Conservatism and Auditor-Client Negotiations

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1. The Auditor's Curse

This paper examines an auditor's incentives to take actions that lead to objective financial statements. Our results challenge the common perception that auditors are conservative. Under Generally Accepted Auditing Standards, the literal claim is that financial statements are the representations of management. Our view of the auditing process, however, focuses on its negotiated character. Financial statements should be read as a *joint* statement from the auditor and manager. The statement becomes a joint venture if the auditor is unwilling to provide an unqualified opinion on management's stated representations. At that point, the auditor and client begin negotiations in which the auditor may offer a revised statement. The client may threaten to dismiss him and find one more accepting of its views. Or they may decide to extend the audit to obtain more facts. In the end, compromises are usually found, statements are revised, and the auditor issues an unqualified opinion on the revised statements.[1]

[1] While there are many studies of auditor changes (e.g., Burton and Roberts [1967], Chow and Rice [1982], Danos and Eichenseher [1982], Schwartz and Menon [1985], Eichenseher and Shields [1983], Healy and Lys [1986], Smith [1986], and Simon and Francis [1988]), we do not know of studies focusing on the frequency of auditor–client conflict and the range of resolutions. Some evidence of auditor–client negotiation is found in studies of account errors, which encounter both proposed and actual adjustments; see, e.g., Kreutzfeldt and Wallace [1986] and Wright and Ashton [1989].

Perhaps the character of the auditor–client negotiations leads to the perception that auditors are conservative. Conservatism conjures up many images. In the accounting profession, it is often captured by the phrase "anticipate no profits but anticipate all losses."[2] Thus a common complaint against conservatism is that current overstatement of expenses leads to future understatement.[3]

Intuition suggests a good reason for auditors to take a conservative stance in negotiations with clients. If the client has better knowledge of the state of financial affairs than does the auditor, the client can take advantage of an auditor's mistakes. Clients who seek larger current income reports will protest any understatements and work to correct these "mistakes" in extended audit procedures, while remaining silent about overstatements. The only auditor mistakes left uncorrected are those which result in overstatement of income. Rational conservatism is the protection against this "auditor's curse."

There is a familiar parallel with the unfavorable reputation of cashiers for returning change to a customer. While some cashiers are dishonest, bias is also a rational response for honest cashiers. Most customers are quick to point out they have been given too little change; fewer will report that they have been given excess change. Even an honest cashier does better erring on the side of short-changing customers in order to maintain a check on his balances.

This intuition suggests the auditor's initial offer in an auditor–client negotiation may appear conservative. But the users of financial reports see only the *final negotiated* outcome, where it is less clear whether conservatism reigns. Specifically, if the auditor errs on the side of caution, while the management corrects the most glaring understatements, is the final negotiated result biased upward or downward?[4] We demonstrate that when auditing contracts are designed to maximize joint auditor–client surplus, the expected ex post

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[2] For many years this concept of conservatism was given prominent status in best-selling accounting textbooks (see, e.g., Welsch, Zlatkovich, and White [1972, p. 22]). Although less emphasized today, accounting practices such as "the lower of cost or market rule" indicate conservatism still may be found (see the FASB's *Statement of Concepts No. 2*, paragraphs 91–97). Clients faced with limited increases in income but unlimited increases in losses due to changing inventory prices may believe that their accountants are unduly conservative. These beliefs are likely to be far deeper when a disagreement arises over the presentation of an item not strictly covered by existing accounting conventions.

[3] For example, Paton and Paton [1952, p. 84] state, "Is there anything essentially conservative . . . in a scheme of valuation that merely shifts income among periods?" The use of the word "merely" is odd, since all accrual accounting procedures "merely" shift income from one period into the next. Given the crucial nature of timing of income recognition, it is reasonable to interpret conservatism as delaying income recognition. See Antle and Demski [1989] for a discussion of timing issues in revenue recognition.

[4] Smaller errors are left unchallenged when they are more costly to correct than they are worth.

bias is always upward. Thus, an auditor's initial conservative stance does not necessarily lead to a conservative final report.

Section 2 presents a brief review of earlier work on conservatism. In section 3, we describe the game, the players' incentives, and the intuition for our results. Section 4 introduces the formal model. Section 5 presents the optimal strategy for the auditor and related comparative static results. Section 6 uses these results to discuss conservatism, given an efficient cost-sharing contract between auditor and client surplus, and materiality. Section 7 is our conclusion. Appendix A presents a generalization of the model. Appendix B offers more detail on the derivation of a specific equation.

2. The Road to Conservatism

Two different explanations for conservatism are offered in Devine [1963] and Antle and Lambert [1988]. To Devine, conservatism means prompt revelation of unfavorable circumstances and reluctant revelation of favorable circumstances. Devine's reasons for conservatism, translated into current terms, are as follows.

- The users of financial reports have an asymmetric loss function, with losses counting more heavily than gains.
- There is a natural bias in the users' information processing. They can more easily correct a mistaken negative claim than confirm the accuracy of a positive one.
- The management has a natural positive bias and presents the auditor with too rosy a picture.

Even if the first argument is correct, it does not provide a motivation for auditors' conservatism. The users of the financial reports should seek an unbiased report whatever their preferences. If they want a biased report, they can add any bias they want.

Devine's second reason focuses on a potential asymmetry in the ability of those who read the report to verify its contents. There is a parallel asymmetry for the firm. The firm may have an equal ability to correct a mistaken negative claim and to correct a mistaken positive claim, but its incentives to do so are not equal. Devine's third argument is a step in that direction. If auditors recognize management's incentive to accentuate the positive, they can be content to focus their search for hidden negatives, because the positives are unlikely to be hidden.[5] While this approach helps us understand the

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[5] Our primary focus is on the case where management desires a higher income report. If management wishes to report low profits (e.g., when they fear an excess profits tax or want to affect an MBO; see DeAngelo [1986]), we find that even when the auditor's initial estimate of the firm's financial position is generous, the expected negotiated agreement will be conservative. This reversal of client preferences is discussed further at the end of section 6.1.

search strategy, it does not say how the auditor should translate his findings into the financial report. This paper focuses on that last stage: what to do given the facts on the table.

Antle and Lambert [1988] show how a principal–agent problem between client and auditor can induce a preference for conservative practices. When an auditor's effort is unobservable, efficient incentives involve tying compensation to the accuracy of his report. Efficient incentives more heavily penalize errors involving a priori likely events than a priori unlikely events. The auditor's incentive schedule is asymmetric and, depending on the prior distribution, may provide the auditor with an incentive to be conservative. The Antle and Lambert model, however, contains only an accountant and an owner; since ownership and management are the same, there is no incentive for the client to inflate the profit figures. An ideal model would examine the incentive issues for both auditor and client. The owner-manager-auditor models of Antle [1982] and Baiman, Evans, and Noel [1987] contain some of the necessary ingredients, but their mechanism orientation precludes interest in the richer auditor–manager interaction.

Our present model reflects a trade-off. We leave aside the incentive problem of motivating auditor effort in order to focus on the conflict between auditor and client. Conflict of interest is necessary for an outside auditor to have any value. If the auditor shared the client's preferences, the auditor would always accommodate the client's wishes and auditing would be useless. Taken to the extreme, such an auditor might have an incentive to report arbitrarily large incomes. Although these inflated figures would not be credible, nothing the auditor reports adds credibility to the financial statements. At the other extreme, a client who shared the auditor's objective would have the incentive to reveal its information as accurately as possible and there would be no need for an outside auditor. The fact that an auditor and client have different objectives is what gives the report both credibility and value-added.[6] We focus on the negotiated resolution of this conflict.

3. Negotiations Between Auditors and Clients

We study client–auditor bargaining over financial statements in the context of a highly stylized negotiation game. In these negotiations, the client prefers higher reported income to lower reported income. The auditor wants to present the facts as correctly as possible. We assume that the auditor has a symmetric loss function over

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[6] A conflict of interests raises the issue of independence. Might the auditor and client try to remove the conflict by recontracting? (See Antle [1984].) The focus on recontracting must be to remove inefficiencies while preserving the positive tension provided by the presence of differing objectives.

estimation errors. This assumption is intentionally unrealistic. Suppose the auditor acts as an agent for investors. If, as Devine has argued, investors have an asymmetric ability to process information, the auditor should be more concerned with verifying positive claims than with confirming negative ones. Moreover, the auditor is most likely to be sued in the event of an unanticipated bankruptcy. Here, too, understating profits is less danagerous than making an overstatement. In practice, we expect that most auditors have an asymmetric loss function. By imposing a symmetric loss function, we isolate the effects of negotiation from the asymmetry of the loss function.

Our focus is on the bias caused by the client's superior knowledge of its income. The client accepts errors in its favor and protests those that fall against it. This asymmetry of the client's behavior affects the auditor's attempt to reach an unbiased conclusion. Intuition suggests that the auditor will begin negotiations with a conservative stance.

The negotiations are based on the information produced in a regular audit. The auditor examines the firm's financials and seeks evidence to verify or disprove management representations (see Robertson [1990]). The traditional view is that the auditor is then either willing or unwilling to issue an unqualified opinion about the management's representations. But if the auditor is unwilling to issue an unqualified opinion, he will explain his reasons and offer an unqualified opinion if the management's representations are suitably adjusted. In response, the firm can either accept the proposed revisions, agree to disagree (and report a qualified opinion), hire a new auditor, or demand that the auditor begin an extended audit in order to correct its faulty initial impressions.[7]

We simplify these negotiations to a two-step game. The auditor uses the information from the regular audit (including the representations provided by the client) to calculate an unbiased estimate of the firm's income. The auditor then presents the firm with a financial statement for which he is willing to give an unqualified opinion. The client can either accept or reject.[8] If the client accepts, the report is issued, and the auditor runs the risk of incurring losses due to

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[7] Dismissing the auditor is an extreme form of rejecting the offer. Since replacing the auditor is a public statement, a new auditor is likely to demand an extended audit before signing on. Any time an accounting firm is unwilling to issue an unqualified opinion, it risks being dismissed. In our model, all auditors are identical, and so there is no point in dismissing an auditor. More generally, a firm can go fishing for a second opinion. The auditor's conservatism is tempered both by the possibility of paying for part of the extended audit and by the risk of being dismissed. From the firm's side, it must worry about its ability to attract another auditor and how the market will react to the dismissal. See Dye [1991] and Teoh [1991] for discussions of these issues.

[8] In a richer model, we would allow the client the option to present its representations with a *qualified* auditor's opinion.

inaccuracies. If the client rejects, audit procedures are extended. As a result of this costly additional audit, a more accurate estimate of income is discovered and reported.[9] The auditor and client are in essence negotiating the trade-off between inaccuracies and auditing costs. More accurate auditing is possible but only at a higher cost. The degree of conservatism depends on the costs of extending audit procedures and, more important, who bears them.[10]

We are interested in evaluating conservatism in the final statement *conditional* on the client's acceptance of the auditor's offer. Here, the bias is less clear. The final statement will be "generous" (i.e., it will overstate income) when the client takes advantage of an auditor's error. It will be conservative when a client accepts a low number in order to avoid the time and costs associated with extending the audit. In particular, the reading of the report will vary based on whether the estimate comes from an auditor's offer that was accepted or one that was rejected.

Three auditor strategies arise: Tough, Business as Usual, and Accommodating.

- A *Tough* auditor offers an impossibly low income to the client and always forces extended audit procedures.
- A *Business as Usual* auditor adjusts the worst case income upward by an amount that depends on a comparison of the cost of extending the audit to the cost of making a mistake.
- An *Accommodating* auditor offers an income high enough to ensure the client always accepts, avoiding any costs of extending audit procedures.

A tough offer is always conservative. The auditor deliberately understates the firm's financial position in order to force an extended audit. A business as usual offer may or may not be conservative. An accommodating offer is never conservative and will sometimes be generous. Whether the auditor's offer is tough, business as usual, or accommodating and the consequences of each are discussed in section 5.

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[9] One application of the model is to view the auditor as the Internal Revenue Service (IRS). Although the government benefits from overstatements and loses from understatements, the IRS is given a mandate to perform an unbiased audit. If the IRS disputes any of the firm's representations, the IRS traditionally makes a settlement offer before going to tax court. Tax court is the equivalent of an extended audit. Of course, in tax negotiations, the firm is interested in lower reported profits. This change in incentives reverses our results. See the discussion following Proposition 3 in section 6.2.

[10] Although the auditing firm may bill the client for its work during the extended audit, that does not mean the client will pay these bills. A rational auditor predicts that it will have to pay some fraction of the extended audit costs.

We want to emphasize that there is more to the problem than simply the auditor's offer and the client's accept–reject decision. The agreement determining how the costs of extending the audit are shared is itself the outcome of negotiation. This is the focus of section 6.

If conservatism is a problem, it might seem that when the auditor and client can agree to a cost-sharing arrangement, they would want to do so in a way to raise the auditor's offer to the client. A higher offer leads to a first-order benefit to the client. To the auditor, there is no first-order loss when his original estimate is optimally chosen. The question is then how to motivate the auditor to raise his offer. One way to accomplish this is to make the auditor pay a larger share of the costs of extending the audit.[11] However, this change in cost sharing makes the firm more willing to reject the auditor's offer. Thus optimal cost sharing requires trading off the benefits to the client from a higher reported income against the cost to the auditor from the client's increased willingness to demand an extended audit.

No matter how the contract is structured, one side will take advantage of the other. When the client pays for the extended audit, the auditor is too conservative. When the auditor pays, the client demands too many extensions. In the cost-sharing contract that maximizes joint auditor–client surplus, an accepted offer is never conservative. Furthermore, the auditor never uses the tough strategy. We now turn to the formal model.

4. A Model of Client–Auditor Negotiation of Financial Statements

This section adapts the pretrial negotiation model of Nalebuff [1987] to study negotiations between auditor and client. Two parties, a client and an auditor, must agree on a number, $\hat{\pi}$, to report as the firm's preaudit income on the financial statement.[12] We make the stylization that prior to the audit, the client believes its income is π.[13] The client retains the auditor for a fee of k, for which the auditor performs a regular audit. The regular audit provides the auditor with a noisy estimate of π; the auditor learns that π is uniformly

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[11] This could be offset by higher fees for the regular audit.

[12] The financial statement contains much more than just a bottom line. Negotiations may evolve over both the total and its breakdown. It is also important to consider how this information is used by external parties.

[13] Careful interpretation should be given to π and $\hat{\pi}$. The client's expectation should be interpreted as the income resulting from correct application of generally accepted accounting principles, and not as some true economic income. See Beaver and Demski [1979] for some of the problems with the concept of accounting measurement as true economic income.

distributed on the interval, $[\bar{\pi} - r, \bar{\pi} + r]$. Hence, $\bar{\pi}$ is an unbiased estimate for π, while r represents the scope for error.[14]

With this information, the auditor offers to report an estimated income $\hat{\pi}$.[15] The client either accepts, in which case $\hat{\pi}$ is reported, or rejects, in which case costs of A are paid to extend audit procedures. The cost of extending audit procedures is split according to a prearranged formula; the client pays fraction λ and the auditor pays fraction $(1 - \lambda)$.[16]

In the event of an extended audit, the auditor discovers more accurate information about the client's income. Appendix A presents the mathematics for the case when the extended audit yields a second noisy signal about the client's income. In the text, we suppose that the extended audit leaves the client and the auditor equally well informed about the firm's earnings. In particular, the auditor learns the client's expected income figure, π, so there is no longer an asymmetric information problem.

The accuracy of a financial statement is discovered over time. We assume that the public perceives the firm's "true" earnings as $\pi^* = \pi + \epsilon$, where ϵ is normally distributed with mean 0 and variance σ^2. The ϵ reflects revisions to the stated earnings that the auditor and client would make with the benefit of hindsight. (It may also include misperceptions of the public when performing an ex post evaluation, such as a restatement of inventory or accounts receivable.)

The payoffs to auditor and client depend on reported income ($\hat{\pi}$), estimated income (π), "true" realized income (π^*), and extended auditing costs (A). We model the client's utility function as:

$$U_{Client} = \begin{cases} \hat{\pi} + \alpha(\pi^* - \hat{\pi}) - k, & \text{if } \hat{\pi} \text{ is accepted;} \\ \pi + \alpha(\pi^* - \pi) - k - \lambda A, & \text{if } \hat{\pi} \text{ is rejected,} \end{cases} \quad (1)$$

where $\alpha \in [0, 1]$ reflects the client's value of unreported profits (or losses). This objective function gives the client preferences for both higher true income and higher reported income while allowing the two to be valued differently. Since audit costs affect true income and reported income equally, they are subtracted directly from utility.

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[14] It is unrealistic that the auditor would perform the same type of audit for a firm in healthy financial condition and for a firm near bankruptcy. This suggests that both r and k should be functions of $\bar{\pi}$.

[15] This offer could be thought of as the net result of the auditor's proposed entry adjustments. The effects of any client reports to the auditor are assumed to be impounded in the auditor's belief that π is uniformly distributed on $[\bar{\pi} - r, \bar{\pi} + r]$. We begin with the auditor's offer for technical ease. Because the auditor is less informed than the client at the point the offer is made, the client takes the offer at face value; the client does not learn any information from the initial offer.

[16] The optimal choice of λ is discussed in section 6.

The value of α will be related to the manager's compensation contract. At $\alpha = 0$, the client cares only about reported income. At $\alpha = 1$, the client cares only about the true performance (which will eventually come out). The intermediate cases of $0 < \alpha < 1$ correspond to compensation schemes based partly on short-term performance (reported income) and partly on long-term performance (actual income). Reported income may be the only indicator of short-run performance. To the extent that reported income misrepresents present performance, these mistakes will be corrected in the long-term when π^* is realized. The manager's incentives to distort income, even at the expense of true performance, will depend on this compensation contract.[17]

The client is risk neutral, so the variability of true earnings around expected earnings does not enter the expected utility.

$$Expected\ U_{Client} = \begin{cases} \hat{\pi} + \alpha(\pi - \hat{\pi}) - k, & \text{if } \hat{\pi} \text{ is accepted;} \\ \pi - k - \lambda A, & \text{if } \hat{\pi} \text{ is rejected.} \end{cases} \tag{1'}$$

It is straightforward to deduce the client's reaction to an offer by the auditor. The client will reject the offer $\hat{\pi}$ if:

$$\hat{\pi} + \alpha(\pi - \hat{\pi}) \le \pi - \lambda A. \tag{2}$$

Otherwise, the client accepts. The condition for rejection reduces to:

$$\pi \ge \hat{\pi} + y, \qquad \text{where } y \equiv \frac{\lambda A}{1 - \alpha}. \tag{3}$$

The client's accept–reject decision depends on the shortfall of $\hat{\pi}$ compared to π. The client is willing to accept any shortfall less than y.[18] Because extended audits are costly to the client, the estimated income can understate the true income by an amount up to y, and even though the client knows this, he will accept the auditor's offer.

We now turn to consider the auditor's objective function. The auditor receives fee, k, minus his share of the extended audit costs, minus a penalty for errors in the reported income. Even when the auditor knows π and reports this unbiased estimate of income, the public can evaluate the auditor's accuracy only by checking the ex post accuracy of $\hat{\pi}$. The loss to the auditor then depends on the difference between $\hat{\pi}$ and π^*. We assume a quadratic penalty for expected estimation errors; its symmetry does not by itself induce a

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[17] The auditor takes into account the client's compensation scheme during the negotiations. Interpretation of a financial statement requires the user to know α.

[18] Calculating the client's rejection rule is significantly more complicated when the extended audit does not provide perfect information about π. The reason is that the client's rejection rule affects the auditor's interpretation of his signal from the extended audit; see Appendix A.

bias in reporting, and it has the realistic property that small errors are relatively costless while large errors are not. The parameter c_a is then used to place a dollar value on the quadratic loss due to expected accounting mistakes. Note that the penalty for expected estimation error is not a transfer payment. Rather, it is a deadweight loss as might arise if the firm's reputation were diminished.

The auditor's expected loss due to reporting error is $c_a E[\hat{\pi} - \pi^*]^2$. It helps to break this into two components. If reported income is different from the firm's expected income ($\hat{\pi} \neq \pi$), then the report is biased and the loss is quadratic in the bias. Additionally, there is a loss due to difference between expected income, π, and realized income, π^*, because even the firm's information is imperfect at the time of the audit. Mathematically, the two terms are additively separable:

$$c_a E[\hat{\pi} - \pi^*]^2 = c_a E[(\hat{\pi} - \pi) + (\pi - \pi^*)]^2$$
$$= c_a E[(\hat{\pi} - \pi) + \epsilon]^2$$
$$= c_a E[\hat{\pi} - \pi]^2 + c_a \sigma^2,$$

as $\pi^* = \pi + \epsilon$, π and ϵ are independent, $E[\epsilon] = 0$, $E[\pi^*] = \pi$, and $E(\epsilon^2) = \sigma^2$.

Let $F(\cdot)$ and $f(\cdot)$ represent the cumulative distribution function and density, respectively, of the uniform distribution on $[\bar{\pi} - r, \bar{\pi} + r]$. When the auditor offers $\hat{\pi}$, the client rejects if $\hat{\pi} + y < \pi$. This happens with probability $[1 - F(\hat{\pi} + y)]$, and when it does, the costs of extending audit procedures are incurred. In this event, extended procedures reveal π and the auditor bears only the loss due to difference between expected income, π, and realized income, π^*. If π is between $\bar{\pi} - r$ and $\hat{\pi} + y$, the client accepts the auditor's offer and costs of extending procedures are avoided. In this case, the auditor has an expected loss due to bias in addition to the uncertainty.

The auditor's expected utility function is:

$$EU_{Auditor} = k - (1 - \lambda) A[1 - F(\hat{\pi} + y)]$$
$$- c_a \int_{\bar{\pi} - r}^{\hat{\pi} + y} (\pi - \hat{\pi})^2 f(\pi) d\pi - c_a \sigma^2. \qquad (4)$$

5. Optimal Strategies for the Auditor

There are three auditing strategies to consider.

1. Tough: $\hat{\pi} + y = \bar{\pi} - r$.
2. Business as Usual: $\hat{\pi} + y \in (\bar{\pi} - r, \bar{\pi} + r)$.
3. Accommodating: $\hat{\pi} + y \geq \bar{\pi} + r$.

Intuitively, tough and accommodating are corner strategies, while business as usual is an interior solution. We discuss these three strategies in turn.

5.1 TOUGH

A tough auditor refuses to give the client an unqualified statement without going through an extended audit procedure. Although the decision to extend the audit is made by the client in our model, the auditor can choose $\hat{\pi}$ so that the client always rejects the offer. To do this, the auditor reports an income he knows to be *impossibly* low, $\hat{\pi} = \bar{\pi} - r - y$. Since this is below the reservation acceptance level of even the lowest-profit firm, all clients will demand an extended audit. The auditor's expected utility with the tough strategy is:

$$EU_A^{Tough} = k - (1 - \lambda)A - c_a\sigma^2. \tag{5}$$

Since the audit is always extended, there is no loss due to estimation error. We note immediately that tough play is optimal for the auditor when $\lambda = 1$ or $A = 0$: reporting π leads to the auditor's maximum possible payoff.

5.2 BUSINESS AS USUAL

Under business as usual, a client with sufficiently high income will reject $\hat{\pi}$ and demand extended procedures while a client with sufficiently low income will accept.

PROPOSITION 1. When business as usual is the maximizing strategy, the auditor offers:

$$\hat{\pi} = \bar{\pi} - r + x, \quad \text{where} \quad x \equiv \sqrt{\frac{(1 - \lambda)A}{c_a}}.$$

Proof. The first-order condition for maximizing expected utility with respect to $\hat{\pi}$ is:

$$\frac{dEU_A}{d\hat{\pi}} = (1 - \lambda)Af(\hat{\pi} + y) - c_a y^2 f(\hat{\pi} + y)$$

$$+ c_a\int_{\bar{\pi}-r}^{\hat{\pi}+y} 2(\pi - \hat{\pi})f(\pi)d\pi = 0. \tag{6}$$

Since $f(\cdot)$ is the uniform density, $f(\hat{\pi} + y) = f(\pi) = 1/2r$. We can factor out $c_a f$ and equation (6) becomes:

$$\frac{(1 - \lambda)A}{c_a} - y^2 + \int_{\bar{\pi}-r}^{\hat{\pi}+y} 2(\pi - \hat{\pi})d\pi = 0. \tag{7}$$

Substituting $x = \sqrt{\dfrac{(1 - \lambda)A}{c_a}}$, the first-order condition can be

rewritten:

$$x^2 - y^2 + \left(\pi - \hat{\pi}\right)^2 \Big|_{\overline{\pi} - r}^{\hat{\pi} + y} = 0, \tag{8}$$

which simplifies to $x^2 - (\overline{\pi} - r - \hat{\pi})^2 = 0$. There are two candidates for a local maximum: $\hat{\pi} = \overline{\pi} - r - x$ and $\hat{\pi} = \overline{\pi} - r + x$. Since our calculation of the integral presumes $\hat{\pi} + y \in (\overline{\pi} - r, \overline{\pi} + r)$, the candidate $\hat{\pi} = \overline{\pi} - r + x$ is a solution only when $x + y < 2r$, while the candidate $\hat{\pi} = \overline{\pi} - r - x$ is a solution only when $x < y$.

The second-order condition is $2(\overline{\pi} - r - \hat{\pi}) \leq 0$. Hence whenever $\hat{\pi} = \overline{\pi} - r + x$ is a solution to the first-order condition, it is a local maximum, while whenever $\hat{\pi} = \overline{\pi} - r - x$ is a solution, it is a local minimum.

Thus we have shown that for the parameter values $x + y < 2r$, $\hat{\pi} = \overline{\pi} - r + x$ is a local optimum and falls in the domain of business as usual. What remains is to check whether $\hat{\pi} = \overline{\pi} - r + x$ dominates the options outside the domain of business as usual. These conditions are found in the comparison across regimes in section 5.4. When business as usual maximizes the auditor's utility, the local optimum is the global optimum and the auditor reports $\hat{\pi} = \overline{\pi} - r + x$.   *Q.E.D.*

With this strategy, the auditor starts at the bottom, $\overline{\pi} - r$, and adjusts his estimate upward by x, an amount related to the costs and benefits of extending the audit. Comparative statics on the auditor's business as usual offer are straightforward, provided we stay in the range where business as usual is optimal. As λ decreases or A increases, the auditor's higher cost of extending audit procedures leads him to make a more generous offer. As c_a increases, the cost of estimation error increases, and the auditor's offer to the client decreases. This is true even if $\hat{\pi} < \overline{\pi}$, so decreasing $\hat{\pi}$ increases the expected estimation error conditional on the client accepting the auditor's offer. The increased estimation error upon acceptance plus the increase in cost from extending audit procedures is more than offset by the savings of lower estimation error attained by enlarging the set of incomes for which the client will reject the auditor's offer.

To find the conditions under which the auditor will employ business as usual, we make a comparison across regimes. Thus we note that with the optimal business as usual strategy, the auditor's expected utility is:

$$EU_A^{BaU} = k - c_a \sigma^2 - \frac{c_a}{2r}\left[x^2\big[2r - (x + y)\big] + \frac{1}{3}y^3 + \frac{1}{3}x^3 \right]. \tag{9}$$

5.3 ACCOMMODATING

An accommodating offer is sufficiently generous that all clients are willing to accept: $\hat{\pi} + y \geq \overline{\pi} + r$. Note that the auditor will not always choose the minimal accommodating offer. If $y > r$, then the

minimal accommodating offer is less than $\bar{\pi}$, and the auditor prefers to raise $\hat{\pi}$ to $\bar{\pi}$. Doing so maintains acceptance by the client while lowering the loss from estimation error; since the client always accepts, an unbiased estimate minimizes the expected quadratic loss. Accommodation by setting $\hat{\pi} = \bar{\pi} + r - y$ may be optimal even when it involves setting $\hat{\pi} > \bar{\pi}$, thereby incurring some additional costs due to estimation error. This achieves savings relative to business as usual by eliminating all client rejections.[19] To handle both possibilities, we specify the accommodating strategy by setting $\hat{\pi} = \max(\bar{\pi}, \bar{\pi} + r - y)$. Putting these two cases together, we note that the accommodating strategy is either unbiased or generous—it is never conservative.

When $r < y$, the scope for error in the regular audit is sufficiently small (compared to the cost of correcting it) that even a client with expected income $\bar{\pi} + r$ is willing to accept $\bar{\pi}$. Hence the auditor is willing to offer his unbiased estimate as there is no adverse selection. One example of this case occurs when the client cares about true earnings and has almost no concern over reported income. Here $\alpha \rightarrow 1$, so that $y \rightarrow \infty$; the client is willing to accept almost any reported income in order to avoid the real costs of an extended audit. Since the client always accepts $\bar{\pi}$, an accommodating auditor is willing to provide an unbiased report.[20]

In the case where $r > y$, the auditing is sufficiently imprecise that a client with expected income in the range $[\bar{\pi} + y, \bar{\pi} + r]$ prefers to pay the costs associated with an extended audit than to accept $\bar{\pi}$. To accommodate, the auditor must raise the reported income to $\bar{\pi} + r - y$ to eliminate any incentive for an extended audit. The auditor's expected utility under the accommodating strategy depends on which term is maximal in the expression for $\hat{\pi}$:

$$EU_A^{Accommodating} = k - c_a\left(\sigma^2 + \frac{1}{3}r^2\right) - c_a[\max(0, (r - y))]^2. \quad (10)$$

5.4 COMPARISON OF AUDITOR STRATEGIES

Sections 5.1 to 5.3 have considered these strategies: tough, business as usual, accommodation at $\bar{\pi}$, and accommodation at $\bar{\pi} + r - y$.

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[19] Recall that the first-order approach to finding the business as usual strategy does not have a maximum when $x + y > 2r$. The auditor's expected utility is increasing in $\hat{\pi}$ at the boundary point, $\hat{\pi} = \bar{\pi} + r$.

[20] It does not follow that accommodation is the auditor's optimal strategy. If the auditor pays only a small share of the extended audit costs, then the auditor may choose to force an extended audit. In our model, this is done by refusing to offer anything other than the impossibly low income of $\bar{\pi} - r - y$. Stepping outside our model, the auditor refuses to give any unqualified opinion without performing an extended audit.

Comparison of the expected utility levels in equations (5), (9), and (10) reveals that each of these strategies is optimal for some parameter values.

A tough strategy is optimal when $y \geq 2x$ and $x \leq r/\sqrt{3}$. In this case, x is sufficiently small that the auditor is willing to pay the costs of extending the audit rather than suffer any estimation error. Negotiation is supplanted by better information.

Accommodation at $\bar{\pi} + r - y$ is optimal when $x + y > 2r$ and $y < r$. Extending the audit costs more than it is worth. Along $y = r$, accommodation at $\bar{\pi} + r - y$ becomes accommodation at $\bar{\pi}$ and remains so for even higher values of y. Along $x + y = 2r$, accommodation at $\bar{\pi} + r - y$ borders with business as usual. The boundary between business as usual and accommodation at $\bar{\pi}$ is the only nonlinear segment. To give a sense of the general solution, figure 1 shows the regions in which the various strategies are optimal.

Figure 1 illustrates how reporting strategies change at the boundaries of the tough–accommodating and tough–business-as-usual
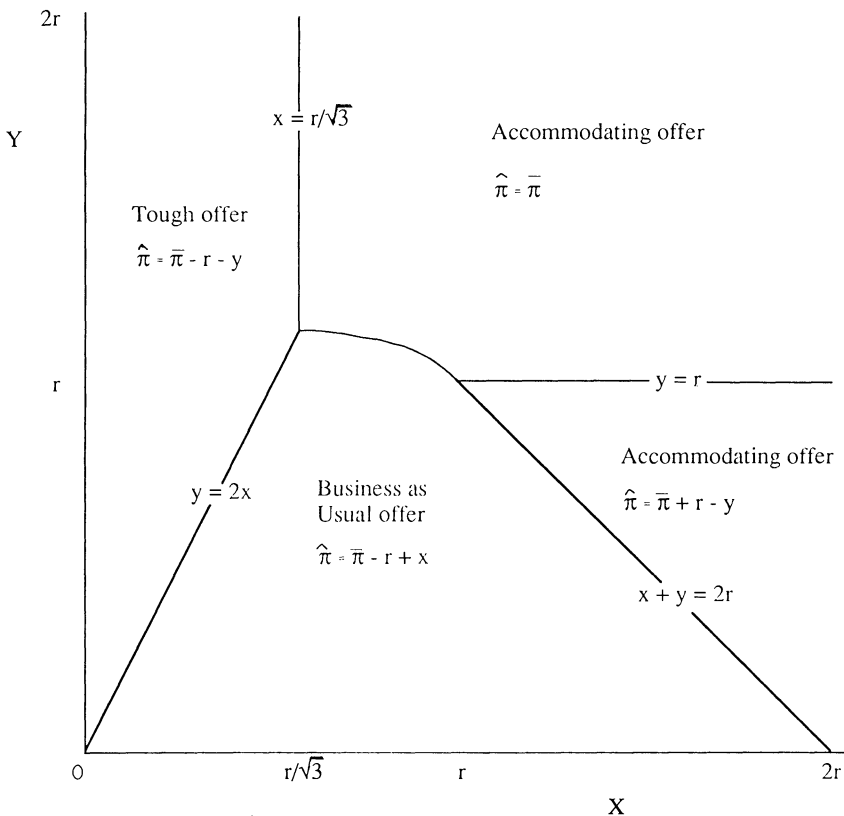

FIG. 1.—Regions of auditor strategies.

regions. Around $x = r/\sqrt{3}$ and $y = 2r/\sqrt{3}$, a small decrease in x makes the tough strategy optimal: $\hat{\pi} = \bar{\pi} + r - y$. A small increase in x, however, makes accommodation optimal; $\hat{\pi} = \bar{\pi}$ and audit procedures are never extended. While the auditor is indifferent between reporting $\bar{\pi}$ and $\bar{\pi} + r - y$, the client prefers the $\bar{\pi}$ report. Similarly, the business-as-usual strategy does not converge to the tough strategy on the line $y = 2x$. While the auditor is indifferent between business as usual and tough at $y = 2x$, the client prefers business as usual. This suggests room for cooperation. The large gain to the client more than compensates for the small loss to the auditor. In the next section, we demonstrate that the joint-surplus-maximizing contract never induces tough play from the auditor.

6. Conservatism, Optimal Cost Sharing, and Materiality

In this section, we characterize the conditions under which the reported income has a downward bias. We then show that a cost-sharing contract designed to maximize joint auditor–client surplus implies these conditions will never hold. With optimal cost sharing, the result of auditor–client negotiations is either an unbiased report or one that is generous to the client.

6.1 CONSERVATISM

A client faced with a "tough" auditor might well perceive the auditor to be conservative, because the auditor's offer of reported income is impossibly low. The auditor must be shown a higher income, even if it is very close to $\bar{\pi} - r$. The negotiated outcome, however, will contain no error, and therefore will not reflect any conservatism.

If the auditor's optimal strategy is accommodation with $\bar{\pi}$, the client would find an unbiased auditor in the negotiation phase. The final report will contain errors but will be unbiased. An accommodating offer of $\bar{\pi} + r - y$ exceeds the expectation of the client's income, $\bar{\pi}$, as $\hat{\pi} = \max(\bar{\pi}, \bar{\pi} + r - y)$. On average, the auditor is generous, not conservative, at the initial offer stage. Since this accommodating offer is always accepted, these results translate directly to the final report.

With the business as usual strategy, the conservatism of the auditor at the offer stage depends on the relation between x and r. If $x = r$, the optimal business-as-usual strategy sets the offer equal to $\bar{\pi}$, and the auditor's offer is unbiased. If $x < r$, the auditor's offer is conservative in that it is lower than $\bar{\pi}$. If $x > r$, the auditor's offer is generous relative to $\bar{\pi}$.

If the final report was generated by the acceptance of a business-as-usual offer, any conservatism in this report depends on the relation between x and y. If $x > y$, then there is a greater probability that an

accepting client has income below rather than above $\hat{\pi}$. The report is, therefore, generous in that $\hat{\pi}$ exceeds our posterior expectation for profits. If $x < y$, the opposite is true, and the report is conservative.

LEMMA 1. Under business as usual, $\hat{\pi} > E[\pi \mid \hat{\pi} \text{ accepted}]$ if and only if $x > y$.

Proof.

$$E[\pi \mid \hat{\pi} \text{ accepted}] = \left[\int_{\overline{\pi} - r}^{\hat{\pi} + y} \pi f(\pi) d\pi \right] / F(\hat{\pi} + y) = \hat{\pi} + (y - x)/2.$$

$$(11)$$

This result shows how the costs of extending the audit and the cost-sharing agreement determine the relation between the final report and the expected income of the client; $x > y$ holds when $\sqrt{[(1 - \lambda)A]/c_a} > \lambda A/(1 - \alpha)$. The result also indicates how the play of the game influences the interpretation of the data. For example, an important factor in estimating the client's income from its financial statements is whether the report was generated by a rejected tough offer followed by an extended audit, an accommodating offer, or a business-as-usual offer. If it was generated by a business-as-usual offer, we would want to know whether the offer was accepted or rejected. Our processing of the information depends on the play of the auditor–client negotiation game.

6.2 OPTIMAL COST SHARING

To continue our examination of contract design, suppose the client and auditor negotiate the fee and cost-sharing agreement to maximize the sum of their expected utilities. To avoid difficulties associated with information conveyance in cost-sharing negotiation, these negotiations take place before the client knows its expected income.[21]

PROPOSITION 2. It is never optimal to induce tough play from the auditor.

Proof. The sum of auditor's and client's expected utility is constant over the entire tough region independent of the cost-sharing contract:

$$E[U_C + U_A] = \overline{\pi} - A - c_a \sigma^2.$$

Inside the tough region, a renegotiation of cost sharing hurts the auditor and helps the client, but the result is just a transfer between the two parties so there is no effect on the sum of the utilities. If the

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[21] Auditors and clients often have a long-term relationship in which the same cost-sharing arrangement will be used repeatedly. In these cases, the choice of a cost-sharing contract does not convey information about the present financial condition.

cost-sharing contract is changed so that the auditor bears a larger fraction of the extended audit costs (λ increases), the resulting fall in y and increase in x will eventually induce the auditor to employ either accommodation at $\bar{\pi}$ (when $x = r/\sqrt{3}$) or business as usual (when $y = 2x$). In either case, at the boundary between tough and accommodation at $\bar{\pi}$ or at the boundary between tough and business as usual, the auditor is indifferent about which strategy to follow. In contrast, the client strictly prefers either option to tough. Both alternatives involve a higher initial offer by the auditor, and any increase in $\hat{\pi}$ above $\bar{\pi} - r - y$ strictly improves the client's expected utility.

Remaining in the tough region cannot be optimal. An increase in λ that brings x and y to the border of tough with either accommodation or business as usual has no effect on the sum of expected utilities. From there, a marginal increase in λ has no first-order effects on the auditor (since the auditor is indifferent between strategies) but provides a first-order benefit to the client due to the increase in reported income.   *Q.E.D.*

Whenever it is optimal to induce accommodating behavior, we know the final report is never conservative. But what about the circumstances when it is optimal to induce business as usual? Here too we find that with optimal cost sharing the auditor is never conservative.

PROPOSITION 3. With a cost-sharing contract designed to maximize joint auditor–client surplus and business as usual, the final report is expected to be generous: $\hat{\pi} > E[\pi \mid \hat{\pi} \ accepted]$.

Proof. The sum of the client's and auditor's objective functions is:

$$E[U_C + U_A] = \bar{\pi} + \int_{\bar{\pi}-r}^{\hat{\pi}+y} (1 - \alpha)[\hat{\pi} - \pi] f(\pi) d\pi - A[1 - F(\hat{\pi} + y)]$$

$$- c_a \int_{\bar{\pi}-r}^{\hat{\pi}+y} (\pi - \hat{\pi})^2 f(\pi) d\pi - c_a \sigma^2. \tag{12}$$

Under business as usual, the first-order condition for maximizing the joint welfare determines the optimal value of λ:

$$\frac{dE[U_C + U_A]}{d\lambda}$$

$$= \frac{\partial E[U_C + U_A]}{\partial \lambda} + \frac{\partial E[U_C + U_A]}{\partial \hat{\pi}} \frac{\partial \hat{\pi}}{\partial \lambda} + \frac{\partial E[U_C + U_A]}{\partial y} \frac{\partial y}{\partial \lambda} = 0.$$

In Appendix B, we show that this equation simplifies to:

$$(1 - \alpha) F(\hat{\pi} + y) \frac{d\hat{\pi}}{d\lambda} + c_a f(\hat{\pi} + y)[x^2 - y^2] \frac{dy}{d\lambda} = 0. \tag{13}$$

Since $\dfrac{d\hat{\pi}}{d\lambda} < 0$, the first term is negative. Hence the second term must

be positive. As $\dfrac{dy}{d\lambda} > 0$, at the maximizing choice of λ, $x > y$. Finally, since $x > y$, Lemma 1 implies that posterior expectation of profits conditional on $\hat{\pi}$ being accepted is below $\hat{\pi}$: the report is generous. *Q.E.D.*

Although a formal derivation is given in Appendix B, we give a brief intuitive explanation for this result. Three things happen when λ is raised: there is the direct effect of changing the cost split; the auditor's offer, $\hat{\pi}$, falls; and the client's acceptance range, which is determined by y, rises.

The direct effect of raising λ is zero, because the division of costs is a transfer issue with no efficiency effect. The indirect effect of decreasing $\hat{\pi}$ has seven terms, six of which cancel due to the client's optimal choice of y and the auditor's optimization of $\hat{\pi}$. That leaves as a net expected loss the client's cost of a reduction in reported earnings; this lowers welfare by $(1 - \alpha)$ whenever $\hat{\pi}$ is acceptable (which has probability $F(\hat{\pi} + y)$). It is apparent, then, that at the optimal λ, the effect through the change in y must raise joint welfare. Analogous to the case of $\hat{\pi}$, there is no first-order effect of y on the expected utility of the client. For the auditor, raising y induces the marginal client to accept. This saves auditing costs proportional to x^2 while increasing variance by y^2. This helps the auditor only when $x > y$.

The choice of cost sharing influences reported earnings. Thus it is important to recognize that the auditor's and client's selection of the optimal λ may not be socially optimal. In particular, society as a whole may not value the benefits the client receives for higher reported incomes. But given that auditors and clients do negotiate fees, it is interesting that negotiated cost sharing leads auditors away from a conservative position.

So far, we have assumed that the client seeks to inflate accounting profits. When the auditor is the IRS or in the case of management buyouts, there may be an incentive to understate profits. In these circumstances, $\alpha > 1$ and the client places a *negative* value on higher reported profits. The client accepts $\hat{\pi}$ when $\pi > \hat{\pi} + y$, where y is now a negative number. The corresponding translation for the auditor is $\hat{\pi} = \bar{\pi} + r - x$. The negotiated business-as-usual report is generous when $x < y$. The joint-surplus-maximizing cost-sharing contract ensures that under business as usual, $x > y$, so that conservatism is the rule. With this reversal of the adverse selection problem, the analysis carries through although the signs of the effects are reversed.

6.3 MATERIALITY

Another set of issues revolves around how the accuracy of the regular audit affects the size of the region in which accommodation is optimal for the auditor. A "small" r leads to at most "small"

expected errors in the financial statements. The auditor's optimal response to the situation in which there are at most "small" expected errors is to accommodate, which with "small" r means offering to report $\bar{\pi}$. It is as if the auditor has assessed any remaining expected error as immaterial.

We have placed small in quotation marks because it is the relationship between x, y, and r that determines behavior in the model. Even if r is small in an absolute sense, if the costs of extending an audit are comparably small, the auditor will not accommodate. Equating an assessment that an expected error is small with an assessment that it is immaterial, we see how materiality judgments in our model are a function of the costs and benefits of extending the audit. In this way, our model points to materiality as an economic assessment of trade-offs, not an absolute standard.

7. Conclusion

The negotiation game analyzed in this paper is only one of many interactions between auditor and client. The effects of altering the client's and auditor's incentives, their information, and the sequencing of their moves are avenues for future efforts. Our negotiation game is best thought of as embedded in a larger game, in which multiple clients and competing auditors play a role.

Our goal has been to emphasize the negotiated aspect of financial statements. The literal claim that financial statements are the representations of management should not be taken at face value. Conservatism in the financial report is the result of negotiations between auditor and client. If the client has better knowledge of the state of financial affairs, he can take advantage of an auditor's mistakes. Clients who seek larger current income reports will protest understatements and attempt to correct these "mistakes" in extended audit procedures. The only auditor's mistakes left uncorrected are the ones which result in overstatement of income. Rational conservatism is the protection against this "auditor's curse."

Those who use financial reports see only the final negotiated outcome. Here it is less clear whether conservatism reigns. The auditor errs on the side of caution. The management corrects the most glaring understatements. Is the final negotiated result biased upward or downward? We demonstrate that when auditing contracts are designed to maximize joint auditor–client welfare, the expected ex post bias is always upward. Even an auditor's conservative bark belies a generous heart.

APPENDIX A

One of the simplifying assumptions of our model is that an extended audit perfectly reveals the client's information π. This is the

limiting case of a more general model where an extended audit gives the auditor better but not perfect information about the client's income.[22] In this appendix, we sketch the more general model.

Consider an extended audit procedure which gives the auditor a signal $\tilde{\pi} = \pi + \mu$, where the error μ is normally distributed with mean 0, variance σ_μ^2, and is uncorrelated with the unanticipated earnings, $\epsilon = \pi^* - \pi$. The auditor's interpretation of $\tilde{\pi}$ now depends on the client's rejection rule. But the client's rejection rule depends on the expected offer resulting from an extended audit. A consistent solution for the auditor's and client's maximization problem requires calculation of a fixed point.

Before calculating the client's equilibrium rejection rule and the auditor's posterior beliefs, it is important to review the information structure of the game. The client knows π. As a result of the initial audit, the auditor learns $\bar{\pi}$. We assume this information is public, so that the client also learns the value of $\bar{\pi}$. (Otherwise, there is a further complication, since the client must infer the auditor's signal based on the initial offer $\hat{\pi}$.) If $\hat{\pi}$ is rejected, then extended audit fees are paid and the auditor gets the signal $\tilde{\pi}$; based on that signal, the auditor issues a revised report.[23]

In making the revised report, the auditor's interpretation of $\tilde{\pi}$ depends on the prior information, $\bar{\pi}$, and the client's rejection rule, $R(\hat{\pi}, \bar{\pi})$. (Since the auditor's interpretation of a rejection depends on the priors, the client's rejection rule also depends on this information.) The loss function is quadratic, so the auditor minimizes his expected loss by offering his posterior expected value of π as the revised ·report. We denote the report from a second-stage audit by the func-

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[22] Since the second-stage audit is no longer perfect, there is now the potential to gather additional information after a second-stage audit. If the second-stage audit is sufficiently inaccurate and as a consequence the auditor's report is sufficiently downward biased, then the client may want to spend resources for a third audit. Equilibrium behavior is characterized by an optimal stopping rule. In this appendix, we limit ourselves to the case of a single additional audit.

[23] The fact that the client rejected the initial offer may provide enough information that the auditor does not actually want to pay $(1 - \lambda)A$ for the extended audit. For simplicity, we assume that he is committed to perform the extended audit if the initial offer is rejected. If such commitment is not possible, this may place additional constraints on the auditor's initial offer (see Nalebuff [1987]). In this case, the auditor can always choose an accommodating offer (one that everyone accepts). The other alternative is to ensure that the additional information provided by the extended audit lowers the expected loss by an amount sufficient to justify its cost. There are two ways to make the threat of an extended audit credible. One is to lower the initial offer; since this expands the rejection range, it raises the value of additional information. Alternatively, the auditor can employ a mixed strategy for the extended audit. A reduction in the probability of an extended audit raises the rejection range and makes auditing more valuable; the indifference point for the auditor is a potential mixed-strategy equilibrium.

tion $O(\tilde{\pi} \mid \overline{\pi}, R(\hat{\pi}, \tilde{\pi}))$:

$$O\big(\tilde{\pi} \mid \overline{\pi}, R(\hat{\pi}, \overline{\pi})\big) = \int_{R(\hat{\pi}, \overline{\pi})}^{\overline{\pi}+r} xg\big(x \mid \tilde{\pi}\big)dx, \qquad (A1)$$

where $g(x \mid \tilde{\pi})$ is the density of a truncated normal (between $R(\hat{\pi}, \overline{\pi})$ and $\overline{\pi} + r$) with mean $\tilde{\pi}$ and variance σ_μ^2.

The client with $\pi = R(\hat{\pi}, \overline{\pi})$ is just indifferent between accepting $\hat{\pi}$ and paying λA in order to receive the expectation of $O(\tilde{\pi} \mid \overline{\pi}, R(\hat{\pi}, \overline{\pi}))$. Thus the equilibrium rejection rule satisfies:

$$\int_{-\infty}^{\infty} h\big(\tilde{\pi} \mid R(\hat{\pi}, \overline{\pi})\big)O\big(\tilde{\pi} \mid \overline{\pi}, R(\hat{\pi}, \overline{\pi})\big)d\tilde{\pi} = \hat{\pi} + \lambda A /(1 - \alpha), \quad (A2)$$

where $h(\tilde{\pi} \mid R(\hat{\pi}, \overline{\pi}))$ is a normal density with mean $R(\hat{\pi}, \overline{\pi})$ and variance σ_μ^2.

One immediate consequence of the imperfect information in the extended audit is that the client is less willing to accept the auditor's initial offer. The reason is parallel to a lemons problem (see Akerlof [1970]) but in the reverse direction. Rejecting $\hat{\pi}$ leads to the inference that the client has high income. The auditor places the client's income somewhere in the range $R(\hat{\pi}, \overline{\pi})$ to $\overline{\pi} + r$. For the client who is marginal between accepting $\hat{\pi}$ and proceeding with an extended audit, $\pi = R(\hat{\pi}, \overline{\pi})$ so that *all the potential error is in his favor*. Thus, for $\hat{\pi} < \overline{\pi} + r - y$:

$$R\big(\hat{\pi}, \overline{\pi}\big) < \hat{\pi} + \lambda A /(1 - \alpha). \qquad (A3)$$

With the solution of the client's rejection rule ($A2$), we can return to consider the auditor's optimal choice of $\hat{\pi}$ in the first round. The auditor's expected utility as a function of $\hat{\pi}$ is:

$$\begin{aligned}
EU_{Auditor} = k &- \big(1 - \lambda\big) A\big[1 - F\big(R(\hat{\pi}, \overline{\pi})\big)\big] \\
&- c_a \int_{\overline{\pi}-r}^{R(\hat{\pi}, \overline{\pi})} \big(\pi - \hat{\pi}\big)^2 f\big(\pi\big)d\pi \\
&- c_a \int_{R(\hat{\pi}, \overline{\pi})}^{\overline{\pi}+r} \int_{-\infty}^{\infty} \big[\pi - O\big(\tilde{\pi} \mid \overline{\pi}, R(\hat{\pi}, \overline{\pi})\big)\big]^2 \\
&\times g\big(\tilde{\pi} \mid \pi\big)f\big(\pi\big)d\tilde{\pi}\,d\pi - c_a \sigma^2,
\end{aligned} \qquad (A4)$$

where $g(\tilde{\pi} \mid \pi)$ is a normal density with mean π and variance σ_μ^2 and $f(\pi)$ is the uniform density on $[\overline{\pi} - r, \overline{\pi} + r]$.

We do not solve for the optimal offer in the case of business as usual. But it is interesting to note that the accommodating and tough strategies remain essentially unchanged. The optimal accommodating offer is:

$$\hat{\pi} = \max\big[\overline{\pi}, \overline{\pi} + r - y\big].$$

The reason this strategy remains unchanged is that the extended audit provides perfect information in the case of an accommodating offer; the interpretation of a rejection collapses to the point $\bar{\pi} + r$ and the signal $\tilde{\pi}$ adds no information ($R(\bar{\pi} + r - y, \bar{\pi}) = \bar{\pi} + r$). In the case of a tough strategy, the auditor offers $\hat{\pi}$ such that $R(\hat{\pi}, \bar{\pi}) = \bar{\pi} - r$ and all clients reject. The precise effect of imperfect information on the business as usual strategy and the effect this has on the division into optimal regions remain topics for future research.

APPENDIX B

In this appendix, we provide the derivation for equation (13). We start with the first-order condition, broken down into three parts.

$$\frac{dE[U_C + U_A]}{d\lambda}$$

$$= \frac{\partial E[U_C + U_A]}{\partial \lambda} + \frac{\partial E[U_C + U_A]}{\partial \hat{\pi}} \frac{\partial \hat{\pi}}{\partial \lambda} + \frac{\partial E[U_C + U_A]}{\partial y} \frac{\partial y}{\partial \lambda} = 0.$$

First we observe that:

$$\frac{\partial E[U_C + U_A]}{\partial \lambda} = 0.$$

The division of costs is only a transfer issue. The summation of λ and $(1 - \lambda)$ is always 1, so that a change in λ has no effect on the sum of utilities.

Next we break up the partial derivatives into the terms for the client, U_C, and those for the auditor, U_A:

$$\frac{\partial E[U_C + U_A]}{\partial \hat{\pi}} = \frac{\partial E[U_C]}{\partial \hat{\pi}} = \frac{\partial E[U_A]}{\partial \hat{\pi}} = \frac{\partial E[U_C]}{\partial \hat{\pi}}.$$

Since the auditor chooses $\hat{\pi}$ optimally, there is no first-order effect from a small change in $\hat{\pi}$. Similarly, we break up the effect of a change in y:

$$\frac{\partial E[U_C + U_A]}{\partial y} = \frac{\partial E[U_C]}{\partial y} + \frac{\partial E[U_A]}{\partial y} = \frac{\partial E[U_A]}{\partial \hat{\pi}}.$$

Analogous to the case of $\hat{\pi}$, there is no first-order effect of y on the expected utility of the client.

These simplifications reduce the first-order condition to:

$$\frac{dE[U_C + U_A]}{d\lambda} = \frac{\partial E[U_C]}{\partial \hat{\pi}} \frac{\partial \hat{\pi}}{\partial \lambda} + \frac{\partial E[U_A]}{\partial y} \frac{\partial y}{\partial \lambda} = 0. \qquad (B1)$$

To complete the derivation, we plug in the values for these partial derivatives:

$$\frac{\partial E[U_C]}{\partial \hat{\pi}} = (1 - \alpha)F(\hat{\pi} + y) - (1 - \alpha)yf(\hat{\pi} + y) + \lambda Af(\hat{\pi} + y)$$

$$= (1 - \alpha)F(\hat{\pi} + y). \qquad (B2)$$

The last two terms cancel after substitution, $y = \lambda A/(1 - \alpha)$. Turning to the partial derivative with respect to y, we have:

$$\frac{\partial E[U_A]}{\partial y} = (1 - \lambda)Af(\hat{\pi} + y) - c_a f(\hat{\pi} + y)y^2 \qquad (B3)$$

$$= c_a f(\hat{\pi} + y)[x^2 - y^2].$$

Here we have used the substitution $x^2 = (1 - \lambda)A/c_a$. Bringing $(B1)$ together with $(B2)$ and $(B3)$, the first-order condition simplifies to:

$$(1 - \alpha)F(\hat{\pi} + y)\frac{d\hat{\pi}}{d\lambda} + c_a f(\hat{\pi} + y)[x^2 - y^2]\frac{dy}{d\lambda} = 0. \qquad (13)$$

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