Auditor Conservatism and Investment Efficiency

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Forthcoming in The Accounting Review

We thank Steven Kachelmeier and two anonymous reviewers for their comments. We are particularly grateful to the editor, Madhav Rajan, for his encouragement and guidance. We have also benefited from the comments of workshop participants at Dartmouth College, Imperial College, University of California at Berkeley, University of Chicago, University of Houston, and University of Illinois at Urbana-Champaign, as well as participants of the Chicago-Minnesota Accounting Theory Conference and the Fifth Empirical Accounting International Conference in China. Haresh Sapra gratefully acknowledges the financial support of the University of Chicago Booth School of Business.

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ABSTRACT: We develop a theoretical framework to investigate (1) both the determinants and the consequences of auditor conservatism in a capital market setting and (2) the implications of Section 201 of the Sarbanes-Oxley Act for auditor conservatism and investment efficiency. We derive three primary results. First, by adjusting the mix of audit and nonaudit fees, companies with high business risk induce auditor conservatism while companies with low business risk induce auditor aggressiveness. Second, if auditor conservatism is in force, a greater client pressure on auditors improves audit quality, but if auditor aggressiveness is in force, a greater client pressure on auditors impairs audit quality. Third, the nature of a firm's investment inefficiency (overinvestment or underinvestment) depends on its auditor's attestation (conservative or aggressive). Our analysis also implies that a mandatory restriction of nonaudit services imposed by Section 201 may decrease audit quality and damage investment efficiency.

Keywords: auditor conservatism; audit quality; investment efficiency; nonaudit services.

I. INTRODUCTION

Empirical research provides evidence that, since the demise of Arthur Andersen and the enactment of the Sarbanes-Oxley Act (SOX) in 2002, auditors have become more conservative in auditing their client firms (Cahan and Zhang 2006; Lobo and Zhou 2006). This finding is perhaps not surprising in light of the heightened litigation risk faced by auditors and the restrictions they now encounter in performing audit and nonaudit services for their clients. Nonetheless, the literature offers little by way of systematic analysis of the *determinants and consequences* of auditor conservatism. Therefore, we develop a theoretical framework to investigate (1) both the causes and the effects of auditor conservatism and (2) the implications of the increased auditor conservatism in a post-SOX world.

It is a well-accepted notion that auditing reduces the information risk in accounting reports, thereby improving investors' investment decision (Arens et al. 2006). Thus, we focus on the link between auditing and investment efficiency. Specifically, we model the interactions between corporate decisions and investors' decisions and assess how auditing mediates these interactions. We focus on two aspects of auditing: audit quality and auditor conservatism. *Audit quality* is the probability that an auditor will detect misstatements in financial statements.[1] The audit process may produce either conclusive evidence or inconclusive evidence. Inconclusive evidence (i.e., auditor doubt) raises the issue of the nature of the auditor's attestation. We refer to the attestation of an auditor who, when in doubt, disapproves a favorable client report as *auditor conservatism* and to the attestation of an auditor who, when in doubt, approves a favorable client report as *auditor aggressiveness*.[2]

We address both the demand for and the supply of auditing. That is, we investigate how auditor conservatism and audit quality arise *endogenously* in equilibrium. Specifically, we examine how auditor conservatism and audit quality affect the information content of the audited accounting report. Investors in the capital market extract information from the

[1] Our definition of audit quality is similar to that used in the theoretical auditing literature (see, for example, Dye 1993 and Hillegeist 1999).

[2] Our definition of auditor conservatism is consistent with that used in the auditing profession. When *in doubt*, a conservative auditor requires her client to make a downward adjustment to the financial statements or else she will issue a qualified or adverse opinion. If the auditor knows her client's financial condition without doubt, a request for a downward adjustment is viewed as a "correction," not as "conservatism."

audited accounting report, price the firm, and make their investment decisions accordingly. The capital market's pricing rule induces the firm demand for auditing, that, in turn, affects the firm's auditor fee decision. In turn, auditor fees, balanced against the auditor's litigation risk, determine the auditor supply of auditing. Overall, the demand for and the supply of auditing determine the equilibrium auditor conservatism and audit quality. Our model generates four main results.

1. Companies with high business risk induce auditor conservatism, while companies with low business risk induce auditor aggressiveness. This finding contributes to the literature by linking auditor conservatism to client characteristics and therefore identifying the determinants of auditor conservatism in a capital market setting. We also provide a theoretical explanation for the positive relation between firm business risk and conservatism that has been documented empirically (see, e.g., Khan and Watts 2007).

2. If auditor conservatism is in force, a greater client pressure on auditors improves audit quality, but if auditor aggressiveness is in force, a greater client pressure on auditors impairs audit quality. Client pressure on auditors can take the form of potential client businesses for the auditor, such as nonaudit services and repeat audit engagements (Kornish and Levine 2004). This result is contrary to the popular belief that client pressure on auditors is always bad. We find that client pressure is desirable when the auditor is conservative.

3. The nature of investment efficiency depends on the auditor's attestation. Given auditor conservatism, an unfavorable report triggers overinvestment. Given auditor aggressiveness, a favorable report triggers underinvestment. In specifying the conditions under which investment inefficiencies arise, we contribute to the literature by identifying the real effects of auditing.

4. Our results shed light on the potential effects of Section 201 of the Sarbanes-Oxley Act of 2002, which prohibits public companies from granting their auditors many types of nonaudit services. Section 201 aims at constraining client pressure on auditors. However, our model implies that such a one-size-fits-all constraint may lead to unintended consequences. We find that a mandatory restriction of client pressure in general and

nonaudit services in particular (1) increases auditor conservatism, (2) decreases a conservative auditor's audit quality and increases an aggressive auditor's audit quality, (3) increases overinvestment and decreases underinvestment, and (4) increases the audit fee. The above predictions can be used by both public policy makers in evaluating Section 201 and by empirical researchers in making pre-SOX versus post-SOX comparisons.

The extant literature on theories of conservatism is characterized by three strands of research: GAAP conservatism research (e.g., Gigler and Hemmer 2001), which focuses on the effects of the conservatism embedded in generally accepted accounting principles (GAAP); managerial conservatism research (e.g., Levine 1996), which focuses on the choice of the degree of conservatism in managerial reporting decision within GAAP; and auditor conservatism research. The last strand is sparse and is the perspective we adopt in this paper.

In contrast to Antle and Nalebuff (1991), who study auditor conservatism in the client-auditor negotiation process, or Patterson and Smith (2003), who examine it in the presence of materiality uncertainty, we analyze the effects of auditor conservatism on investment decisions in a capital market setting.

Whereas Shibano (2000) studies the effect of auditor conservatism on investment without exploring audit quality and Schwartz (1997) identifies the effect of audit quality on investment without introducing auditor conservatism, we show that auditor conservatism and audit quality are jointly determined and are therefore inherently linked. Thus, we investigate the relation between those two aspects of auditing and investment.

Kornish and Levine (2004) demonstrate in a contractual setting that a contingent audit fee contract can induce an unbiased audited accounting report. We show that, in a market setting, auditor biases (either conservatism or aggressiveness) will emerge in equilibrium. While Kornish and Levine concentrate exclusively on the auditor's reporting decision, we study both auditor biases and audit quality decisions. In Kornish and Levine (2004), restricting nonaudit services leads to uninformative reports; in our study, the effect of restricting nonaudit services is case-specific: it impairs investment efficiency in the case of a conservative auditor but improves investment efficiency in the case of an aggressive auditor.

Our paper is related to Li (2001), who studies commitment to conservatism in a group decision making setting in which group members must make a decision on whether to accept or

reject a job candidate. He shows that group members have the incentive to free-ride on other members' evidence gathering effort. His main finding is that commitment to a conservative hiring standard alleviates the free-rider problem in the sense that it stimulates the provision of effort. In both Li's model and ours, the anticipation of next-stage conservatism/aggressiveness affects the decision maker's current-stage evidence gathering effort. In contrast to Li's (2001) result that conservatism is always socially beneficial in a free-riding context, we find that conservatism is desirable in terms of investment efficiency if and only if a firm has a high business risk.

Section II describes the model. Section III derives the supply of and the demand for auditing and shows how the two sides are linked by the capital market price and investment. It then derives the client firm's optimal fees decision and characterizes the equilibrium auditor attestation and audit quality. Section IV discusses regulatory and empirical implications of the model. Section V concludes. The Appendix contains proofs of the major results.

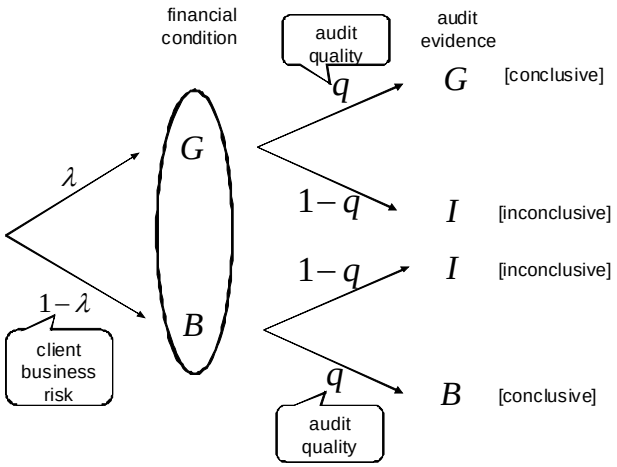
II. MODEL

In this section, we specify the key ingredients of our model. A firm has a production technology that generates a stochastic return. If the firm's financial condition is good, denoted by G, an investment of k generates a return of $2\mu\sqrt{k}$, where $\mu > 0$, and if the firm's financial condition is bad, denoted by B, an investment of k generates a low return that we normalize to 0. With probability λ, the firm's financial condition will be G and with probability $1-\lambda$, its financial condition will be B. We refer to the parameter $1-\lambda$ as "client business risk."

We assume that, for life cycle reasons, the current owners of the firm sell the firm to prospective owners at an endogenously determined market price of M. The new owners pay M to acquire the firm and then make an investment of k in the firm's technology. In order to value the firm and subsequently make an informed investment, the prospective investors require the firm to issue an audited accounting report.

The financial reporting process is as follows. At the beginning of the period, the firm hires an external auditor and chooses audit fees. The firm then proposes a report, y_G or y_B, to its auditor. Report y_G claims that the financial condition is G and report y_B claims that the

Figure 1: The Auditor's Evidence Accumulation



financial condition is B. The firm strictly prefers the favorable report, y_G, to the unfavorable report, y_B. The firm's auditor accumulates audit evidence about the firm's financial condition and then attests to the client's proposed report.

The process of evidence accumulation (outlined in Figure 1) is as follows. The auditor chooses the quality of her audit procedures, $q \in [0, 1]$. The audit cost, $c(q)$, is increasing and convex in q, with $c(0) = 0$, $c'(0) = 0$, and $c'(1) = \infty$. With probability q, the auditor obtains conclusive evidence, G or B; with probability $1-q$, the auditor obtains inconclusive evidence, I.[3] We refer to the probability, q, of accumulating conclusive evidence as *audit quality*. The higher the audit quality, the more likely the auditor will detect any misstatement in the client report.

After accumulating evidence, the auditor makes an attestation decision about whether or not to approve the favorable client report, y_G. Given auditor approval, the client firm issues report y_G; given auditor disapproval, the client firm must issue report y_B. When the evidence is inconclusive, that is, when the auditor is in doubt, she must use her professional judgment

[3]In Figure 1, the firm's financial condition is circled, indicating that at the time of choosing her audit quality, the auditor does not know the client's financial condition; that is, the audit quality chosen is not dependent on the financial condition unknown to the auditor. In addition, because the client always proposes y_G, the audit quality chosen is not dependent on the reported financial condition either.

to assess the firm's financial condition.[4] An auditor who, when in doubt, makes a decision to disapprove y_G is called conservative and one who, when in doubt, makes a decision to approve y_G is called aggressive. Thus, *auditor conservatism* or *aggressiveness* becomes an issue whenever the auditor is in doubt.[5]

In making her attestation decision, the auditor is torn between the expected auditor fees from her client and the expected legal liability for overstatements in the client report.[6] The auditor receives an audit fee, F, which is not contingent on the auditor's attestation decision.[7] In addition, we denote the benefit to the auditor from the client's potential business opportunities by ϕ. The term ϕ could capture nonaudit fees and/or fees from repeat audit engagements. By granting or withholding those business opportunities, the client firm can effectively exert pressure on the auditor for a favorable audit opinion.[8] Therefore, ϕ can be effectively contingent on the audit opinion, representing client pressure on auditors (Kornish and Levine 2004).

In order to study the implications of SOX, we interpret ϕ in our environment as nonaudit fees. Before the enactment of SOX, client firms could hire their auditors for both audit and nonaudit services. However, under Section 201 of SOX, many types of nonaudit services are banned and still some other types are permitted (e.g., tax services); that is, SOX restricts (but does not eliminate) auditor-provided nonaudit services. We first introduce nonaudit services into our model and then investigate the economic consequences of restricting such services. In other words, we compare a pre–SOX regime in which nonaudit services are not restricted with a post–SOX regime in which they are restricted.

When the audited accounting report is issued, investors value the firm at price M and then

[4] The accumulated evidence may remain inconclusive because time and/or financial constraints force the auditor to stop digging for more evidence after a certain point in time.

[5] As the Securities and Exchange Commission accepts no financial statements accompanied by a disclaimer of audit opinion, we introduce no possibility of a disclaimer into our model, thereby essentially restricting the message space.

[6] Like Dye (1993), our model does not include a client firm's legal liability to investors because we want to focus on the role of auditing. If such a liability were effective so that a firm with financial condition B would indeed report y_B, then auditing issues would become moot.

[7] The *Code of Professional Conduct* of the American Institute of Certified Public Accountants forbids contingent audit fees.

[8] We deliberately abstract away from the potential benefits of granting non-audit services to the auditor such as synergies between audit and nonaudit services. Nonetheless, as we demonstrate in Section IV, even without these benefits, restricting client pressure may still be detrimental.

invest k in the firm's production technology, which produces a return of $2\mu\sqrt{k}$ or 0 in a later point in time when the firm's financial condition, G or B, is revealed. If an overstatement is exposed—that is, if the return to investment is 0 but the audited accounting report was y_G—the auditor is legally liable to investors.[9] We denote the auditor's legal liability by L.[10]

The sequence of events is as follows:

- Nature selects the firm's financial condition, either G with probability of λ or B with probability of $1-\lambda$. All agents know λ, but do not observe the financial condition at this time.
- The firm hires an auditor and chooses an audit fee, F, and a nonaudit fee, ϕ, both of which are disclosed publicly.
- The firm proposes the report y_G to the auditor.
- The auditor chooses the audit quality, q, of the audit procedures, and accumulates her audit evidence, G or B or I. Both the firm and its auditor observe the audit evidence.[11]
- The auditor makes her attestation, and the firm issues the audited accounting report, either y_G or y_B.
- The investors acquire the firm at price M and invest k in the firm's technology.
- The return to investment, $2\mu\sqrt{k}$ or 0, is realized (and therefore the financial condition, G or B, is revealed publicly).

[9] We exclude auditor liability for understatement because it is seldom observed in practice. The reason for this phenomenon may be twofold. First, the client firm can penalize its auditor by withholding business opportunities, ϕ. Second, as Kornish and Levine (2004) observe, it is extremely difficult for capital market traders to make a case in a court of law for foregone investment opportunities resulting from understated financial statements. In contrast, it is relatively easy to make a case for the actual investment loss incurred because of overstatement.

[10] We can further assume that $L = sD$, where s is the probability that the auditor loses the lawsuit and D is the damage measure (see, e.g., Laux and Newman 2007). The parameter $s = 1$ corresponds to a strict liability rule and $s < 1$ corresponds to a due-care liability rule in the current legal regime. Given that the focus of our analysis is not on the optimal legal liability regime, we purposely do not decompose L.

[11] The observability of q is not an issue because we show later that, even if q were unobservable, it may be inferred from the variables ϕ and L.

- A legal liability, L (which is common knowledge), for any overstatement in the audited accounting report, is imposed on the auditor.[12]

Our model assumes that the firm and its auditor are symmetrically and imperfectly informed throughout the audit engagement.[13] However, investors in the capital market are less informed than the firm and its auditor in the sense that investors do not directly observe the audit evidence.

We impose the following additional assumptions: the firm chooses its auditor fees, F and ϕ, to maximize its expected capital market price less its expected auditor fees; the auditor chooses her audit quality, q, and her attestation (i.e., whether or not to approve y_G) to maximize her expected auditor fees less her expected legal liability and her audit cost; investors choose their investment, k, to maximize their expected return on investment. We assume both a competitive capital market and a competitive audit market.

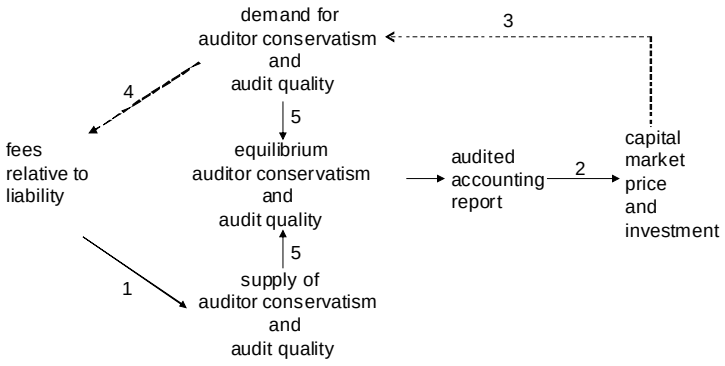
III. EQUILIBRIUM

We conduct our analysis in the order illustrated in Figure 2. First, we investigate how the tension between auditor fees and auditor liability determines the supply of auditing. Next, using the fee/liability ratio, we show how the capital market interprets the audited accounting report in order to value the firm and make an investment decision. We then explore how the anticipation of the capital market's pricing rule generates the firm's demand for auditing. Finally, we characterize how the firm makes its auditor fee decision to implement its demand for auditing, which along with the auditor's supply of auditing, determines the equilibrium auditor conservatism and audit quality.

[12] In principle, the auditor's legal liability, L, may either be equal to the investors' investment loss (an out-of-pocket damage measure), or smaller than the investment loss (a separate and proportionate liability), or larger than the investment loss (a punitive damage measure). We thank an anonymous reviewer for this taxonomy. The relative magnitude of L vis-a-vis the investors' investment loss is not important for our analysis. What is crucial is the fee-liability ratio, $\frac{\phi}{L}$. As shown later in the analysis, whatever the level of L may be, the firm will react by adjusting its choice of ϕ so as to acheive its desired fee-liability ratio.

[13] If the firm were to learn its financial condition *after* hiring the auditor so that it wishes to renegotiate the original audit contract, all our results would still qualitatively hold. A proof of this claim is available upon request.

Figure 2: The Framework



(The numbers indicate the order followed in the analysis.)

Supply of Auditing

We begin the analysis by deriving the supply of auditing (step 1 in Figure 2). On one hand, auditors face client pressure to approve favorable client reports; such client pressure is measured by the nonaudit fee, ϕ. On the other hand, if auditors succumb to such pressure, they risk legal liability, L. We next show that this tension, captured by the fee-liability ratio, $\frac{\phi}{L}$, determines the supply of both auditor conservatism and audit quality.

Supply of Auditor Conservatism

The client firm uses the nonaudit fee, ϕ, to pressure its auditor to approve its favorable report, y_G. It grants ϕ if its auditor approves y_G and withholds ϕ if its auditor disapproves y_G.[14] On the other hand, a legal liability, L, will be imposed on the auditor when any overstatement in the audited accounting reports is eventually exposed. When making her attestation decision, the auditor trades off her expected fee against her expected liability. The auditor's expected payoff and attestation decision rule are as follows:

[14] If the client firm reneges—that is, if the firm withholds ϕ after the auditor approves its favorable report, y_G—the auditor can recall her audit opinion. Such a threat by the auditor precludes client reneging in our one-period model. However, in a multiperiod setting, such a threat may not work.

audit evidence	payoff from approving y_G	payoff from disapproving y_G	approving y_G if and only if
G [conclusive]	ϕ	0	$\frac{\phi}{L} \geq 0$
I [inconclusive]	$\phi - (1-\lambda)L$	0	$\frac{\phi}{L} \geq 1-\lambda$
B [conclusive]	$\phi - L$	0	$\frac{\phi}{L} \geq 1$

Disapproving y_G means forfeiting the nonaudit fee, ϕ, but the auditor risks no legal liability for overstatement. Thus, the auditor's expected payoff from disapproving y_G is 0. In contrast, approving y_G leads to a payoff of ϕ, but the auditor bears a litigation risk for overstatement. If the audit evidence is G, the auditor is safe; if the audit evidence is B, the auditor is definitely liable for L. If the audit evidence is inconclusive, the auditor assesses her client's business risk as $1-\lambda$ (the probability of financial condition B). Thus, her expected liability is $(1-\lambda)L$. The auditor's decision rule, stated in the last column of the table, is derived by comparing her expected payoffs from approving and disapproving y_G. Using this decision rule, we next derive the publicly issued accounting report, which depends on the tension between fee and liability, captured by $\frac{\phi}{L}$, and the audit evidence, G or B or I. Claim 1 and Figure 3 describe the audited accounting reports resulting from auditor-client interactions.

Claim 1

(i) When $\frac{\phi}{L} \leq 1-\lambda$, the audited accounting report issued is y_B unless the auditor's evidence is G, in which case report y_G is issued.

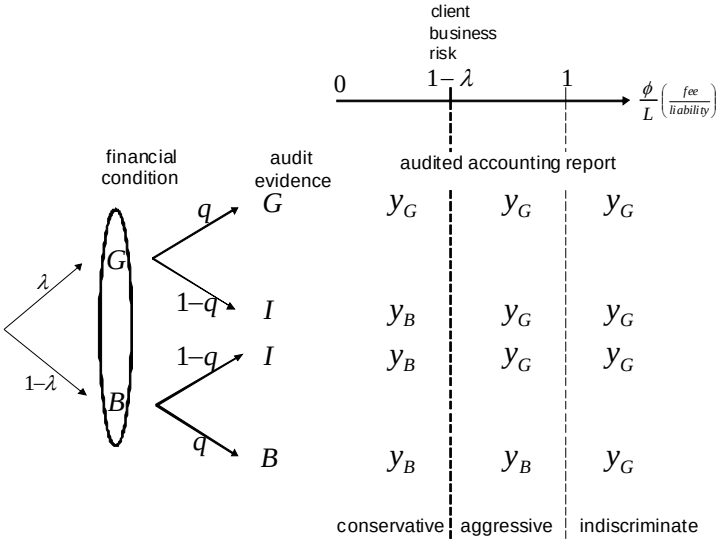
(ii) When $\frac{\phi}{L} \in [1-\lambda, 1]$, the audited accounting report issued is y_G unless the auditor's evidence is B, in which case report y_B is issued.

(iii) When $\frac{\phi}{L} \geq 1$, the audited accounting report issued is always y_G.

We refer to the attestation of an auditor who, when in doubt, disapproves y_G as *auditor conservatism* and to the attestation of an auditor who, when in doubt, approves y_G as auditor aggressiveness.[15] The following observations can be made about auditor conservatism and auditor aggressiveness.

[15] As Figure 3 illustrates, when the fee overwhelms the liability ($\frac{\phi}{L} \geq 1$), the auditor approves y_G regardless of her audit evidence, a strategy termed "indiscriminate attestation." Note that any report produced from an indiscriminate attestation is uninformative to outsiders. We show later that a client firm would not induce an indiscriminate attestation in equilibrium.

Figure 3: The Supply of Auditor Conservatism



Remark 1

(i) The favorable report y_G produced by a conservative attestation perfectly reveals the firm's financial condition G, while a favorable report y_G produced by an aggressive attestation may overstate the firm's financial condition. Conversely, the unfavorable report y_B produced by an aggressive attestation perfectly reveals the firm's financial condition B, while the unfavorable report y_B produced by a conservative attestation may understate the firm's financial condition.
(ii) If the client's business risk is large (i.e., if $1-\lambda > \frac{1}{2}$), a conservative attestation results in a lower likelihood of misstatements in the audited financial report relative to an aggressive attestation. Conversely, if the client's business risk is small (i.e., if $1-\lambda < \frac{1}{2}$), an aggressive attestation results in a lower likelihood of misstatements in the audited financial report relative to a conservative attestation. A higher audit quality (i.e., a higher q) reduces the likelihood of misstatements.
(iii) A fee-liability ratio below the client business risk ($\frac{\phi}{L} < 1-\lambda$) induces auditor conservatism, whereas a fee-liability ratio above the client business risk ($\frac{\phi}{L} > 1-\lambda$) induces auditor aggressiveness.

Remark 1(i) demonstrates that the information content of the audited accounting report depends on the nature of the auditor's attestation, i.e., whether she is conservative or aggressive. Remark 1(ii) implies that client business risk ($1-\lambda$) and audit quality (q) are important

determinants of the informativeness of the financial reporting and auditing system. Remark 1(*iii*) states that whether an auditor's attestation is conservative or aggressive is endogenous, depending on the fee-liability ratio, $\frac{\phi}{L}$. That is, auditor conservatism or aggressiveness results from the auditor optimally trading off the expected nonaudit benefits against expected litigation costs. We later show how these three implications influence the firm's demand for auditing.

Supply of Audit Quality

We now derive the auditor's choice of audit quality. For a given fee-liability ratio, $\frac{\phi}{L}$, when choosing her audit quality, the auditor anticipates her subsequent attestation strategy (conservative, aggressive, or indiscriminate). The auditor's expected payoff at the time of her audit quality choice is her expected payoff from her subsequent attestation strategy less $c(q)$, the cost of performing audit procedures with quality q. Next, we discuss the auditor's expected payoff from the audit quality decision.

The case of auditor conservatism ($\frac{\phi}{L} \leq 1-\lambda$)

From Figure 3, when $\frac{\phi}{L} \leq 1-\lambda$, the auditor approves y_G only when her audit evidence is G. If her evidence is G (the probability of which is λq), she receives ϕ (see the table in the preceding subsection). Therefore, the auditor's expected payoff in anticipation of a conservative attestation is

$$\underbrace{\lambda q}_{\substack{\text{probability of} \\ \text{evidence } G}} \quad \underbrace{\phi}_{\substack{\text{payoff from} \\ \text{approving } y_G \\ \text{given } G}} \quad - \quad \underbrace{c(q)}_{\substack{\text{audit} \\ \text{cost}}} . \tag{1}$$

The case of auditor aggressiveness ($\frac{\phi}{L} \in [1-\lambda, 1]$)

From Figure 3, when $\frac{\phi}{L} \in [1-\lambda, 1]$, the auditor approves y_G when her audit evidence is either G or I. If her evidence is G (the probability of which is λq), she will receive ϕ; if her evidence is I (the probability of which is $1-q$), she will receive $\phi - (1-\lambda)L$ (see the table in the preceding subsection). Therefore, the auditor's expected payoff in anticipation of an

aggressive attestation is

$$\underbrace{\lambda q}_{\substack{\text{probability of}\\ \text{evidence } G}} \quad \underbrace{\phi}_{\substack{\text{payoff from}\\ \text{approving } y_G\\ \text{given } G}} \quad + \quad \underbrace{(1-q)}_{\substack{\text{probability of}\\ \text{evidence } I}} \quad \underbrace{[\phi-(1-\lambda)L]}_{\substack{\text{payoff from}\\ \text{approving } y_G\\ \text{given } I}} - \quad \underbrace{c(q)}_{\substack{\text{audit}\\ \text{cost}}} . \tag{2}$$

The case of an indiscriminate attestation ($\frac{\phi}{L} \geq 1$)

According to Figure 3, when $\frac{\phi}{L} \geq 1$, the auditor approves y_G regardless of her audit evidence. Thus, the auditor always receives ϕ. Because the probability of overstatement (approving y_G when the firm's financial condition is B) is $1-\lambda$, the auditor's expected liability is $(1-\lambda)L$. Therefore, the auditor's expected payoff is $\phi-(1-\lambda)L-c(q)$.

The auditor's supply of audit quality is described in Proposition 2 and illustrated in Figure 4.

Claim 2 *The auditor's supply of audit quality, q, is characterized as follows:*

$$c'(q) = \lambda\phi \quad \textit{for } \tfrac{\phi}{L} \leq 1-\lambda \quad \textit{(the case of auditor conservatism)} \tag{3}$$

$$c'(q) = (1-\lambda)(L-\phi) \quad \textit{for } \tfrac{\phi}{L} \in [1-\lambda, 1] \quad \textit{(the case of auditor aggressiveness)} \tag{4}$$

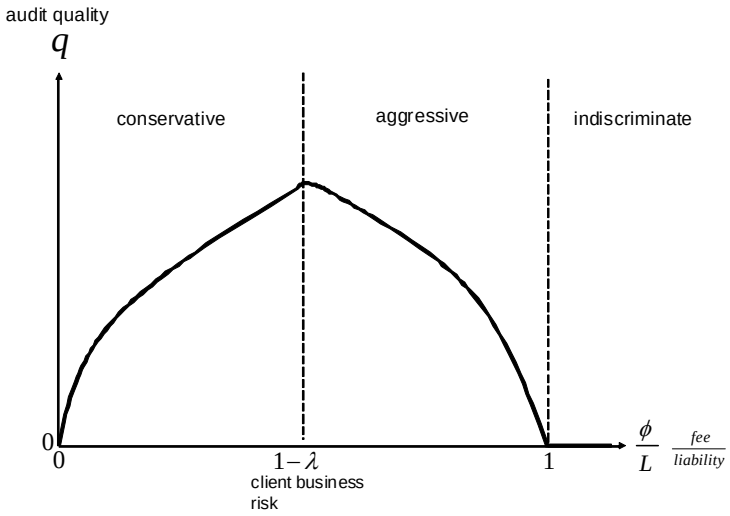
$$q = 0 \quad \textit{for } \tfrac{\phi}{L} \geq 1 \quad \textit{(the case of an indiscriminate attestation)}$$

It follows from Claim 2 that the supply of audit quality, q, is hump-shaped and non-differentiable at the hump point, as illustrated in Figure 4.

Remark 2 *When the auditor is conservative, a higher fee-liability ratio increases the supply of audit quality ($\frac{dq}{d(\frac{\phi}{L})} > 0$), whereas when the auditor is aggressive, a higher fee-liability ratio decreases the supply of audit quality ($\frac{dq}{d(\frac{\phi}{L})} < 0$).*

Remark 2 is contrary to the popular belief that client pressure on auditors, represented by ϕ in our environment, always damages audit quality. Our results imply that the effect of client pressure on audit quality depends on the nature of the auditor's attestation strategy. The popular belief applies only in the case of auditor aggressiveness. Conversely, when auditor conservatism is in force, client pressure actually improves audit quality!

Figure 4: The Supply of Audit Quality



The intuition for the above results is as follows. An auditor who expects to be conservative in her subsequent attestation (disapproving y_G when in doubt) may make a type I error and lose business opportunities offered by her client, represented by ϕ. The higher the fee at stake, the larger the expected loss from unknowingly understating the client's condition. Therefore, higher fees provide more incentive for the auditor to increase audit quality, q, to augment the chance of accumulating conclusive evidence. On the other hand, an auditor expecting to be aggressive in her subsequent attestation (approving y_G when in doubt) may make a type II error and bear excessive legal liability. Nonetheless, the larger the fees from her business opportunities offered by the client, the lower the expected loss from unknowingly overstating the client's condition. Therefore, when fees are higher, the auditor's optimally reduces audit quality q.[16]

Figure 4 illustrates that a fee-liability ratio, $\frac{\phi}{L}$, simultaneously determines the auditor attestation (conservative or aggressive) and audit quality. Note that the existence of contingent fees is crucial in our one-period model. Without contingent fees, auditors would provide the minimal level of audit quality so that audited reports would be uninformative.[17]

[16] At the extreme, when she expects to be indiscriminate in her subsequent attestation (approving y_G regardless of audit evidence), the auditor has no incentive to accumulate audit evidence in the first place, so her supply of audit quality is minimal.

[17] In the conclusion we discuss how, in a multiperiod setting, other forces such as the auditor's reputation

Price and Investment

We now examine how investors in the capital market extract information from the audited accounting report to price the firm and to make their investment in the firm's production technology (refer to step 2 in Figure 2). We show that because both auditor conservatism and audit quality affect the information content of the firm's report (Remark 1(i)), they affect the market price of the firm and the investors' investment in production technology.

Because investors do not know the firm's financial condition, G or B, they must infer it from all publicly available information. Let p denote the investors' perceived probability of financial condition G, i.e.,

$$p \equiv \Pr(G|\textit{investors' information set}),$$

where p is derived below. Recall that an investment of k will generate a return of $2\mu\sqrt{k}$ if the financial condition is G and 0 if the financial condition is B. Therefore, investors choose k to maximize their net expected return, $p \cdot 2\mu\sqrt{k} - k$, which implies that the firm's optimal investment is given by

$$k = p^2\mu^2. \tag{5}$$

The investors' perceived probability, p, of financial condition G, depends on the information content of the audited financial report, which in turn depends on the auditor attestation and audit quality. To derive p, investors use the fee-liability ratio, $\frac{\phi}{L}$, to infer the auditor conservatism and audit quality in order to interpret the audited accounting report. In our environment, investors know the fee-liability ratio because both ϕ and L are common knowledge. Figure 3 illustrates how the knowledge of the fee-liability ratio can be used to infer the auditor attestation (conservative ("C"), aggressive ("A"), or indiscriminate ("IND")). Similarly, Figure 4 illustrates how knowledge of the fee-liability ratio can be used to infer the audit quality, q.

As Figure 3 illustrates, a favorable report resulting from auditor conservatism (i.e., y_G given C) perfectly reveals G; thus, $p = 1$. An unfavorable report resulting from auditor conservatism (i.e., y_B given C) may be issued either from a firm with financial condition G or from a firm with financial condition B. From Figure 3 and Bayes' rule, $p = \frac{\lambda(1-q)}{1-\lambda q}$.

may provide incentives for the auditor to choose a nontrivial level of audit quality.

On the other hand, a favorable report resulting from auditor aggressiveness (i.e., y_G given A) may be issued from either a firm with financial condition G or a firm with financial condition B. Again using Figure 3 and Bayes' rule, $p = \frac{\lambda}{1-(1-\lambda)q}$. An unfavorable report resulting from auditor aggressiveness (i.e., y_B given A) perfectly reveals B; thus, $p = 0$. A report resulting from an indiscriminate attestation is always favorable. Such a report has no incremental information content and therefore investors do not update their priors about G, so that $p = \lambda$. The investors' posterior beliefs given an audited accounting report, auditor attestation, and audit quality are summarized as follows:

$$\begin{array}{lll} p(y_G, C, q) & \equiv \Pr(G|y_G, C, q) & = 1 \\ p(y_B, C, q) & \equiv \Pr(G\ |y_B, C, q) & = \frac{\lambda(1-q)}{1-\lambda q} \\ p(y_G, A, q) & \equiv \Pr(G\ |y_G, A, q) & = \frac{\lambda}{1-(1-\lambda)q} \\ p(y_B, A, q) & \equiv \Pr(G\ |y_B, A, q) & = 0 \\ p(y_G, IND, q) & \equiv \Pr(G\ |y_G, IND, q) & = \lambda \end{array} \tag{6}$$

Substituting the values of p from (6) into (5) yields investors' optimal investment as a function of auditor attestation and audit quality described below:

Claim 3

(i) Given auditor conservatism and audit quality q, the investors' optimal investments given a favorable and unfavorable audited accounting report are, respectively,

$$k(y_G, C, q) = \mu^2 \tag{7}$$

$$k(y_B, C, q) = \left[\frac{\lambda(1-q)}{1-\lambda q}\right]^2 \mu^2. \tag{8}$$

(ii) Given auditor aggressiveness and audit quality q, the investors' optimal investments given a favorable and unfavorable audited accounting report are, respectively,

$$k(y_G, A, q) = \left[\frac{\lambda}{1-(1-\lambda)q}\right]^2 \mu^2 \tag{9}$$

$$k(y_B, A, q) = 0. \tag{10}$$

(iii) Given an indiscriminate auditor attestation, the investors' optimal investment is

$$k(y_G, IND, q) = \lambda^2 \mu^2.$$

In order to gauge the nature and magnitude of investment inefficiencies, we use a full information regime as a benchmark. By full information, we mean an ideal situation in which the firm's financial condition is directly observable to investors so that $y_G = G$ and $y_B = B$. Using (5), the full information levels of investments, given the firm's audited reports y_G and y_B, are $k^{FI}(y_G) = \mu^2$ and $k^{FI}(y_B) = 0$, respectively. Using these investment benchmarks, we measure the investment inefficiencies in the current setting in which the accounting reports do not always perfectly reveal the financial conditions.

Remark 3

(i) Investors overinvest when a conservative auditor attests to an unfavorable report, i.e.,

$$k(y_B, C, q) > k^{FI}(y_B)$$

and investors underinvest when an aggressive auditor attests to a favorable report, i.e.,

$$k(y_G, A, q) < k^{FI}(y_G).$$

(ii) A higher audit quality improves investment efficiency: both $|k(y_B, C, q) - k^{FI}(y_B)|$ *and* $|k(y_G, A, q) - k^{FI}(y_G)|$ *decrease in* q.

The intuition for Remark 3 is as follows. First consider the case of a conservative auditor. If the conservative auditor attests to a favorable report, this report perfectly reveals the firm's favorable financial condition, such that investors make an efficient investment (i.e., $k(y_G, C, q) = k^{FI}(y_G) = \mu^2$). But if a conservative auditor attests to an unfavorable report, investors recognize that understatement is a possibility, so that they give the firm the benefit of the doubt and choose an investment level that is higher than they would have chosen if they knew for sure that the firm's financial condition is unfavorable; that is, the investors overinvest.

Now consider the case of an aggressive auditor. If an aggressive auditor attests to an unfavorable report, that report perfectly reveals the firm's unfavorable financial condition, such that investors make an efficient investment (i.e., $k(y_B, A, q) = k^{FI}(y_B) = 0$). But if an aggressive auditor attests to a favorable report, investors realize that overstatement is a possibility so that they discount the report and choose an investment level that is lower than

they would have chosen if they knew for sure the firm's financial condition is favorable; that is, the investors underinvest.

Regardless of the auditor's attestation, higher audit quality reduces the likelihood of both understatement and overstatement, thereby making the reports more representationally faithful and the investments more efficient.

Given the assumption of a competitive capital market, the price of the firm equals the investors' expected return on investment (gross return less the investment cost) plus their expected damage award due to any overstatement in the audited accounting report. The following claim describes the capital market pricing of the firm.

Claim 4

(i) Given auditor conservatism and audit quality q, the capital market prices, given a favorable and unfavorable audited accounting report are, respectively,

$$M(y_G, C, q) = \mu^2 \text{ and } M(y_B, C, q) = \left[\frac{\lambda(1-q)}{1-\lambda q}\right]^2 \mu^2.$$

(ii) Given auditor aggressiveness and audit quality q, the capital market prices given a favorable and unfavorable audited accounting report are, respectively,

$$M(y_G, A, q) = \left[\frac{\lambda}{1-(1-\lambda)q}\right]^2 \mu^2 + \frac{(1-\lambda)(1-q)}{1-(1-\lambda)q} L \quad \text{and} \quad M(y_B, A, q) = 0.$$

(iii) Given an indiscriminate attestation, the capital market price is

$$M(y_G, IND, q) = \lambda^2 \mu^2 + (1-\lambda)L.$$

Claim 4 indicates how capital market prices react differently to the accounting reports due to differences in auditor conservatism and audit quality. In particular, the market does not take an accounting report at face value but rather interprets the same accounting report issued by a conservative auditor very differently from that issued by an aggressive auditor.

Demand for Auditing

We now turn to the following question from step 3 in Figure 2. Given the firm's desire to boost its expected market price and given that the market prices the firm very differently as auditor attestation and audit quality change, what kind of auditor attestation and what level

of audit quality would the firm prefer? To answer this question, we first lay out the firm's expected payoff as a function of both auditor attestation and audit quality. We then derive the firm's demand for auditing. Recall that the firm's expected payoff is its expected capital market price less its expected auditor fees.

The case of auditor conservatism

As defined below, U_C represents the firm's expected payoff given auditor conservatism (C) and audit quality q:

$$U_C \equiv \underbrace{\lambda q}_{\substack{\text{probability}\\ \text{of } y_G}} \underbrace{\mu^2}_{\substack{\text{price}\\ \text{given } y_G}} + \underbrace{(1-\lambda q)}_{\substack{\text{probability}\\ \text{of } y_B}} \underbrace{\left[\frac{\lambda(1-q)}{1-\lambda q}\right]^2 \mu^2}_{\substack{\text{price}\\ \text{given } y_B}} - \underbrace{\lambda q}_{\substack{\text{probability}\\ \text{of } y_G}} \underbrace{\phi}_{\substack{\text{nonaudit}\\ \text{fee}}} - \underbrace{F}_{\substack{\text{noncontingent}\\ \text{audit fee}}} . \tag{11}$$

The case of auditor aggressiveness

As defined below, U_A represents the firm's expected payoff given auditor aggressiveness (A) and audit quality q:[18]

$$U_A \equiv \underbrace{[1-(1-\lambda)q]}_{\substack{\text{probability}\\ \text{of } y_G}} \underbrace{\left[\left[\frac{\lambda}{1-(1-\lambda)q}\right]^2 \mu^2 + \frac{(1-\lambda)(1-q)}{1-(1-\lambda)q} L\right]}_{\substack{\text{price}\\ \text{given } y_G}} + \underbrace{(1-\lambda)q}_{\substack{\text{probability}\\ \text{of } y_B}} \underbrace{0}_{\substack{\text{price}\\ \text{given } y_B}} - \underbrace{[1-(1-\lambda)q]}_{\substack{\text{probability}\\ \text{of } y_G}} \underbrace{\phi}_{\substack{\text{nonaudit}\\ \text{fee}}} - \underbrace{F}_{\substack{\text{noncontingent}\\ \text{audit fee}}} . \tag{12}$$

Claim 5

(i) For any level of audit quality q, a firm with a high client business risk (i.e., $1-\lambda \geq \frac{1}{2}$) prefers auditor conservatism and a firm with a low client business risk (i.e., $1-\lambda \leq \frac{1}{2}$) prefers

[18] Given an indiscriminate attestation, the firm always expects to issue y_G and pay ϕ. Thus, its expected payoff is $M(y_G; IND, q) - \phi - F$, where $M(y_G; IND, q) = \lambda^2\mu^2 + (1-\lambda)L$ by Claim 4. Note that this payoff equals U_A when $q = 0$. Thus, from the firm's perspective, an indiscriminate attestation is a special case of auditor aggressiveness. Therefore, for the rest of the analysis, we can focus, without loss, on the conservative and aggressive attestations.

auditor aggressiveness.
(ii) The client firm prefers a higher audit quality: $\frac{\partial U_C}{\partial q} > 0$ *and* $\frac{\partial U_A}{\partial q} > 0$.

Claim 5(i) can be interpreted as follows. The higher the client business risk—that is, the larger the value of $(1-\lambda)$—the more likely the firm's financial condition will be unfavorable (B). From Figure 3, given an unfavorable condition, B, an aggressive attestation can produce either an unfavorable or a favorable report. If an unfavorable report is generated by an aggressive attestation, it will perfectly reveal the unfavorable condition. If a favorable report is generated by an aggressive attestation, even though the firm will be priced high, a legal liability will eventually be imposed on the auditor when the overstatement is exposed. Hence, the auditor demands a large fee from the firm to compensate for litigation risk, thereby offsetting the high market price. In sum, aggressiveness is not attractive to a firm with a high client business risk. On the other hand, conservatism produces an unfavorable report, y_B, for the unfavorable condition B. But because the market knows that the unfavorable report may be due to understatement, it gives the firm the benefit of the doubt and does not price it too low. Therefore, a firm with a high client business risk prefers conservatism to aggressiveness.

On the other hand, the lower the client business risk—that is, the smaller the value of $(1-\lambda)$—the more likely the firm's financial condition will be favorable (G). Whereas a conservative attestation may understate the favorable condition, G, an aggressive attestation will not (see Figure 3). In other words, an aggressive attestation produces a report that more faithfully represents the firm's underlying favorable condition. Therefore, a firm with a lower business risk prefers an aggressive attestation to a conservative attestation.

An alternative interpretation of Claim 5 is from an investment efficiency perspective. The firm's expected payoff increases in its expected market price, which in turn increases in investment efficiency. Therefore, the firm prefers an auditor attestation that enhances its investors' investment efficiency. Claim 5 implies that, when client business risk is large $(1-\lambda \geq \frac{1}{2})$, for any audit quality q, the firm values auditor conservatism more than auditor aggressiveness because its investors' investment decision is more efficient. Conversely, when client business risk is small $(1-\lambda \leq \frac{1}{2})$, for any audit quality q, the firm values auditor conservatism more than auditor aggressiveness because its investors' investment decision is

more efficient.

While Claim 5(i) characterizes the firm's demand for auditor attestation, Claim 5(ii) speaks of the firm's demand for audit quality. Recall that the firm's expected payoff increases in its expected market price, which, in turn, increases in investment efficiency. The larger the audit quality q, the more efficient is the investors' investment decision. Therefore, investors value audit quality, inducing the firm's preference for audit quality.

Fees and Equilibrium Auditing

Having derived the supply of and the demand for auditing, we characterize the equilibrium auditor attestation and audit quality. Claims 1 and 2 describe the supply of auditor conservatism and audit quality, respectively, while Claim 5 describes the demand for auditor conservatism and audit quality. The client firm uses ϕ to induce its auditor to *supply* the auditor attestation and audit quality *demanded* by the client. We now show how the firm chooses its optimal auditor fees (step 4 in Figure 2). The firm's optimal fees decision simultaneously determines the equilibrium auditor attestation and audit quality (step 5 in Figure 2).

Proposition 1

(i) For a firm with high business risk (i.e., $1-\lambda \geq \frac{1}{2}$), there exists a unique pair of fees $\{\phi_C, F_C\}$ that satisfies

$$\begin{aligned} \phi_C &= \left(\frac{1-\lambda}{1-\lambda q_C}\right)^2 \mu^2 \quad st. \quad \frac{\phi_C}{L} \leq 1-\lambda \\ F_C &= c(q_C) - \lambda q_C \phi_C \\ \frac{dF_C}{d\phi_C} &< 0 \end{aligned} \tag{13}$$

such that in equilibrium, (a) the auditor adopts a conservative attestation and (b) the unique audit quality q_C is characterized by

$$\frac{\lambda(1-\lambda)^2}{(1-\lambda q_C)^2}\mu^2 = c'(q_C). \tag{14}$$

(ii) For a firm with low business risk (i.e., $1-\lambda \leq \frac{1}{2}$), there exists a unique pair of fees

$\{\phi_A, F_A\}$ *that satisfies*

$$\begin{aligned} \phi_A &= L - \left(\frac{\lambda}{1-(1-\lambda)q_A}\right)^2 \mu^2 \quad st. \quad \frac{\phi_A}{L} \geq 1-\lambda \\ F_A &= c(q_A) - \lambda q_A \phi_A - (1-q_A)[\phi_A - (1-\lambda)L] \\ \frac{dF_A}{d\phi_A} &< 0 \end{aligned} \tag{15}$$

such that in equilibrium, (a) the auditor adopts an aggressive attestation and (b) the unique audit quality q_A *is characterized by*

$$\frac{\lambda^2(1-\lambda)}{(1-(1-\lambda)q_A)^2}\mu^2 = c'(q_A). \tag{16}$$

Proposition 1 implies that, in equilibrium, a firm with a particular level of client business risk (captured by $1-\lambda$) chooses its optimal fees to induce a unique combination of auditor attestation and audit quality.

To see how such an equilibrium is achieved, consider a firm with high business risk (i.e., $1-\lambda \geq \frac{1}{2}$). To maximize its payoffs, such a firm would set its auditor fees to induce its auditor to supply a conservative attestation and an audit quality, q_C. To induce conservatism, such a firm sets the level of ϕ below $(1-\lambda)L$ (see Figure 4). The remaining task for the firm is to pinpoint a particular value of ϕ within the range of $\phi \leq (1-\lambda)L$ to induce a particular level of audit quality. However, the firm faces a tradeoff. On one hand, higher audit quality reduces the likelihood of misstatement in the accounting report (Remark 1(ii)), thereby enhancing investment efficiency and the expected market price. This beneficial effect is captured by the left-hand side of (14). On the other hand, higher audit quality entails higher audit cost that the client firm must cover with its auditor fees. This cost effect is captured by the right-hand side of (14). This tradeoff between investment efficiency and audit cost yields the unique level of audit quality q_C, which, in turn, pins down the level of the equilibrium nonaudit fee captured by (13). Overall, the firm's optimal fees simultaneously determine the equilibrium auditor attestation and audit quality.

A byproduct of Proposition 1 is that, in equilibrium, the audit fee and the nonaudit fee are negatively related, i.e., $\frac{dF_C}{d\phi_C} < 0$ and $\frac{dF_A}{d\phi_A} < 0$, and are therefore inherently linked. This linkage occurs because, for a lower nonaudit fee, the firm must raise the audit fee for the auditor to break even.

The following corollary demonstrates how the equilibrium audit quality and fees vary with (a) the client business risk, $1-\lambda$, and (b) the scale to the return to investment, μ.

Corollary 1

(i) $\frac{dq_C}{d\lambda} > 0$ *and* $\frac{dq_A}{d\lambda} < 0$*;* $\frac{dq_C}{d\mu} > 0$ *and* $\frac{dq_A}{d\mu} > 0$*;*
(ii) $\frac{d\phi_C}{d\lambda} < 0$, $\frac{dF_C}{d\lambda} > 0$, $\frac{d\phi_A}{d\lambda} > 0$, *and* $\frac{dF_A}{d\lambda} < 0$*;* $\frac{d\phi_C}{d\mu} > 0$, $\frac{dF_C}{d\mu} < 0$, $\frac{d\phi_A}{d\mu} < 0$, *and* $\frac{dF_A}{d\mu} > 0$.

The intuition for Corollary $1(i)$ is as follows. As client business risk $(1-\lambda)$ decreases, such that the client is more likely to have a favorable financial condition, the auditor's opportunity cost of losing such a client's business due to conservatism (a Type I error) increases, giving her more incentives to boost audit quality to decrease the likelihood of a Type I error ($\frac{dq_C}{d\lambda} > 0$). On the other hand, as client business risk $(1-\lambda)$ increases, such that the client is more likely to have an unfavorable financial condition, the auditor's risk of certifying such a client's report due to aggressiveness (a Type II error) increases, giving her more incentives to boost audit quality to decrease the likelihood of a Type II error ($\frac{dq_C}{d\lambda} < 0$). In addition, as the scale of the firm's return to investment (μ) increases, the costs of her Type I and Type II errors increase, so the auditor chooses a higher audit quality ($\frac{dq_C}{d\mu} > 0$ and $\frac{dq_A}{d\mu} > 0$).

As for Corollary $1(ii)$, when client business risk $(1-\lambda)$ decreases, the likelihood of a Type I error increases, so the client chooses a higher contingent fee to motivate the auditor to select a higher audit quality ($\frac{d\phi_C}{d\lambda} < 0$); to decrease the total expected fees to be paid, the client must therefore decrease the noncontingent audit fee ($\frac{dF_C}{d\lambda} > 0$). On the other hand, when client business risk $(1-\lambda)$ increases, the likelihood of a Type II error increases, so the client chooses a lower contingent fee to motivate the auditor to select a higher audit quality ($\frac{d\phi_A}{d\lambda} > 0$); to make the total expected fees acceptable for the auditor, the client must therefore decrease the noncontingent audit fee ($\frac{dF_A}{d\lambda} < 0$). In addition, when the scale of the return to investment (μ) increases, the costs of Type I and Type II errors increase. To induce the auditor to choose a higher audit quality, the client firm therefore chooses a larger contingent fee in the case of auditor conservatism and a lower contingent fee in the case of auditor aggressiveness ($\frac{d\phi_C}{d\mu} > 0$ and $\frac{d\phi_A}{d\mu} < 0$). Because the optimal noncontingent and contingent fees are inversely related, a larger scale of the return to investment results in a smaller noncontingent audit fee in the case of auditor conservatism and a larger noncontingent audit fee in the case of auditor aggressiveness ($\frac{dF_C}{d\mu} < 0$ and $\frac{dF_A}{d\mu} > 0$).

Referring back to Figure 2, we have investigated how the tension between auditor fees and auditor liability determines the supply of auditing and how the capital market interprets the audited accounting report in order to price the firm and to make its investment. We have further explored how the anticipation of the capital market's pricing rule generates the demand for auditing. In this subsection, we have completed the loop in Figure 2 by characterizing how the firm makes its auditor fee decision to implement its demand for auditing, which, along with the auditor's supply of auditing, determine the equilibrium auditor conservatism and audit quality.

IV. REGULATORY AND EMPIRICAL IMPLICATIONS

Our model offers some new perspective on the economic consequences of Section 201 of the Sarbanes-Oxley Act (SOX), which prohibits public companies from granting their auditors many nonaudit services. Section 201 proponents have claimed that, by using nonaudit services to exert pressure on their auditors, client firms may impair auditor independence and audit quality. Opponents have countered that restricting nonaudit services may be inefficient because it damages the synergy between audit and nonaudit services. We have deliberately assumed away any synergies between audit and nonaudit services and any direct benefits of nonaudit services to the client firm. We next show that, even without those benefits, restricting nonaudit services may still be detrimental.

Our analysis indicates that the regulatory concern about nonaudit services potentially damaging auditor independence and audit quality is partially valid. If we interpret a violation of auditor independence as the auditor biasing her opinion in favor of the client due to financial incentives, then auditor aggressiveness in our model is a violation of auditor independence. Specifically, if the nonaudit fee is high relative to the auditor's legal liability ($\frac{\phi}{L} \geq 1-\lambda$), the auditor adopts an aggressive attestation (see Figure 3), in which case a larger nonaudit fee induces lower audit quality (see Figure 4). Nonetheless, our analysis shows that regulators are focusing on only one piece of the puzzle: the *supply* of auditing. We demonstrate that it is the joint forces of *supply and demand* that determine the equilibrium auditor attestation and

audit quality. Specifically, we have shown that firms with high business risks induce auditor conservatism and, given auditor conservatism, a high level of nonaudit services increases audit quality!

If the equilibrium level of nonaudit fees is lower than that permitted by SOX, regulations would have no impact. It remains an empirical question whether or not SOX restrictions on nonaudit services and fees are binding. In the following discussion, we discuss two scenarios in which SOX restrictions are binding.

- Scenario 1: A firm with high business risk induces auditor conservatism (Claim 5). From Figure 4, given conservatism, a lower fee results in lower audit quality. Thus, restricting nonaudit services decreases audit quality, q_C, thereby increasing the extent of overinvestment by investors (see Remark 3).

- Scenario 2: a firm with low business risk induces auditor aggressiveness (Claim 5). According to Figure 4, given aggressiveness, a lower fee results in higher audit quality. Thus, restricting nonaudit services may increase audit quality, q_A, thereby reducing the extent of underinvestment (see Remark 3). However, if the restriction on nonaudit services is too severe, auditor aggressiveness may change to auditor conservatism, which would decrease the incidence of underinvestment and increase the incidence of overinvestment (see Remark 3).

These two scenarios illustrate that a one-size-fits-all requirement that restricts all public companies from granting their auditors many nonaudit services is generally suboptimal. The preceding analysis may also explain the inconclusive empirical evidence on the economic consequences of nonaudit services. For example, DeFond et al. (2002) find no association between the level of nonaudit fees and the auditor's propensity to issue a going concern opinion. Similarly, Ashbaugh et al. (2003) and Chung and Kallapur (2003) find no association between the level of nonaudit fees and accounting quality. However, Frankel et al. (2002) document a negative association between the nonaudit fee to total fee ratio and accounting quality. Kinney et al. (2004) find that the association between the level of nonaudit fees and extent of restatements depends on the type of nonaudit services. While they find no association for financial information systems or internal audit services, they find a positive association for unspecified nonaudit services and a negative association for tax services.

Our model might explain the inconclusive nature of the preceding empirical evidence. We predict that, given auditor conservatism, nonaudit fees and audit quality are positively related while, given auditor aggressiveness, nonaudit fees and audit quality are negatively related. Therefore, it is possible that the mixed empirical evidence on the economic consequences of nonaudit services is due to the use of pooled samples in empirical studies that combine firms with aggressive and conservative auditors. For example, for those studies that do not document any significant association, it is likely that the average firm in the sample is equally likely to have either a conservative auditor or an aggressive auditor. In order to increase the statistical power of those tests, our model suggests that the sample of firms be partitioned into two subsamples: a subsample of firms with conservative auditors, and one with aggressive auditors. In particular, these partitioned samples may be used to test the following implications of Section 201.

Corollary 2 *A mandatory (binding) restriction of the nonaudit fee, ϕ,*
(i) increases auditor conservatism,
(ii) decreases a conservative auditor's audit quality, q_C, and increases an aggressive auditor's audit quality, q_A,
(iii) increases the extent of overinvestment, $|k(y_B, C, q_C) - k^{FI}(y_B)|$, and decreases the extent of underinvestment, $|k(y_G, A, q_A) - k^{FI}(y_G)|$, and
(iv) increases the audit fee, F.

V. CONCLUSION

We have developed a theoretical framework to investigate both the determinants and the consequences of auditor conservatism. We have shown that auditor conservatism and audit quality are simultaneously determined and are therefore inherently linked. In particular, we have shown that the equilibrium auditor attestation and audit quality depend on the firm's business risk. Furthermore, the equilibrium auditor attestation and audit quality affect the firm's market price and, therefore, its investment efficiency. We thus demonstrate that auditing plays a dual role (a price role and an investment role) and that these two roles are

naturally intertwined. Our analysis also implies that a mandatory restriction of nonaudit services imposed by Section 201 of SOX may decrease audit quality and damage investment efficiency.

Our current model may be used as a springboard to investigate additional issues. For example, we have assumed that the firm and its auditor are symmetrically and imperfectly informed throughout the audit engagement. It is possible that the firm's insiders may have superior information relative to the auditor during the audit process. In such an information asymmetric setting, the disclosed audit/nonaudit fees could then reveal the firm's private information to outsiders. Studying such a setting may shed additional insights into the interactions among audit quality, auditor attestation, and investment efficiency.

Another limitation is that the model is static, such that the firm and its auditor only interact once. In practice, a client firm and its auditor interact over multiple periods. In a multiperiod model, the firm may sometimes propose a less favorable report in earlier periods to save for the future or may engage in reputation building by truthful reporting. Those incentives of the firm may affect auditor conservatism and investment efficiency, thereby altering the results derived in a static model. Investigating a multiperiod setting would enrich the current analysis and may provide further insights into the post-SOX world.

Overall, our analysis has illustrated the real effects of auditing. Both auditor conservatism and audit quality affect the information content of accounting reports. Accounting reports, in turn, affect investment decisions and therefore the firm's future cash flows. In that sense, auditing alters the very cash flows that it helps to predict.

APPENDIX: PROOFS

Proof of Remark 1

Refer to Figure 3. Remark 1(i) is due to the fact that conservatism may produce understatement in the audited accounting report (i.e., report y_B may be issued for a firm with financial condition G) and aggressiveness may produce overstatement in the audited accounting report (i.e., report y_G may be issued for a firm with financial condition B). Remark 1(ii) follows immediately from the probability of understatement ($\lambda(1-q)$) and the probability of

overstatement ($(1-\lambda)(1-q)$) (see Figure 3). Remark 1(iii) is just a restatement of Claim 1. ■

Proofs of Claim 2 and Remark 2

The first order condition of (1) with respect to q gives rise to $c'(q) = \lambda\phi$, which implies that $\frac{dq}{d(\frac{\phi}{L})} > 0$. The first order condition of (2) with respect to q gives rise to $c'(q) = (1-\lambda)(L-\phi)$, which implies that $\frac{dq}{d(\frac{\phi}{L})} < 0$. In the case of an indiscriminate attestation, as discussed in the text, the auditor's expected payoff is $\phi - (1-\lambda)L - c(q)$, which implies that $q = 0$. ■

Proof of Claim 4

Recall that by the assumption of a competitive capital market, the price of the firm equals the investors' expected return on investment plus their expected damage award due to any overstatement in the accounting report.

Substituting the investors' optimal investment policy, (5), into the investors' objective function, $p2\mu\sqrt{k} - k$, yields

$$p^2\mu^2, \tag{17}$$

which is the investors' expected return on investment. Recall that p is the investors' perceived probability of financial condition G, that is, $p = \Pr(G|\text{investors' information set})$.

By (6), $p(y_G, C, q) = 1$. Substituting it into (17) yields the market price, $M(y_G, C, q) = \mu^2$. Similarly, by (6), $p(y_B, C, q) = \frac{\lambda(1-q)}{1-\lambda q}$. Substituting it into (17) yields the market price, $M(y_B, C, q) = \left[\frac{\lambda(1-q)}{1-\lambda q}\right]^2 \mu^2$.

By (6), $p(y_G, A, q) = \frac{\lambda}{1-(1-\lambda)q}$. Substituting it into (17) yields the market's expected return on investment, $\left[\frac{\lambda}{1-(1-\lambda)q}\right]^2 \mu^2$. Furthermore, if an overstatement is exposed subsequently, the investors will receive a legal liability payment, L, from the auditor. Thus, the market price given a favorable report resulting from auditor aggressiveness is given by

$$M(y_G, A, q) = \underbrace{\left[\frac{\lambda}{1-(1-\lambda)q}\right]^2 \mu^2}_{\substack{\text{expected return on} \\ \text{investment}}} + \underbrace{\frac{(1-\lambda)(1-q)}{1-(1-\lambda)q}}_{\substack{\text{probability of} \\ \text{overstatement}}} \underbrace{L}_{\substack{\text{damage} \\ \text{award}}}.$$

On the other hand, by (6), $p(y_B, A, q) = 0$. Substituting it into (17) yields the market price, $M(y_B, A, q) = 0$.

By (6), $p(y_G, IND, q) = \lambda$. Substituting it into (17) yields the market's expected return on investment, $\lambda^2\mu^2$. Furthermore, if an overstatement is exposed subsequently, the investors will receive a legal liability payment, L, from the auditor. Thus, the market price given a favorable report resulting from an indiscriminate attestation is $M(y_G, IND, q) = \lambda^2\mu^2 + (1 - \lambda)L$. ■

Proof of Claim 5

Proof of part (i): We rewrite the firm's expected payoffs expressed in (11) and (12), taking advantage of the assumption of a competitive audit market.

First, we study the case of auditor conservatism. Given the assumption of a competitive audit market, the auditor's expected payoff prior to the beginning of her engagement equals her reservation utility, which is normalized to 0. This implies that the auditor's expected payoff expressed in (1) plus her noncontingent fee, F, equals 0:

$$F + \lambda q\phi - c(q) = 0. \tag{18}$$

Thus, using (18), U_C in (11) can be rewritten as

$$U_C = \frac{\lambda(\lambda + q - 2\lambda q)}{1 - \lambda q}\mu^2 - c(q). \tag{19}$$

Next, we switch to the case of auditor aggressiveness. Given the assumption of a competitive audit market, the auditor's expected payoff prior to the beginning of her engagement, the auditor's expected payoff expressed in (2) plus her noncontingent fee, F, equals 0:

$$F + \lambda q\phi + (1 - q)[\phi - (1 - \lambda)L] - c(q) = 0. \tag{20}$$

Thus, using (20), U_A in (12) can be rewritten as

$$U_A = \frac{\lambda^2}{1 - (1 - \lambda)q}\mu^2 - c(q). \tag{21}$$

Finally, it follows that for any given q, $U_C \geq U_A$ if and only if $\lambda \leq \frac{1}{2}$. That is, when $\lambda \leq \frac{1}{2}$, for any given q, $U_C \geq U_A$, which implies that the maximal value of U_C is greater than the maximal value of U_A so that the client firm can and will choose auditor fees to induce auditor conservatism and maximize U_C. Conversely, when $\lambda \geq \frac{1}{2}$, for any given q, $U_C \leq U_A$, which implies that the maximal value of U_A is greater than the maximal value of U_C so that

the client firm can and will choose auditor fees to induce auditor aggressiveness and maximize U_A. We show how the client firm sets its optimal auditor fees in Proposition 1.

Proof of part (ii): Taking the derivatives of the firm's expected payoffs expressed in (11) and (12) with respect to q yields the desired results. ■

Proof of Proposition 1

(i) Taking the derivative of the client firm's expected payoff given auditor conservatism, (19), with respect to q yields (14), which characterizes q_C. Because both sides of (14) are convex in q and the left-hand side of (14) is greater than the right-hand side at $q = 0$ and the right-hand side of (14) is greater than the left-hand side at $q = 1$, so both sides of (14) intersect only once, which means that q_C is unique.

Equating (3) and (14) yields $\phi = \left(\frac{1-\lambda}{1-\lambda q_C}\right)^2 \mu^2$. From Figure 3, $\frac{\phi_C}{L} \leq 1-\lambda$ is necessary to induce auditor conservatism. Using (18), we obtain $F_C = c(q_C) - \lambda q_C \phi_C$. By the envelope theorem, we have $\frac{dF_C}{d\phi_C} = -\lambda q_C < 0$.

(ii) Taking the derivative of the client firm's expected payoff given auditor aggressiveness, (21), with respect to q yields (16), which characterizes q_A. The proof of the uniqueness of q_A is similar to the proof of the uniqueness of q_C above.

Equating (4) and (16) yields $\phi_A = L - \left(\frac{\lambda}{1-(1-\lambda)q_A}\right)^2 \mu^2$. From Figure 3, $\frac{\phi_C}{L} \geq 1-\lambda$ is necessary to induce auditor aggressiveness. Using (20), we obtain $F_A = c(q_A) - \lambda q_A \phi_A - (1 - q_A)[\phi_A - (1-\lambda)L]$. By the envelope theorem, we have $\frac{dF_A}{d\phi_A} = -\lambda q_A - (1 - q_A) < 0$. ■

Proof of Corollary 1

Taking the derivatives of (14), (16), (13), and (15) with respect to λ and μ, respectively, yields the desired results. ■

Proof of Corollary 2

Parts (i) and (ii) of the corollary follow immediately from Figures 3 and 4.

Recall that Claim 3(i) states that overinvestment may occur in the case of auditor conservatism and underinvestment may occur in the case of auditor aggressiveness. Therefore, part (i) implies part (iii). Furthermore, part (ii) and Claim 3(ii) imply part (iii). In brief, part (iii) follows from (i) and/or (ii). Part (iv) follows trivially from the inverse relation between F and ϕ stated in Proposition 1. ■

REFERENCES

Antle, R., and B. Nalebuff. 1991. Conservatism and auditor-client negotiations. *Journal of Accounting Research* 29 (Supplement): 31–54.

Arens, A. A., R. J. Elder, and M. S. Beasley. 2006. *Auditing and Assurance Services: An Integrated Approach.* 11th edition. Upper Saddle River, NJ: Pearson Prentice Hall.

Ashbaugh, H., R. Lafond, and B. W. Mayhew. 2003. Do non-audit services compromise auditor independence? Further evidence. *The Accounting Review* 78: 611-639.

Cahan, S. F., and W. Zhang. 2006. After Enron: Auditor conservatism and ex-Andersen clients. *The Accounting Review* 81 (January): 49–82.

Chung, H., and S. Kallapur. 2003. Client importance, non-audit services and abnormal accruals. *The Accounting Review* 78: 931—955.

DeFond, M. L., K. Raghunandan, and K. R. Subramanyam. 2002. Do non-audit service fees impair auditor independence? Evidence from going-concern audit opinion. *Journal of Accounting Research* 40: 1247–1274.

Dye, R. A. 1993. Auditing standards, legal liability, and auditor wealth. *Journal of Political Economy* 101 (October): 887–914.

Frankel, R. M., M. F. Johnson, and K. K. Nelson. 2002. The relation between auditors' fees for nonaudit services and earnings management. *The Accounting Review* 77: 71–105.

Gigler, F. B., and T. Hemmer. 2001. Conservatism, optimal disclosure policy, and the timeliness of financial reports. *The Accounting Review* 76 (October): 471–493.

Hillegeist, S. A. 1999. Financial reporting and auditing under alternative damage apportionment rules. *The Accounting Review* 74 (July): 347–369.

Khan, M., and R. L. Watts. 2007. Estimation and validation of a firm-year measure of conservatism. Working paper, Massachusetts Institute of Technology.

Kinney, W. R., Z. V. Palmrose, and S. W. Scholz. 2004. Auditor independence, non-audit services, and restatements: Was the U.S. government right? *Journal of Accounting Research* 42: 561–588.

Kornish, L. J., and C. B. Levine. 2004. Discipline with common agency: The case of audit and nonaudit services. *The Accounting Review* 79 (January): 173–200.

Laux, V., and P. Newman. 2007. Auditor liabilities and client acceptance decisions. Working paper, University of Texas at Austin.

Levine, C. B. 1996. Contracts and conservatism: The case of accounting for stock-based compensation. Ph.D. dissertation, Carnegie Mellon University.

Li, H. 2001. A Theory of Conservatism. *Journal of Political Economy* 109: 617–636.

Lobo, G. J., and J. Zhou. 2006. Did conservatism in financial reporting increase after the Sarbanes-Oxley Act? Initial evidence. *Accounting Horizons* 20 (March): 57–73.

Patterson, E. R., and R. Smith. 2003. Materiality uncertainty and earnings misstatement. *The Accounting Review* 78 (July): 819–846.

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

Shibano, T. 2000. Overguarding the guardians: Increasing auditor liability decreases new investments. Working paper, Columbia University.