (decreases) audit quality by a lower (higher) AF_{tec} rate, but induce lower (higher) auditor independence and, thus, gives rise to lower (higher) investments. Since the basic legal environment facing the auditors consists of a negligence regime (Schwartz 1997) and is now moving toward a strict regime after the passage of the Sarbanes-Oxley Act of 2002, this trade-off has an important implication to the policy makers: No single legal system can provoke higher audit quality, improve auditor independence, and encourage firm's investments simultaneously. Accordingly, in evaluating and choosing an "appropriate" legal system, the policy makers need to rigorously consider what regulatory consequences or goals they want to attain. If auditor's independence and firm's investment are emphasized, the experimental results suggest that ST_PR should be the desirable legal system to adopt. This notion has often been overlooked in the policy debates and prior studies concerning auditor's legal liability and independence.

Finally, this trade-off also highlights the necessity of incorporating auditor's independence strategy into the examination of auditor's legal liability with a consideration of both legal regimes and damage apportionment rules. Without considering these salient features, Schwartz (1997) proves that a socially optimal level of investment and audit effort can be induced simultaneously under a ST regime with a damage measure that is independent of the actual investment. My experimental results show that Schwartz's (1997) findings may no longer be valid if the auditor faces both audit effort and independence decisions under more complete legal settings.

4.2 Players' Ethical Concerns and Fairness Perception (tests of Hypotheses H3 and H6):

Panel A of Table 4 has shown that the auditor-subjects' reporting strategy supports hypotheses H1-(a) and H2-(a). As indicated in Panel A of Table 4, however, the overall average AF_{ind} rates are 85.07 and 84.64 percent under the JS and PR rules, respectively, which are both significantly less than one (t = −7.2235 and −5.2981, two-tailed $p < 0.0000$). In hypothesis H3, I posit that one possible behavioral reason underlying this deviation from model's point prediction is the auditor-subjects' ethical concerns about compromising their independence. To test this hypothesis, I follow Stevens (2002) and capture each auditor-subject's ethical concerns (denoted by *ETHICS*) through his / her response to the following statement in the post-experimental questionnaire, which ranges from 1 (strongly disagree) to 7 (strongly agree):

To have accepted the side payment from the manager and issued an $\hat{H}$ report when you observe an S^L signal would have been unethical.

Part (1) in Panel A of Table 5 displays summary statistics of the AF_{ind} rate (measured by the average AF_{ind} rate across both damage apportionment rules for each subject) and *ETHICS*. Part (2) shows that the Pearson and nonparametric Spearman correlation coefficients between AF_{ind} and *ETHICS* are −0.7088 and −0.6661, respectively, which are both significant at the 1% level. That is, the auditor-subjects' ethical concerns are negatively related to their independence-compromising decision. To test H3 in a more complete and precise way, I control the order effect by employing the following multivariate regression model:

$$AF_{ind} = a + b_1(ETHICS) + b_2(ORDER) + \varepsilon,$$

where AF_{ind} = The average AF_{ind} rate across both damage apportionment rules for each subject;
ETHICS = Subject's ethical concerns about compromising independence, ranging from 1 to 7;
ORDER = 0 if the *RULE* order is JS_PR and 1 if the *RULE* order is PR_JS;
ε = the residual term.

According to Hypothesis H3, I predict that $b_1 < 0$. Part (3) in Panel A of Table 5 indicates that the bootstrap regression coefficient $\hat{b}_1$ = −0.0387 is significantly less than zero at the 1% significance level.[19] Therefore, hypothesis H3 is supported, implying that the auditor-subjects tend to compromise their independence less often than the model prediction

[19]The bootstrap-estimated parameters are computed from resampling of the original data. To test the significance of the parameters, confidence limits are calculated using the *bias-corrected and accelerated* (BC_a) method (Efron and Tibshirani 1993). Confidence limits are given four values of the significance level: 0.5%, 2.5%, 97.5%, and 99.5%. Confidence intervals can then be created using pairs of these limits (e.g., 2.5% and 97.5% confidence limits form a 95% confidence interval). Hypotheses can then be tested by checking whether a parameter of interest lies in a specific confidence interval. To achieve acceptable accuracy of the confidence limits, all parameters are estimated with 30,000 replications.

because of their ethical concerns.

[Insert Table 5 here]

Columns (A) and (B) on Panel A of Table 4 have shown that, given the NE regime, the average frequencies of auditor-subjects' exerting e_A^{high} are both significantly closer to one under the JS and PR rules. Three *t* tests indicate, however, that the PR rule induces significantly higher frequency of e_A^{high} than the JS rule for two separate *RULE* orders ($t = -1.8511$, two-tailed $p < 0.10$ for order 1 and $t = -4.3105$, two-tailed $p < 0.01$ for order 2) and the overall sample ($t = -3.6120$, two-tailed $p < 0.01$). A similar result can be found under the ST regime. As depicted in columns (I) and (J) on Panel B of Table 4, even though the average frequencies of auditor-subjects' exerting e_A^{high} are both significantly closer to zero, the PR rule still motivates significantly higher frequency of e_A^{high} than the JS rule. In hypothesis H6 I posit that these significant differences can be explained by auditor-subjects' relative fairness perception about the two damage apportionment rules. To test this hypothesis, I measure each auditor-subject's fairness perception (denoted by *FAIR*) through his / her response to the following statement in the post-experimental questionnaire, which also ranges from 1 (strongly disagree) to 7 (strongly agree):

> *When there is a verification failure, the legal penalty in Session II of the experiment would have been relatively fair to Player A than the legal penalty in Session I of the experiment.*[20]

Part (1) in Panel B of Table 5 presents descriptive statistics of the difference of each auditor-subject's frequency of exerting e_A^{high} between the PR and JS rules (denoted by *DIFF*) and *FAIR*. Part (2) indicates that the Pearson and nonparametric Spearman correlation coefficients between *DIFF* and *FAIR* are 0.7270 and 0.7834, respectively, which are both significant at the 1% level. In other words, the auditor-subjects' fairness perception is positively related to the differences of the frequencies of exerting e_A^{high} between two damage apportionment rules. I also employ the following multivariate regression model to test hypothesis H6:

$$DIFF = a + b_1(FAIR) + b_2(REGIME) + b_3(ORDER) + \varepsilon,$$

where *DIFF* = The difference of each auditor-subject's frequency of exerting e_A^{high} between PR and JS rules;
FAIR = Subject's fairness perception about the PR and JS rules, ranging from 1 to 7;
ORDER = 0 if the *RULE* order is JS_PR and 1 if the *RULE* order is PR_JS;

[20]This statement is used for *RULE* order #1 (i.e., JS_PR). In the experimental instructions, Session I refers to the JS rule and Session II refers to the PR rule. For *RULE* order #2, (i.e., PR_JS), the statement in the post-experimental questionnaire is changed to: "*When there is a verification failure, the legal penalty in Session I of the experiment would have been relatively fair to Player A than the legal penalty in Session II of the experiment.*"

ε = the residual term.

Hypothesis H6 implies that $b_1 > 0$. Part (3) in Panel B of Table 5 reports that the bootstrap regression coefficient $\hat{b}_1$ = 0.0548 is significantly greater than zero at the 1% significance level. Therefore, the fairness perception hypothesis is supported, suggesting that auditor-subjects tend to exert more e_A^{high} under the PR rule than under the JS rule because they perceive the PR rule to be relatively fair in the occurrence of a technical audit failure.

In summary, the bivariate correlations and multivariate bootstrap regression results provide consistent support for both behavioral hypotheses. In this regard, my study not only contributes to the literature in auditor's legal liability and independence by showing the prominent effects of subjects' ethical concerns and fairness perception on auditor's independence and effort decisions under different legal systems, but also contributes to the experimental economics literature in auditing by investigating the predictive ability of an economic model using psychological factors such as ethics and fairness.

4.3 The Effects of Legal Regimes and Damage Apportionment Rules on Auditor Independence:

One issue that has never been addressed in prior literature is the relative effectiveness of legal regime and damage apportionment rule in improving auditor independence. This issue is important because a switching from the JS to PR rule is one of the key provisions stipulated in the 1995 Reform Act that has far-reaching impacts to the auditing profession (King and Schwartz 1997; Lee and Mande 2003). However, recent studies (e.g., Ali and Kallapur 2001; Johnson et al. 2002; Lee and Mande 2003) has lagged in exploring the usefulness of this provision to auditor's independence. On the other hand, the Title II of the Sarbanes-Oxley Act of 2002 has specified more stringent rules to the auditors for the purpose of enhancing independence. These new rules seem to move the auditor's legal liability on the violation of independence toward a strict regime. Therefore, more research should be done to examine the desired effects of these new regulations on auditor's independence. In light of these, a study of the relative efficacy of legal regime and damage apportionment rule may provide insightful implications to the policy makers.

Table 6 reports the repeated-measured ANOVA results on auditor's e_A^{high}, AF_{tec}, AF_{ind}, and manager's I_{high} decisions. As reported in the table, the main effect of the between-subject variable *REGIME* is significant for all four dependent variables at the 1% significance level, suggesting that legal regime *alone* plays an important role to auditor-subject's effort and independence strategies and manager-subject's investment decisions. In contrast, the within-subject variable *RULE* is significant only for auditor-subjects' effort choice and their corresponding AF_{tec} rates, suggesting that damage apportionment rule may not have significant impacts on auditor-subject's independence behavior and manager-subject's investment decision. Together, the ANOVA results indicate an important regulation implication: a focus on damage apportionment rule (as is the case in the 1995 Reform Act) is by itself not enough to improve auditor independence and motivate firms' investments. As the experimental results show, if the policy makers' purpose is to improve auditor independence and motivate higher investment, a switch of legal regime should be more useful than a switch of damage apportionment rule. This evidence not only partially explains why the Houston office of Arthur Andersen compromises its independence with Enron after the 1995 Reform Act (whose focus is on the switching from the JS to PR rule), but also supports recent trends of moving auditor's legal liability toward a strict regime after the passage of the Sarbanes-Oxley Act of 2002. This conclusion is crucial to the recent debates on auditor's independence and legal liability but has been overlooked by the regulators, auditing profession, and the accounting academic.

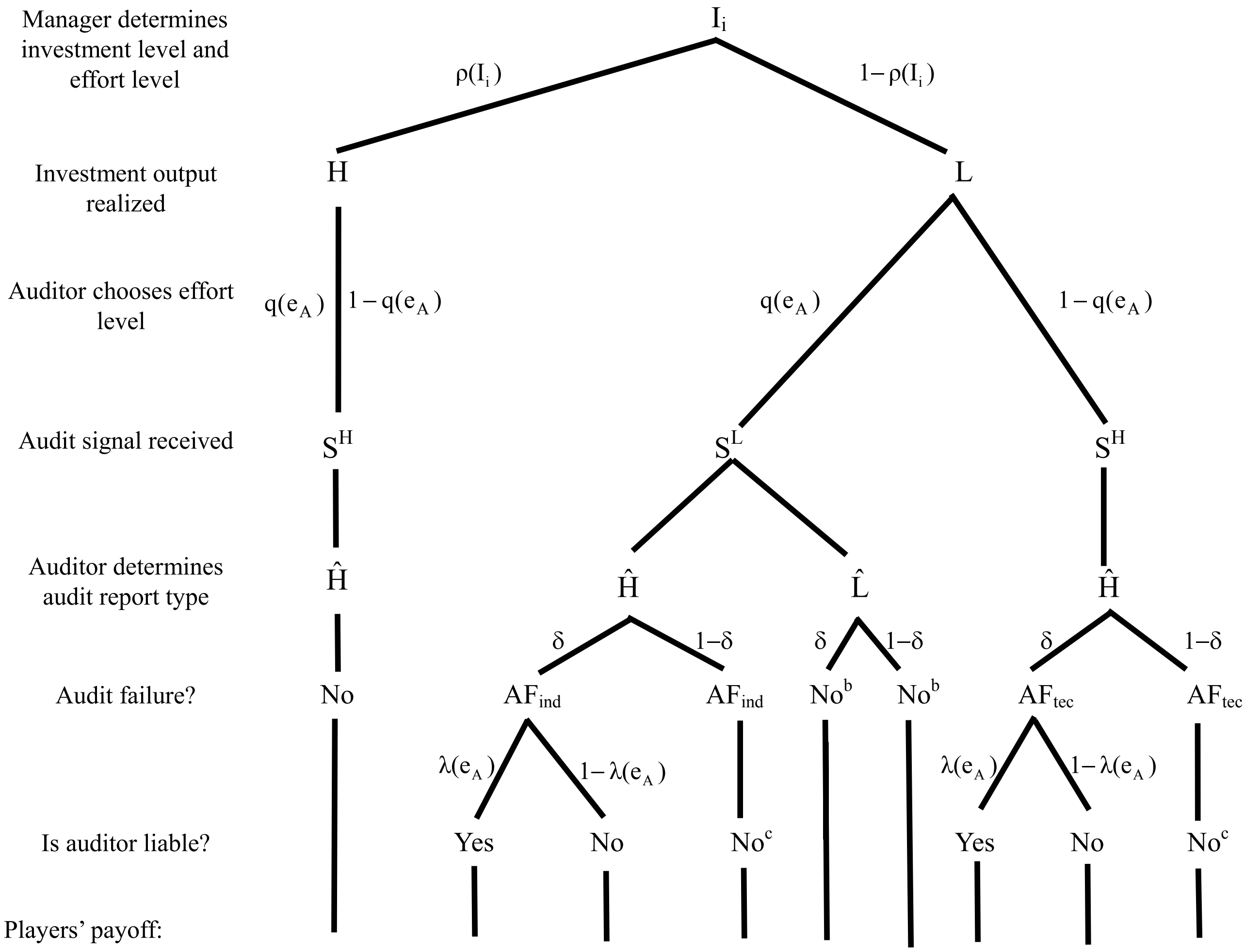
[Insert Table 6 here]

5. SUMMARY AND CONCLUSIONS

This paper reports the results of four experiments designed to examine the effects of different legal systems on auditor's effort choice, independence behavior, and manager's investment decision. The experimental economics methodology is used to test a series of economic and behavioral hypotheses derived from a one-period game model in which (a) the manager provides the quasi-rents and side payment to induce the auditor to compromise his independence, and (b) the auditor may commit either a technical audit failure (due to imperfect audit technology and audit effort) or an independence audit failure (due to the impairment of independence). I separate audit failure into these two types because they are subjected to different damage apportionment rules stipulated in the 1995 Reform Act. The experimental results document several important findings. First, there is a trade-off among technical audit failure, independence audit failure, and firm's new investments. In particular, the NE (ST) regime motivates higher (lower) auditor effort, resulting in lower (higher) technical audit failure rate. However, the NE (ST) regime also induces lower (higher) auditor independence and lower (higher) investments. This trade-off implies that no single legal system can induce higher audit quality, improve auditor independence, and encourage firm's investment simultaneously. If the policy makers and regulators intend to enhance auditor independence and motivate more investments, a legal system that consists of a ST regime with a PR rule is the most favorable one to achieve these goals. In addition, this trade-off also accentuates the importance of incorporating auditor's independence strategy into the examination of auditor's legal liability under a setting in which both the legal regimes and damage apportionment rules are considered. Second, the experimental results document the significant effects of auditors' ethical concerns and fairness perception on their independence and effort decisions. The existence of these effects suggests the necessity of considering human's psychological factors such as ethics and fairness in examining auditor's legal liability, audit quality, and independence. Finally, a switching of legal regime (from NE to ST) seems to be more useful than a switching of damage apportionment rule (from JS to PR) in motivating higher auditor independence and firm's investment. This result provides support for the new regulations ruled by the Sarbanes–Oxley Act of 2002 and the SEC, which moves auditor's legal liability toward a strict regime.

Several limitations of the experiments and future research directions should be recognized. First, the experiments are designed and conducted based on a one-period model. Therefore, the effects of auditor's and manager's reputation cannot be examined. A direct extension of the study would be to extend the model and experiments into a multi-period setting. Second, the experiments have shown that auditor's effort choice and independence decision are affected by their fairness perception and ethical concerns. These results suggest that future game theoretical studies in auditor's legal liability and independence should take these behavioral or psychological factors into considerations in analyzing auditor's optimal strategies. Finally, prior studies in the area of psychology and behavioral accounting have shown that subjects' *tolerance for ambiguity* (defined as the way subjects perceive and process information about ambiguous situations) may affect their decisions under uncertainty (Einhorn and Hogarth 1985; Ghosh and Ray 1992, 1997; Wright and Davidson 2000). Therefore, the experiments can be modified to investigate how tolerance for ambiguity may affect auditor's and manager's behavior.

FIGURE 1
Game Tree of the Model[a]



ST_JS system	A_{ST}^{JS}	B_{ST}^{JS}	C_{ST}^{JS}	D_{ST}^{JS}	E_{ST}^{JS}	F_{ST}^{JS}	G_{ST}^{JS}	H_{ST}^{JS}	I_{ST}^{JS}
ST_PR system	A_{ST}^{PR}	B_{ST}^{PR}	C_{ST}^{PR}	D_{ST}^{PR}	E_{ST}^{PR}	F_{ST}^{PR}	G_{ST}^{PR}	H_{ST}^{PR}	I_{ST}^{PR}
NE_JS system	A_{NE}^{JS}	B_{NE}^{JS}	C_{NE}^{JS}	D_{NE}^{JS}	E_{NE}^{JS}	F_{NE}^{JS}	G_{NE}^{JS}	H_{NE}^{JS}	I_{NE}^{JS}
NE_PR system	A_{NE}^{PR}	B_{NE}^{PR}	C_{NE}^{PR}	D_{NE}^{PR}	E_{NE}^{PR}	F_{NE}^{PR}	G_{NE}^{PR}	H_{NE}^{PR}	I_{NE}^{PR}

[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; $q(e_A)$ 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 audit failure occurs; ST and NE denote the strict and negligence legal regimes, respectively; JS and PR denote the joint-and-several and proportionate rules of damage apportionment, respectively. Letters A_i^j to I_i^j (where i = ST or NE and j = JS or PR) denote managers' and auditor's possible payoffs under different game outcomes and legal systems (see Appendix 1 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 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	$C(e_M^{high}) = 650$ EDs, $C(e_M^{low}) = 250$ EDs
M_r	Manager's compensation when audit report is r	$M_{\hat{H}}$ = 1,820 EDS, $M_{\hat{L}}$ =1,000 EDs
SP	Side payment paid by the manager to the auditor	400 EDs
SC	Manager's switching costs if auditor is dismissed	500 EDs
(3) Auditor's Parameters:		
F	Audit fees	450 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	$C(e_A^{high})$ = 260 EDs, $C(e_A^{low}) = 100$ EDs
ξ	Audit signal obtained	$\xi \in \{S^H, S^L\}$
$q(e_A^j)$	Audit quality (probability of obtaining a correct signal)	$q(e_A^{high}) = 0.7$, $q(e_A^{low}) = 0.3$
r	Audit report type	$r \in \{\hat{H}, \hat{L}\}$
ER	Present value of all future quasi rents	500 EDs
(4) Legal Liability Parameters:		
δ	Probability that the state of economy is bad	0.6
$\lambda(e_A^j)$	Probability that the auditor will be held liable	NE regime: $\lambda(e_A^{high}) = 0.3$, $\lambda(e_A^{low})$ =0.7 ST regime: $\lambda(e_A^j)$ =1
D_{tec}	Total damage losses due to technical audit failures	800 EDs
D_{ind}	Total damage losses due to independence audit failures	1,450 EDs
k	The portion of damage losses paid by the auditor	JS rule: $k = 1$ PR rule: $k = 0.4$

*A notional currency called *Experimental Dollars* (EDs) was used in the experiments.

TABLE 2
Comparisons of Equilibrium Predictions under Different Legal Systems[a]

Legal regimes	**Negligence Liability**[b]				**Strict Liability**[b]	
Damage apportionment rules	**Joint-and-Several**		**Proportionate**		**Joint-and-Several**	**Proportionate**
Equilibrium	Equilibrium #1 (A)	Equilibrium #2 (B)	Equilibrium #1 (C)	Equilibrium #2 (D)	Equilibrium (E)	Equilibrium (F)
Manager's investment strategy	I_{low}	I_{high}	I_{low}	I_{high}	I_{high}	I_{high}
Auditor' effort strategy	e_A^{high}	e_A^{low}	e_A^{high}	e_A^{low}	e_A^{low}	e_A^{low}
Auditor's reporting strategy when obtain S^L	Always report $\hat{L}$	Always report $\hat{H}$	Always report $\hat{L}$	Always report $\hat{H}$	Always report $\hat{H}$	Always report $\hat{H}$
Auditor's AF_{ind} rate[c]	0.00	1.00	0.00	1.00	1.00	1.00
Auditor's AF_{tec} rate[d]	0.30	0.70	0.30	0.70	0.70	0.70
Manager's expected payoff	571 EDs	543 EDs	571 EDs	543 EDs	543 EDs	543 EDs
Auditor's expected payoff	518 EDs	671 EDs	536 EDs	714 EDs	641 EDs	702 EDs

[a]The equilibria shown in this table are obtained by solving the game using the parameter values specified in Table 1 (see Appendix 2 for details).
[b]Under the NE (ST) regime, there are two equilibria (a unique equilibrium) for each of the two damage apportionment rules.
[c]The AF_{ind} rate is measured by the conditional probability that the auditor issues an $\hat{H}$ report when the audit signal is S^L, i.e., $AF_{ind} \equiv p(\hat{H} \mid S^L)$.
[d]The AF_{tec} rate is measured by the conditional probability that the auditor obtains an audit signal S^H when the true investment outcome is L, i.e., $AF_{tec} \equiv p(S^H \mid L^A)$. Since this definition is exactly the measure of audit quality $q(e_A)$, the equilibrium AF_{tec} rates equal $q(e_A^{high}) = 0.7$ and $q(e_A^{low}) = 0.3$.

TABLE 3
Experimental Design

Experiments	***REGIME*** [a]	***REGIME* Parameter** $\lambda(e_A)$ [b]	***RULE*** [a]	***RULE* Parameter *k*** [c]	**Number of Periods**[a]	**Number of Subjects**[d]
1	NE	0.3 or 0.7	JS	1.0	35	10 Auditors 10 Managers
			PR	0.4	35	
2	NE	0.3 or 0.7	PR	0.4	35	10 Auditors 10 Managers
			JS	1.0	35	
3	ST	1.0	JS	1.0	35	10 Auditors 10 Managers
			PR	0.4	35	
4	ST	1.0	PR	0.4	35	10 Auditors 10 Managers
			JS	1.0	35	

[a]This study adopts a split-plot factorial design, with one between-subject variable, *REGIME* (manipulated at two levels: NE vs. ST), and one within-subject variable, *RULE* (manipulated at two levels: JS vs. PR). NE and ST denote negligence and strict legal regimes, respectively; JS and PR denote joint-and-several and proportionate damage apportionment rules, respectively. Each experiment consists of 35 periods of treatment JS and 35 periods of treatment PR. To minimize the carryover effect, two *RULE* orders are manipulated for each *REGIME* level: JS_PR (labeled "Order #1") and PR_JS (labeled "Order #2").

[b]Under the NE regime, the probability that the auditor will be held liable by the court $\lambda(e_A)$ is decreasing in auditor's effort level. In the experiments, $\lambda(e_A^{high}) = 0.3$ and $\lambda(e_A^{low}) = 0.7$. Conversely, under the ST regime the auditor will always be held liable if the investors sue the auditor, that is, $\lambda(e_A) = 1.0$. Therefore, in the experiments I manipulate $\lambda(e_A)$ at two levels (i.e., $\lambda(e_A) = 0.3$ or 0.7 vs. $\lambda(e_A) = 1$) to reflect the fundamental difference between NE and ST regimes.

[c]In the experiment as well as in my model, the auditor only has to pay *k* percent of the total D_{tec} when there is an AF_{tec} (in which the PR rule is applied), but he has to pay the full amount of D_{ind} when an AF_{ind} occurs (in which the JS rule is applied). Therefore, in the experiments I manipulate this damage share *k* at two levels (i.e., $k = 0.4$ vs. 1) to capture the basic difference between JS and PR rules.

[d]The subject pool consists of 80 senior Business School students, with ten auditor-subjects and ten manager-subjects randomly assigned to each experiment. All subjects draw to determine the role they will play in the experiments. At the beginning of each period, each manager-subject is endowed with 1,200 EDs and each auditor-subject is endowed with 1,000 EDs. Each subject plays the same role throughout all 70 periods.

TABLE 4
Players' Overall Behavior in Four Experiments[a]

Panel A: Negligence (NE) Liability Regime

Experiment Orders[a]	*f* (auditor's high effort)					*f* (auditor's independence audit failure)				
	Joint and Several (JS)		Proportionate (PR)		*t* tests between (A) and (B)[c]	Joint and Several (JS)		Proportionate (PR)		*t* tests between (C) and (D)[c]
	Prediction	Average[b] (A)	Prediction	Average[b] (B)		Prediction	Average[b] (C)	Prediction	Average[b] (D)	
Order #1 (n = 10)	1.00 or 0.00	0.7229 (0.0358)	1.00 or 0.00	0.8057 (0.1165)	−1.8511*	1.00 or 0.00	0.8483 (0.0984)	1.00 or 0.00	0.8375 (0.1782)	0.1329
Order #2 (n = 10)	1.00 or 0.00	0.7400 (0.0314)	1.00 or 0.00	0.8314 (0.0706)	−4.3105***	1.00 or 0.00	0.8529 (0.0914)	1.00 or 0.00	0.8552 (0.0596)	−0.0722
Overall (n = 20)	1.00 or 0.00	0.7314 (0.0339)	1.00 or 0.00	0.8186 (0.0947)	−3.6120***	1.00 or 0.00	0.8507 (0.0925)	1.00 or 0.00	0.8464 (0.1296)	0.1009

Experiment Orders[a]	*f* (auditor's technical audit failure)					*f* (manager's high investment)				
	Joint and Several (JS)		Proportionate (PR)		*t* tests between (E) and (F)[c]	Joint and Several (JS)		Proportionate (PR)		*t* tests between (G) and (H)[c]
	Prediction	Average[b] (E)	Prediction	Average[b] (F)		Prediction	Average[b] (G)	Prediction	Average[b] (H)	
Order #1 (n = 10)	0.3 or 0.7	0.3383 (0.0570)	0.3 or 0.7	0.2916 (0.0737)	2.0527*	1.00 or 0.00	0.2029 (0.1047)	1.00 or 0.00	0.2286 (0.1134)	−0.5745
Order #2 (n = 10)	0.3 or 0.7	0.3560 (0.0605)	0.3 or 0.7	0.2934 (0.0519)	2.7707**	1.00 or 0.00	0.2171 (0.1009)	1.00 or 0.00	0.2343 (0.1254)	−0.2824
Overall (n = 20)	0.3 or 0.7	0.3472 (0.0579)	0.3 or 0.7	0.2925 (0.0621)	3.4788***	1.00 or 0.00	0.2100 (0.1004)	1.00 or 0.00	0.2314 (0.1165)	−0.5835

TABLE 4
Players' Overall Behavior in Experiments (cont'd)

Panel B: Strict (ST) Liability Regime

Experiment Orders[a]	*f* (auditor's high effort)					*f* (auditor's independence audit failure)				
	Joint and Several (JS)		Proportionate (PR)		*t* tests between (I) and (J)[c]	Joint and Several (JS)		Proportionate (PR)		*t* tests between (K) and (L)[c]
	Prediction	Average[b] (I)	Prediction	Average[b] (J)		Prediction	Average[b] (K)	Prediction	Average[b] (L)	
Order #1 (n = 10)	0.00	0.1629 (0.0382)	0.00	0.2057 (0.0295)	−3.7371***	0.00	0.2317 (0.2064)	0.00	0.2017 (0.1233)	0.3014
Order #2 (n = 10)	0.00	0.1429 (0.0060)	0.00	0.1971 (0.0284)	−2.4327**	0.00	0.1833 (0.1610)	0.00	0.1829 (0.0887)	0.0087
Overall (n = 20)	0.00	0.1529 (0.0535)	0.00	0.2014 (0.0285)	−3.9552***	0.00	0.2075 (0.1818)	0.00	0.1923 (0.1049)	0.2750

Experiment Orders[a]	*f* (auditor's technical audit failure)					*f* (manager's high investment)				
	Joint and Several (JS)		Proportionate (PR)		*t* tests between (M) and (N)[c]	Joint and Several (JS)		Proportionate (PR)		*t* tests between (O) and (P)[c]
	Prediction	Average[b] (M)	Prediction	Average[b] (N)		Prediction	Average[b] (O)	Prediction	Average[b] (P)	
Order #1 (n = 10)	0.7	0.6317 (0.0815)	0.7	0.5581 (0.0622)	2.3151**	1.00	0.7286 (0.0753)	1.00	0.7514 (0.1135)	−0.4785
Order #2 (n = 10)	0.7	0.6086 (0.0762)	0.7	0.5444 (0.0758)	1.8265*	1.00	0.7086 (0.1125)	1.00	0.7771 (0.1703)	−1.1267
Overall (n = 20)	0.7	0.6201 (0.0777)	0.7	0.5512 (0.0679)	2.9841***	1.00	0.7186 (0.0937)	1.00	0.7643 (0.1415)	−1.2025

[a]This study adopts a split-plot factorial design, with one between-subject variable, *REGIME* (manipulated at two levels: NE vs. ST), and one within-subject variable, *RULE* (manipulated at two levels: JS vs. PR). Each experiment consists of 35 periods of treatment JS and 35 periods of treatment PR participated by 20 subjects (10 auditors and 10

managers). To minimize the carryover effect, two *RULE* orders are manipulated for each *REGIME* level: JS_PR (Order #1) and PR_JS (Order #2). Four dependent variables are of particular interest: (a) *f*(auditor's high effort), which denotes the frequency of auditor's choosing high effort level, (b) *f*(auditor's independence audit failure), which denotes the frequency of auditor's committing an audit failure due to a lack of independence, (c) *f*(auditor's technical audit failure), which denotes the frequency of auditor's committing a technical audit failure, and (d) *f*(manager's high investment), which denotes the frequency of manager's choosing a high investment project.

[b]Standard deviations are reported in parentheses.

[c]Since each subject is given two different *RULE* treatments in each experiment, his / her responses under treatments JS and PR are dependent (or correlated). Therefore, the matched-sample *t* tests are used to examine whether subjects' decisions are different under both rules. Asterisks *, **, and *** indicate significance of the *t*-statistic at the 0.10, 0.05, and 0.01 levels, two-tailed, respectively.

TABLE 5
Tests of Subjects' Ethical Concerns (Hypothesis H3) and Fairness Perception (Hypothesis H6)

Panel A: Test of Hypothesis H3 (Ethical Concerns)

(1) Descriptive Statistics (n = 20):

Variables	Mean	Std. Dev.	Max.	Min.
AF_{ind}[a]	0.8485	0.0603	0.9643	0.7386
ETHICS[b]	4.0500	1.0990	7	3

(2) Bivariate Statistics between AF_{ind} and *ETHICS*:[c]

Pearson correlation:	-0.7088^{***}
Spearman correlation:	-0.6661^{***}

(3) Bootstrap-estimated Parameters of Regression Model: $AF_{ind} = a + b_1(ETHICS) + b_2(ORDER) + \varepsilon$ (H3: $b_1 < 0$)

Variables	Estimated Coefficient	Confidence Limits[d]			
		0.5%	2.5%	97.5%	99.5%
Intercept	1.0016	0.9101	0.9318	1.0866	1.1207
ETHICS	–0.0387	–0.0697	–0.0594	–0.0246	–0.0186
ORDER[e]	0.0073	–0.0471	–0.0332	0.0443	0.0544

Panel B: Test of Hypothesis H6 (Fairness Perception)

(1) Descriptive Statistics (n = 40):

Variables	Mean	Std. Dev.	Max.	Min.
DIFF[f]	0.0679	0.0867	0.3143	–0.2286
FAIR[g]	5.6000	1.1500	7	3

(2) Bivariate Statistics between *DIFF* and *FAIR*:[c]

Pearson correlation:	0.7270^{***}
Spearman correlation:	0.7834^{***}

(3) Bootstrap-estimated Parameters of Regression Model: $DIFF = a + b_1(FAIR) + b_2(REGIME) + b_3(ORDER) + \varepsilon$
(H6: $b_1 > 0$)

Variables	Estimated Coefficient	Confidence Limits[d]			
		0.5%	2.5%	97.5%	99.5%
Intercept	–0.2438	–0.4116	–0.3792	–0.1119	–0.0909
FAIR	0.0548	0.0264	0.0313	0.0849	0.0971
REGIME[h]	–0.0002	–0.0589	–0.0462	0.0529	0.0706
ORDER[e]	0.0100	–0.0445	–0.0301	0.0475	0.0582

[a]Variable AF_{ind} is measured by the average of the two AF_{ind} rates under both damage apportionment rules for each subject.

[b]Variable *ETHICS* is measured by each subject's response to one statement in the post-experimental questionnaire, which ranges from 1 (strongly disagree) to 7 (strongly agree).

[c]Asterisks *** indicate the two-tailed significance of the correlation coefficient at the 0.01 levels.

[d]The bootstrap-estimated parameters are computed from resampling of the original data. To test the significance of the parameters, confidence limits are calculated using the *bias-corrected and accelerated* (BC_a) method (Efron and Tibshirani 1993). Confidence limits are given four values of the significance level: 0.5%, 2.5%, 97.5%, and 99.5%. Confidence intervals can then be created using pairs of these limits (e.g., 2.5% and 97.5% confidence limits form a 95% confidence interval). Hypotheses can then be tested by checking whether a parameter of interest lies in a specific confidence interval. To achieve acceptable accuracy of the confidence limits, all parameters are estimated with 30,000 replications.

[e]Variable *ORDER* denotes the two *RULE* orders that are manipulated for each *REGIME* level in the experiments: JS_PR (Order #1) and PR_JS (Order #2).

[f]Variable *DIFF* is measured by the difference of each auditor-subject's frequency of exerting e_A^{high} between the PR and JS rules.

[g]Variable *FAIR* is measured by each subject's response to one statement in the post-experimental questionnaire, which ranges from 1 (strongly disagree) to 7 (strongly agree).

[h]Variable *REGIME* denotes the between-subject variable, which is manipulated at two levels: NE and ST.

TABLE 6
Repeated-Measured ANOVA Results[a]
(n = 40)

Panel A: ANOVA on the Mean Frequency of Auditor's Choosing High Effort Level

Source of Variation	***SS***	***df***	***MS***	***F* statistic[b]**	***p* value**
Between-Subject					
REGIME	7.149	1	7.149	2214.409	< 0.000
Subject-within-groups	0.123	38	0.003		
Within-Subject					
RULE	0.092	1	0.092	25.132	< 0.000
RULE × *REGIME*	0.007	1	0.007	2.030	< 0.162
RULE × Subject-within-groups	0.139	38	0.004		

Panel B: ANOVA on the Mean Frequency of Auditor's Committing Technical Audit Failure

Source of Variation	***SS***	***df***	***MS***	***F* statistic[b]**	***p* value**
Between-Subject					
REGIME	1.413	1	1.413	281.221	< 0.000
Subject-within-groups	0.191	38	0.005		
Within-Subject					
RULE	0.076	1	0.076	19.575	< 0.000
RULE × *REGIME*	0.001	1	0.001	0.259	< 0.614
RULE × Subject-within-groups	0.148	38	0.004		

Panel C: ANOVA on the Mean Frequency of Auditor's Committing Independence Audit Failure

Source of Variation	***SS***	***df***	***MS***	***F* statistic[b]**	***p* value**
Between-Subject					
REGIME	8.414	1	8.414	814.428	< 0.000
Subject-within-groups	0.393	38	0.010		
Within-Subject					
RULE	0.002	1	0.002	0.078	< 0.781
RULE × *REGIME*	0.001	1	0.001	0.025	< 0.876
RULE × Subject-within-groups	0.927	38	0.024		

TABLE 6
Repeated-Measured ANOVA Results (cont'd)
(n = 40)

Panel D: ANOVA on the Mean Frequency of Manager's Undertaking High Investment

Source of Variation	***SS***	***df***	***MS***	***F* statistic**[b]	***p* value**
Between-Subject					
REGIME	5.423	1	5.423	442.576	< 0.000
Subject-within-groups	0.466	38	0.012		
Within-Subject					
RULE	0.023	1	0.023	1.614	< 0.212
RULE × *REGIME*	0.003	1	0.003	0.211	< 0.649
RULE × Subject-within-groups	0.531	38	0.014		

[a]This study adopts a split-plot factorial design, with one between-subject variable, *REGIME* (manipulated at two levels: NE vs. ST), and one within-subject variable, *RULE* (manipulated at two levels: JS vs. PR). Each experiment consists of 35 periods of treatment JS and 35 periods of treatment PR participated by 20 subjects (10 auditor-subjects and 10 manager-subjects).

[b]In calculating the *F* statistics, the degree of freedom is adjusted by the Huynh-Feldt (1970) procedures. This adjustment (also called the Box adjustment) is usually recommended in repeated measures design when researchers have reservations about making the sphericity assumption in using the *F* test (see Hays 1994, section 13.22).

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APPENDIX 1
Players' Payoffs under Different Legal systems and Game Outcomes

Panel A: ST_JS Legal System

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

Panel B: ST_PR Legal System

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

APPENDIX 1 (cont'd)
Players' Payoffs under Different Legal systems and Game Outcomes

Panel C: NE_JS Legal System

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

Panel D: NE_PR Legal System

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

[a]See Table 1 for the definitions and parameter values of all variables shown in this Table.
[b]Since λ equals one under the strict legal regime, game outcomes C and H in Panel A and Panel B do not exist.

APPENDIX 2
Numerical Solutions of the Game

I first specify both players' strategy spaces as follows:

The Auditor: {(Exert high effort, Reporting high when audit signal is low), (Exert low effort, Reporting low when audit signal is low), (Exert high effort, Reporting low when audit signal is low), (Exert low effort, Reporting high when audit signal is low)}

The Manager: {High investment, Low investment}

I then define the payoff functions for both players:

Payoff functions for the Auditor:

If the auditor compromises his independence:

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

If the auditor remains independence:

$$U_A((e_A^i,\hat{L}),I_i) = [F - C(e_A^j)] + \{\rho(I_i) + [1 - q(e_A^j)] \cdot (1-\delta) \cdot [1-\rho(I_i)]\} \cdot ER - [1-\rho(I_i)] \cdot \delta \cdot \lambda(e_A^j) \cdot [1-q(e_A^j)] \cdot k \cdot D_{tec}$$

Payoff functions for the manager:

If the manager receives an $\hat{H}$ report:

$$U_M((e_A^i,\hat{H}),I_i) = [1-\delta+\delta \cdot \rho(I_i)] \cdot [M_{\hat{H}} - C(e_M^i) - F] - [1-\rho(I_i)] \cdot (1-\delta) \cdot q(e_A^j) \cdot SP$$

If the manager receives an $\hat{L}$ report:

$$U_M((e_A^i,\hat{L}),I_i) = [1-\delta+\delta \cdot \rho(I_i)] \cdot [M_{\hat{H}} - C(e_M^i) - F] - [1-\rho(I_i)] \cdot (1-\delta) \cdot q(e_A^j) \cdot [SC + (M_{\hat{H}} - M_{\hat{L}})]$$

Using the payoff functions specified above and the payoff formulas listed in Appendix 1, I use the backward induction and obtain the following normal form Nash equilibria (labeled by an asterisk *) under different legal systems. Note that the "row" player is the auditor while the "column" player is the manager. By convention, the payoff to the "row" ("column") player is the first (second) payoff given in each parenthesis.

(1) The **NE_PR** legal system (i.e., $\lambda(e_A^j) = 0.3$ or 0.7, $k = 0.4$):

	High Investment	Low Investment
Exert high effort, Reporting high when audit signal is low	(62.40, 55.68)	(53.60, 57.12)*
Exert high effort, Reporting low when audit signal is low	(55.28, 54.29)	(36.99, 53.87)
Exert low effort, Reporting high when audit signal is low	(71.30, 55.68)	(53.03, 57.12)
Exert low effort, Reporting low when audit signal is low	(71.38, 54.29)*	(53.21, 53.87)

(2) The **NE_JS** legal system (i.e., $\lambda(e_A^j) = 0.3$ or 0.7, $k = 1$):

	High Investment	Low Investment
Exert high effort, Reporting high when audit signal is low	(61.62, 55.68)	(51.79, 57.12)*
Exert high effort, Reporting low when audit signal is low	(54.50, 54.29)	(35.18, 53.87)
Exert low effort, Reporting high when audit signal is low	(67.06, 55.68)	(43.15, 57.12)
Exert low effort, Reporting low when audit signal is low	(67.14, 54.29)*	(43.34, 53.87)

(3) The **ST_PR** legal system (i.e., $\lambda(e_A^j) = 1$, $k = 0.4$):

	High Investment	Low Investment
Exert high effort, Reporting high when audit signal is low	(48.40, 55.68)	(20.94, 57.12)
Exert high effort, Reporting low when audit signal is low	(54.07, 54.29)	(34.17, 53.87)
Exert low effort, Reporting high when audit signal is low	(67.74, 55.68)	(44.72, 57.12)
Exert low effort, Reporting low when audit signal is low	(70.17, 54.29)*	(50.39, 53.87)

(4) The **ST_JS** legal system (i.e., $\lambda(e_A^j) = 1$, $k = 1$):

	High Investment	Low Investment
Exert high effort, Reporting high when audit signal is low	(45.81, 55.68)	(20.94, 57.12)
Exert high effort, Reporting low when audit signal is low	(51.48, 54.29)	(28.12, 53.87)
Exert low effort, Reporting high when audit signal is low	(61.69, 55.68)	(30.61, 57.12)
Exert low effort, Reporting low when audit signal is low	(64.12, 54.29)*	(36.28, 53.87)