

**The Economics of Setting Auditing Standards under Different Legal Regimes:**

**Implications for International Standards on Auditing\***

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# **The Economics of Setting Auditing Standards under Different Legal Regimes: Implications for International Standards on Auditing**

## **Abstract**

We derive the optimal toughness of auditing standards under different legal regimes, which are characterized by differences in the uncertainty concerning the outcome of legal proceedings (termed vagueness of legal systems) and differences in the size of damage awards. We find that optimal audit quality that maximizes investors' welfare requires different auditing standards when legal systems have different characteristics. This finding provides implications for the adoption of International Standards on Auditing (ISAs). Countries, such as the U.S., where auditor legal liability is significantly more onerous than the global norm are not likely to adopt ISAs, since these standards may not induce auditors to provide the optimal level of audit quality. Conversely, the adoption of ISA's by countries, such as China, where the legal system makes the recovery of damages from auditors quite difficult, is not by itself likely to result in a high level of audit quality.

**Keywords:** Auditing standards, legal regimes, international standards

## I. INTRODUCTION

In a recent paper, Ye and Simunic (2013) develop a theory of preferences over auditing standards of different interest groups that may set such standards. Specifically, they analyze how optimal auditing standards would vary if the standards were set by auditors, acting in their own self-interest, versus by investors, acting in their interests. Auditing standards are represented by two properties: the level of “toughness”, defined as the average level of auditing effort required by the standards, and the level of “vagueness”, or the degree of imprecision in the wording of the standards. Among other things, they find that preferences over toughness are not independent of the level of vagueness (and vice-versa). In addition, investors generally have the same preferences over the properties of auditing standards as do auditors. Both investors and auditors prefer precise auditing standards, if toughness can be set at the optimal level. However, if toughness cannot be set optimally, then both investors and auditors prefer vague standards.

In their analysis, Ye and Simunic assume that the legal system within which standard setting occurs is fixed. Thus their analysis applies to standard setting within a given legal framework. However, legal systems and the consequent litigation risk imposed on auditors vary across countries. For example, the existing literature suggests that litigation risk in the U.S. is significantly higher than in other countries. The high litigation risk in the U.S. is reflected by a high likelihood that an auditor is deemed liable after a client’s business failure and by large amounts of damage payments awarded to plaintiffs (Arthur Andersen & Co. et al. 1992; Baginski et al. 2002; Choi et al. 2008, 2009; Francis and Wang 2008; Hope and Langli 2010; Khurana and Raman 2004; Mednick 1987; Palmrose 1997; Seetharaman et al. 2002; Wingate 1997; etc.). The legal regime in the U.S. is harsh, such that even if auditors comply with auditing standards, they may still be held liable. In contrast, legal regimes in other countries are significantly weaker than the U.S. legal regime (Wingate 1997), and are exceptionally weak in some economically important countries, such as India and China.

In this paper, we extend the analysis in Ye and Simunic to consider how optimal auditing standards would differ under different legal regimes. Our analysis considers two potentially important characteristics of legal systems: the degree of uncertainty or *vagueness in interpreting* auditing standards

by courts in determining whether an auditor is liable for a failed audit, and the *damage award size* paid to investors by auditors deemed liable for investors' losses.<sup>1</sup> (Including more legal factors in the analysis would not affect the main thrust of the paper. Additionally, the concepts of damage award size and legal vagueness implicitly incorporate the effects of other legal factors, such as proportionate vs. joint and several liability, common law vs. civil law systems, etc.)

We start our analysis by determining audit quality under given auditing standards and a given legal system.<sup>2</sup> Then we determine the level of *optimal* auditing standards that induce the *value maximizing* audit quality under a given legal system. Finally, we analyze the complex relationships between the two legal system parameters, optimal auditing standards, and the level of audit quality that auditors are motivated to provide, given the legal system and optimal auditing standards within that system.

We find that the vagueness in a legal system has a profound impact on optimal auditing standards. Also, damage award size has greater marginal impact on the optimal standards, especially when vagueness is high. Under different combinations of these two factors, the standards inducing the same level of audit quality could be drastically different. In other words, optimal audit quality is usually not obtained under the same audit standards when legal systems have different vagueness and/or different size of damage awards. Our analysis demonstrates that audit quality is determined by both auditing standards and characteristics of legal systems.<sup>3</sup> Adopting a set of auditing standards without a proper legal enforcement system will not achieve the desired audit quality.

Our research makes the following contributions. We contribute to the analytical literature on audit quality by considering the interacting effect of auditing standards and legal regimes on audit quality. A stream of literature, such as Hillegeist (1999), Pae and Yoo (2001), Polinsky and Che (1991), Schwartz (1998), Smith and Tidrick (1998), and Wu (2013), analyzes the impact of liability rules on audit quality.

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<sup>1</sup>The "vagueness" is a measure of the range of due care audit effort from courts' interpretations of given auditing standards as well as the possible inaccuracy of observing audit quality. This parameter captures an important characteristic of common law and civil law systems, because under both systems, courts need to interpret laws.

<sup>2</sup> We assume auditors are economic agents who maximize their own utility. We use audit quality and audit effort interchangeably throughout the paper.

<sup>3</sup> Our analysis focuses on negligence based liability regimes with vague due care, as common in practice.

But none of these papers analyze how the legal regime would affect optimal auditing standards. Another stream of literature analyzes the impact of auditing standards on audit quality for a given legal system. Dye (1993) analyzes auditors' attitudes toward and responses to the level (toughness) of auditing standards with an upper limit on damage award size. He shows that the average quality of audits may decline as auditing standards are raised, because damage award size cannot exceed the auditor's wealth. Willekens and Simunic (2007) model the impact on audit quality of changes in the vagueness of auditing standards and conclude that increasing the vagueness of the standards induces an auditor to produce higher or lower audit quality, depending on the level of the vagueness. Ewert (1999) argues that vague auditing standards can outperform precise standards by inducing higher audit quality, higher quality of financial statements, lower expected legal costs, and lower direct as well as total audit costs. As noted earlier, Ye and Simunic (2013) analyze how the toughness and vagueness of auditing standards is determined by different standard-setters. Two studies that link legal regimes with auditing standards are Willekens et al. (1996) and Schwartz (1998). They show that auditing standards only affect auditor behavior if legal standards of care are unclear, and the auditing standards help to clarify the legal standards. In summary, while existing studies examine various aspects of the impact of legal regimes on audit quality, and the impact of auditing standards on audit quality, this study is the first to provide a comprehensive analysis of the impact of various levels of damage award size and the vagueness of legal regimes on optimal auditing standards and the level of audit quality such standards will induce.

While several existing papers such as Ball (2006), Barth et al. (1999), Dye and Sunder (2001), and Ray (2010) articulate the pros and cons of uniform *accounting* standards, very few papers in the literature discuss the impact of uniform *auditing* standards. Accounting standards and auditing standards play quite different roles in financial reporting. Audits are performed to improve the validity and reliability of information produced in compliance with a set of accounting standards, and auditing standards provide a measure of audit quality and articulate the objectives to be achieved in an audit (AICPA 2001; Becker et al. 1998; Schilder and Knechel 2010). Auditing standards that regulate audit quality in a country have traditionally reflected the characteristics of the country's business environment

and legal system, and consequently, standards have varied across countries. However, in recent years, an increasing number of countries have adopted a uniform set of standards, the International Standards on Auditing or ISAs, as their domestic standards. For example, the countries in the European Union did this in 2005 and Canada adopted ISAs in 2012, while the debate as to whether or not ISAs' should be adopted domestically is ongoing in the U.S.<sup>4</sup>

Kohler (2009) conducts a survey of stakeholders affected by the adoption of ISAs in the European Union to assess the costs and benefits of ISA adoption, and concludes that significant net benefits were expected. However, no one has provided a formal economic analysis of how differences in legal systems across countries can impact on the optimal characteristics of auditing standards, and – by implication – whether or not the adoption of uniform auditing standards across countries is likely to be beneficial or harmful. We provide such an analysis in this paper. Our analysis predicts that ISAs will be adopted by countries with similar legal characteristics, without or with minor modifications. Where ISAs are similar to countries' existing domestic (optimal) standards (e.g., in Canada (Simunic 2003), the ISAs can induce first-best audit quality. However, due to the more litigious legal environment in the U.S. than in other countries, the adoption of ISAs by the U.S. is likely to induce sub-optimal audit quality and reduce audit value in that country. Conversely, the adoption of ISAs as domestic standards by a country such as China, is not in itself likely to increase average audit quality.

There is no doubt that the decision of U.S. regulators as to whether or not to adopt ISAs is an important one. The current rules of the U.S. Securities and Exchange Commission (SEC) require that any audited filings of foreign registrants must be audited in accordance with U.S. auditing standards. Many firms are cross-listed in the U.S. and other countries for various reasons (Karolyi 1998, 2004; Licht 2001, 2003; Reese and Weisbach 2002; Siegel 2005). The position of the U.S. on auditing standards convergence thus has a powerful influence on the global economy. Whether it is beneficial to maintain country-specific auditing standards or converge to a unified set is debatable, as is the question of the level

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<sup>4</sup>As of 2012, 32 countries have adopted the ISAs as their national standards, without modification; an additional 29 countries have adopted ISAs, with the option of some modification to accommodate local circumstances; while the use of ISAs as national standards is required by law in 11 countries. See [www.ifac.org/isa-adoption/chart](http://www.ifac.org/isa-adoption/chart).

to which the standards should converge. By formally analyzing these issues, this paper fills an important void in the literature.

The remainder of the paper is organized as follows. We describe our model setup and players' objectives in Section II. Section III presents the analysis. We discuss the implications of the analysis for the adoption of ISAs in Section IV. Section V concludes the paper. All proofs of the main results are provided in the Appendix.

## II. MODEL

### Model Description

Our analysis uses a single-period auditing model with risk-neutral players. In the model, a typical firm in a country seeks to raise capital in the form of equity to start one project. The amount of upfront investment from investors is denoted as  $I$ . With probability of  $\beta$  the project is good (denoted as *good*) and generates a cash flow of  $B$ , whereas with probability of  $1-\beta$  the project is bad (denoted as *bad*) and yields zero return.<sup>5</sup> The above information is known to the public. However, the type (good or bad) of the project is not known. We assume that  $\beta(B - I) + (1 - \beta)(0 - I) > 0$ . That is, the expected return of the project is assumed to be positive and the project should be undertaken even if its type is not known.

If the investors can identify the type of the project, a loss can be avoided by not investing in a *bad* project. The investors can hire an auditor by paying a fee of  $F$  to identify the type of the project.<sup>6</sup> The manager will always claim the project type is good in order to obtain the investment. The auditor may be viewed as obtaining information about the veracity of the manager's assertions about the project type (Laux and Newman 2010). The auditor exerts  $a$  ( $\geq 0$ ) units of effort (audit quality) and obtains a binary signal about the project's type (i.e.,  $signal \in \{g, b\}$ , where  $g$  and  $b$ , respectively, denote the auditor's signal that the project is of good type or of bad type). The level of audit quality is not publicly observable when the auditor's report is issued. For a given audit quality, the auditor might not be able to detect

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<sup>5</sup> Considering a variant of the model that assumes a positive probability with which a good project fails does not affect our key analysis.

<sup>6</sup> This is essentially the same as to audit financial statements of the firm that provide information relevant to the firm's future cash flow.

material misstatements due to audit technology limitations and because a perfect audit is likely to be too costly. As is common in the literature, the relation between the audit report and the true project type is assumed to be as follows:

$$\Pr(g|good, a) = 1 \text{ and } \Pr(b|bad, a) = q(a).$$

The assumption that  $\Pr(g|good, a) = 1$  is innocuous and reflects the fact that Type I errors are rare and unimportant in audit practice (Antle and Nalebuff 1991).  $\Pr(b|bad, a) = q(a)$  implies that the auditor may fail to accumulate sufficient and appropriate evidence to identify a bad firm. The probability of detecting a bad project conditional on a bad project and effort  $a$  is  $q(a)$ , where  $q'(a) > 0$  and  $q''(a) \leq 0$ . We assume the auditor is prohibited from reporting a firm as bad unless there is proper evidence to support the opinion. The scenario of an auditor always reporting “bad” regardless of audit evidence would result in a collapse of audit markets, since no auditor will work, which causes audit value to be zero and investors will not hire an auditor. Furthermore, the auditor has no incentive to report “good” if the evidence indicates that the firm is bad. The management has no incentive to bribe the auditor to report “good” since there is no surplus to share between the management and the auditor.

Audit failure occurs when the project is bad but the auditor issues a “good” report; in other words, he fails to recognize a bad project. Consequently, the investors will make inappropriate investment decisions and incur a loss. The probability of audit failure conditional on the project being bad is  $1 - q(a)$ . If an audit failure occurs and the auditor is found liable, he is required to pay a damage amount of  $D$  to the investors. We assume legal friction costs are trivial and that investors will always sue auditors if an audit failure occurs.<sup>7</sup> The damage payment  $D$  is related to the losses suffered by investors, and can include compensation for damages, a punitive amount imposed on the auditor, and an amount resulting from joint and several liability rules (if applicable) (Narayanan 1994 and Patterson and Wright 2003).

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<sup>7</sup>If the legal cost is not trivial, investors may not always sue the auditor after an audit failure. Including non-trivial legal costs in the model would alter the auditor’s equilibrium effort. However, this does not change the qualitative conclusions regarding the implications of adopting international auditing standards. Interested readers can read Boritz and Zhang (1997) and Zhang and Thoman (1999) that provide systematic analysis on the impact of non-trivial legal costs on auditor behavior. Additionally, in the U.S., the legal cost for initiating a law suit is low due to the widely used contingent legal fee system.

Courts determine whether the auditor is liable by referring to auditing standards. However, the auditor is uncertain how a court would interpret the auditing standards prior to a trial due to the vagueness of auditing standards.

Vagueness of auditing standards represents the uncertainty in the mapping of auditing standards and required audit effort. With vague standards, there is no one-to-one mapping between the standards and the exact level of required audit effort. For given auditing standards, the vagueness of the standards increases when the span of the possible corresponding due care level of audit effort widens. Auditing standards might be interpreted in various ways for two basic reasons: because of ambiguities in the wording of the standards written by standard setters, and because of characteristics of court systems. We denote the wording vagueness of standards by  $\sigma \geq 0$ . Standard setters choose the toughness  $s$  and the wording vagueness,  $\sigma$ . Additionally, courts can impose their own interpretation on the standards. The courts in different countries may interpret the standards differently even if  $\sigma$  is the same across countries. For example, the outcome of a given case under a jury trial is more difficult to predict than under a bench trial. We denote the variance of courts' interpretation of auditing standards by  $\delta > 0$ . The higher the value of  $\delta$ , the more difficult it is to predict a case outcome. We use the term "overall vagueness of auditing standards" to measure the variance of interpretations of the standards and denote it by  $v > 0$ . It is an increasing function of both  $\sigma$  and  $\delta$ , that is,

$$v = f(\sigma, \delta), \quad \frac{dv}{d\sigma} > 0, \quad \frac{dv}{d\delta} > 0, \quad \text{and} \quad \frac{d^2v}{d\sigma d\delta} > 0.$$

For a given court system,  $v$  reaches its lowest value when  $\sigma = 0$ , that is the wording of standards is perfectly precise. For tractability purposes, we assume  $v = \delta$  when  $\sigma = 0$ .<sup>8</sup>

Under given standards and legal system, after exerting a level of effort ( $a$ ), the auditor will be judged as having complied or not complied with the standards. The probability that the auditor will be

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<sup>8</sup> For example, in the case of Arthur Andersen vs. Fund of Funds, Arthur Andersen followed the standards regarding confidential client information; however, the courts did not find this to be a sufficient defence. Therefore, it is possible that when  $\sigma = 0$ , the overall vagueness is nonzero.

deemed by a court to have complied with auditing standards and therefore has exercised due care in performing the audit is summarized below:

$$P(a|s, v) = \begin{cases} 1 & \text{if } a \geq s + v, \\ \frac{a - (s - v)}{2v} & \text{if } s - v \leq a < s + v, \\ 0 & \text{if } a < s - v, \end{cases}$$

The probability of being found liable by a court after an audit failure is then  $1 - P(a|s, v)$ .

We define the value of  $s$  as the toughness of the standards which is the average understanding by the court system of audit quality required by auditing standards as applied to a client.  $s + v$  is the highest level of audit quality required by auditing standards as understood by courts, and  $s - v$  is the lowest level of audit quality.<sup>9</sup> In other words, for given auditing standards, if the audit quality is not lower than  $s + v$ , the auditor is regarded by any judge/jury as having complied with the auditing standards. We define effort in this range as *certain compliance* effort. If the audit quality is between  $s - v$  and  $s + v$ , the auditor is regarded as having complied with the standards by some judges/juries, but not by others. We define effort in this range as *possible compliance* effort. Finally, if the audit quality is lower than  $s - v$ , the auditor is regarded by every judge/jury as having not complied with the auditing standards, and we define effort in this range as *noncompliance* effort. Note that the due care level of audit effort under the standards is client firm specific. Auditing standards require auditors to consider firm characteristics before determining the audit effort, for example by assessing inherent risk, control risk, and business risk. Inherent risk and control risk are captured by the probability of the project being bad (i.e.,  $1 - \beta$ ). The potential loss of the investment  $I$  captures the business risk. The damage award  $D$  is related to  $I$ , and thus, is also firm specific.

The auditors' likelihood of being found liable is affected by the interaction of  $\sigma$  and  $\delta$ , that is, the overall vagueness  $v$  of the standards. When audit effort increases, more judges/juries will conclude that the auditor has complied with the standards. The value of  $v$  reflects both judge's/jury's interpretation of standards and possible inaccuracy of observing audit quality. If  $v$  equals zero, then the standards are both precisely set and interpreted. Finally, if the toughness of standards is very high with a low value of  $v$

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<sup>9</sup> Since the lowest audit quality must be greater than or equal to zero, the vagueness  $v$  must not be greater than  $s$ .

under a negligence liability regime, then the legal system is equivalent to a strict liability system, where an auditor is liable as long as an audit failure occurs regardless of his effort, because auditors will never comply with such the standards (see Ye and Simunic 2013).

In our analysis, we first identify the players' objectives and the first-best solution, and then derive the auditors' effort choices for given toughness and overall vagueness of auditing standards. Based on the effort choices, we then determine the optimal auditing standards (i.e., optimal  $s$  and  $\sigma$ ) for given characteristics of legal regimes (i.e., damage award  $D$  and vagueness in court systems/legal regimes  $\delta$ ). Finally, we consider the implications of this analysis for the adoption of ISAs.

### **Objectives of Players**

The investors' objective is to maximize the value of the investment when they consider the auditor hiring decision. The value of the investment when an auditor is not hired is:

$$\beta(B - I) - (1 - \beta)I.$$

The first component in the above equation is the expected profit if the project is a good project, and the second component is the expected loss if the project is bad.

The value of the investment when an auditor is hired can be written as follows:

$$\beta(B - I) - (1 - \beta)(1 - q(a))I + (1 - \beta)(1 - q(a))(1 - P(a|s, v))D - F.$$

The first component in the above equation is the expected profit if the project is a good project, the second component is the expected loss if the project is bad and the auditor fails to identify the type of the project, the third component is the expected damage award from the auditor if the auditor is held liable for a failed audit, and the fourth component is the audit fee.

The difference of the investment value with and without an audit can be written as:

$$(1 - \beta)q(a)I + (1 - \beta)(1 - q(a))(1 - P(a|s, v))D - F.$$

The first component of the above equation is the loss avoided by not investing in a bad project, the second component is the value of compensation from the auditor after an audit failure, and the third component is the audit fee paid to the auditor. The constraint on the investors' maximization problem is the auditor's

effort decision. The auditor's objective is to choose an audit quality to maximize the net value to the auditor from rendering the audit service. The auditor has the following objective function:

$$\text{Max}_a F - \mu a - (1 - \beta)(1 - q(a))(1 - P(a|s, v))D,$$

where  $(\mu a)$  is the auditor's resource cost of producing an audit quality level  $a$ . The parameter  $\mu$  measures the unit cost (price) of a unit of audit quality.<sup>10</sup> The audit fee is determined by the competitive audit market and is not a function of the audit report (i.e., no contingent fees). After an auditor is hired, the audit fee does not play a role in the auditor's effort decision, and the auditor chooses a level of effort to minimize the total costs. Note that audit fees are implicitly endogenously determined, and will equal equilibrium effort cost, including a normal return. The auditor's objective can therefore be simplified as follows:

$$\text{Min}_a \mu a + (1 - \beta)(1 - q(a))(1 - P(a|s, v))D.$$

The audit value is the difference between the total welfare with and without an audit. Since we have two groups of players (i.e., investors and auditors) in this setting, it is the sum of increased payoff to the investors due to an audit and the net payoff to auditors. In a competitive audit market, auditors earn zero economic profit. Hence, the audit value is the benefit of an audit net of the audit cost for investors, as defined in Schwartz (1998). It has the following expression:

$$(1 - \beta)q(a)I - \mu a.$$

The optimal auditing standards maximize the audit value by motivating auditors to exert appropriate audit quality, which is determined by the following program:

$$\begin{aligned} & \text{Max}_{s, \sigma} (1 - \beta)q(a)I - \mu a \\ & \text{s. t. } \text{Min}_a \mu a + (1 - \beta)(1 - q(a))(1 - P(a|s, v))D. \end{aligned}$$

To serve as a benchmark for later analysis, we determine the first-best effort, which maximizes audit value without the constraint. The first-order condition to maximize the audit value is:

$$\mu - (1 - \beta)q'(a)I = 0 \quad (1)$$

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<sup>10</sup> The variation of audit firms' marginal cost was included in an early draft of the paper and doesn't affect the main analysis. It is available upon request.

The level of effort solving equation (1) is the first-best level of effort. We denote it as  $a^*$ .<sup>11</sup>

### III. ANALYSIS

#### Auditor's Effort Choice for A Given Set of Auditing Standards

For given toughness  $s$  and vagueness  $v$ , an audit's chosen effort is in one of three categories with respect to auditing standards compliance: certain compliance ( $a \geq s + v$ ), possible compliance ( $s + v \geq a \geq s - v$ ), and noncompliance ( $a < s - v$ ). The auditor minimizes his total costs by selecting an effort level from these choices. Hence, we next determine and compare the total costs of each choice.

When audit quality is  $s + v$  or higher, the auditor will be judged as not liable for damages resulting from an audit failure. The auditor's total costs with effort of  $s + v$  or higher have the following value:

$$TC_c = \mu a.$$

The subscript  $c$  represents certain compliance with auditing standards. The auditor will not exert effort higher than  $s + v$  because the total cost of the audit is an increasing function of effort and there is no benefit to the auditor. Therefore, we obtain the auditor's first available choice as certain compliance with an effort of  $s + v$ .

The second choice for the auditor is possible compliance with an effort between  $s - v$  and  $s + v$ . We term it "possible compliance" because the auditor is not regarded as having complied with the standards with certainty. When the audit quality is between  $s - v$  and  $s + v$ , the auditor is liable to the investors with a probability  $\frac{(s+v-a)}{2v}$  for losses resulting from an audit failure, and the auditor's total costs are:

$$TC_p = \mu a + (1 - \beta)(1 - q(a)) \frac{s + v - a}{2v} D.$$

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<sup>11</sup>If the auditor acts as an insurer, the first-best effort can also be obtained. However, the investors and managers may not manage the firm the same way as when the investment was not insured due to moral hazard problem, which can lead to the failure of the audit insurance market.

The subscript  $p$  represents possible compliance with auditing standards. If possible compliance is the optimal choice for the auditor, then there exists an effort between  $s - v$  and  $s + v$  that minimizes  $TC_p$ , denoted as  $a_p$ . The value of  $a_p$  is determined by the following equation:

$$\mu - (1 - \beta)q'(a_p) \frac{s + v - a_p}{2v} D - (1 - \beta) \left(1 - q(a_p)\right) \frac{1}{2v} D = 0.$$

This equation is obtained by taking the first-order condition on the total costs of possible compliance with respect to audit quality  $a$ . The second derivative of  $TC_p$  is positive.

The third choice for the auditor is not to comply with the auditing standards, with an effort lower than  $s - v$ . When the audit quality is lower than  $s - v$ , the auditor is always liable to the investors for some level of damages resulting from an audit failure, and the auditor's total costs are:

$$TC_n = \mu a + (1 - \beta)(1 - q(a))D.$$

The subscript  $n$  represents noncompliance. If noncompliance is optimal, then the audit quality minimizing  $TC_n$ , denoted as  $a_n$ , is determined by the following equation:

$$\mu - (1 - \beta)Dq'(a_n) = 0.$$

Therefore,  $a_n$  is the optimal noncompliance effort and  $a_n$  is lower than  $s - v$ .

We now define several threshold values of auditing standards for use in later analysis. The first threshold variable is a specific level of toughness for a given overall vagueness. It determines the choice between certain and possible compliance with the standards. This variable is denoted as  $s_v$ , which is determined by the following equation:<sup>12</sup>

$$\frac{dTC_p(a = (s_v + v))}{da} = \mu - (1 - \beta)(1 - q(a)) \frac{1}{2v} D = 0.$$

The above equation indicates that the certain compliance level of auditor effort  $s_v + v$  satisfies the first-order condition (left differentiation, see footnote 9) for determining effort when the toughness of standards is  $s_v$  and the overall vagueness is  $v$ . For a given  $v$ ,  $s_v$  represents the maximum toughness of

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<sup>12</sup>Note that when  $a = s_v + v$ ,  $TC_p$  is left differentiable but not right differentiable. The derivative at that point should be expressed as  $\frac{dTC_p(a=(s_v+v)^-)}{da}$ . For the convenience of our presentation, this derivative is expressed as  $\frac{dTC_p(a=(s_v+v))}{da}$ .

auditing standards with which the auditor certainly complies if the choice is between possible compliance and certain compliance. More specifically, if  $s > s_v$ , then  $\frac{dTC_p(a=s+v)}{da} > 0$  and the total costs of certain compliance  $TC_c(s+v)$  would never be less than the total costs of possible compliance  $TC_p(a_p)$  for  $a_p$  between  $s-v$  and  $s+v$ . Therefore, the auditor will not comply certainly with the standards. If  $s \leq s_v$ , then  $\frac{dTC_p(a=s+v)}{da} \leq 0$  and there does not exist a possible compliance effort that results in costs lower than the costs of certain compliance. Therefore, the threshold toughness,  $s_v$ , represents the standards at which the possible and certain compliance efforts converge at  $s_v + v$ .

Comparative static analysis shows that  $\frac{ds_v}{dv} = -\left(1 + \frac{1-q(s_v+v)}{q'(s_v+v)v}\right) < -1$  and  $\frac{ds_v}{dD} = \frac{1-q(s_v+v)}{q'(s_v+v)D} > 0$ .  $\frac{ds_v}{dv} < -1$  implies  $\frac{d(s_v+v)}{dv} = \frac{ds_v}{dv} + 1 < 0$ . Therefore, the value of  $s_v + v$  is a decreasing function of  $v$ . For a given  $v$ , there is a unique  $s_v$  that is an increasing function of  $D$ . Since  $\frac{ds_v}{dv} < -1$ , when  $v$  is large,  $s_v$  could be quite small. In this paper, we focus on the cases where  $s_v$  is greater than zero. Moreover, we assume that the level of vagueness is reasonable, such that the audit quality is not degenerate.

Since  $\frac{d(s_v+v)}{dv} < 0$ , the certain compliance effort is higher when  $v$  decreases. There exists a threshold value of overall vagueness such that the auditor is indifferent between certain compliance and noncompliance when  $s = s_v$ . We denote this threshold value of overall vagueness as  $\bar{v}$  and the corresponding  $s_v$  as  $s^0$ , which are determined by the following equations:

$$\frac{dTC_p(a = s^0 + \bar{v})}{da} = \mu - (1 - \beta)(1 - q(s^0 + \bar{v})) \frac{1}{2\bar{v}} D = 0,$$

$$TC_p(s^0 + \bar{v}) = TC_n(a_n).$$

The first equation indicates that the certain compliance effort (audit quality)  $s^0 + \bar{v}$  satisfies the first-order condition for determining the possible compliance effort when the toughness of standards is  $s^0$  and the vagueness is  $\bar{v}$ . The second equation indicates that the total costs of possible compliance with effort  $s^0 + \bar{v}$  equal the total costs of noncompliance. The interpretation of  $s^0$  and  $\bar{v}$  is that if the vagueness is  $\bar{v}$ , then  $s^0$  represents the maximum toughness of auditing standards with which the auditor

certainly complies given that the auditor's choices are among certain compliance, possible compliance and noncompliance. Since  $s^0$  is  $s_v$  at  $v = \bar{v}$  and  $\frac{d(s_v+v)}{dv} < 0$ , we obtain  $s_v + v > s^0 + \bar{v}$  if  $v < \bar{v}$  and  $s_v + v < s^0 + \bar{v}$  if  $v > \bar{v}$ .

When  $v \leq \bar{v}$ , the auditor will not choose possible compliance. The reasons are as follows. If the toughness of auditing standard,  $s$ , is lower than  $s^0 + \bar{v} - v$ , then  $s + v < s^0 + \bar{v}$ . Given  $v \leq \bar{v}$ ,  $s^0 + \bar{v} \leq s_v + v$ . Thus,  $s + v < s_v + v$ . Since  $TC'_p(s_v + v) = 0$ , then  $TC'_p(s + v) < 0$  and therefore, there does not exist a possible compliance effort  $a_p (< s + v)$ . If the toughness,  $s$ , is higher than  $s^0 + \bar{v} - v$ , then  $TC_p(a_p | s > s^0 + \bar{v} - v) > TC_p(a_p | s = s^0 + \bar{v} - v) > TC_c(s^0 + \bar{v}) = TC_n(a_n)$ , because  $TC_p$  and  $TC_c$  are increasing functions of  $s$ , and  $s_v + v > s^0 + \bar{v}$  if  $v < \bar{v}$ . Therefore, auditors do not exert possible compliance effort if  $v \leq \bar{v}$ .

However, when  $v > \bar{v}$  and the toughness of the standards is greater than  $s_v$ , the auditor will choose between possible compliance and noncompliance. We define a threshold level of toughness (denoted as  $s'$ ), which is greater than  $s_v$  for a given  $v (> \bar{v})$  as determined by the following equations:

$$\frac{dTC_p}{da} = \mu - (1 - \beta)q'(a) \frac{s' + v - a}{2v} D - (1 - \beta)(1 - q(a)) \frac{1}{2v} D = 0,$$

$$TC_p(a | s') = TC_n(a_n).$$

The first equation is the first-order condition for determining the possible compliance effort under the specific toughness  $s'$ , and the second equation indicates that the total costs of possible compliance equal the total costs of noncompliance under the same toughness. The  $s'$  represents the toughest standards ( $s = s'$ ) with which the auditor possibly complies. If the toughness is higher than  $s'$ , the auditor will choose noncompliance effort when  $v > \bar{v}$ .

The auditor's effort choice for a given level of toughnesss and vagueness  $v$  is summarized in Lemma 1 and illustrated in Figure 1.

**Lemma 1.**

a. Given  $v \leq \bar{v}$ , if the toughness of the standards is lower than or equal to  $s^0 + \bar{v} - v$ , the auditor will comply certainly with the standards (i.e.,  $a = s + v$ ), but if the toughness is greater than  $s^0 + \bar{v} - v$ , the auditor will not comply with the standards (i.e.,  $a = a_n$ ).

b. Given  $v > \bar{v}$ , if the toughness is lower than or equal to  $s_v$ , then the auditor will comply certainly with the standards (i.e.,  $a = s + v$ ); if the toughness is between  $s_v$  and  $s'$ , the auditor will possibly comply with the standards (i.e.,  $a = a_p$ ); and if the toughness is greater than  $s'$ , the auditor will exert noncompliance effort (i.e.,  $a = a_n$ ).

Lemma 1 implies that when the vagueness is low, the auditor will comply certainly with the standards if the toughness is not higher than a threshold (i.e.,  $s^0 + \bar{v} - v$ ), and will otherwise choose not to comply with the standards. The auditor will not take a chance and only possibly comply with the standards, because one of the other two choices (certain compliance or noncompliance) is more attractive given a low level of vagueness. In contrast, when the vagueness is high, the auditor moves from certain compliance to possible compliance and to noncompliance when the standards become increasingly tougher.

In Figure 1, the dashed line is  $s^0 + \bar{v} - v$  and the solid line is  $s_v$  and the dash dotted line is  $s'$ . The auditor chooses  $s + v$  in the region below the dashed and solid line, chooses  $a_p$  in the region above the solid line and below the dash dotted line, and choose  $a_n$  in the region of above the dashed line and the solid line.

**Optimal Toughness of the Standards**

Assuming standard setters set the standards precisely ( $\sigma = 0$ ), we solve for the optimal toughness of auditing standards taking into account the characteristics of a country's legal regime,  $D$  and  $\delta$ . The optimal toughness of the standards induces auditors to produce the first best audit quality or as close to the first best as possible. We first present the impact of vagueness in court systems (i.e.,  $\delta$ ) on the choice of optimal standards holding the damage award (i.e.,  $D$ ) constant and then show the impact of damage

award on the choice of optimal standards holding the vagueness in court systems fixed. Recall that the overall vagueness of the standards  $v$  is the vagueness in court systems when the wording of the standards is perfectly precise (i.e.,  $v = \delta$  when  $\sigma = 0$ ). Even if the language of standards is precise, court systems involve different parties, such as, lawyers, witnesses, judges, and maybe jurors, and the final decision regarding the liability of auditors can still be uncertain.

### ***The Impact of Vagueness in Court Systems on Optimal Standards***

Standard setters can use information about vagueness in court systems to develop standards with a toughness that maximizes the audit value. Since the first-best audit quality is  $a^*$ , the standard setters will set standards that induce an audit quality equal to  $a^*$  or as close to  $a^*$  as possible (see Ye and Simunic 2013). From Lemma 1, we directly obtain the optimal standards as shown in Proposition 1.

#### **Proposition 1.**

- a. Given  $v \leq \bar{v}$ , if  $a^* \leq s^0 + \bar{v}$ , then the toughness of the standards should be set at  $\bar{s}$  such that  $\bar{s} + v = a^*$ , where  $\bar{s} \leq s^0 + \bar{v} - v$ ; if  $a^* > s^0 + \bar{v}$ , then the toughness should be set at  $\bar{\bar{s}}$  such that  $\bar{\bar{s}} + v = s^0 + \bar{v}$ , where  $\bar{\bar{s}} = s^0 + \bar{v} - v$ .*
- b. Given  $v > \bar{v}$ , if  $a^* \leq s_v + v$ , then the toughness should be set at  $\bar{s}$  such that  $\bar{s} + v = a^*$ , where  $\bar{s} \leq s_v$ ; if  $s_v + v < a^* \leq a_p'$ , where  $a_p'$  is the possible compliance effort when  $s = s'$ , then the toughness should be set at  $s$  such that  $a_p = a^*$  at  $s$ , where  $s_v < s \leq s'$ ; if  $a^* > a_p'$ , then the optimal toughness can be set at  $s'$ .*

### ***The Impact of Damage Award on Optimal Standards***

First, we consider the case when the interpretation of standards by the court system is also precise (i.e.,  $\delta = 0 \rightarrow v = 0$ ). From Lemma 1(a), no vagueness implies that if the toughness of standards is lower than or equal to  $s^0 + \bar{v}$ , the auditor will comply certainly with the standards (i.e.,  $a = s$ ), but if the toughness of standards is greater than  $s^0 + \bar{v}$ , the auditor will not comply with the standards (i.e.,  $a = a_n$ ). Thus, if  $a^* < s^0 + \bar{v}$ , then the standards can be set at  $a^*$  and if  $a^* > s^0 + \bar{v}$ , then the standards should be set at  $s^0 + \bar{v}$ . Since  $s^0 + \bar{v}$  is a function of  $D$ , we obtain a  $D^0$  by equating  $a^*$  and  $s^0 + \bar{v}$ . If  $D > D^0$ , then

$a^* < s^0 + \bar{v}$  and the optimal standard is  $a^*$ . If  $D < D^0$ , then  $a^* > s^0 + \bar{v}$  and the optimal standard is  $s^0 + \bar{v}$ .

**Remark 1**

*If  $D > D^0$ , then the optimal standard is  $a^*$  and will induce the auditor to exert effort equal to  $a^*$ .*

*If  $D < D^0$ , then the optimal standard is  $s^0 + \bar{v}$  under which the auditor exerts  $s^0 + \bar{v}$ .*

This remark shows that optimal standards are set to induce first-best effort or as close to the first-best as possible. They do not necessarily induce the first-best. If a country's normal or typical damage award is not large enough ( $D < D^0$ ), the first-best audit quality is never obtained. If the normal damage award is at least  $D^0$ , then it is possible for a country to induce the first-best audit quality by choosing the optimal standards.

Now we move on to a more general case when different courts may interpret standards differently (i.e.,  $\delta > 0$  and  $v = \delta$ ) in a country. The derivation of Remark 1 shows that we compare the first-best effort with the threshold value of  $s$  to find the threshold value of  $D$  where the equilibrium effort equals  $a^*$ . Similarly, in the following lemma, we define several threshold values of damage award by comparing the first-best effort  $a^*$  with the threshold value of  $s$ .

**Lemma 2.**

*a.  $s^0 + \bar{v}$  is an increasing function of the damage award size and there exists a damage award size at which  $s^0 + \bar{v} = a^*$  when the standards are  $s^0$  and the vagueness in legal system is  $\bar{v}$ . This damage award size is not a function of  $v$  and has the value of  $D^0$  which is smaller than  $I$ .*

*b. There exists a damage award size at which  $s_v + v = a^*$  when auditing standards are  $s_v$  and the vagueness in legal system is  $v$ . This damage award size is denoted as  $D^v$  and is an increasing function of  $v$ . Since  $s_v$  only exists for  $v \geq \bar{v}$ , we have  $D^v \geq D^0$ .*

*c. For  $s > s_v$  and  $v > \bar{v}$  there exist damage awards at which  $a_p = a^*$ . The minimum value of such damage awards is denoted as  $D^p$ , which is an increasing function of  $v$ , and  $D^0 \leq D^p \leq D^v$ .*

From Lemma 2 and Proposition 1, we can directly derive the optimal toughness of auditing standards under various conditions of the severity of legal systems ( $D$ ). The results are summarized in Proposition 2. The proof is in the Appendix. Figure 2 illustrates the optimal toughness under various  $D$  and  $v$ .

**Proposition 2.**

*a. Given  $v \leq \bar{v}$ , if  $D \geq D^0$ , a country can set the optimal toughness of the standards to be  $\alpha^* - v$  and induce the first-best level of audit quality; if  $D < D^0$ , the optimal toughness (i.e.,  $s^0 + \bar{v} - v$ ) can only induce an audit quality below the first-best. In either case, the optimal toughness is a linear decreasing function of the vagueness in legal systems.*

*b. Given  $v > \bar{v}$ , if  $D \geq D^v$ , a country can choose the optimal toughness to be  $\alpha^* - v$  and motivate the first-best audit quality. The optimal toughness is a linear decreasing function of the vagueness in legal systems; if  $D^p \leq D < D^v$ , the optimal toughness (i.e.,  $s$  such that  $\alpha_p = \alpha^*$  at  $s$ , where  $s_v < s \leq s'$ ) will also induce first-best level of effort. Ceteris paribus, the optimal toughness is an increasing function of the vagueness in the legal system and a decreasing function of the damage award; if  $D < D^p$ , the optimal toughness (i.e.,  $s'$ ) can result in an audit quality below the first-best.*

As shown in Figure 2, for high values of  $v$ ,  $s^*$  increases as  $v$  increases if  $D$  is not too large. As  $D$  increases,  $s^*$  increases until at very high  $D$ ,  $s^*$  will decrease so that auditor effort does not exceed the first-best. For low values of  $v$ , as  $v$  increases  $s^*$  will decrease since auditors will choose to comply with standards at the upper bound and lower toughness can compensate for increased vagueness. As  $D$  increases,  $s^*$  will increase until the first-best audit quality is attained.

Note that Remark 1 is a special case of Proposition 2 (a), that is, when  $v = 0$ . Proposition 2 and Lemma 2 imply that given low vagueness in a legal system (i.e.,  $v \leq \bar{v}$ ), the first-best effort can be motivated if the damage award is greater than or equal to  $D^0$ ; given high vagueness in the legal system (i.e.,  $v > \bar{v}$ ), first-best effort can be achieved by choosing proper standards if the damage award is greater than or equal to  $D^p$ , which is greater than  $D^0$  given  $v > \bar{v}$ ). As the vagueness increases, the damage

award needed to motivate the first-best effort increases, because both  $D^p$  and  $D^v$  are increasing functions of  $v$ .<sup>13</sup> This result is summarized in Corollary 1.

**Corollary 1.** *When the vagueness in a legal system is low (i.e.,  $v \leq \bar{v}$ ), the damage award necessary to motivate the first-best effort (i.e.,  $D^0$ ) is not a function of the vagueness. When the vagueness in a legal system is high (i.e.,  $v > \bar{v}$ ) and increasing, a country with higher damage awards (i.e.,  $D \geq D^p$ ) can achieve the first-best effort.*

Figure 3 illustrates how audit quality will vary with vagueness and damage award size if the toughness of the standards is optimally set. It shows that  $D$  needs to be large enough to induce the first-best quality. When  $D$  is not large enough, optimal standards induce an effort as close to the first best as possible. When  $v$  is low, the audit effort is  $s^0 + \bar{v}$ , which doesn't vary with  $v$ , but is affected by  $D$ . When  $v$  is high, the auditor will only possibly comply with standards. When  $v$  increases, the possible compliance effort decreases, and tougher standards are needed to increase the possible compliance effort.

### **Optimal Standards ( $s$ and $\sigma$ )**

The optimal combination of  $s$  and  $\sigma$  for different levels of vagueness in court systems  $\delta$  holding  $D$  constant can be directly derived from Proposition 1. Recall that the standards overall interpretation vagueness  $v$  is an increasing function of both standards wording vagueness  $\sigma$  and vagueness in court system  $\delta$ . We can find the optimal combination of  $s$  and  $\sigma$  for different levels of  $D$  given fixed  $\delta$  from Proposition 2.

Recall  $v$  reaches its lowest value, denoted by  $\underline{v}$  when  $\sigma = 0$  for a given vagueness in the court system. If a country's vagueness in court systems is very large, that is,  $\underline{v} > \bar{v}$ , then  $v = \delta + \sigma > \bar{v}$  and

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<sup>13</sup>It is generally very difficult to set  $D = I$ , because the management has the primary responsibility for misstated financial statements. The joint and several liabilities or proportionate liability regime would not make the auditor certainly responsible for the total  $I$ . Since we discuss the impact of various legal regimes on standards in this section, we recognize that it is possible to set  $D$  equal to  $I$  or greater than  $I$  through other means (such as punitive damage award). Under this scenario (i.e.,  $D = I$ ), auditing standards can be set optimally (i.e.,  $s \geq a^* - v$ ) to induce the first-best effort; and if auditing standards are very low, auditors will comply with the standards and the first-best effort may not be achieved. This highlights the need to set auditing standards properly after properly choosing the amount of damage award.

only Proposition 1 (b) and Proposition 2 (b) are possible. If  $v < \bar{v}$ , then Proposition 1 (a) and (b) and Proposition 2 (a) and (b) are all possible.

**Remark 2**

*The optimal standards (both toughness  $s$  and wording vagueness  $\sigma$ ) satisfy the conditions in Propositions 1 and 2 for given legal characteristics (damage award  $D$  and vagueness in court system  $\delta$ ).*

We have shown above the audit effort choices under a given set of standards and the optimal standards given the vagueness in legal system ( $\delta$ ) and damage award size ( $D$ ). These analyses can be used to analyze a country's decision regarding adoption of international auditing standards.

**IV. IMPLICATIONS OF THE ANALYSIS FOR THE ADOPTION OF ISAs**

The International Standards on Auditing (ISAs) are written by a private sector group of standard setters, the International Auditing and Assurance Standards Board, which includes representatives from public accounting firms, academia, and investor groups in thirteen countries. The countries represented on IAASB change over time. When developing and voting on the adoption of a proposed standard, Board members are urged to consider the interests of the public and the profession as a whole, rather than the specific interests of the country they represent. Thus – by construction – the ISAs do not take into account the characteristics of country-specific legal systems. Yet, as shown in Figure 2, the optimal toughness of auditing standards varies considerably with the average size of damage awards and the vagueness of countries' legal systems. Thus the ISAs, which are characterized by a certain aggregate level of toughness,  $s$ , and wording vagueness,  $\sigma$ , cannot simultaneously be optimal for all countries.

For countries, such as China, where both  $v$  and  $D$  are very low ( $v < \bar{v}$ ,  $D < D^0$ ), optimal auditing standards, given the existing legal system, will have low toughness and the first-best audit quality will likely not be attained. In fact, China has been involved in the process of converging its national auditing standards with the ISAs since 2005 and was fully convergent as of 2010. But our analysis suggests that these standards will be too tough, given the Chinese legal system, and auditor non-compliance can be

expected. In fact, existing evidence (see Simunic and Wu, 2009) suggests that poor audit quality and non-compliance with standards is an ongoing problem in China.

By contrast, in the U.S.A. both  $v$  and  $D$  are likely to be high ( $v > \bar{v}$ ,  $D^p < D < D^v$ ). The legal environment in the U.S. for auditors is highly litigious (Seetharaman et al. 2002) and auditor litigation risk in the U.S. is uniquely higher than in other countries (Khurana and Raman 2004). Damage awards in the U.S. are large, they often include punitive damages, and the jury system leaves the judgment as to auditor non-compliance with standards to people who lack relevant expertise which can result in large variance in interpreting auditing rules. In these circumstances, optimal toughness of auditing standards needs to be high so that the first-best audit quality can be attained. In addition, auditor effort given these tough auditing standards will likely be in the “possible compliance” range, rather than “certain compliance”. This implies that auditors will normally “take chances” with regards to standards compliance and successful lawsuits against auditors will be relatively common. This is consistent with the evidence (e.g. Wingate 1997). Moreover, optimal standards in a country such as the U.S.A. should be precise since the optimal toughness is an increasing function of  $v$ . If the standards are imprecise, then optimal toughness needs to be even higher. Therefore, adoption by the U.S. of the ISAs as its national standards would be problematic since these standards are likely to be insufficiently tough and have too much wording vagueness. The ISAs are commonly viewed as being “principle-based” standards as contrasted to the “rules-based standards” currently being issued by the Public Company Accounting Oversight Board (PCAOB) (see Ye 2009). If the U.S. were to adopt ISAs domestically, the resulting average audit quality would likely be less than the first-best. So the reluctance of U.S regulators to adopt ISAs as domestic standards is consistent with our analysis.<sup>14</sup>

In contrast to the extremes of legal systems represented by China and the U.S.A., the legal systems in the countries in Europe have low legal vagueness ( $v < \bar{v}$ ) and moderate damage award size ( $D > D^0$ ). Due to the similarity in the characteristics of legal systems in these countries, adopting ISAs is

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<sup>14</sup> A more detailed analysis of the issues arising in the possible adoption of ISAs by the United States is available from the authors upon request.

likely to be beneficial for them and, in fact, the European Union adopted the ISAs as domestic standards in 2005. The auditors in these countries can be expected to exert effort at the “certain compliance” level and the resulting audit quality is most likely to be the first-best. Note that “certain compliance” by auditors implies that the rate of litigation against auditors will likely be rather low, which again seems consistent with existing evidence (Wingate 1997).

## V. CONCLUSION

This paper studies the impact of a country’s legal liability regime on the setting of auditing standards. Auditing standards are represented by two properties: the level of “toughness”, defined as the average level of auditing effort required by the standards, and the level of “vagueness”, or the degree of imprecision in the wording of the standards. Since Ye and Simunic (2013) showed that both investors and auditors prefer precise auditing standards when toughness can be set at the optimal level, in this paper we assume that auditing standards are set by investors so as to maximize audit value by motivating auditors to exert appropriate audit effort (audit quality). We characterize a legal regime in our model by two parameters: the extent of *vagueness in interpreting* auditing standards by courts in determining whether an auditor is liable for a failed audit, and the *damage award size* paid to investors by auditors deemed liable for investors’ losses. We start our analysis by determining audit quality under given auditing standards and a given legal system. Then we determine the level of *optimal* auditing standards that induce the *value maximizing* audit quality under a given legal system. Finally, we analyze the relationship between the two legal system parameters and optimal auditing standards.

We find that the combination of damage award size, vagueness in legal system, and the characteristics of standards affect audit quality produced in an economy. In other words, audit quality depends on the legal system and the auditing standards under which the auditor operates. Also, optimal auditing standards are complex functions of damage award size and vagueness in the legal system. The vagueness in a legal system has a profound impact on optimal auditing standards. Also, damage award size has greater marginal impact on the optimal standards, especially when vagueness is high. Under different combinations of these two factors, the standards inducing the same level of audit quality could

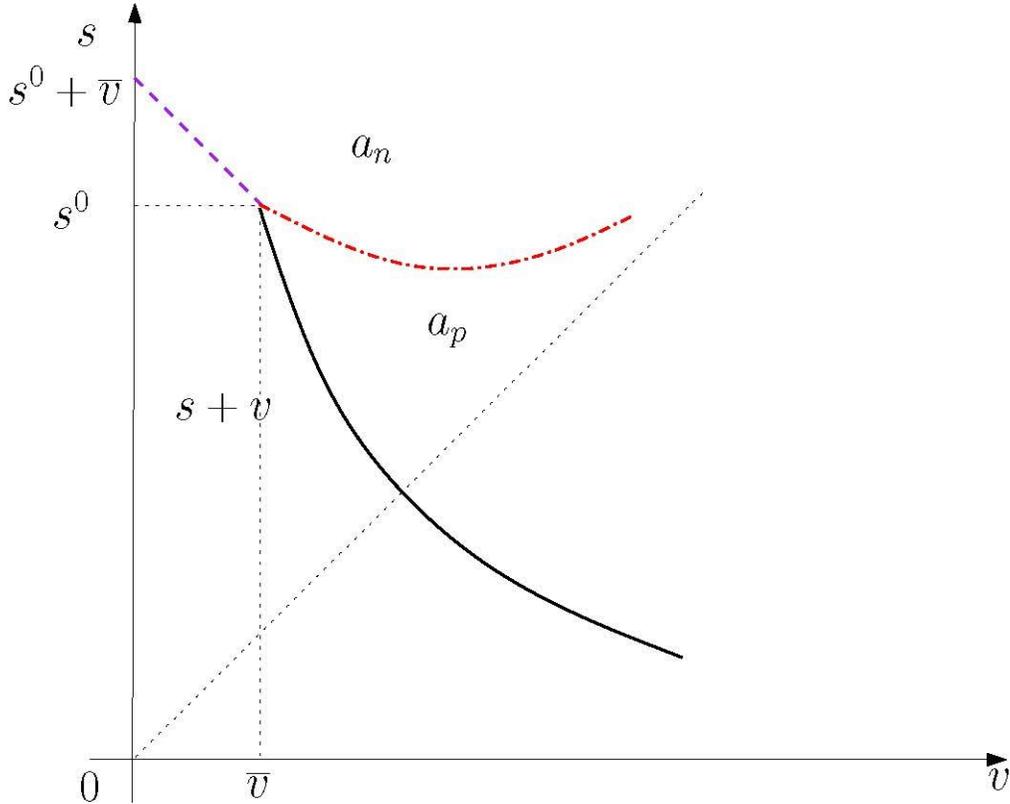
be drastically different. In other words, optimal audit quality is usually not obtained under the same audit standards when legal systems have different vagueness and/or different sizes of damage award.

The analysis is then applied to various countries' decisions to adopt (or not adopt) the International Standards on Auditing. We find that, the high litigation risk for auditors in the U.S. suggests that the U.S. legal system has high vagueness and damage award size, which requires quite tough auditing standards to induce optimal audit quality. Consequently, the U.S. would have different preferences concerning the characteristics of a set of uniform standards than other countries, and the U.S. should probably not accept the unified standards preferred by other countries, because those standards can reduce the audit quality and audit value in the U.S. For countries with similar legal systems and liability characteristics, adopting uniform auditing standards, such as the ISAs, may well be optimal since this decision can result in cost savings related to standards development. Finally, countries where domestic auditing institutions are not well developed and legal systems are weak (e.g. China) may well experience compliance problems after adopting a set of auditing standards that are not appropriate. In summary, globally uniform auditing standards cannot be optimal in all countries unless national legal systems are also sufficiently uniform.

To conclude, our analysis highlights the importance of legal regimes in auditing standard setting and illuminates the economic incentives related to adopting unified auditing standards. We believe that this analysis can help inform regulators and standard setting boards in the U.S. and other countries in their deliberations regarding the possible adoption of the ISAs. We believe imposing an initially non-optimal set of auditing standards on a country will require concurrent changes in the legal environment if those standards are expected to be effective (e.g. elicit auditor compliance with the rules). Further research on the possible adaptations that a country would need to make if it adopts an initially non-optimal set of auditing standards would appear to be useful.

Appendix I Figures

Figure 1: Audit effort under given toughness of the standards and interpretation vagueness

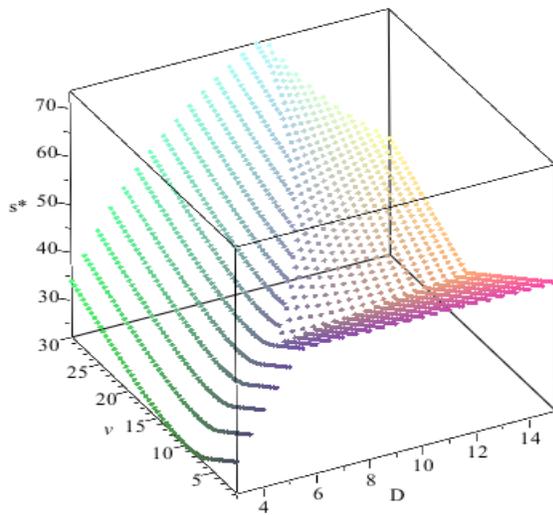


This figure illustrates auditor's quality/effort choices at different regions of  $s$  (toughness of the standards) and  $v$  (interpretation vagueness). The dashed (purple) line is  $s = s^0 + \bar{v} - v$  for which the auditor is indifferent in choosing certain compliance ( $a = s + v = s^0 + \bar{v}$ ) and noncompliance ( $a = a_n$ ). The solid(black) line is  $s = s_v$  where the auditor is indifferent between certain compliance ( $a = s_v + v$ ) and possible compliance ( $a = a_p$ ). At the dash dotted (red) line  $s'$ , the auditor is indifferent between possible compliance ( $a = a_p$ ) and noncompliance ( $a = a_n$ ). The auditor's effort is  $s + v$  in the region of below the purple and blue line,  $a_p$  in the region of above the blue and below the red line, and  $a_n$  in the region of above the purple and red line.

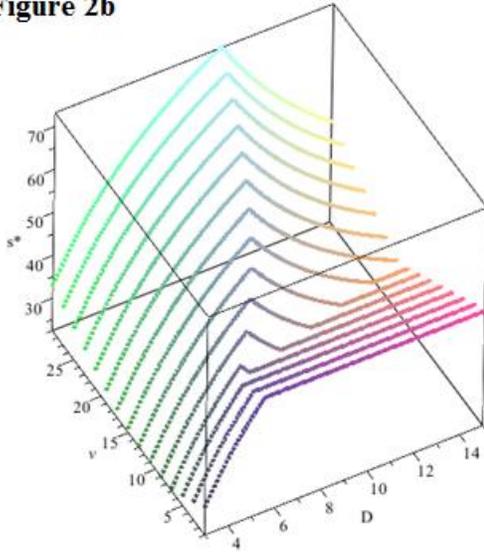
### Figure 2: The impact of $D$ and $v$ on the optimal toughness of the standards

Two figures are used below to show how the optimal toughness vary with  $v$  and  $D$ . Figure 2a is prepared using fewer points for  $D$ , such that the relationship between the optimal toughness and  $v$  for a given  $D$  can be easily visualized. Similarly, Figure 2b is prepared using fewer points for  $v$ , such that the relationship between the optimal toughness and  $D$  for a given  $v$  can be easily visualized. In both figures,  $s^*$  is the optimal toughness of the standards,  $v$  is the overall vagueness, and  $D$  is the damage award. We use the following function and parameter values to generate these figures:  $q(a) = 1 - \exp(-0.03a)$ ,  $\mu = 0.05$ ,  $\beta = 0.5$ ,  $I=15$ .

**Figure 2a**



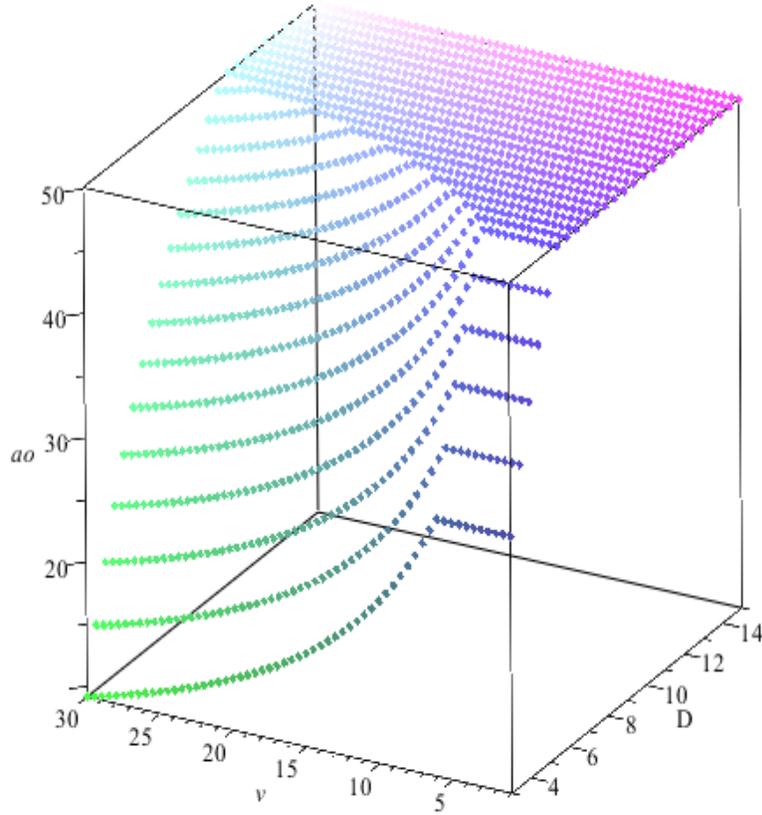
**Figure 2b**



The figures show, for a given  $v(\leq \bar{v})$ , as damage award  $D$  increases, optimal toughness increases and then becomes a constant once  $D \geq D^0$ . The value of  $D^0$  is the minimum of  $D$  at the point that the optimal toughness  $s^*$  becomes a constant under a given  $v(\leq \bar{v})$ . The value of  $D^0$  is around 7 in above figure and it is not a function of  $v$ . The optimal toughness decreases as  $v$  increases when  $v \leq \bar{v}$ .

**For a given  $v(> \bar{v})$** , the ridge is the optimal toughness when  $D = D^p$  and the valley is the optimal toughness when  $D = D^v$ . **For given  $v(> \bar{v})$** ,  $D^p < D^v$ . The optimal toughness is a not a function of  $D$  if  $D \geq D^v$ . The optimal toughness decreases in  $D$  if  $D^v > D \geq D^p$ , and the optimal toughness increases in  $D$  if  $D < D^p$ . Both  $D^v$  and  $D^p$  are increasing functions of  $v$ .

**Figure 3 The impact of D and v on audit quality under optimal toughness of the standards**



In this figure,  $a^o$  is the optimal audit quality,  $v$  is the interpretation vagueness, and  $D$  is the damage award.

This figure illustrates how auditor effort  $a^o$  varies with  $v$  and  $D$ , if the toughness of auditing standards is optimally set. We use the following function and parameter values to generate this figure:  $(a) = 1 - \exp(-0.03a)$ ,  $\mu = 0.05$ ,  $\beta = 0.5$ ,  $I=15$ .

The first-best  $a^o$  is at the top of this figure and its value is 50.136. For all  $a^o$  below first-best,  $a^o$  increases and turns to a constant as  $v$  decreases for a given  $D$  (less than  $D^0$  for  $v \leq \bar{v}$  and less than  $D^p$  for  $v > \bar{v}$ ).  $\bar{v}$  (value around 6 in the v-axis) is the kink point where  $a^o$  turns to a constant for a given  $D$ .  $D^0$

(value around 7 in D-axis) is the minimum value of  $D$  that results in the first best audit quality when  $v \leq \bar{v}$ . Greater value of  $D$  is required to obtain the first best audit effort when the value of  $v$  increases. The minimum value of  $D$  that results in the first best audit quality when  $v > \bar{v}$  is  $D^p$ , which is an increasing function of  $v$ .

This figure shows that  $D$  needs to be large enough to induce the first-best quality, especially when  $v$  is high. When  $D$  is not large enough, optimal standards induce an effort as close to the first best as possible. When  $v$  is low, the audit effort is  $s^0 + \bar{v}$ , which doesn't vary with  $v$ , but is affected by  $D$ . When  $v$  is high, the auditor will comply possibly. When  $v$  increases, the possible compliance effort decreases, and thus, tougher standards are needed to increase the possible compliance effort.

### Appendix III Proofs

#### Proof of Lemma 1.

The auditor chooses the level of effort to minimize total expected costs in a given legal environment. The expected costs are

$$TC = \mu a + (1 - \beta)(1 - q(a))(1 - P(a|s, v))D,$$

where

$$P(a|s, v) = \begin{cases} 1 & \text{if } a \geq s + v \\ \frac{a - s + v}{2v} & \text{if } s - v \leq a < s + v \\ 0 & \text{if } a < s - v \end{cases}$$

Then the auditor cost functions with different levels of audit quality can be written as

$$TC = \begin{cases} TC_c & \text{if } a \geq s + v \\ TC_p & \text{if } s - v \leq a < s + v \\ TC_n & \text{if } a < s - v \end{cases}$$

We analyze and summarize the auditor's effort choice by categorizing vagueness in legal system and the standards  $s$ .

1.  $v \leq \bar{v}$

a.  $s + v > s_v + v \geq s^0 + \bar{v}$

If  $s + v > s_v + v \geq s^0 + \bar{v}$ , then  $TC'_p(a = s + v) > 0$  and there is an interior solution between  $s - v$  and  $s + v$ . The effort,  $a_p$ , is obtained from the following equation:

$$\mu - (1 - \beta)q'(a_p) \frac{v - a_p + s}{2v} D - (1 - \beta) \left(1 - q(a_p)\right) \frac{1}{2v} D = 0$$

Since  $\mu - (1 - \beta) \left(1 - q(s_v + v)\right) \frac{1}{2v} D = 0$ , then

$$(1 - \beta)q'(a_p) \frac{v - a_p + s}{2v} D = (1 - \beta) \left(q(a_p) - q(s_v + v)\right) \frac{1}{2v} D \quad (A.1)$$

Because  $a_p < s + v$ ,  $q'(a) > 0$ , and  $1 - \beta > 0$ ,  $(1 - \beta)q'(a_p)\frac{v-a_p+s}{2v}D$  is greater than zero. Equation (A.1) implies that  $(1 - \beta)(q(a_p) - q(s_v + v))\frac{1}{2v}D > 0$ . Since  $1 - \beta > 0$  and  $\frac{1}{2v}D > 0$ , we have  $q(a_p) - q(s_v + v) > 0$ , which implies  $a_p > s_v + v$ .

Since the possible compliance function (i.e.,  $TC_p$ ) is a continuous function between  $s - v$  and  $s + v$ , at effort level of  $s + v$ ,  $TC_p(s + v) = TC_c(s + v)$ . Since  $TC_p$  is minimized at effort level of  $a_p$ , thus,  $TC_p(a_p) < TC_p(s + v)$ . Therefore, we have  $TC_p(a_p) < TC_f(s + v)$ .

Therefore,  $TC_c(s + v) > TC_p(a_p) > TC_c(s_v + v) \geq TC_c(s^0 + \bar{v}) = TC_n(a_n)$ , and the auditor effort will be  $a_n$ . Note that  $a_n$  must be lower than  $s - v$  because  $TC_p(a_p) > TC_n(a_n)$ .

$$\text{b. } s_v + v \geq s + v > s^0 + \bar{v}$$

If  $s_v + v \geq s + v > s^0 + \bar{v}$ , then  $TC'_p(a = s + v) \leq 0$  and there is not an interior solution between  $s - v$  and  $s + v$ . That is,  $a_p < s + v$  does not exist. Hence, the auditor's effort choice is between  $a_n$  and  $s + v$ .  $TC_c(s + v) > TC_c(s^0 + \bar{v}) = TC_n(a_n)$ . Consequently, the audit quality is  $a_n$ . The  $a_n < s - v$  exists, because  $a_n < s^0 - \bar{v} = s^0 + \bar{v} - 2\bar{v} < s^0 + \bar{v} - 2v < s + v - 2v = s - v$ .

$$\text{c. } s_v + v > s^0 + \bar{v} \geq s + v$$

If  $s_v + v > s^0 + \bar{v} \geq s + v$ , again  $TC'_p(a = s + v) < 0$  and there is not an interior solution between  $s - v$  and  $s + v$  (i.e.,  $a_p$  does not exist). The auditor's effort choice is between  $a_n$  and  $s + v$  given there exists an  $a_n < s - v$ . Since  $TC_c(s + v) \leq TC_c(s^0 + \bar{v}) = TC_n(a_n)$ , the auditor will comply certainly with the standards, that is, the effort is  $s + v$ . If there does not exist an  $a_n < s - v$ , then the audit quality is also  $s + v$ .

In summary, given  $v \leq \bar{v}$ , if the standards are less than or equal to  $s^0 + \bar{v} - v$ , the auditor will comply certainly with the standards (i.e.,  $a = s + v$ ), but if the standards are greater than  $s^0 + \bar{v} - v$ , the auditor will not comply with the standards (i.e.,  $a = a_n$ ).

## 2. $v > \bar{v}$

$$\text{a. } s + v \leq s_v + v < s^0 + \bar{v}$$

If  $s + v \leq s_v + v < s^0 + \bar{v}$ , then  $TC'_p(a = s + v) \leq 0$  and there is not an interior solution between  $s - v$  and  $s + v$ . The auditor's effort choice is either  $a_n$  or  $s + v$  given there exists an  $a_n < s - v$ . Since  $TC_c(s + v) < TC_c(s^0 + \bar{v}) = TC_n(a_n)$ , the auditor will comply certainly with the standards (i.e.,  $a = s + v$ ). If there does not exist an  $a_n < s - v$ , then the audit quality is also  $s + v$ .

b.  $s_v + v < s^0 + \bar{v}$  and  $s_v < s \leq s'$  (The standard  $s'$  is obtained when  $TC_p(a_p) = TC_n(a_n)$ .)

If  $s_v < s$ , then  $TC'_p(a = s + v) > 0$  and there is an interior solution between  $s - v$  and  $s + v$  (i.e.,  $a_p$  can be a feasible choice). Recall from the proof of 1.a, regardless of the conditions related to  $s$ , we have  $TC_p(a_p) < TC_p(s + v) = TC_c(s + v)$ . Therefore, the auditor will not exert a level of effort equal to  $s + v$  and will choose either  $a_p$  or  $a_n$  given there exists an  $a_n < s - v$ , depending on the size of the costs associated with either effort. If  $s = s_v$ , then  $TC_p(a_p) < TC_c(s + v) = TC_c(s_v + v) < TC_c(s^0 + \bar{v}) = TC_n(a_n)$ . Thus, the auditor will choose effort  $a_p$ . If there does not exist an  $a_n < s - v$ , the effort is also  $a_p$ . Since  $a_p$  and  $TC_p(a_p)$  are increasing functions of the standards, when the standards increase to a certain level, denoted as  $s'$ ,  $TC_p(a_p) = TC_n(a_n)$ . Consequently, as long as the standards are less than or equal to  $s'$ , the auditor will choose a level of effort equal to  $a_p$ . We denote  $a_p$  as  $a_p'$  when  $s$  equals  $s'$ . When  $TC_p(a_p) \geq TC_n(a_n)$ , then there must exist an  $a_n < s - v$  because  $TC_p(a_p) \geq TC_n(a_n)$  implies  $TC_p(s - v) > TC_n(a_n)$  and  $a_n < s - v$ .

c.  $s_v + v < s^0 + \bar{v}$  and  $s_v < s' < s$

When the standards are greater than  $s'$ , we obtain  $TC_p(a_p) > TC_n(a_n)$ . Hence, if the standards are greater than  $s'$ , the auditor will choose a level of effort equal to  $a_n$ .

To summarize, given  $v > \bar{v}$ , if the standards are lower than  $s_v$ , the auditor will comply certainly with the standards (i.e.,  $a = s + v$ ); if the standards are between  $s_v$  and  $s'$ , the auditor will comply possibly with the standards (i.e.,  $a = a_p$ ); and if the standards are greater than  $s'$ , the auditor will exert noncompliance effort (i.e.,  $a = a_n$ ).

Q.E.D.

**Proof of Proposition 1.**

(a) Given  $v \leq \bar{v}$ , if the standards are lower than or equal to  $s^0 + \bar{v} - v$  (i.e.,  $s + v \leq s^0 + \bar{v}$ ), the auditor will comply certainly with the standards (i.e.,  $a = s + v$ ). If the first-best effort  $a^* \leq s^0 + \bar{v}$ , then the standards can be set at  $\bar{s}$  such that  $\bar{s} + v = a^*$ , where  $\bar{s} \leq s^0 + \bar{v} - v$ . The auditor will comply certainly with the standards and his effort is equal to  $a^*$ ; However, if  $a^* > s^0 + \bar{v}$ , then the standards should be set at a highest level with which the auditor will comply, that is  $\bar{s}$  such that  $\bar{s} + v = s^0 + \bar{v}$ , where  $\bar{s} = s^0 + \bar{v} - v$ . If the standards are set at  $\bar{s}$ , the auditor will not comply with it and exert  $a_n$ , which would be less than  $\bar{s} + v$ .

(b) Given  $v > \bar{v}$ , if  $a^* \leq s_v + v$ , then it is feasible to set the standards at  $\bar{s}$  such that  $\bar{s} + v = a^*$ , where  $\bar{s} \leq s_v$ . The auditor will comply certainly with the standards and exert  $\bar{s} + v = a^*$ . If  $s_v + v < a^* \leq a_p'$  and  $a_p'$  is the possible compliance effort when  $s = s'$ , then the standards should be set at  $s$  such that  $a_p = a^*$  at  $s$ , where  $s_v < s \leq s'$ , so that the auditor chooses effort equal to  $a_p = a^*$ . If  $a^* > a_p'$ , we can not find a  $s$ , such that  $s_v < s \leq s'$  to induce  $a_p = a^*$ , because  $a^* > a_p'$ . Therefore, the optimal standards can be set at  $s'$  and the auditor exerts effort equal to  $a_p'$ , which is as close to  $a^*$  as possible.

Q.E.D.

**Proof of Lemma 2.**

(a)  $s^0 + \bar{v}$  are determined by the following equations:

$$\frac{dTC_p(a = s^0 + \bar{v})}{da} = \mu - (1 - \beta)(1 - q(s^0 + \bar{v})) \frac{1}{2\bar{v}} D = 0$$

$$TC_p(s^0 + \bar{v}) = TC_n(a_n)$$

Partial derivative shows

$$\frac{d(s^0 + \bar{v})}{dD} = \frac{(1 - \beta)(1 - q(a_n))}{\mu} > 0$$

Therefore,  $s^0 + \bar{v}$  is a strict increasing function of  $D$ . When  $D = 0$ ,  $a_n = 0$  and  $s^0 + \bar{v} = 0$  and when  $D = I$ ,  $a_n = a^*$  and  $s^0 + \bar{v} > a^*$ . Therefore, there exists a  $D > 0$  such that  $s^0 + \bar{v} = a^*$ . This damage award size is denoted as  $D^0$  and it is smaller than  $I$ .

(b) The value of  $s_v$  with a given  $v$  is determined by the following equation:

$$\frac{dT C_p(a = s_v + v)}{da} = \mu - (1 - \beta)(1 - q(a)) \frac{1}{2v} D = 0$$

We have

$$\frac{ds_v}{dD} = \frac{1 - q(s_v + v)}{q'(s_v + v)D} > 0$$

Recall that we have assumed that  $v$  is not too large such that it is comparable to a reasonable audit quality. Therefore,  $v$  must be lower than  $a^*$ . There must exist a  $D$  at the level  $s_v = 0$  and  $s_v + v < a^*$ . Increasing  $D$  will increase the value of  $s_v + v$ . When  $D$  is increased to a specific level, denoted as  $D^v$ , we have  $s_v + v = a^*$ .

Given  $s_v + v = a^*$ , we have

$$\frac{dT C_p(a = s_v + v)}{da} = \mu - (1 - \beta)(1 - q(a^*)) \frac{1}{2v} D^v = 0$$

and

$$\frac{dD^v}{dv} = \frac{2\mu}{(1 - \beta)(1 - q(a^*))} = \frac{D^v}{v} > 0$$

When  $v = \bar{v}$ ,  $s_v = s^0$ , and therefore,  $D^v = D^0$ . When  $v < \bar{v}$ , we have  $D^v < D^0$ . When  $v > \bar{v}$ , we have  $D^v > D^0$ . Lemma 1 indicates  $s_v$  only exists for  $v \geq \bar{v}$ . Therefore,  $D^v \geq D^0$ .

(c) The total costs of auditor providing effort  $a_p$  is:  $T C_p = \mu a + (1 - \beta)(1 - q(a)) \frac{s+v-a}{2v} D$

The effort  $a_p$  solves the following equation given  $s - v \leq a_p < s + v$ :

$$\frac{dT C_p}{da} = \mu - (1 - \beta)q'(a) \frac{s + v - a}{2v} D - (1 - \beta)(1 - q(a)) \frac{1}{2v} D = 0$$

Thus

$$\frac{da_p}{dD} = \frac{q'(a)(s+v-a) + (1-q(a))}{q'(a)(1+D) - q''(a)(s+v-a)D} > 0$$

and

$$\frac{da_p}{ds} = \frac{q'(a)}{2q'(a) - q''(a)(s+v-a)} > 0$$

If the toughness of the standards equal to  $s'$ , then  $TC_n(a_n|s') = TC_p(a_p|s')$ , and

$$\frac{ds'}{dD} = \frac{1}{D} \left( \frac{1-q(a_n)}{1-q(a_p)} 2v - (s+v-a_p) \right)$$

Since  $a_n < a_p$  and  $s+v-a_p < 2v$ , we obtain

$$\frac{ds'}{dD} > 0$$

When the toughness is  $s'$ , then the first-order condition is

$$\frac{dTC_p}{da_p'} = \mu - (1-\beta)q'(a_p') \frac{s'+v-a_p'}{2v} D - (1-\beta)(1-q(a_p')) \frac{1}{2v} D = 0$$

We have

$$\frac{d^2TC_p}{da_p'^2} \left( \frac{da_p'}{dD} + \frac{da_p' ds'}{ds' dD} \right) - (1-\beta)q'(a_p') \frac{D}{2v} \left( \frac{ds'}{dD} \right) - \frac{\mu}{D} = 0$$

Then

$$\frac{da_p'}{dD} = \frac{(1-\beta)q'(a_p') \frac{D}{2v} \left( \frac{ds'}{dD} \right) + \frac{\mu}{D} + \frac{d^2TC_p}{da_p'^2} \frac{da_p' ds'}{ds' dD}}{\frac{d^2TC_p}{da_p'^2}} = \frac{\frac{\mu}{D}}{\frac{d^2TC_p}{da_p'^2}} > 0$$

When  $s = s_v$  and  $D = D^v$ ,  $s_v + v = a^*$  and  $\mu - (1-\beta)(1-q(a^*)) \frac{1}{2v} D^v = 0$ . This implies  $D^v =$

$$\frac{\mu 2v}{(1-\beta)(1-q(a^*))}$$

For a  $s > s_v$ , when  $D = D^v$ , the first-order condition is:

$$\frac{dTC_p}{da_p} = \mu - (1-\beta)q'(a_p) \frac{s+v-a_p}{2v} D^v - (1-\beta)(1-q(a_p)) \frac{1}{2v} D^v = 0$$

Substituting  $D^v = \frac{\mu 2v}{(1-\beta)(1-q(a^*))}$  into the equation, we obtain  $q(a_p) - q(a^*) = q'(a_p)(s + v - a_p)$ .

Since  $q'(a_p) > 0$  and  $a_p < s + v$ , we have  $q(a_p) - q(a^*) > 0$ , which implies  $a_p > a^*$ .

Hence, if  $s > s_v$  and  $D = D^v$ , then  $a_p > a^*$ . Since  $a_p$  is an increasing function of  $D$ , there exists a  $D < D^v$  such that  $a_p = a^*$  when  $s > s_v$ .

When  $a_p = a^*$ , then

$$\frac{dTC_p}{da_p} = \mu - (1 - \beta)q'(a^*) \frac{s + v - a^*}{2v} D - (1 - \beta)(1 - q(a^*)) \frac{1}{2v} D = 0$$

Since  $\frac{ds'}{dD} > 0$ , when the effort is fixed, decreasing  $s'$  decreases  $D$ . Therefore,  $D^p < D^v$  is the minimum value of damage award size at which  $a_p = a^*$  and  $s'$  is at its minimum.

Given auditing standards of  $s = a^* - v$ ,  $TC_n(a_n|D^0) = TC_c(a^*|D^0)$ . Given minimum auditing standards of  $s' (> s_v)$ ,  $TC_n(a_n|D^p) = TC_p(a^*|D^p)$ . Therefore,  $TC_p(a^*|D^p) > TC_c(a^*|D^0)$  and  $D^p > D^0$ , which can be shown below.

When  $D = D^0$ ,  $s = s^0$  and  $v \leq \bar{v}$ ,  $s^0 + \bar{v} = a^*$  then  $TC_n(a_n|D^0) = TC_c(a^*|D^0)$  implies

$$\mu a_n + (1 - \beta)(1 - q(a_n))D^0 = \mu a^*$$

When  $D = D^p$ ,  $s = s' > s_v$  and  $v > \bar{v}$ ,  $a_p = a^*$ , then  $TC_n(a_n|D^p) = TC_p(a^*|D^p)$  implies

$$\mu a_n + (1 - \beta)(1 - q(a_n))D^p = \mu a^* + (1 - \beta)(1 - q(a^*)) \frac{s' + v - a^*}{2v} D^p$$

Comparing the above two equations, we have  $\frac{D^0}{D^p} = \frac{[1 - q(a_n)] - (1 - q(a^*)) \frac{s' + v - a^*}{2v}}{1 - q(a_n)} < 1$ . Hence, we conclude that

$D^p > D^0$ .

We have shown that for  $s > s_v$  and  $v > \bar{v}$ , there exist damage awards at which  $a_p = a^*$ . The minimum value of such damage awards is denoted as  $D^p$  and  $D^0 \leq D^p \leq D^v$ . Next, we prove that  $D^p$  is an increasing function of  $v$ .

When  $a_p = a^*$ ,  $s = s'$  and  $D = D^p$ , we have

$$TC_n(a_n|D^p) = TC_p(a^*|D^p)$$

$$\text{or } \mu a_n + (1 - \beta)(1 - q(a_n))D^p = \mu a^* + (1 - \beta)(1 - q(a^*))\frac{s' + v - a^*}{2v}D^p$$

Thus

$$(1 - \beta)(1 - q(a^*))\frac{ds'}{2v}D^p + (1 - \beta)(1 - q(a^*))\frac{v - (s' + v - a^*)}{2v^2}D^p dv = 0$$

or

$$\frac{ds'}{dv} = \frac{(s' - a^*)}{v}$$

We also have

$$\frac{ds'}{dD^p} = \frac{1}{D^p} \left( \frac{1 - q(a_n)}{1 - q(a^*)} 2v - (s' + v - a^*) \right) > 0$$

When  $a_p = a^*$ ,  $s = s'$  and  $D = D^p$ , we have

$$\frac{dTC_p}{da_p} = \mu - (1 - \beta)q'(a^*)\frac{s' + v - a^*}{2v}D^p - (1 - \beta)(1 - q(a^*))\frac{1}{2v}D^p = 0$$

When  $v$  changes, we have

$$\begin{aligned} -(1 - \beta)q'(a^*)\frac{D^p}{2v} \left( \frac{ds'}{dv} dv + \frac{ds'}{dD^p} dD^p \right) - (1 - \beta)q'(a^*) \left[ \frac{v - (s' + v - a^*)}{2v^2} D^p dv \right. \\ \left. + (1 - \beta)(1 - q(a^*))\frac{dv}{2v^2} D^p - \frac{\mu}{D^p} dD^p \right] = 0 \end{aligned}$$

or

$$\begin{aligned} \frac{dD^p}{dv} &= \frac{-(1 - \beta)q'(a^*)\frac{D^p}{2v} \left( \frac{ds'}{dv} - \frac{(s' - a^*)}{v} \right) + (1 - \beta)(1 - q(a^*))\frac{D^p}{2v^2}}{(1 - \beta)q'(a^*)\frac{D^p}{2v}\frac{ds'}{dD^p} + \frac{\mu}{D^p}} \\ &= \frac{(1 - \beta)(1 - q(a^*))\frac{D^p}{2v^2}}{(1 - \beta)q'(a^*)\frac{D^p}{2v}\frac{ds'}{dD^p} + \frac{\mu}{D^p}} > 0 \end{aligned}$$

Therefore,  $D^p$  is an increasing function of the vagueness in legal system. If the Disgreater than  $D^p$ , the optimal standards always result in the first-best audit quality. If the damage award is lower than  $D^p$  but not lower than  $D^0$ , the first-best audit quality is still obtainable if  $v$  is lower than  $\bar{v}$ . Note that

$D^p < D^v$  for a given  $v$  and  $D^0$  is not a function of  $v$ . When the vagueness is high and increases, larger damage awards are needed to motivate the first-best effort.

Q.E.D.

**Proof of Proposition 2.**

(a) Given  $v \leq \bar{v}$ , if  $D \geq D^0$ , then  $s^0 + \bar{v} \geq a^*$ . According to Proposition 1 (a), the optimal standards will be  $a^* - v$ . Since the standards are lower than or equal to  $s^0 + \bar{v} - v$ , Lemma 1 (a) shows that the audit quality will be  $a^*$ . Similarly, if  $D < D^0$ , then  $s^0 + \bar{v} < a^*$ . From Proposition 1 (a) and Lemma 1 (a), we obtain the optimal standards  $s^0 + \bar{v} - v$  and these standards can only induce an audit quality below the first-best. Either  $a^* - v$  or  $s^0 + \bar{v} - v$  is a linear decreasing function of the overall vagueness, which is an increasing function of vagueness in legal system.

(b) Given  $v > \bar{v}$ , if  $D \geq D^v$ , then  $a^* \leq s_v + v$ . According to Proposition 1 (b), the optimal standards will be  $a^* - v$ . It is a linear decreasing function of the vagueness in legal systems. Since the standards are lower than or equal to  $s_v$ , Lemma 1 (b) shows that the audit quality will be  $a^*$ . If  $D^p \leq D < D^v$ , then  $s_v + v < a^* \leq a_p'$ . From Proposition 1 (b) and Lemma 1 (b), we have the optimal standards are  $s$  such that  $a_p = a^*$  at  $s$ , where  $s_v < s \leq s'$ .

The optimal standards are determined by the following equations.

$$\frac{dTC_p}{da} = \mu - (1 - \beta)q'(a^*) \frac{s + v - a^*}{2v} D - (1 - \beta)(1 - q(a^*)) \frac{1}{2v} D = 0,$$

Since  $a^*$  is a constant, then the relation between standards and vagueness is as follows:

$$(1 - \beta)q'(a^*) \frac{vds - (s - a^*)dv}{2v^2} D - (1 - \beta)(1 - q(a^*)) \frac{dv}{2v^2} D = 0$$

Simplify the above equation we have

$$\frac{ds}{dv} = \frac{1}{(1 - \beta)q'(a^*)D} [2\mu - (1 - \beta)q'(a^*)D]$$

In the possible compliance situation,  $\mu - (1 - \beta)q'(a^*)D > 0$  since  $a^* > a_n$  and  $q'(a^*) < 0$ .

Therefore,

$$\frac{ds}{dv} = \frac{1}{(1-\beta)q'(a^*)D} [\mu + \mu - (1-\beta)q'(a^*)D] > 1$$

Similarly, the relation between standards and damage award is as follows:

$$(1-\beta)q'(a^*) \frac{Dds + (s+v-a^*)dD}{2v} + (1-\beta)(1-q(a^*)) \frac{dD}{2v} = 0$$

$$\frac{ds}{dD} = \frac{2v}{(1-\beta)q'(a^*)D} \left[ -\frac{\mu}{D} \right] < 0$$

If  $D < D^p$ , then  $a^* > a_p'$ . Again Proposition 1 (b) and Lemma 1 (b) shows that the optimal standards (i.e.,  $s'$ ) can induce effort equal to  $a_p'$ , which is below the first-best.

Q.E.D.

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