

**To Whom Should The Auditor Be Liable? An Analysis of Efficient Liability Rules.**

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### Abstract

Current auditor liability rules require the auditor to pay investors damages in the event of an audit failure. I show, in a simple model of investment under uncertainty, that no such payment mechanism will, in general, be efficient, i.e., implement first-best audit effort or investment levels. By contrast, a system of *decoupled* damages in which the damages paid by auditors vary with investment while damages received by investors do not implements first best. In contrast to most extant proposals for auditor liability reform (*financial statement insurance*, damages as a multiple of audit fees or auditee market value, auditor liability caps) which seek to modify aspects of the current system (of direct transfers), I show that efficiency calls for a radically different approach, namely moving to decoupled liability. The approach also highlights a role for non-transferable penalties upon auditors: such penalties can motivate auditor effort without distorting investor incentives but have been largely ignored in the literature which focuses for the most part on direct financial transfers from auditors to investors. Thus my approach also provides a framework to unify the study of different types of penalties to motivate auditors.

**Key words:** Damage rules; Auditor incentives; Insurance contracts; Product Bundling.

**JEL Classification:** K13, K23, M4

# To Whom Should The Auditor Be Liable? An Analysis of Efficient Liability Rules.

## I. Introduction.

There is a move worldwide to examine afresh auditor liability rules (American Assembly 2003, US Chamber of Commerce 2004, OFT (UK) 2004, European Union 2007, US Treasury 2007).<sup>1</sup> Recently, the United States Department of the Treasury Advisory Committee on the Auditing Profession, which was constituted to carry out a thorough review of the current system of auditor liability in the United States, issued a call for comments on a wide-ranging set of questions including (Federal Register 2007):

- 3.4.1.4. Consider whether any potential changes should be considered in auditor liability regimes.
- 3.4.1.5. Consider how altering auditor liability regimes would impact audit quality.
- 3.4.1.6. Consider how altering auditor liability regimes would impact investors.
- 3.4.1.7. Consider the costs and benefits of various auditor liability regimes (and corresponding disclosure regimes) to investors and the marketplace (including issues of moral hazard).

While a great deal of research has investigated the impact of specific auditor liability rules on audit quality and investor welfare, there is little research to guide the design of what auditor liability rules *should* be. This study addresses this gap in the literature. I derive a fundamental result that speaks directly to key policy questions facing audit market regulators interested in reforming auditor liability.

The demand for auditing arises because the auditor can more efficiently screen projects or managerial assertions than investors could themselves do. This screening

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<sup>1</sup> The impact of auditor liability rules on audit market outcomes has attracted a great deal of regulatory, professional and press attention since at least the late 1980s when the dimensions of what now is termed a *liability crisis* began to emerge. See, e.g., Berton (1985), the Big Six white paper on auditor liability (Andersen et al., 1992), the special conference issue of the Journal of Economics and Management (1993) devoted to the topic of *The Liability Crisis in the United States and its Impact on Accounting* and Lys and Watts (1994). For recent press coverage see Economist (2004), Norris (2006), Ip, Scannell and Solomon (2006), Reilly (2007), Heaton (2007), Scannell (2007).

requires costly -- and unobservable -- diligence on part of the auditor. *Efficient* levels of auditing and investment are those that would be undertaken if economic agents (investors, auditors, managers) could somehow be motivated to put aside self-interest and focus on maximizing the collective payoff. Economic agents, however, can be expected to act in their self-interest, giving rise to the specter of inefficiency, i.e., the possibility that the resulting choices (of audit effort and of investment) may be other than those which would maximize the collective payoff.

I define an *efficient* auditor liability rule as one that induces efficient levels of *both* investment and audit effort. My fundamental question is: Do there exist auditor liability rules that permit decentralized implementation of efficient investment and audit effort decisions by self-interested agents in an economy with a plethora of different project types where (1) audit effort is unobservable, (2) investment levels are endogenous and depend upon investors' expectations about audit quality and (3) project type is "soft" information that cannot be contracted upon?

I find that efficient liability rules exist and *necessarily* involve decoupled damages, i.e. require that damages paid by the auditor of a failed project do not necessarily equal damages received by investors in that project. *No rule that requires auditors to directly pay damages to investors can be efficient.* The reason for this inefficiency is that given the sequential nature of auditing and investing decisions of agents in the economy, the insurance role of the auditor's damage payment (Dye 1993) inevitably distorts investment. Any liability rule that bundles, directly or indirectly, an information product (auditing) with an insurance product (damages), far from fixing the problem, only causes well-known inefficiencies in insurance markets to spill over into the audit market.

Overall, my analysis highlights the need for radically rethinking the fundamental approach to auditor liability embedded in most prior literature or in any of the current proposals to “reform” auditor liability (EU 2007, Partnoy 2001 and 2004, Coffee 2003, Ronen 2002, Dontoh, Ronen and Sarath 2004). One of the contributions of this study is to show that *none* of these proposals is likely to induce efficient investment and auditing. In this way, the approach adopted in this study provides a simple framework for evaluating any proposed auditor liability rule. Finally, I find that several inefficiencies documented in prior models of auditor liability that examined only direct transfer mechanisms disappear when a decoupled damage rule is introduced into the analysis.

The literature thus far has largely avoided the highly sensitive issue of non-transferable penalties on auditors.<sup>2</sup> Given the increasing likelihood of criminal prosecution of audit firm personnel in the wake of significant financial scandals, this lacuna in the literature is worthy of attention. Once decoupled damages are accepted as a viable policy alternative, the role of non-transferable penalties on the auditor can be explored in a more natural way. My model provides a setting in which such penalties play an economically meaningful role, and extensions thereof can be helpful in future research on the role of such penalties in implementing efficient audit market outcomes.

This study differs in three key respects from several closely related prior studies. Dye (1993) argues that damages paid to investors in the event of an audit failure serve an

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<sup>2</sup> Non-transferable penalties are those where the imposition of a cost on an economic actor do not necessarily result in corresponding benefits to another actor. Disutility from incarceration or from the suspension or revocation of an individual’s professional certification are examples of such non-transferable penalties. The economic role of such penalties cannot be readily studied in models that focus primarily on direct transfer rules since investors do not benefit from imposing such penalties on auditors. Consequently, in any direct transfer setting, non-transferable penalties appear to be nothing but deadweight costs: the auditor would generally be willing to pay some amount of money to avoid the non-transferable penalty and part of this money if transferred to the investor would improve at least one party’s welfare while leaving the other no worse off. By contrast in settings like the one studied here, nontransferable penalties emerge in a totally different light since here they function as essential mechanisms for implementing first best.

insurance function and shows that negligence rules cannot implement the efficient level of audit effort (and, by implication, investment). Schwartz (1997) shows that there exists a strict liability damage rule which induces efficient investment and audit effort. Thoman and Zhang (1999) show that in general only strict liability rules can implement first best, i.e. efficient outcomes. These studies all consider only *direct transfer schemes* in which the auditor pays damages directly to investors. Moreover, in all three studies, all projects in the economy are ex-ante identical and so project type is, by definition, contractible.

By contrast, my research approach is as follows. First, and most notably, I impose very little *a priori* structure on investor-auditor contracts. Second, I consider an economy with a continuum of heterogeneous projects each with a *different* efficient level of investment (i.e., a continuum of project *types*). Third, in my model, project type is soft information and therefore cannot be contracted upon. This analysis allows me to better focus on the fundamental connections between auditor liability rules, audit quality and investor behavior. In sum, unlike prior studies, I *endogenously* derive the characterization of efficient auditor liability rules. My study also differs from prior studies of decoupled liability such as Polinsky and Che (1991) in that I show a role for decoupling even in the absence of any litigation costs: the need for decoupling in the audit setting arises from the need to decouple assurance and insurance.

The rest of the paper is organized as follows. Section II reviews prior related research. Section III presents a model of investment under uncertainty and derives the main results. Section IV evaluates different proposals to reform auditor liability. Section V examines the effect of introducing decoupled liability in some recent studies that examine direct transfer rules only. Section VI offers a summary and conclusions.

## II. Related Research.

A large body of work investigates the impact of various aspects of auditor liability rules on audit quality. Some studies have investigated the circumstances under which auditors should be held liable for damages, the main variants studied are the strict liability, pure negligence or vague negligence regimes.<sup>3</sup> With respect to the allocation of liability, studies have examined the impact of joint and several liability or proportional damage rules on audit quality.<sup>4</sup> Finally a number of studies investigate the role of auditor wealth on audit quality and investor welfare.<sup>5</sup> I briefly review some key studies below.

Balachandran and Nagarajan (1987) and Moore and Scott (1989) compare audit outcomes under both negligence and strict liability rules. Nelson, Ronen and White (1988) and Melumad and Thoman (1990) investigate strict liability settings while Sarath (1991) examines how the availability of auditor insurance affects audit effort under a negligence standard. Narayanan (1994) and Chan and Pae (1998) investigate the effect of joint-and-several versus proportionate auditor liability rules on audit effort and litigation probabilities. In these models, the level of audit effort does not influence any production decisions, i.e. audit quality (auditor effort) only affects investors' decision to sue and does *not* affect investment incentives in the economy.

Dye (1993) models a negligence liability regime where audit reports are informative about firm value and finds that the socially optimal level of audit quality when audit effort is not observable is lower than first best (the level of audit quality when audit effort

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<sup>3</sup> Broadly speaking, under a strict liability regime, the auditor is liable to pay damages whenever financial statements are found to be misstated. Under a pure negligence regime only an auditor found to have failed to exercise due care must pay damages. Under a vague negligence regime, whether the auditor has failed to exercise due care is ex-ante uncertain and may never be fully resolved (Schwartz 1998).

<sup>4</sup> Under joint and several liability, all defendants are liable to the plaintiff to the full extent of their wealth. Under proportional liability, each defendant is liable to the plaintiff for only *its* share of the damages.

<sup>5</sup> Another theme is the impact of litigation costs (see e.g., Smith and Tidrick 1997, Radhakrishnan 1999).

is observable). Thoman and Zhang (1999) show that only strict liability rules can implement first best. In both these studies, the scale of investment in the project is (exogenously) fixed, the investor only decides whether or not to invest. Schwartz (1997) studies a more general model in which the audit is informative about firm value *and* the scale of investment varies with audit quality (auditor effort). In this setting optimal auditor liability rules must induce both efficient auditing *and* efficient investment. However in her economy there is only one type of project, and the penalty imposed on the auditor is, in her model, equal to the damages paid to investors, i.e. attention is restricted to direct transfer mechanisms only. In this study I relax all three of these key assumptions, namely the fixed investment assumption, the single project assumption and the direct transfer mechanism assumption and examine the resulting characterization of optimal auditor liability rules.

More recently, Hillegeist (1999) and Pae and Yoo (2001) have extended the Schwartz model to incorporate additional managerial choices and find that the damage rule proposed by Schwartz (1997) does not implement first best in their settings. Partnoy (2001, 2004) and Coffee (2003) have proposed that damages as a multiple of auditee size or audit fees. Taking a different tack, Ronen (2002) and Dontoh, Ronen and Sarath (2003) have proposed financial statement insurance as an alternative to liability rules. The analysis in this study casts fresh light on their findings and I discuss these implications in greater detail later in the study.

To recapitulate, the principal difference between this study and the literature reviewed above is that extant studies each focus on a specific institutional setting that obtains in practice or has been proposed as a reform measure. My analysis, by contrast, starts out

with a basic information problem that leads to an economic demand for auditing and imposes very few restrictions on the form of the audit contract. This approach permits me to examine afresh the fundamental question of interest to regulators, namely, “What *should* optimal auditor liability rules look like?”

### **III. Optimal Auditor Liability with Investment Uncertainty.**

Consider an economy with a continuum of risky projects indexed by a *type* parameter  $\theta \in [\underline{\theta}, \bar{\theta}]$ . Project type is common knowledge but is soft information and thus not contractible.<sup>6</sup> Investors value each project at its expected return (a function of project type  $\theta$ ). With probability  $\alpha(\theta)$  a project of type  $\theta$  is likely to succeed and return  $R(I)$  on an investment of  $I$  while with probability  $1-\alpha(\theta)$ , it is expected to fail and return 0 for any investment  $I$  (all investment is lost). Without loss of generality, label project outcomes good ( $G$ ) if the project succeeds and bad ( $B$ ) if the project fails.

Assume that a project of type  $\theta$  has a likelihood of success,  $\alpha(\theta)$  associated with it (i.e., the map  $\theta \rightarrow \alpha$  is a function -- one-to-one and invertible). Assume also that  $R(I)$  has the following properties:  $R(0)=0$ ,  $R'(0)=\infty$ ,  $R''<0 \forall \theta$ : collectively these assumptions ensure that if any project is likely to succeed with probability 1, it always attracts non-zero investment and that investment displays decreasing returns to scale (i.e., the optimal investment level is bounded above).

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<sup>6</sup> Kirschenheiter (2006) gives as an example of soft accounting information that is “perfectly observable but has different meaning to different people”, estimates of values of comparable machinery: the values may be perfectly observable but observers may disagree with what exactly is the best comparison.

In this economy, an auditor can be hired to conduct an audit and, if hired, can produce a signal that is informative about project outcomes.<sup>7</sup> Specifically, the auditor can correctly predict the failure outcome ( $B$ ) with probability  $e \in (0,1)$ . With probability  $1-e$  however, the auditor is wrong and incorrectly predicts a  $B$  outcome as  $G$ . The auditor always correctly predicts outcome  $G$ . In other words, auditing is costly and imperfect. Assume  $e$  is auditor effort and the cost of auditing  $C(e)$  is convex increasing in  $e$ :  $C(0)=0$ ,  $C'(e)>0$  and  $C(1)=\infty$ . For ease of discussion, label the auditor's report (outcome prediction) as *Low* or  $L$  (resp. *High* or  $H$ ) if the auditor predicts outcome  $B$  (resp.  $G$ ). Given the audit technology, conditional on a Low report, the probability of project failure is 1 while, conditional on a High report, the probability of project success is

$$\alpha(e, \theta) = \frac{\alpha(\theta)}{\alpha(\theta) + (1 - \alpha(\theta))(1 - e)}.$$

After seeing the audit report, investors choose the investment level  $I$  and project returns are realized. Since the conditional probability of project failure given a Low report is 1, if the auditor makes such a report, investment does not occur and the game ends. If however the auditor's report is High, investment is expected to be profitable and investors choose investment levels. If the project succeeds it returns  $R(I)$  and the game ends. If the project fails, it returns zero and the auditor pays damages  $\lambda(I)$ .

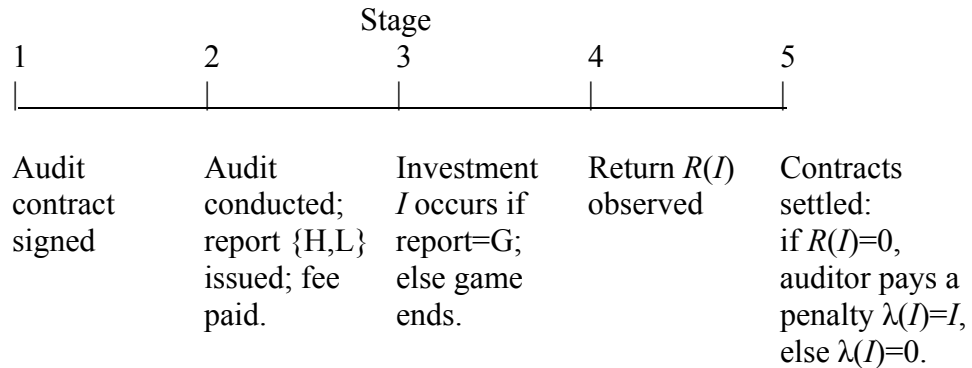
The sequence of events can be depicted as in Figure 1 (below). There are five key stages in this time-line. In stage 1 the investor hires an auditor to report on the project type. In stage 2 the audit is conducted with effort  $e$  and a report  $\{H,L\}$  is issued and the auditor is paid the audit fee. If the stage 2 audit report is  $H$ , investment occurs in Stage 3,

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<sup>7</sup> The auditor's predictive ability may be thought of as stemming from expertise in the business context within which the auditee operates (see e.g. Bell et. al 1997).

if not, the game ends. In stage 4, project returns are realized: if the outcome is  $G$ ,  $R(I) > 0$  and the game ends, else the outcome is  $B$  and  $R(I) = 0$ . If the project has failed (i.e.,  $R(I) = 0$ ), in stage 5 the auditor pays a penalty  $\lambda(I)$  ending the game.

**Figure 1**



Several features of this setting are worthy of note. First, uncertainty about the nature of the project is *one-sided*: Good projects are always identifiable as such, bad projects can, with some probability, successfully evade detection (appear to be good) in stage 2. In other words, no good project goes to waste in this economy. Second, audit technology is costly and imperfect so the likelihood that a project will succeed conditional on a High report is strictly less than one. Both of these assumptions are relatively innocuous in that adding two sided uncertainty would permit no new insights while assuming perfect auditing would make moot the problem of implementing first-best.

Third, the payoffs to the auditor in this model are restricted to take the form of (1) an upfront payment to the auditor followed by (2) no transactions between the auditor and other players (managers, investors, regulators) if either, (a) in stage 2 the auditor issues a low report or (b) in stage 3,  $R(I) > 0$  and (3) a transfer  $\lambda(I)$  from the auditor *only* if the

stage report was high and the project subsequently fails. Conditions (1) and (2) jointly can be interpreted as modeling bans on contingent audit fees and auditor ownership interest in the auditee: such bans are commonly imposed by professional standards and regulatory requirements. Condition (3) restricts attention to strict liability regimes since prior research (Dye 1993, Schwartz 1997, Thoman and Zhang 1999) suggests that only such regimes can implement first best. Note in particular that auditor wealth is not *a priori* restricted in this analysis:  $\lambda(I)$  can be arbitrary. While empirically absurd, this freedom highlights the fact that auditor wealth constraints are *not* the reason for the inefficiency of the direct transfer mechanism.

A fourth and key feature of this model is that investment occurs in stage 3, after the audit contract has been signed and the audit report issued. Consider the investor's problem after the auditor has, in stage 2, issued a low report. At this point the investor can infer that with probability one the project is of type  $B$  and therefore not worthy of investment and the game will end. However if, in stage 2, the auditor issues a high report, the investor knows that the probability of success is no longer  $\alpha$ , it has increased to  $\alpha(e)$ . This increase in the success probability raises the optimal level of investment and creates socially valuable gains from auditing. However in computing the privately optimal level of investment the investor will also take into account any expected recovery from the auditor in stage 5, i.e., the investor will also account for the fact that by issuing a high report, the auditor has in effect written the investor an insurance policy guaranteed to pay off iff the project should fail. This insurance policy induces (privately optimal but second-best) over-investment and an optimal auditor liability rule must be one which takes into account and corrects this private incentive to over-invest.

In what follows, I analyze first best and privately optimal investment and audit effort choices assuming that there is only one project in the economy. I therefore suppress the project index  $\theta$  in what follows. After establishing some fundamental features of the optimal auditor liability rule, I generalize the analysis to the case of a continuum of projects and revert to indexing projects by  $\theta$ .

*The Social Optimum (First Best)*

The socially optimal level of investing can be derived by ignoring private payoffs to all parties<sup>8</sup> and solving for the maximal total project payoff net of audit costs

**Program FB**

$$\text{Max}_{e,I} \Pi^S = \alpha R(I) - (\alpha + (1-\alpha)(1-e))I - C(e)$$

where  $\alpha$  is unconditional probability of a project being good,  $R(I)$  is the expected return on investment  $I$  in a good project,  $\alpha+(1-\alpha)(1-e)$  is the probability of a high report in stage 2 and thus the frequency of investment, and  $C(e)$  is the cost of auditing.<sup>9</sup> The solution to this maximization program is given by the pair of first order conditions

$$R'(I^{FB}) = \frac{\alpha + (1-\alpha)(1-e^{FB})}{\alpha} = \frac{1}{\alpha(e^{FB})} \tag{1a}$$

$$C'(e^{FB}) = (1-\alpha)I^{FB} \tag{1b}$$

Note that at the first-best level of investment, the expected marginal project return equals the inverse of the conditional likelihood of project success given a high report in

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<sup>8</sup> Any transfers to the auditor for fees and any transfers by the auditor in the form of penalties are paid to someone else in society so they net out in the social payoff function, leaving only the cost of auditing to be considered. Similarly any transfers to managers also drop out of the social payoff function.

<sup>9</sup> Another way to write  $\Pi^S$  is  $\Pi^S = \alpha[R(I)-I] - (1-\alpha)(1-e)I - C(e)$  where the first term is the expected profit from a good project times the population proportion of good projects, the second term is the proportion of times a bad project goes undetected in stage 2 times the “lost” investment  $I$  and the third term is the cost of auditing. Basically since only bad projects can appear to be good, no good project ever goes to waste in this economy which is why the first term,  $\alpha[R(I)-I]$  is the expected profit from a good project times the unconditional probability of a good project.

stage 2 times the price of money in the economy (here normalized to 1). Similarly the effort level is chosen to equalize the marginal cost of effort to the marginal benefit from preventing a wasted investment of  $I^{FB}$  in a bad project. The total cost of audit effort is  $C(e^{FB})$ . These conditions provide a benchmark for evaluating all proposed auditor liability rules. No audit contract and no auditor liability rule can do better than to implement this pair of investment and effort levels. Conversely, any audit contract and any auditor liability rule that implements this pair of investment and effort levels is said to be *optimal*.

*Privately Optimal Investment, Audit Effort and Audit Fees (Second Best)*

To solve for privately optimal levels of investment and audit effort, I tackle the problem using backward induction. First I solve for the investor's privately optimal investment level in stage 3. Step 2 incorporates the expected investment level into the auditor's effort selection decision at stage 2. Step 3 incorporates the auditor's expected effort level into the optimal audit contract (effort and fee) chosen in stage 1. Breaking up the global maximization problem in Program FB in this fashion, we shall see, introduces inefficiency in investment and hence in audit effort.

In stage 3, the investor maximizes expected payoff by choosing  $I$  to solve

**Program PI**

$$\text{Max}_I \Pi^{PI} = \alpha(e)R(I) - I - k + (1 - \alpha(e))D(I)$$

where  $\alpha(e)$  is the likelihood of project success given a high audit report in stage 2 and a conjectured (equilibrium) level of auditor effort  $e$ ,  $R(I)$  is the expected project return on investment  $I$ ,  $k$  is the payment to the manager and  $D(I)$  is the damage received by the investor should the project fail. Comparing Program PI to Program FB, one notices that

$C(e)$ , the cost of auditing has been replaced in Program PI by  $k - (1 - \alpha(e))D(I)$  which is the investor's cost of paying the manager reduced by the expected loss recovery from the auditor. The reason  $C(e)$  drops out of Program PI is that at stage 3 the audit cost is a sunk cost and does not enter the investor's computations. The solution to Program PI is given by the first order condition

$$\alpha(e^{SB})R'(I^{SB}) + (1 - \alpha(e^{SB}))D'(I^{SB}) = 1 \quad (2)$$

where  $I^{SB}$  is the privately optimal level of investment for a conjectured level of auditor effort  $e^{SB}$ .

The auditor's effort choice, in turn, solves the following stage 2 cost-minimization program. It may be useful to note that Program PA does not include the usual *individual rationality* (IR) constraint because the Program reflects the auditor's decision problem at stage 2 when the audit fee, having been already agreed upon in stage 1, drops out of the Program.

### **Program PA**

$$\text{Min}_e \Pi^A = -C(e) - (1 - \alpha)(1 - e)\lambda(I^{SB})$$

where  $C(e)$  is the cost of auditing,  $1 - \alpha(e)$  is the conditional probability of the project failing after a good report in stage 2,  $\lambda(I^{SB})$  is the expected penalty if the project fails after the investor has chosen the (privately optimal) investment level  $I^{SB}$ .

The solution to Program PA is given by the first order condition

$$C'(e^{SB}) = (1 - \alpha)\lambda(I^{SB}) \quad (3)$$

which equates the marginal cost of effort to the marginal expected penalty.

With  $e^{SB}$  identified, the total audit fee,  $F$ , can now be written as

$$F = C(e^{SB}) + (1 - \alpha)(1 - e^{SB})\lambda(I^{SB}) \quad (F)$$

where  $C(e^{SB})$  is cost of second-best effort and  $(1 - \alpha)(1 - e^{SB})\lambda(I^{SB})$  is the auditor's damage payment,  $\lambda(I^{SB})$ , times the probability that a High stage 2 report will be followed by a stage 4 project failure,  $(1 - \alpha)(1 - e^{SB})$ .

#### *Optimal Auditor Liability Rules with One Project Type*

Direct comparison of (3) with (1b) reveals that setting  $\lambda(I^{SB}) = I^{FB}$  implements first-best audit effort: the auditor is held liable for the first best-level of investment no matter what the investor's actual choice of  $I^{SB}$  is. Since for any project,  $I^{FB}$  is a constant, substituting  $D(I) = I^{FB}$  in Program PI yields  $D'(I) = 0$  in (2) so that (2) reduces to (1a) which ensures first-best investment as well. This is the key result (Proposition 3) in Schwartz (1997):

**Proposition 0:** For any project, setting damages equal to the first-best level of investment in that project implements efficient outcomes.

With these basic results in hand and the intuition provided by the case of an economy with only a single project type case, I turn now to the main task, i.e., the analysis of an economy with a continuum of (non-contractible) project types.

#### *Optimal Auditor Liability Rules With a Continuum of Projects*

Application of the envelope theorem to (1a) and (1b) shows that

$$\frac{d}{d\alpha} [R'(I^{FB})] = \frac{\partial}{\partial \alpha} \left[ \frac{\alpha + (1 - \alpha)(1 - e^{FB})}{\alpha} \right] = -\frac{1 - e^{FB}}{\alpha^2} < 0 \quad (4a)$$

$$\frac{d}{d\alpha} [C'(e^{FB})] = \frac{\partial}{\partial \alpha} [(1 - \alpha)I^{FB}] = -I^{FB} < 0 \quad (4b)$$

Let projects be indexed by  $\theta$  so that as project type  $\theta$  increases, so does the likelihood of success,  $\alpha(\theta)$ . Then (4a) and (4b) show that the level of first best investment  $I^{FB}(\theta)$

increases and the level of first best audit effort  $e^{FB}(\theta)$  decreases with  $\alpha$  and therefore with  $\theta$ . Intuitively, this is sensible: a higher  $\theta$  corresponds to a more benign environment since the ex-ante likelihood of success,  $\alpha(\theta)$  is higher. When the environment is more benign, investors have incentives to invest more and, as equation (4a) shows,  $I^{FB}(\theta)$  increases with  $\theta$ . As the environment becomes more benign, the benefits from auditing fall, and, by the envelope theorem and equation (4b), even after adjusting for the extra demand for auditing created by the higher investment implicit in (4a), the overall demand for auditing falls.

If project types are contractible then the optimal auditor liability rule can be defined as a function of  $\theta$  and for every  $\theta$  the corresponding first best levels of investment and effort can be implemented by setting

$$\forall \theta \in [\underline{\theta}, \bar{\theta}] \quad \begin{cases} \lambda(I, \theta) \equiv I^{FB}(\theta) & (5a) \\ D(I, \theta) \equiv (1 - \alpha(e^{FB}(\theta)))I^{FB}(\theta) & (5b) \end{cases}$$

If, however, project type is *not* contractible, then damage awards must depend only on investment levels and project outcomes. From equation (2) we know that privately optimal implementation of efficient investment requires  $D'(I(\theta))$  to be stationary while privately optimal implementation of efficient audit effort requires  $\lambda(I, \theta) = I^{FB}(\theta)$  to satisfy (3). In other words, the damages paid to investors must be independent of observed investment levels. This will ensure efficient investment for all  $\theta$ . Auditor penalties on the other hand must increase with observed investment levels (recall that by (4a),  $I^{FB}(\theta)$  increases in  $\theta$ ) otherwise first-best audit effort cannot be implemented. To formally state the main result of this analysis, it is helpful to define *direct transfer* and *decoupled damage* rules as follows:

**Definition (D1).** A direct transfer (or coupled damage) rule is a damage rule in which for every project undertaken in the economy, damages paid by the auditor equal damages paid to investors, i.e., for every project in the economy,  $\lambda(I) = D(I)$ .

**Definition (D2).** A decoupled damage rule is a damage rule in which for some project undertaken in the economy, damages paid by the auditor do not equal damages paid to investors, i.e., for some project in the economy,  $\lambda(I) \neq D(I)$ .

Our main result can now be formally stated as

**Proposition DD.** If project type is non-contractible, any optimal auditor liability rule must be a decoupled damage rule.

**Proof.** (*Necessity*) Consider two projects of type  $\tau$  and  $\tau'$ ,  $\tau = \tau' + \varepsilon$  where  $\varepsilon$  is some small positive number (i.e.,  $\varepsilon > 0$  and lies in every open ball of zero). By (4a),  $I^{FB}(\tau) > I^{FB}(\tau')$  and by (4b),  $e^{FB}(\tau) < e^{FB}(\tau')$ . To induce efficient investment, equation (2) requires that  $D'(I) = 0 \Rightarrow D(\tau) = D(\tau')$ . However to induce efficient audit effort, equation (3) requires that  $\lambda(\tau) > \lambda(\tau')$ . No coupled damage rule can ensure simultaneously that

$$D(\tau) = D(\tau') \quad (7a)$$

$$\lambda(\tau) > \lambda(\tau') \quad (7b)$$

$$D(\tau) = \lambda(\tau) \quad (7c)$$

$$D(\tau') = \lambda(\tau') \quad (7d)$$

where (7a) follows from the need for stationarity of investor damages in investment, i.e., equation (4a), (7b) follows from the nonstationarity of auditor damages in investment i.e. equation (4b), and (7c) and 7(d) follow from the definition of coupled damages (D1). In fact it is obvious that (7a), (7b) and (7c) jointly imply that (7d) *cannot* be true. Therefore, any optimal liability rule, if one exists must be decoupled. ■

The proof of Proposition DD shows the way to construct an optimal auditor liability rule (there is a continuum of such rules). The optimal rule exploits the feature of the stage game that decoupling investor damages from investment induces efficient investment. Once investors can be relied upon to invest efficiently, the observed level of investment reveals perfectly the level of due care required by the auditor. This level of due care can be implemented by holding the auditor liable for the actual amount invested (which is, by investor self-interest, efficient). More formally, define

**Definition (D3).** A *basic decoupled damage rule* is a damage rule in which investors get a fixed damage payment  $D$  no matter how much they invest while auditors pay variable damages equal to the actual amount of invested, i.e.,  $\lambda(I(\theta)) = I(\theta)$ .

**Comment 1.** There is a continuum of such rules. Any choice of investor damages  $D \in \mathfrak{R}^+ \equiv [0, \infty)$ , or any randomization thereof, i.e., any  $d$  such that  $d = D + \tilde{\varepsilon}$  where  $\text{cov}(\tilde{\varepsilon}, I) = 0$  will induce also efficient investment as long as  $\lambda(I(\theta)) = I(\theta)$ .

**Comment 2.** Not all decoupled damage rules are efficient: consider a rule that sets investor damages on all projects at some  $D \in \mathfrak{R}^+ \equiv [0, \infty)$  but does not specify  $\lambda(I(\theta)) = I(\theta)$ . Such a rule will implement efficient investment, but it will fail to implement efficient auditing.

**Comment 3.** The example in the previous comment shows that inducing efficient investment is not, in and of itself, sufficient to induce efficient auditing.

I now prove a basic (existence) result, namely,

**Proposition E.** Optimal auditor liability rules exist.

**Proof.** Any basic decoupled damage rule satisfies equations (2) and (3) and, therefore, implements efficient outcomes. ■

The foregoing analysis permits three observations.

*Observation 1* (Investor damages are not necessary.) If the system of *damage payments* by the auditor to investors is replaced with a system of *finer* paid by the auditor to a court the second term in the LHS of equation (2) remains uniformly zero and that investors' first order condition is  $\alpha(e^*)R'(I)=1$ , i.e., identical to (1). In other words, while a system of *damages* paid to investors may not always implement first best, a system of *finer* paid to a courts *always* implements first best ( $D \equiv 0$ ).

*Observation 2.* Equation (2) shows that when the auditor issues a High report in stage 2 the investor's payoff is the social payoff function *plus* a damage term that distorts investor conduct (the amount invested). For the investor's equilibrium choice of  $I^*$  to be the same as the social optimum, it is *necessary* that  $D'(I) = 0$ : this is not the same as the (more restrictive) condition that  $r_{GB} = 0$  (i.e. denying investors any damages at all). To implement efficient investment, an optimal liability rule must ensure that investors' private returns from varying the investment in *failed* projects equal society's return from such projects, i.e., zero.

*Observation 3.* Since damages imposed on auditors do not need to equal damages paid to investors, auditor liability can include non-transferable penalties such as incarceration or other personally noxious obligations that if imposed would decrease auditor utility without distorting investor incentives. Seen this way, personal liabilities such as disbarment which impairs the rent stream from an individual auditor's human capital or the imposition of penal servitude can both serve as powerful implementation mechanisms. Intuitively, if the audit *firm* is to be free of "ruinous liability", then to implement good auditing, penalties on *individual* auditors must perforce face higher

penalties (since the firm now has less incentive to monitor the auditor, cf. Balachandran and Ramakrishnan 1988). This insight permits the role of tightening professional codes of conduct (rules governing expulsion from professional societies) or of disbarment from serving public clients to be readily integrated into the analysis of auditor liability rules.

#### **IV. Evaluating Auditor Liability Reform Proposals**

Proposition DD and E provide a powerful set of tools to evaluate auditor liability reform proposals and, more generally, audit contracts. I address these tasks next. In this section, I apply the framework developed thus far to evaluate alternative proposals for reforming auditor liability. More specifically, I examine various reform proposals, namely the innovative notion of Financial Statement Insurance proposed by Ronen (1998) and formalized in Dontoh, Ronen and Sarath (2004), the much-discussed Partnoy (2001, 2004) and Coffee (2003) damage rule proposals and the notion of auditor liability caps under discussion (US Chamber of Commerce 2006).

*Proposal 1 (Financial Statement Insurance or FSI).* In a FSI scheme, the investor gets project returns if the project succeeds and an insurance payment if the project fails. To ensure efficient investment, it is evident from equation (2) that insurance payments cannot increase with investment. Moreover the insurance company must provide the auditor incentives to take the correct amount of effort as well. Financial statement insurance schemes therefore offer no improvements over a basic decoupled damage regime. In fact, unless the insurance payments are independent of the amount invested, FSI, like any other damage scheme, distorts investment incentives.

*Proposal 2 (Damages proportional to investor losses).* Partnoy (2001, 2004) proposes auditors pay investors damage as a multiple of the amount of investment loss. This is a special case of out-of-pocket damages where the damage rule can be written as a multiple  $\varphi$  either of the opportunity loss  $R(I) - I$ , or, of amount invested  $I$ ,  $\varphi > 0$ . From (2) it is immediate that the Partnoy rule always induces over-investment. In addition, unless project types are contractible, no single multiplier will induce efficient auditing on all types of projects.

*Proposal 3 (Damages proportional to audit fees).* Coffee (2003) proposes auditors pay investors damages as a multiple of audit fees. However the expected audit fees must equal the auditor's cost of effort  $C(e)$  plus the expected damage. So the damages paid will have the form  $D(I) = \varphi \cdot [C(e) + (1 - \alpha)(1 - e)D(I)] \Rightarrow D(I) = \frac{\varphi \cdot C(e)}{1 - \varphi(1 - \alpha)(1 - e)}$ ,  $\varphi > 0$ .

Thus, the Coffee rule need not distort investment incentives if  $D'(I) = 0$ . However since  $e$  and thus  $C(e)$  increase in  $\theta$ , this will not in general be the case. However it may be that  $D(I)$  increases more slowly in  $I$  under Coffee damages than under the Partnoy rule and therefore induces less over-investment. However, damages do not equal the amount invested, this rule will not induce efficient auditing on all project types either. In fact, the Coffee rule is likely to induce greater under-auditing than the Partnoy rule.

*Proposal 4 (Auditor Liability Caps).* What if auditor liability were to be capped at some maximum dollar amount of actual investment losses? In other words,  $D(I) = I$  if  $I \leq I^*$  and  $D(I) = I^*$  if  $I > I^*$ . Then, for the region in which  $D(I)$  is increasing, there would be over-investment and efficient auditing and for the region in which  $D(I)$  is constant, there would be under-auditing.

## V. Other Applications of Decoupled Damage Rules.

In this section I review some recent research on auditor liability rules on which my approach sheds new light. Two main themes emerge: First, certain inefficiencies in these models disappear when decoupling is permitted and second, the introduction of non-contractible project types *must* necessarily introduce the need for decoupling damages.

*Application 1 (Auditor Insurance).* Sarath (1991) considers a setting in which the auditor has access to an insurance market. He shows that the limiting the auditor's purchase of insurance increases investor welfare since, *ex-post*, investors would sue a fully insured auditor *too often*, raising the expected cost of auditing but a less-than-fully-insured auditor would, *ex-post*, be sued less frequently and so would demand a lower ex-ante audit fee. Limited insurance, in turn, leads to inefficient investment. By contrast, in our analysis, the investor's incentive to exploit, *ex-post*, the auditor's deep pockets is curbed by making the damages constant. Formally, this amounts to setting  $\forall i: H_i \equiv H$  in Sarath, Proposition 3. This allows the insurer to collect a state-contingent ex-post transfer from the auditor while making the transfer to the investor a constant. In effect, our risk-neutral auditor is an amalgam of Sarath's risk-averse auditor and risk-neutral insurer.

*Application 2. (Fixed Investment with Managerial Frictions.)* In both Hillegeist's (1999) bankrupt entrepreneur model as well as in Pae and Yoo's (2001) model which adds an information system choice by the manager prior to the auditor's effort choice stage in the Schwartz game, efficient investment follows directly upon setting investor recovery to zero (or, for that matter to any constant). In both studies, inefficiencies stem from the

auditor playing the role of an ex-post insurer for a bankrupt manager (Hillegeist) or as a captive input supplier who has to compensate for managerial under-investment (Pae and Yoo).<sup>10</sup> In each case, setting investor damages to zero causes the price distortions caused by auditor-provided insurance or input compensation to be internalized by the seller of the firm and this cures the inefficiency in each model.

## **VI. Summary and conclusions.**

Extant research on auditor liability rules is largely *descriptive*. Prior studies have investigated extensively the effects of extant auditor liability rules. However there is very little research that speaks to the normative problem of designing optimal auditor liability rules. My study addresses this issue.

In this study I demonstrate that in any realistic economy, i.e., any economy in which there are multiple project types and in which project type cannot be contracted upon, *no* direct transfer mechanism in which the auditor directly pays damages to investors can implement socially desirable (first-best, efficient) outcomes. This failure stems from the fact that to decentralize implementation of first-best, society must hold investors and auditors accountable in fundamentally different ways: auditors' penalties must increase with losses to induce them to work harder when the expected loss from a bad project is bigger. Investors' damages however must be held invariant with respect to the amount invested in order to prevent auditor-provided insurance from distorting investment incentives. Direct transfer mechanisms, by design, *bundle* insurance and information services: such contracts cannot be optimal because the purchase of insurance precedes the

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<sup>10</sup> Formally, this can be seen by adding an auditor participation constraint to each model. Both studies, it seems, ignore the role the imposition of such a constraint would have on their model conclusions.

provision of information leading to overly aggressive risk-seeking by investors in the second stage game. With a single project type in the economy, project types are in effect contractible so first best can be implemented with direct transfer rules. Formally modeling multiple project types forces us to confront directly whether or not project types are contractible. I show that if project type is not contractible, then decoupled liability is the *only* efficient (optimal, first-best, desirable) solution.

My study casts fresh light on the design of efficient auditor liability rules by throwing into stark relief the consequences of relaxing three important maintained assumptions in most prior studies and policy proposals. These are, first, the almost universal assumption of direct payment of damages by auditors to investors, second, the common assumption that investment levels are exogenously specified (Schwartz 1997 being a notable exception) and third, modeling only simple economies with a single project type.

Furthermore, as noted earlier, my results are timely and relevant since they speak directly to several questions posed by a Treasury Committee appointed to review and recommend reform of extant auditor liability rules in the United States. My findings are also likely to be of interest to regulators in other parts of the world: the European Union for instance recently considered four proposals to reform auditor liability, *none* of which, my analysis shows, can implement efficient outcomes. By contrast, decoupled damages in which damages paid to investors do not vary with investment while penalties imposed on auditors do, readily and robustly implements efficient outcomes in both the audit and investment markets.

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