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Discipline with Common Agency: The Case of Audit and Nonaudit Services

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ABSTRACT: Using a common agency model, we investigate the interactions of a utility-maximizing auditor (the agent) with managers (who hire the agent for nonaudit services) and shareholders (who hire the agent for conducting an audit) of the same firm. In a single-period model, managerial discretion over consulting and other nonaudit service fees can influence auditors to issue unqualified opinions on reports that are more favorable than warranted. Shareholders, represented by an audit committee, cannot recover truth-telling. Removing the current restriction on *contingent* audit fees allows audit committees to offset the incentives provided by management and instead provide the auditor incentives to accept only truthful reports. Extending the model to a multi-period framework, the audit committee can motivate truth-telling by making retention decisions that are contingent on outcome. Auditors will consider the impact of over-reporting on their ability to generate future audit fees from the same client.

I. INTRODUCTION

This paper addresses the independence problems that can arise when firms hire the same agent to provide audit and nonaudit services. We model the relationship between management, the audit committee, and auditors as a common agency, with managers and the audit committee as principals and the auditor as the agent. Managers may influence the outcome of audit reports by awarding nonaudit (e.g., consulting) service contracts in exchange for favorable audit reports. When audit fees are restricted to be noncontingent (i.e., unrelated to outcomes), the audit committee may not be able to recover truthful audit reports. Prohibiting the joint provision of audit and nonaudit services might solve the problem, but at what cost? Restricting audit firms from providing consulting services to audit clients destroys the audit firms' abilities to achieve potentially valuable economies of scope (Antle and Demski 1991). In addition, audit firms argue that a smaller market for the services of the audit firms will make it harder for them to attract top talent and the quality of audits will suffer (McNamee et al. 2000). Instead of an exclusionary ban, we

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suggest eliminating the restriction on noncontingent audit fees, allowing the audit committee to write contracts with their auditor that depend on the outcome of the audit report. We also analyze how auditor-retention strategies in an ongoing interaction can mimic explicitly contingent fees. Then, without eradicating the synergies gained from acquiring audit and nonaudit services from the same provider, the audit committee can recover truthful reporting.

For more than 60 years, auditors have played a large role in maintaining the integrity of financial reports. "Without accountants to ensure the quality and integrity of financial information, the markets for capital would be far less efficient, the cost of capital would be far higher, and our standard of living would be lower" (Wallman 1995). Rules defining and regulating auditor independence have been an integral part of the securities laws since the 1930s. While a precise definition of independence is the source of academic and professional debate, independence in auditing is generally understood to mean an unbiased viewpoint when performing audit tests, evaluating the results, and issuing the audit report.

In the 1980s, a succession of business failures that were viewed as audit failures prompted researchers and practitioners to investigate the accounting profession and public confidence. In surveys of public confidence, there was no noticeable difference in the perceived audit quality of firms whose auditors did and did not also provide nonaudit services.[1]

In the past decade, large accounting firms have, more than ever, consolidated and transformed themselves into multidisciplinary professional service organizations and the issue of auditor independence has re-emerged. Arthur Levitt, former chairman of the Securities and Exchange Commission, asks "How can auditors remain independent when their [audit] fee income is just 30 percent of their firms' total revenues?"[2] Sutton (1997) argues that despite the many studies by the public accounting profession that find no conclusive evidence that nonaudit services compromise auditor independence, doubt about the objectivity and independence of auditors persists. Fundamentally, "[there] is an inherent skepticism about how close the relationship between the auditor and the management of the audit client can be without creating, in fact or in perception, a mutuality of interest that could impair the auditor's independence" (Sutton 1997). These concerns rest on the notion that audit and nonaudit services are provided to a different (and potentially misaligned) set of constituents, namely the audit committee and management.

In June 2000, the SEC drafted a proposal to modernize the rules for auditor independence. The proposal included limits on the scope of services provided by audit firms to their audit clients.[3] This portion of the proposal was the most contentious, and elicited many responses from auditing professionals and their clients. Following several highly publicized corporate failures, Congress passed the Sarbanes-Oxley Act of 2002, which formalized the requirements for communication between auditors and audit committees, restricted the types of nonaudit services that auditors may provide and required CEOs and CFOs to certify the financial statements of their firms. While Sarbanes-Oxley may increase the costs of misreporting, it does not eliminate all independence problems. In this paper, we demonstrate the ability of shareholders to discipline management, without regulatory intervention. Rather than being compensated more for favorable reports, audit committees

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[1] For example, a recent survey commissioned by the Independence Standards Board indicated that respondents believed that the evolution of audit firms into consulting fields was logical and the provision of most consulting services was not likely to create a real problem of independence (Independence Standards Board 1999).

[2] Audit firms' fees from consulting services for their SEC clients increased from 17 percent of audit fees in 1990 to 67 percent in 1999 (Panel on Audit Effectiveness 2000).

[3] A subset of the members of the Panel on Audit Effectiveness suggested an exclusionary ban on nonaudit services in their report.

will align auditors' incentives with those of the shareholders they represent by rewarding audited reports that show relatively low levels of earnings. The incentives provided by the audit committee are balanced against auditor's desire to curry favor with management to gain nonaudit service revenues.

In addition to the controversial debate over barring auditors from providing nonaudit services to audit clients, others have argued strenuously for mandatory auditor rotation. This suggestion rests on the premise that long-term auditor-client relationships lead to an impairment of objectivity. New auditors would provide a fresh (and more skeptical) look at the client. Opponents of auditor rotation argue that continuity makes for better and less costly audits, and that there is rotation of staffers in the normal course of business. In this paper, we discuss how the repeated nature of auditing encourages truthful reporting. With an ongoing interaction, contingent auditor-retention schemes can mimic the effects of contingent fees that we analyze in a single-period setting.

This paper contributes to the theory related to incentives for auditors and proposes novel remedies for a hotly debated policy topic. We model and discuss a less regulatory approach (eliminating restrictions on forms of contracts) rather than a more regulatory approach (bans on activities) to restoring the balance between incentives for exaggeration and incentives for conservatism. Academic research has the opportunity to suggest fresh approaches to difficult problems. That is our aim and, in so doing, we also contribute to the body of theoretical work that has explored the interactions of the three players, auditors, managers, and shareholders, and how the interactions are affected by different incentive schemes.

In the following section, we review the relevant theoretical and empirical literature. In Section III, we develop a mathematical model of the interactions between the two principals—management and the audit committee—and their agent, the auditor. First, we examine a regime in which audit fees cannot be contingent on outcome, but managers can influence auditors with consulting contracts. We follow this with an analysis of a regime allowing contingent audit fees. We finish Section III with a numerical example, characterizing the equilibrium strategies of managers and the audit committee for a fixed set of parameters. In Section IV, we look at the implications of a multiperiod world, and in Section V, we conclude.

II. RELATED LITERATURE

Common agency, first modeled by Bernheim and Whinston (1986), extends the principal-agent model to address situations in which multiple principals contract noncooperatively with a single agent. In their model, multiple principals announce incentive schemes for the agent whose action is not observable by the principals. In our model, the agent makes a decision that is publicly learned at the time of contracting, but the underlying information is not. Recent work on common agency includes theoretical extensions of the framework (e.g., Laussel and Le Breton 2001; Peters 2001) as well as applications of models with a multiprincipal structure (e.g., Dixit et al. 1997). Our work falls in the latter category.

We use the common agency framework to model the relationship between the management, owners, and auditor of a firm. Our work is related to Antle (1984), which also looks at the incentives and actions of these three parties, with a different configuration. Antle (1984) models the auditor and manager as effort-averse agents and evaluates the compensation contracts offered to them by owners. That paper considers auditors that (1) are strongly independent (i.e., work in the interest of shareholders), (2) are independent (i.e., self-interested but unable to enter into collusive arrangements with management), and

(3) lack independence (i.e., collude with managers via side payments). In Antle's (1984) model, owners offer payment schedules to the auditor and the manager, then the auditor and manager respond by choosing "effort" levels and reporting strategies. The owners are always better off with independent auditors, but for any incentive plan, auditors are at least as well off forgoing independence as maintaining it. Using Antle's (1984) classification, the auditors in our model lack independence in that they are self-interested profit maximizers who can be influenced by management. Managers can contract with auditors, but use of the common agency framework permits the audit committee to recognize the incentives offered by the manager and undo them. This in turn realigns auditors' interests with shareholders' interests for truthful reporting.

Antle and Demski (1991) focus on the economies of scope that arise when an incumbent auditor has superior information about the cost of consulting services. In their model, a client firm chooses the levels of audit services and consulting services from both an incumbent audit firm and a replacement firm. Contracting frictions, such as minimum audit quantity requirements or restrictions on the fee schedule, can further enhance the economies of scope between auditing and consulting. However, they omit an examination of auditor independence and misreporting. As in Antle and Demski (1991), we model incumbent auditors as better at providing nonaudit services due to economies of scope. While we do include a notion of competition for provision of nonaudit services, absent from our model is the competition for basic audit services.

Antle and Nalebuff (1991) explicitly model the auditor-client negotiation process that leads up to the client's release of the financial statements and the auditor's opinion of them. They model the auditor and the audit committee as utility-maximizing entities who care about the possible discrepancies between actual and reported earnings, as we do in this paper. The auditor makes an offer of an earnings report and the client either accepts (in which case the audit is done) or rejects (in which case they share the cost of an extended audit). The authors argue that although the auditor may start with a conservative offer, that does "not necessarily lead to a conservative final report" (Antle and Nalebuff 1991, 33). They analyze the interaction between an owner/manager (as a single entity) and the auditor, and we explicitly analyze the effects of divergent interests of the owners (shareholders), managers, and auditors.

Recently, several empirical papers have examined whether the joint provision of audit and nonaudit services impairs auditor independence. Frankel et al. (2002) find a positive association between nonaudit fees and earnings management, as measured by proximity to earnings benchmarks and discretionary accruals. In contrast, Francis and Ke (2002) do not find higher nonaudit service fees associated with meeting or beating earnings targets. Given the mixed evidence, we capture the relation between nonaudit fees and earnings management by modeling the optimal level of consulting (or nonaudit services) based on the costs and benefits of those services. Thus, it is not the level of nonaudit service fees per se that may drive earnings management, but rather the excess fees. Put differently, earnings management is related to nonaudit services fees only after conditioning on the efficiency differential between auditors and outside providers for nonaudit services.

Some have argued that auditor independence or freedom from bias is psychologically impossible, given (1) the close working relationships of auditors and their clients and (2) the fact that the clients pay their own auditors (Bazerman et al. 1997). However, King (2002) finds that the psychological forces associated with group affiliation (e.g., engagement teams, professional organizations) can neutralize the bias that arises from management's ability to persuade auditors of their honesty through personal relationships. We do not

address the psychological or ethical questions regarding truth-telling; our auditors are modeled as rational agents who respond to economic incentives.

III. THE MODEL

> Of fundamental importance in understanding the conflict of interest that arises from the provision of nonaudit services to audit clients is the fact that in so doing the audit firm is really serving two different sets of clients: management in the case of management consulting services and the audit committee, shareholders and all those who rely on the audited financials and the firm's opinion in deciding whether to invest, in the case of the audit...It is obvious that in serving these different clients the firm is subject to conflicts of interest that tear at the fragile fabric of loyalty owed to one client or the other. (Panel on Audit Effectiveness 2000, 108)

Based on the above quotation from the Panel on Audit Effectiveness, we model the auditor-client-manager relationship as a common agency. Two different, risk-neutral parties (management, m, and the shareholders, s, represented by the audit committee) use the services of a single audit firm. In this section, we develop a model of these parties' actions and compare the outcomes in regimes in which audit fees are allowed to be contingent to ones in which they are not allowed to be contingent.

We briefly outline the sequence of events here and develop the notation and details below. We begin at the point at which the audit committee engages the audit firm to conduct their required audit. The auditor then performs the audit, during which he learns information about the performance of the firm. After the audit work, the manager proposes an earnings report and offers a nonaudit service contract to the auditor. The auditor can accept the report and the offer for nonaudit services work, or reject them. The firm issues financial statements with management's report and the auditor's opinion. The opinion can be unqualified, indicating acceptance of the report, or qualified, indicating rejection of report. The auditor is then compensated for the audit. Finally, the auditor completes the nonaudit services (if any) and is paid by the manager for these services. At a later date, if the current period's actual and reported earnings differ, reported earnings are restated. The events are depicted in Figure 1, the notation is summarized in Table 1, and we discuss the details of the model below.

FIGURE 1
Timeline of Events

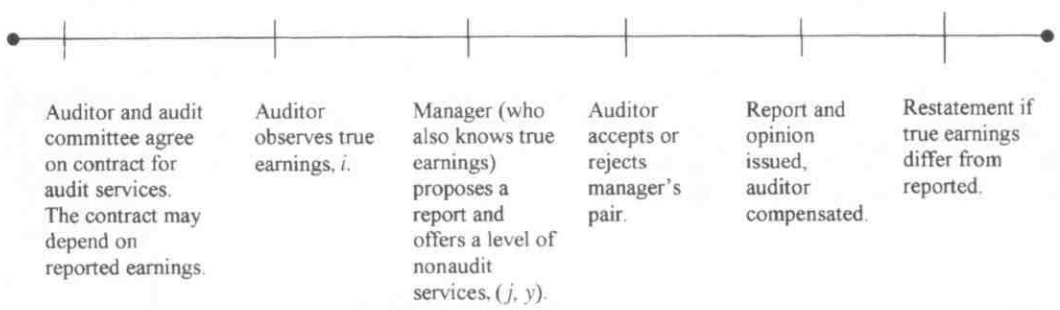


TABLE 1
Table of Notation

N = number of states;
i = level of true earnings;
j = level of reported earnings;
y^s = vector of payments for audit services;
y_j^s = audit service payment for report j;
$Q^s(j - i)$ = cost for shareholders of report j when true earnings are i;
$v_a(x)$ = marginal benefit of hour x of non-audit services;
z = number of bonus states;
b_j = manager's bonus in state j;
y_j^m = nonaudit service contract offered by the manager to the auditor with report j;
α = manager's sensitivity to auditor's compensation;
$Q^a(j - i)$ = error cost for auditor;
K = conservatism parameter;
$A_i(j_i, y_{j_i}^m, y_{j_i}^s)$ = auditor's decision rule (accept or reject); and
D_j = manager's maximum willingness to pay for a report of j.

Background

We model the possible levels of earnings i as a discrete set $i \in \{1,...,N\}$, where 1 is the lowest level of earnings and N is the highest. We assume that the report of earnings, j, also comes from this set. By this restriction, we try to capture the notion that auditors do not permit out-and-out fraud, and will only issue unqualified opinions for earnings levels within what they perceive to be a defensible range. Implicitly, we assume there is sufficient flexibility in accounting standards to allow the auditor to find some evidence supporting a level of earnings different from his private information.[4]

Stage 1: Contracting and Performing Audit

One of the primary functions of audit committees is to retain and supervise the audits of their firms. In this role, the audit committee contracts with the auditor for the audit. Currently, professional conduct codes for auditors prohibit contingent contracts, that is, payment schemes that depend on the outcomes of the audit. In this paper, we investigate how a relaxation of this restriction can improve truthful reporting.

To this end, we model the payment from the audit committee to the auditor as a vector y^s with the elements y_j^s. When we discuss the special case of noncontingent fees, the y_j^s are equal for all reports j. After the contract y^s has been established, the auditor conducts the audit work. During this time, the auditor learns the earnings level i of the firm.[5] In this paper, we do not address the moral hazard questions: Will the auditor work hard? How much work is needed for a good audit? This allows us to focus on an issue central to auditor independence: How can managers' incentives to influence auditors be mitigated by actions taken by the audit committee?

[4] The recently passed Sarbanes-Oxley Act reiterates the need for direct communication between auditors and audit committees. Still, in general, the audit committees will not know *all* of the auditor's private information.

[5] For simplification, we assume there is a "true" level of earnings. However, an alternative interpretation is that the auditor observes a representative sample of accounts from which he could make an unbiased estimate of income.

Given the existence of many investment opportunities, shareholders prefer accurate reporting information so they can allocate their capital to firms with the best expected performance. The audit committee, which represents shareholders, thus prefers truthful reports. To quantify the loss shareholders realize from untruthful earnings reports, we assign the shareholders a loss function, $Q^s(j - i)$, which depends on the difference between reported earnings j and actual earnings i. Of course, the shareholders do not know i *ex ante*. The preference for truthful reports implies that the function $Q^s(j - i)$ has its minimum value at $i = j$; we let $Q^s(0) = 0$. We assume $Q^s(j - i)$ is convex in its argument (e.g., a quadratic form) to capture the increasing marginal costs as reports deviate more and more from the truth.

The audit committee wishes to minimize the expected payments to the auditor and costs to shareholders of inaccuracies in the financial statements. Details of the audit committee's objective function are given later.

Stage 2: Manager's Proposal

The manager's proposal to the auditor has two parts: a level of earnings and an accompanying contract for nonaudit services. Like the auditor, the manager knows true earnings i. Based on this knowledge, the manager chooses a reporting level j. Where appropriate, we refer to the proposed reported level j given the true level of i as j_i. With the proposed earnings report j, the manager also offers the auditor a nonaudit services contract.

Antle and Demski (1991) discuss the synergies between audit and nonaudit services that allow audit firms to perform nonaudit services more efficiently than outsiders. We capture the economies of scope between audit and nonaudit services by assuming that the auditor can provide a higher level of benefit per consulting hour than can an outside consultant. Let $v_a(x)$ be the function describing the marginal benefit of hour x of consulting services provided by the auditor, and let $v_o(x)$ be the marginal benefit from an outside consultant, with (1) $v_a'(x) < 0$ and $v_a(x) > 0$, and (2) $v_o'(x) < 0$ and $v_o(x) > 0$. Due to the synergies of providing both types of services, the auditor is more efficient, or $v_a(x) > v_o(x)$ $\forall$ x. The level of consulting services the manager would like to purchase from either the auditor x_a^* or an outside consultant x_o^* equates the marginal benefit of the services with the marginal cost of acquiring those services. If the billing rates of the auditor and the competitor are equal, then because the auditor is more efficient, $x_a^* > x_o^*$.[6] These relationships are shown in Figure 2.

Given reported earnings are above a threshold level, we assume the manager's bonus is increasing in the level of reported earnings, where b_j is the bonus when earnings are reported to be j. Below the threshold, there is no bonus. There are $z < N$ states with nonzero bonuses, or equivalently, the threshold is $N - z$. If the manager can gain an additional bonus by persuading the auditor to agree to liberally reported earnings, then he may be willing to expend some additional resources on excess consulting. That is, if the auditor agrees to a favorable earnings report, then there exists $x_a' > x_a^*$ such that the manager is better off purchasing x_a' (hours of) consulting services from the auditor and reporting high earnings than either x_a^* from the auditor or x_o^* from the outsider and reporting low earnings. In this scheme, the x_a' can depend on the reported earnings level j. Rather than specify a functional form for $v_a(x)$, we work directly with the manager's net cost for excess nonaudit services when earnings level j is reported, denoted y_j^m. We define:

[6] Observing the joint provision of audit and nonaudit services from a single audit firm would not be evidence of impaired independence. It is only the misuse of nonaudit services, through excess fees, that leads to independence problems.

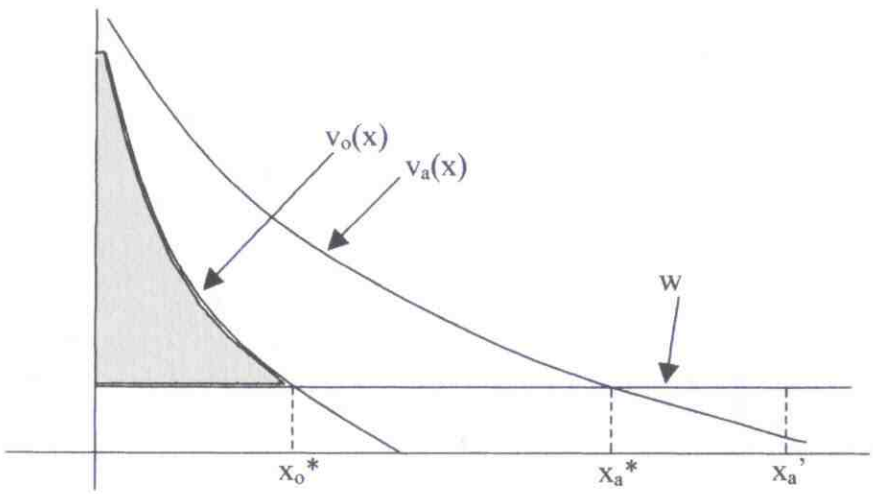
$$y_j^m = (x'_{aj} - x_a^*)w - \int_{x_a^*}^{x'_{aj}} v_a(x)\,dx$$

where w = auditor's hourly wage.

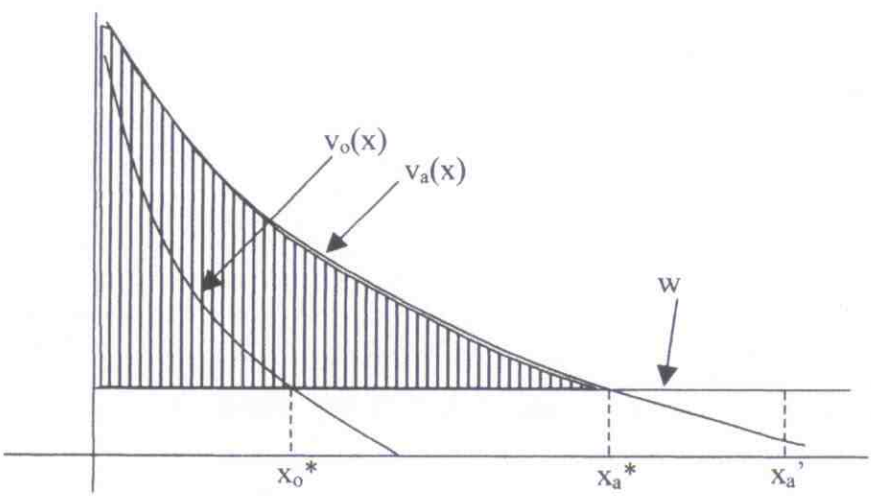
The manager's objective is to maximize his bonus less the (net) cost of the nonaudit

FIGURE 2
Marginal Costs and Benefits of Nonaudit Services from Auditor and Outside Consultant

Panel A: Shaded area is the total benefit to firm purchasing optimal amount of consulting services from outsider (i.e., not the auditor).



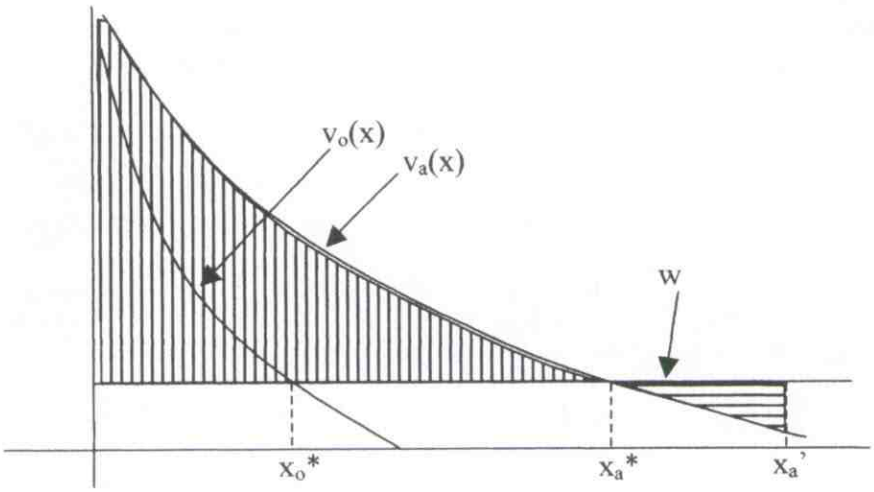
Panel B: Shaded area is the total benefit to firm purchasing optimal amount of consulting services from the auditor.



(*continued on next page*)

FIGURE 2 (continued)

Panel C: The difference in areas between the vertical shaded area and the horizontal shaded area is the total benefit to firm purchasing more than the optimal amount of consulting services from the auditor.



service contract, subject to the existing contract between the auditor and the audit committee. We assume the manager values the net cost (costs less benefits) of services from the audit firm at a rate less than the rate at which he values his bonus. Therefore, the manager is less sensitive to the auditor's compensation costs than is the audit committee. The manager may use the resources not spent on compensating the auditor to consume perquisites, but at a rate of α, where $\alpha \in (0,1]$ is known by all players. The expression for the manager's objective function is given below, after the notation for the auditor's strategy is introduced.

Stage 3: Auditor's Opinion

The auditor accepts or rejects the package (j, y_j^m).[7] If he accepts, then he issues an unqualified opinion on the financial statements and signs the contract for performing the nonaudit services. If he rejects, then he issues a qualified opinion on the financial statements and does not sign the contract for the nonaudit services. We assume that shareholders interpret a qualified opinion negatively.[8] Specifically, we assume that users of financial reports infer the lowest level of earnings in the defensible range, $j = 1$, after a qualified opinion is issued, and compensate the auditor as such.

The auditor's decision to accept or reject, given his knowledge of true earnings i, the y^s audit contract, and the manager's proposal $(j_i, y_{j_i}^m)$ is based on the payments he will receive as well as the expected cost of legal liability from misreporting. We model the

[7] Unlike Antle and Nalebuff (1991), the auditor and manager do not have ongoing negotiations about the report. There is a single offer made, which the auditor accepts or rejects.

[8] This assumption is consistent with Dopuch et al. (1997), who find negative abnormal stock returns associated with the disclosure of qualified audit opinions.

expected legal liability as a function of reported and true earnings $Q^a(j - i)$. Based on the historical patterns of litigation, it is easier to demonstrate damages (losses) from actual rather than hypothetical investments. This asymmetry contributes to the culture of conservatism among auditors. Belkaoui (1985) captures the spirit of it by saying "[t]he principle implies that preferably the lowest values of assets and revenues and the highest values of liabilities and expenses should be reported." Consequently, we assume that auditors have a preference for conservatism (i.e., they prefer to underreport rather than overreport earnings). Arnold and Edwards (1993) also document conservatism in a case study involving going-concern evaluations. To capture the idea of conservatism, we let $Q^a(j - i) = -K$ for $j < i$. For $j \geq i$, we do not restrict the form of $Q^a(j - i)$ except to require that $Q^a(j - i)$ is convex over the entire range of its argument, with $Q^a(0) = 0$.[9] This captures both the asymmetry between conservative and liberal reporting, with the auditors preferring conservative reporting, as well as the increasing marginal cost of accepting inflated earnings reports.

The utility-maximizing auditor will accept the manager's proposal if and only if the net benefit of accepting report j exceeds the net benefit of rejecting the report (where the auditor is compensated as if the report were $j = 1$), or:

$$A_i(j_i, y^m_{j_i}, y^s_{j_i}) = \begin{cases} 1 & \text{if } \; y^s_{j_i} - y^s_1 + y^m_{j_i} - y^m_1 \geq Q^a(j - i) - Q^a(1 - i) \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

where $A_i(j_i, y^m_{j_i}, y^s_{j_i}) = 1$ for an acceptance, and 0 for a rejection.

With this notation for the auditor's strategy, we can express the audit committee's objective function from stage 1 and the manager's objective function from stage 2 as follows. The audit committee's objective function is:

$$\min_{y^s} \sum_i p_i[(Q^s(j_i^* - i) + y^s_{j_i^*})A_i^* + (Q^s(1 - i) + y^s_1)(1 - A_i^*)] \tag{2}$$

where p_i is the *ex ante* probability of earnings level i, j_i^* is the report the manager offers in earnings state i, and A_i^* is the indicator variable for the auditor's optimal accept (1) or reject (0) decision.

The manager's objective function given an observed level of earnings i and the audit contract y^s:

$$\max_{y^m_j, j}(b_j - \alpha y^m_j)A_i^* \tag{3}$$

Stage 4: Follow Through

In the final stage of the process, the financial statements are publicly issued, the auditor is paid for the audit, and the nonaudit services contract is fulfilled. If this period's actual and reported earnings differ, then reported earnings are later restated.

Contingent Audit Fees Disallowed

Rule 302 of the AICPA Code of Conduct prohibits contingent fees for audit services (i.e., fees based on the outcome of the audit). The purpose of this rule was to help maintain

[9] The numerical example at the end of this section contains an example of a functional form that meets these requirements.

objectivity and independence. "Contingent fees result in the auditor having a mutual interest with audit client in the outcome of the work performed" (Securities and Exchange Commission 2000). This prohibition eliminates some obvious independence issues, such as the one in which the firm pays the auditors more for favorable (high earnings) reports than for unfavorable reports. An auditor's legal liability disciplines the auditor from allowing excessively favorable reports when facing a flat fee. In this section, we restrict the audit committee to use contracts with a fixed fee, which we normalize to zero. That is, for any level of reported earnings, the auditor will receive the same level of compensation for his audit services.

As a benchmark case, suppose the manager cannot compensate the auditor for nonaudit services, implying $y_j^m = 0$ for all reports j. In this case, neither principal has the ability to provide incentives to affect the auditor's strategy. As such, the auditor will choose the strategy that maximizes his own utility. Given the auditor's preferences for conservatism, he will accept any report that understates observed earnings.

Now we consider the case in which management can provide incentives over the strategies of the auditor but the audit committee cannot. We allow the manager to award nonaudit service contracts that *de facto* provide contingent compensation.[10] More specifically, the manager creates a payment scheme (corresponding to the award of nonaudit services), based on reported earnings knowing the auditor will use his preferred strategy.[11]

Proposition 1: For any level of earnings i observed, the auditor will accept the pair (N,y) if $y \geq Q^a(N-1)$.

Proof: All proofs are in the Appendix.

The nonaudit service contract offered in Proposition 1 is the lowest cost way for the managers to induce the most egregiously impaired independence. In the next proposition, we examine the conditions under which the manager would pursue such a strategy. The manager balances the costs of compensating the auditor with the benefits of doing so. Proposition 1 focuses on the costs in isolation while Proposition 2 trades off the benefits to the manager (i.e., his bonus) with the required expenditure.

Proposition 2: For any level of earnings i observed, the manager offers the pair $(N,Q^a(N-1))$ if $b_N - b_j \geq \alpha(Q^a(N-1) - Q^a(j-1))$ for all j.

The condition on this proposition implies that the manager's bonuses are increasing significantly with an increased earnings report. The significance is measured relative to the cost to the auditor of agreeing to an exaggerated report, $Q^a(j-1)$. For the auditor to be indifferent between accepting a truthful or a conservative report and an alternate report, regardless of his private information, his compensation for accepting a report of j must offset his highest misreporting cost. This cost would be incurred when true earnings are the lowest ($i = 1$) and reported earnings are the highest ($j = N$). Propositions 1 and 2 highlight the significant influence the manager will have over reporting if he can compensate the auditor via nonaudit services and the audit committee is constrained to fixed audit fees. It is this concern, that auditors may be influenced by excessive *nonaudit* service fees, that

[10] Conceivably, the manager could compensate the auditor for nonaudit services based on the combination of actual earnings and reported earnings. However, we disallow it in our model.

[11] Such contracts seem consistent with the empirical findings in Frankel et al. (2202) that higher nonaudit service fees are associated with greater earnings management.

has prompted the SEC to restrict the provision of nonaudit services to audit clients for certain types of nonaudit services.

Contingent Audit Fees Allowed

To alleviate the independence problem that arises when managers use nonaudit service contracts to persuade auditors to use a particular strategy, the SEC has imposed restrictions on auditors' joint provision of audit and nonaudit services. While this restriction might cut down on the use of nonaudit services to influence auditors, it ignores the possible synergies achieved by using the same firm for both types of services (Antle and Demski 1991). Moreover, it may not necessarily increase the truthfulness of reports, if the auditor's preference is for conservatism.

This section considers how *deregulation* of audit fees can allow for more truthful reporting. If audit fees can be contingent on reported earnings, then the audit committee can determine a payment vector y^s that will "undo" the incentives provided by the manager. Through contingent fees, the audit committee will recover truthful reporting for some parameters. Then, we have the following proposition:

Proposition 3: When contingent audit fees are permitted, if $\min\{Q^s(1),Q^s(-1)\} \geq K$, then a truthful reporting equilibrium exists.

Recall that b_j is the manager's bonus paid when reported earnings are j. Let $D_j = b_j/\alpha$. When $D_N \geq K$, the audit committee offers payments (in the truthful reporting equilibrium) of:

$$y_j^s = \begin{cases} D_N - K & j = 1 \\ D_N & j \in \{2,\ldots,N-z\} \\ D_N - D_j & j > N - z \end{cases} \tag{4}$$

Notice that the audit committee's payments first increase, then decrease. The intuition for this is simple. *Ceteris paribus*, the auditor has a preference for rejecting any report that is not conservative. In the bonus states, the manager would be willing to compensate the auditor for accepting the nonconservative reports. On the other hand, the manager would never compensate the auditor (via nonaudit services) for a report in a non-bonus state (i.e., where his bonus is zero), and it is precisely in that region that audit committees must provide the incentives.

Given the payments from the audit committee above, the manager will offer:

$$(j, y) = \begin{cases} (i,0) & i < N - z + 1 \\ (i,D_i) & \textit{otherwise} \end{cases}$$

Off equilibrium (i.e., if the audit contract is different from that described by Equation (4)), the manager will select the pair that maximizes Equation (3). The manager is providing a significant portion of the incentives to accept truthful reports in bonus states. The audit committee, by providing strong incentives to the auditors in the non-bonus states, cuts off the manager's ability to get overreporting and, thus, "undeserved" bonuses.

Given the payments of Equation (4) and the offered pair described in the previous paragraph, the auditor will accept the contracts and report. Any unexpected offers (off equilibrium) will be evaluated using Equation (1). Because the audit committee and the

manager know the auditor's decision rule, they prefer to offer the contracts and reports given above.

If instead $D_N < K$, the audit committee offers payments of:

$$y_j^s = \begin{cases} 0 & j = 1 \\ K & j \in \{2,...,N - z\} \\ K - D_j & j > N - z \end{cases}$$

As before, the manager and auditor maximize their net benefits. This case is somewhat less interesting, in that independence would not be as severely impaired as in the first case. That is, the amounts that the managers would have to pay the auditors to overreport exceed the benefits (higher bonuses), even if audit committees could not pay contingently.

Several points regarding Proposition 3 are worth noting. The equilibrium payments are different in the two regions $D_N \geq K$ and $D_N < K$ to ensure that the audit committee makes non-negative payments in all states. Because the audit committee represents the overall body of users of financial statements, it is reasonable to imagine that they would have the highest costs of misreporting ($Q^s(1) > K$ and $Q^s(-1) > K$), so a contingent-fee regime has the potential to increase investors' welfare. The audit committee effectively *undoes* the incentives provided by the manager via compensation for lower level earnings reports. If the auditor and the shareholders' preferences were perfectly aligned (i.e., the auditor prefers truthful reporting), there would be no pure strategy equilibrium.[12]

Figure 3 graphically depicts the equilibrium compensation vectors determined by Proposition 3. In Panel A, when the manager has the greatest ability to influence the auditor, the manager offers payments that are increasing in his bonus (i.e., higher consulting fees for high earnings levels) and the audit committee's payments start low, increase, and then decline (assuming the bonus payments are strictly increasing). The net compensation is weakly increasing in reported earnings, but only enough to get the auditor to accept a truthful report, not enough to get the auditor to accept overreporting. In Panel B, where the cost of motivating the auditor to accept a report j equal to N, independent of his private information, is too high for the manager, the audit committee must make more of the total contribution to get the auditor to move away from their preference toward conservatism.

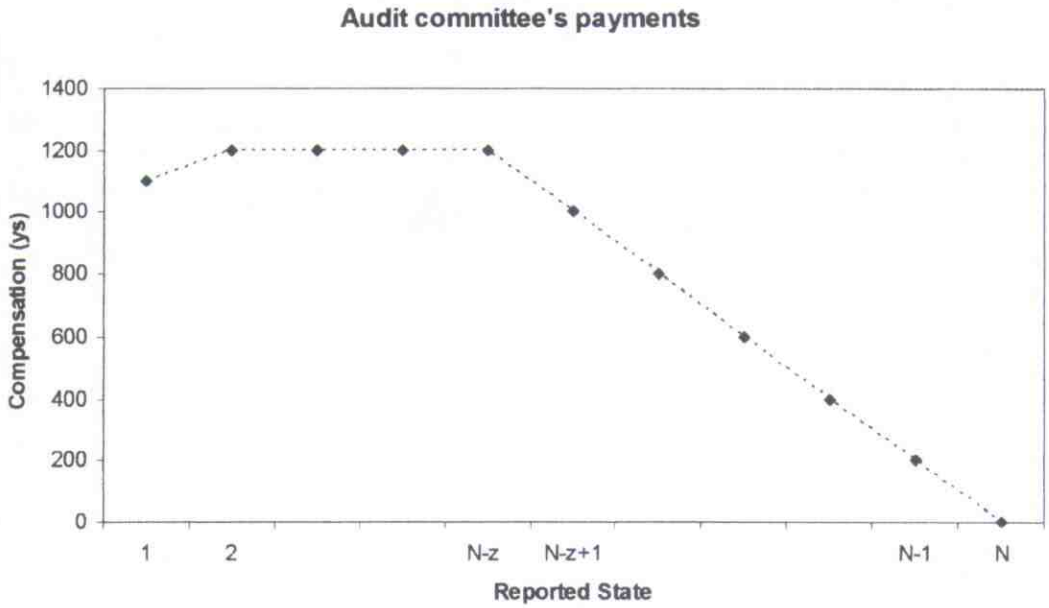
A Numerical Example with $N = 4$, $z = 2$

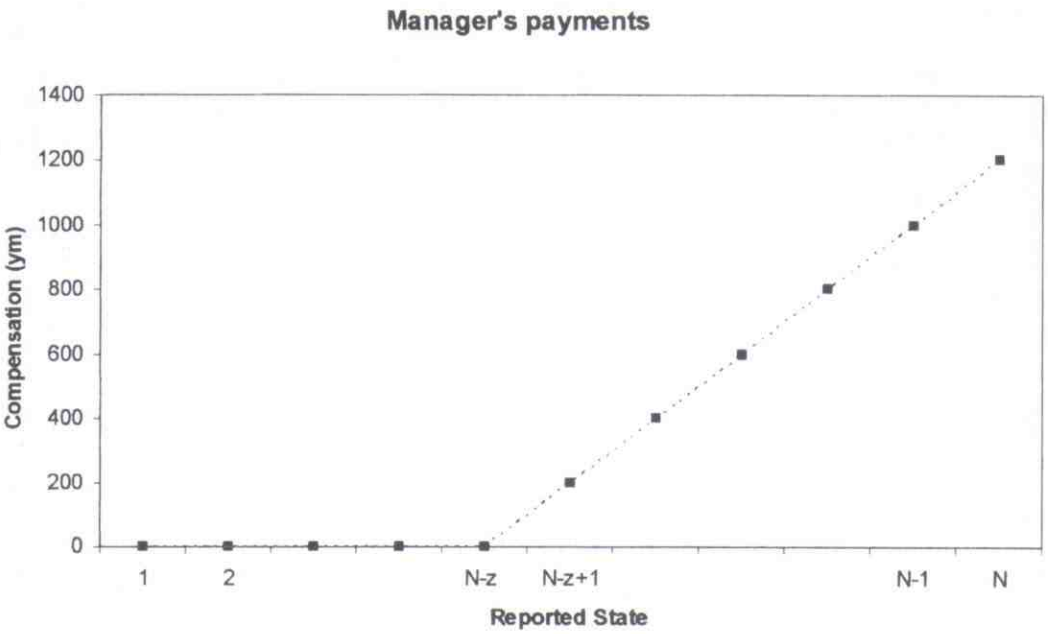
We use the parameters given by Table 2. If the auditor is not compensated for excess nonaudit services, then he will only accept conservative earnings reports. The shareholders incur high error costs, as there is less information in audited earnings. Now suppose the manager offers excess nonaudit services and an earnings report of $j = 4$. In the case of noncontingent audit fees, the condition from Proposition 2 is satisfied ($b_N - b_j \geq \alpha(Q^a(N - 1) - Q^a(j - 1))$ for all j) so the manager offers the pair (4, 300), and the auditor will accept the report/nonaudit service pair for every realization of true earnings. The auditor receives a fixed payment from the audit committee. If he accepts the report, then he will earn 300 for excess nonaudit services, and if he rejects the report, he will not perform those additional nonaudit services for the firm.

[12] Suppose the manager offers compensation to move the auditor away from the truth. In turn, the audit committee responds by offering compensation to reinstate the truth. The manager will certainly want to change his strategy, since his payments are higher than they were initially, and he is not getting any additional bonus. For this reason, this paper focuses on relaxing the restriction on contingent fees, rather than the rule that prohibits auditors from holding shares in their clients' stock (i.e., an action that would more closely align auditor and shareholder interests). This argument rules out $K = 0$ in our model.

FIGURE 3
Shape of Audit Committee and Management Payments in Equilibrium

Panel A: Audit Committee and Manager Payments to Auditor if $D_N \geq K$

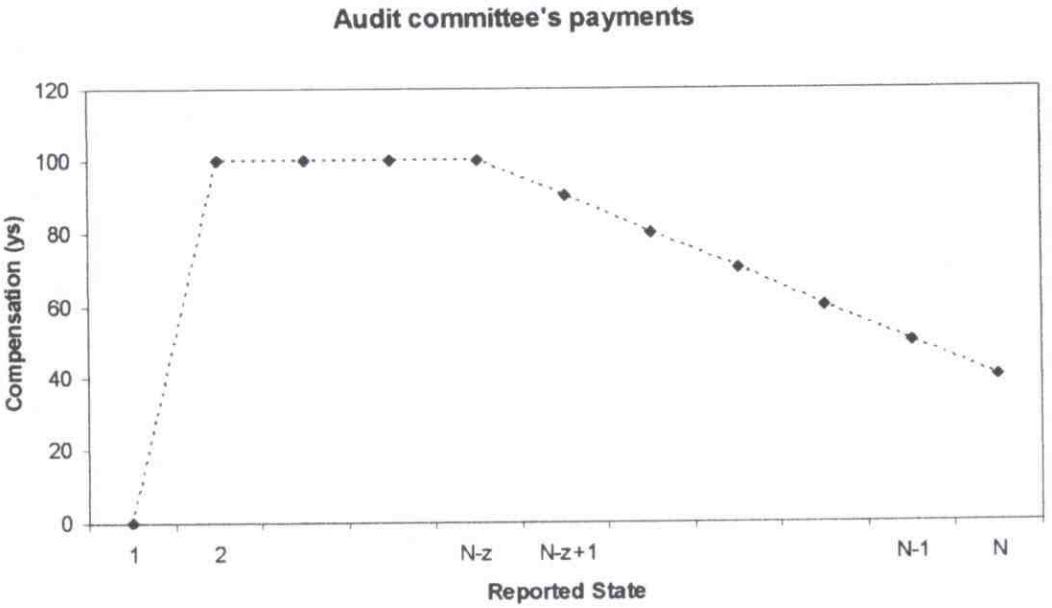




(continued on next page)

FIGURE 3 (continued)

Panel B: Audit Committee and Manager Payments to Auditor if $D_N < K$



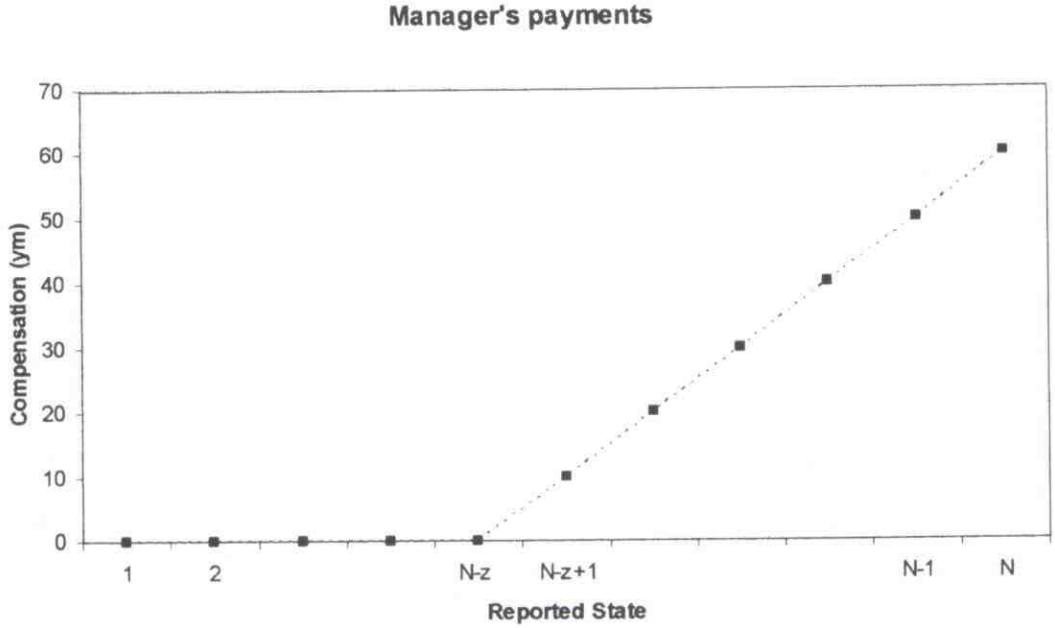


TABLE 2
Parameters for Numerical Example

N = number of states;	4
z = number of bonus states;	2
b_j = manager's bonus in state j;	$2(j-2)$
a = manager's compensation sensitivity;	0.01
$Q^a(j-i)$ = error cost for Auditor;	$\begin{cases}(j-i)K & j \geq i-1 \\ -K & j < i-1\end{cases}$
K = from auditor cost function; and	100
$Q^s(j-i)$ = error cost for shareholder:	$350(j-i)^2$

Here, reported earnings are completely uninformative, since the earnings level $j = 4$ is always reported and accepted, and the manager gets a bonus regardless of the true state.

Turning to the case in which audit fees can be contingent on reported earnings, the manager offers (1, 0) when true earnings $i = 1$, (2, 0) when $i = 2$, (3, 200) when $i = 3$, and (4, 400) when $i = 4$. The audit committee offers, for reported states 1 through 4, $y^s = [300, 400, 200, 0]$.

If the auditor accepts the manager's report pair, then his costs are zero (since the report is truthful) and his benefits are 300 when the true earnings level is 1, and 400 otherwise. Alternatively, the auditor could reject the report, and issue a qualified opinion, whereby he is rewarded as if the reported earnings level is 1. Consider the case when the true earnings level is 2. If the auditor accepts the pair (2, 0), then he receives 400 in compensation from the audit committee, and incurs zero costs (as the report is truthful). On the other hand, if he rejects, then he receives 300, and gets the "conservatism" benefit of 100, for a total of 400. Since he is no better off than accepting the report, he will not reject (qualify the report). An identical argument follows for all other earnings levels and offered pairs.

IV. EXTENDING THE MODEL TO A MULTIPERIOD FRAMEWORK

One of the most salient features of the auditor-client relationship is its ongoing nature. There are incentives for both the auditor and the client to maintain the relationship. In particular, the client's decision to switch auditors is viewed unfavorably by market participants.[13] In this section, we extend our model to incorporate multiple periods. Under the assumption that a firm is a going concern, we consider an infinite horizon model. In each period, the manager makes an offer and the auditor is faced with an accept/reject decision. Although the values of the earnings levels might shift over time, we assume that in every period there are N possible levels for earnings and that the manager is paid a bonus in the top z states.

The audit committee makes a binding recommendation regarding the selection or replacement of the independent auditor after observing the most recent earnings report and opinion. If the audit committee replaces the current auditor, then there are at least two rival auditors (of equal quality) who can conduct future audits. The rival auditors have no prior relationship with this client. The incumbent auditor has a cost advantage in providing audit services since he is familiar with the company's operations, procedures, and the industry

[13] For example, Fried and Schiff (1981) document a negative market reaction to auditor switches.

setting and has developed efficiencies through prior audit engagements. Thus, if the incumbent auditor is fired, then the firm will incur a switching cost of g, which can be loosely interpreted as the total of (1) search costs, (2) the costs to familiarize the rival auditor, and (3) the increased probability of problems that arise due to lack of experience with the firm.[14] We let q_j be the probability that the incumbent auditor is retained by the audit committee when the reported earnings are j. Figure 4 provides the timeline for the multiperiod game.

Contingent Audit Fees Disallowed

In the multiperiod setting, the auditor's decision is now a function of both current and future expected compensation.[15] In this section, we assume the audit committee cannot pay the auditor contingently, but does have the ability to make retention (or replacement) decisions. The audit committee, as seen in Figure 4, commits to the conditional retention probabilities prior to the report. If the auditor believes that the contingent portion of his total income depends solely on managerial decisions, then he may be willing to accept overstated reports to maintain access to current and future consulting revenues. However, the threat of dismissal by the audit committee can effectively discipline the auditor.

If all N states are equally likely, then the auditor's present value of accepting a truthful report with the associated nonaudit services can be expressed recursively as:

$$V = \frac{1}{N}\sum_{i=1}^{N} y_i^s + y_i^m + q_i \beta V \tag{5}$$

where V is the value of the total engagement and $\beta \in (0,1)$ is the one-period discount factor.

Using the fact that the audit committee pays a fixed compensation y_*^s and rearranging we have:

$$V = \frac{1}{N}\left(N y_*^s + \sum_{i=1}^{N} y_i^m + \sum_{i=1}^{N} q_i \beta V\right); \tag{6}$$

$$V = \frac{N y_*^s + \sum_{i=1}^{N} y_i^m}{N - \beta \sum_{i=1}^{N} q_i}. \tag{7}$$

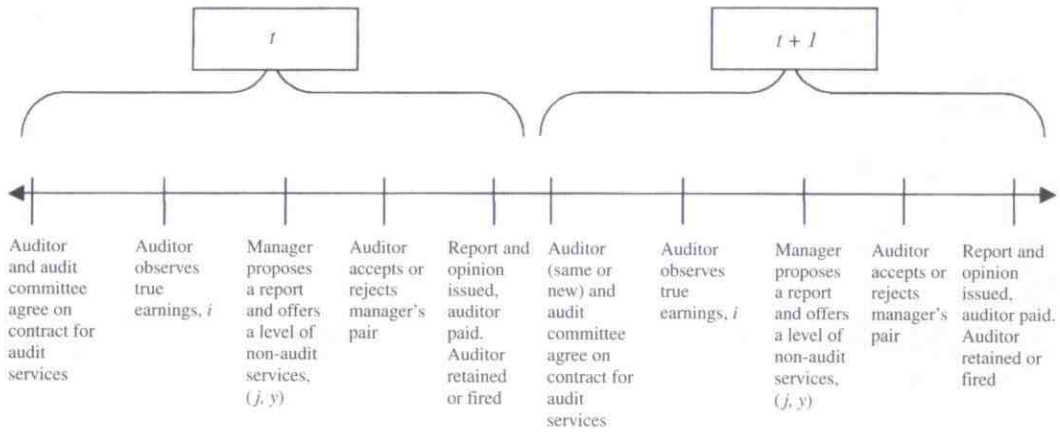
The value V is increasing in total current compensation, the retention rates, and the discount factor. The audit committee must then determine cost-minimizing compensation and retention levels that motivate the auditor to accept only truthful reports in every period.

The audit committee uses the following program for a truth-telling equilibrium:

[14] The Quality Control Inquiry Committee of the SEC Practice Section showed that allegations of audit failure occur almost three times as often when the audit firm is performing its first or second audit of the company.

[15] DeAngelo (1981) discusses the problem of independence in a multiperiod framework, concluding that it is not "low balling" in the first period that impairs auditor independence, but rather the auditor's possibility of gaining rents in subsequent periods.

FIGURE 4
Timeline of Events in Multiperiod Setting



$$\min_{y^s_*, q_i} y^s_* + \frac{g}{N}\sum_{i=1}^{N}(1 - q_i)$$

s.t.

$$y^m_j + y^s_* + q_j\beta V \geq y^m_1 + y^s_* + q_1\beta V + K \qquad j \in \{2,...,N\}. \tag{8}$$

$$y^m_{j'} + y^s_* + q_{j'}\beta V - Q^a(1) \leq y^m_1 + y^s_* + q_1\beta V + K \qquad j' \in \{2,...,N\}$$

$$y^m_2 + y^s_* + q_2\beta V - Q^a(1) \leq y^m_1 + y^s_* + q_1\beta V$$

Recall that g is the cost of replacing the current auditor. The first set of constraints ensures that accepting truthful reports is more attractive to the auditor than rejecting them. The constraint in the second line ensures that the auditor will reject overstated reports. The minimum cost of overstatement is $Q^a(1)$, so we use this on the left-hand side because it is the most restrictive. Finally, the last constraint is for the special case of true earnings $i = 1$, where a rejection is not "conservative."

Proposition 4: In a truth-telling equilibrium, the probability of retaining the auditor increases from state 1 to state 2, is constant for non-bonus states 2 through $N - z$ and is decreasing in the bonus states $N - z + 1$ to N.

The probability of firing the auditor increases the higher the reported earnings, conditional on being in a bonus state. If reported earnings are not in a bonus state, then the probability of firing the auditor is fairly low, except when reported earnings are as low as possible (i.e., interpreted to be level 1, in the case of a qualified opinion). Intuitively, the auditor needs to be "punished" for rejecting nonconservative earnings (his natural preference) or accepting very high earnings (for which the manager has provided him incentives). Since the audit committee is restricted to a fixed payment, it mimics the single-period-contingent-fee case through penalties for reports. In Proposition 3, the audit committee's

payments increased from state 1 to 2, then flattened, and finally decreased from $N - z$ to N. Here the retention probabilities follow exactly the same pattern. The audit committee is able to mimic contingent fees, and achieve a truthful reporting environment.

This result hinges on the fact that in every period, there is a positive probability of continuing the auditor-client relationship. If auditor rotation were mandatory, then the players would face the same problem as the single-period analysis in the period immediately before the auditor would be rotated. Backward induction would lead to an unraveling of the truth-telling equilibrium. Given a continued restriction on contingent audit fees, mandatory rotation could have the effect of decreasing auditor independence. On the other hand, if the ban on contingent audit fees were removed, then mandatory rotation would not necessarily diminish independence, as the audit committee could adjust its fees to motivate truthful reporting.

In determining whether to retain or replace the incumbent, "[t]he outside auditor [should] discuss with the audit committee the auditor's judgments about the quality, not just the acceptability, of the company's accounting principles. The discussion should include...the degree of aggressiveness or conservatism of the company's accounting principles and underlying estimates" (Blue Ribbon Committee 1999). Whether audit committees have lived up to their responsibility to play an active role in the retention/replacement decision is an open question. Still, the opportunity for disciplining in a multiperiod framework exists, and has similar characteristics to the single period, contingent fee model presented in the previous section.

In our model, firing the auditor is not a sign of dissent. The threat of firing must be credible, and therefore auditors are fired with some probability despite the fact that they accept a truthful report. The model suggests that auditors are most likely fired when outcomes (and thus reported earnings) are extreme. Typically, researchers have assumed that firing is more likely when auditors require the firms to report a low earnings number or when auditors issue qualified reports. Our analysis is consistent with this to a point, but the reason for the negative market reaction would be the fact that earnings are low (or lower than reported), not that the auditor was removed. We also have the flip side: auditors will also be more likely to be fired when reported earnings are very high. It remains an empirical question whether there is a nonmonotonic relationship between firings and earnings, and whether we can identify which firms will be penalized for an auditor switch (i.e., those with correctly low earnings) and which should be rewarded (i.e., those with correctly high earnings) for ensuring the independence of their auditors.

For the remainder of this section, we consider a two-state ($N = 2$) world in which the manager is paid a bonus in the high state only ($z = 1$).

Then, the audit committee's optimization program becomes:

$$\min_{y^s_*, q_i} \quad y^s_* + \frac{g}{2}(2 - q_1 - q_2) \tag{9}$$

$$\text{s.t.} \quad K \leq (y^m_2 - y^m_1) - (q_1 - q_2)\beta V \leq Q^a(1) \tag{10}$$

Since $y^m_1 \leq y^m_2$ and $q_1 \geq q_2$, we set $y^m_1 = 0$ and $q_1 = 1$, their cost-minimizing levels. Because of the structure of the constraints, one of three cases holds. Either the left constraint is binding, the right constraint is binding, or neither constraint is binding. If the left constraint is binding, then we can substitute Equation (7) into that constraint

($K = (y_2^m - y_1^m) - (q_1 - q_2)\beta V$), and rewrite y_*^s in terms of q_2. Then, we have the unconstrained objective function:

$$\underbrace{\frac{(y_2^m - K)(2 - \beta(q_2 + 1)) - y_2^m\beta(1 - q_2)}{2\beta(1 - q_2)}}_{y_*^s} + \frac{g}{2}(1 - q_2). \tag{11}$$

Differentiating and setting equal to zero, we solve for the optimal q_2, where:

$$q_2 = 1 - \sqrt{2\frac{(y_2^m - K)(1 - \beta)}{\beta g}}. \tag{12}$$

Then, substituting q_2 into the expression for y_*^s we have:

$$y_*^s = \frac{\sqrt{2g(y_2^m - K)(1 - \beta)} - \sqrt{\beta}K}{2\sqrt{\beta}}. \tag{13}$$

Similarly, if the $Q^a(1)$ side of the constraint is binding, then the substitution results in the analogous expressions for q_2 and y_*^s, with $Q^a(1)$ in place of K:

$$q_2 = 1 - \sqrt{2\frac{(y_2^m - Q^a(1))(1 - \beta)}{\beta g}}; \tag{14}$$

$$y_*^s = \frac{\sqrt{2g(y_2^m - Q^a(1))(1 - \beta)} - \sqrt{\beta}Q^a(1)}{2\sqrt{\beta}}. \tag{15}$$

The values of q_2 and y_*^s from Equations (14) and (15) give better (i.e., lower) values of the objective function than those in Equations (12) and (13) by the following logic.

The mathematical program is a minimization problem. The q_2 expression (12) is increasing in K and the objective function (9) is decreasing in q_2; similarly, the y_*^s expression (13) is decreasing in K and the objective function is increasing in y_*^s. Finally, $Q^a(1) > K$ (by the assumptions that $Q^a(-1) = -K$, $Q^a(0) = 0$, and $Q^a(j - i)$ is convex in its argument).

The third possibility, that neither constraint is binding, gives us an unconstrained minimization problem, the solution to which is $y_*^s = 0$ and $q_2 = 1$. In other words, the audit committee does not offer compensation and always retains the auditor for the next period. This case will only support a truthful equilibrium if $D_2 < Q^a(1)$ (i.e., if the cost of getting overstatements is too high).

The payment y_*^s from Equation (15) is increasing in the probability of retention. We have an interior solution in which q_2 is strictly less than 1 as long as and $y_2^m > Q^a(1)$ and $\beta/(1 - \beta) \geq 2(y_2^m - Q^a(1))/g$. If g is very low, then the audit committee will prefer to "discipline" the auditor with the threat of firing (i.e., a low q_2). However, as g increases, the audit committee will trade off additional compensation with the probability of firing the auditor to make the shareholders' interests (i.e., truthful reports rather than optimistic reports). The auditor's discount rate also plays a role in the trade-off between q_2 and y_*^s. If the auditor values future revenues from audit services very highly (i.e., high β), then the

audit fees in each period will be lower, but the probability of retaining the auditor will increase. Formally:

Proposition 5: In the multiperiod game without contingent audit fees with $N = 2$ and $z = 1$, if $\beta/(1 - \beta) \geq 2(D_2 - Q^a(1))/g$ and $D_2 \geq Q^a(1)$, a truth-telling equilibrium exists.

The audit committee contracts with the auditor using the following compensation/retention scheme:

$$y^s = \left[\frac{\sqrt{2g(D_2 - Q^a(1))(1 - \beta)} - \sqrt{\beta}Q^a(1)}{2\sqrt{\beta}}, \frac{\sqrt{2g(D_2 - Q^a(1))(1 - \beta)} - \sqrt{\beta}Q^a(1)}{2\sqrt{\beta}}\right]$$

$$q = \left[1,1 - \sqrt{2\frac{(D_2 - Q^a(1))(1 - \beta)}{\beta g}}\right].$$

Managers report truthfully, offering the pair (1, 0) when true earnings are $i = 1$ and $(2, D_2)$ when true earnings are $i = 2$. Auditors accept the contracts and report.

In contrast to the single-period analysis, the audit committee can provide incentives to induce the auditors to accept truthful reports even without contingent fees in the multiperiod analysis. The intuition for this is simple. Since the perpetuity value of an audit engagement is quite high, the threat of firing disciplines the auditor to provide unqualified opinions only when the report is truthful. By basing the decision to retain or fire the auditor on the outcome of the reports, the audit committee can *de facto* make auditor's compensation contingent. Despite the fact that auditors will follow a truth-telling strategy in equilibrium, some auditor switches take place.

The assumption of $N = 2$ allows us to solve for an analytical solution for the audit committee's strategy. For $N > 2$, a truth-telling equilibrium will exist when the optimization problem (8) has a solution, that is, the objective function is continuous and bounded and the feasible region is a non-empty, closed set. The objective function is bounded by zero, and the weak inequalities make the feasible region a closed set. The conditions for existence of a truth-telling equilibrium for general N will therefore be the constraints themselves (i.e., the conditions for a non-empty feasible region).

The infinite horizon is a necessary assumption. If there are T periods in the model, then the auditor cannot be motivated to tell the truth in period T for the reasons given in the single period analysis. Then, in period $T-1$, the auditor knows that the value of retaining the client is zero, since the shareholders will not pay more in the last period than the reservation level of the auditor. So, in period $T-1$ the auditor cannot be motivated with the threat of firing. The entire equilibrium unravels, and a finite period model simplifies to a repeated single period game.

The clean surplus nature of accounting requires accounting numbers to reverse themselves in subsequent periods, reducing the severity of the independence problem. We do not model this additional cost of misreporting in our multiperiod analysis. However, since we focus on truthful equilibria, there is no misreporting and thus no "settling up."

Contingent Audit Fees Allowed

In this section, we allow the audit committee to write contingent contracts with auditors. The cost of such a contract will be (weakly) lower since the audit committee could offer

the noncontingent contract given by Proposition 5 to motivate acceptance of truthful reports only. In equilibrium, $y_2^s = 0$ and $q_1 = 1$. Because the manager is attempting to influence the auditor by offering nonaudit revenues for accepting a report of $j = 2$, the shareholders will incur additional costs if they (1) make acceptance of $j = 2$ more attractive (i.e., $y_2^s > 0$) or (2) make acceptance of $j = 1$ less attractive (i.e., $q_1 < 1$). We have the following proposition.

Proposition 6: In the multiperiod game with contingent audit fees allowed with $N = 2$ and $z = 1$, if $D_2 \geq Q^a(1)/2$, a truth-telling equilibrium exists. The audit committee has lower expected costs than under a regime banning contingent fees.

The audit committee contracts with the auditor using the following compensation/retention scheme:

$$y^s = \left[\frac{\sqrt{g(2D_2 - Q^a(1))(1 - \beta)} - \sqrt{\beta}Q^a(1)}{2\sqrt{\beta}}, 0\right];$$

$$q = \left[1, \frac{1}{\beta} - \sqrt{\frac{(2D_2 - Q^a(1))(1 - \beta)}{\beta g}}\right].$$

As before, managers report truthfully, offering the pair (1, 0) when true earnings are $i = 1$ and $(2, D_2)$ when true earnings are $i = 2$. Auditors accept the contracts and report.

Overall, the audit committee is better off when it can offer contingent fees in addition to contingent retention. Since the managers use the same strategy in both cases, the audit committee can always (weakly) improve its objective when fewer constraints are imposed. That is, it could simply resort to the y^s and q from the previous proposition, but chooses a new y^s and q whenever the new compensation/retention pair improves the value of its objective function.

The result that the audit committee's expected costs are reduced generalizes to $N > 2$. The audit committee's optimization problem in the contingent fee regime is a less constrained version of the optimization problem given by Equation (8) in which all the y_j^s can vary.

Numerical Example, continued

Continuing with the parameters given in Table 2, we extend the numerical example for the multiperiod analysis. Let $g = 10{,}000$ and $\beta = .98$; V is calculated from the other parameters.

If the manager offers (1, 0) when earnings $i = 1$, (2, 0) when $i = 2$, (3, 200) when $i = 3$, and (4, 400) when $i = 4$, then the audit committee's best responses as part of a truth-telling equilibrium in the two regimes, contingent and noncontingent fees, are:

Contingent Audit Fees Not Allowed	Contingent Audit Fees Allowed
Audit Fee: y^s= [135, 135, 135, 135]	Audit Fee: y^s= [0, 100, 0, 0]
Retention: q = [0.99, 1, 0.99, 0.96]	Retention: q = [1, 1, 1, 0.97]

When contingent audit fees are not allowed, the audit committee can only discipline the auditor by firing him (which is costly to both). By setting compensation to an amount above zero, the audit committee can reduce the frequency with which it fires its auditor, and save significantly. If audit fees were zero, then the value to the auditor of retaining the audit in future periods, regardless of true earnings, goes down. Therefore, firing the auditor is not a particularly effective disciplining mechanism, and thus it must be used much more extensively. In particular, if audit fees are fixed at zero, then the audit committee would have to fire the auditor 25 percent of the time when reported earnings were 4. The cost to the audit committee of the optimal firing rule and compensation above is 294.

If contingent audit fees are allowed, then the audit committee would pay the auditor zero unless reported earnings are 2, in which case the audit fee would be 100. The auditor will never be fired unless reported earnings are 4, in which case the auditor is retained with probability 0.97. The cost to the audit committee in this environment is 88, a significant savings over the noncontingent fee case. The intuition behind the solution is fairly simple. Firing is costly, so it should be done as infrequently as possible. To insure that rejection is not preferred to accepting a truthful report, the value to the auditor must be $(N - 1)K$ in state N. In state 2, the manager is not providing any compensation to the auditor, so the audit committee must pay 100 for the auditor to accept the truthful report. Alternatively, consider an offer of 400 for a report of 4. Here, state 4 is "too appealing," in that the auditor would accept a report of 4, regardless of true earnings. To reduce the value of accepting a report of 4, the audit committee fires the auditor with positive probability when a report of 4 is issued.

V. CONCLUSION

This paper uses a stylized model to explore one way in which an audit committee, acting on behalf of shareholders, can discipline the auditor-manager interactions to ensure truth-telling in audited financial reports. This work is related to the ongoing debate regarding an exclusionary ban of nonaudit services to audit clients. Our results show that in a single-period framework, a less regulatory approach, that of lifting the prohibition on contingent audit fees, can create the desired result of truthful reports. The more regulatory approach, that of banning nonaudit services to audit clients, would not accomplish this. Moreover, professional services firms have been described as starfish,[16] with legs representing the businesses: auditing, tax assistance, risk management, IT consulting, etc. When one leg is lost, a new leg grows back in its place. For example, Arthur Andersen "regrew" nonaudit services after it split with Andersen Consulting. Thus, a ban on currently provided nonaudit services (e.g., management advisory services) cannot anticipate growth in *new* types of nonaudit services (e.g., global risk management).

Further, when we extend the model to a multiperiod framework, we demonstrate the existence of a truth-telling equilibrium both with and without contingent audit fees. In a multiperiod setting, the audit committee essentially has the power to pay contingently, even if the payments in any one period are noncontingent. There is no proscription against the audit committee adjusting the retention rate of auditors based on the outcome of the audit, and a lower retention rate can serve as a punishment to the auditor. However, if the costs of auditor switching is high, then firms would prefer to discipline their auditors via compensation rather than retention rate.

We study both the single-period model and the multiperiod model because the latter unravels in a finite horizon. In fact, some firms have a policy of periodically rotating the

[16] Rick Antle, Testimony at SEC hearings, Washington D.C., July 25, 2000.

CPA firm that conducts their audit (Addams et al. 1996). At first glance, this policy may appear to enhance auditor independence, but our analysis suggests that firms with such a policy that receive nonaudit services from their auditors are more likely to have overstated earnings, i.e., less independent auditors. It is an empirical question whether audit failures and auditor litigation are more likely for firms with rotation policies.

In both parts of our analysis, the single-period model with contingent audit fees and the multiperiod model with or without contingent audit fees, the audit committee should "punish" (via lower payment or lower retention rate) the auditor for a higher earnings report, i.e., one which garners management a higher bonus. By following such a strategy, the audit committee can ensure truthful reporting. Our analysis is based on the auditors as profit-seeking entities, ignoring the ethical considerations surrounding honesty. Auditing professionals have found this suggestion surprising (among other adjectives), as noncontingent fees have always been believed to promote auditor independence. We feel the changing nature of the auditing environment warrants a reexamination of the ban on contingent fees.

In our model, we assume the following classification of the three players: managers prefer optimistic reports, the audit committee representing shareholders prefers the truth, and auditors prefer understated reports. We recognize that auditors may have incentives not to underreport, including maintaining a good relationship with their clients. For qualitatively similar results, we simply need a divergence between the preferences of managers, shareholders, and auditors. For example, we could assume that managers have a preference for great optimism, shareholders have a preference for slight optimism, and auditors have a preference for the truth.

In this paper, the manager's bonus compensation scheme is exogenously determined. Further work is required to derive the optimal bonus scheme to encourage managerial effort and discourage opportunities for managerial influence over audited reports. Additionally, we have made the implicit assumption that the auditor executes the audit competently, ignoring the auditor's effort decision. Although this is probably a reasonable assumption among a class of audit firms (e.g., Big 4), one could consider motivating auditor inputs rather than focusing solely on outputs. Finally, we have ignored the effects of competition for the audit. An examination of competition could focus on bidding strategies or auditor specialization.

The SEC's debate over auditor independence has polarized the business community. Academic research examining issues of independence has the opportunity to add to the current debate and consider novel remedies. We view this paper as a step toward addressing some of the issues that arise given the current regulatory environment and consider how changes to this environment affect auditor independence and truth-telling.

APPENDIX

Proof of Proposition 1

From (1), the auditor accepts the pair if $y_j^s - y_1^s + y_j^m - y_1^m \geq Q^a(j - i) - Q^a(1 - i)$. The audit committee's payments are normalized to 0 at this point, eliminating the y_j^s and y_1^s terms. If the auditor rejects the proposal, then he refuses both the nonaudit service contract and the report, or $y_1^m = 0$. The auditor's acceptance decision is then: accept if $y \geq Q^a(N - i) - Q^a(1 - i)$. For this to be true for all i, the RHS must be the largest value possible, which occurs at $i = 1$. Therefore, the relevant condition is $y \geq Q^a(N - 1)$.

Proof of Proposition 2

The manager maximizes $(b_j - \alpha y_j^m)A_i^*$ by making a $(j_i, y_{j_i}^m)$ offer to the auditor. Compare $(N, Q^a(N - 1))$ and any other acceptable offer $(j', Q^a(j' - 1))$. Note that if the excess

nonaudit services offered with a report of j' were less than $Q^a(j' - 1)$ the pair would be rejected. If the manager offers $(N,Q^a(N - 1))$, then his net benefit is $b_N - \alpha Q^a(N - 1)$, whereas if he offers $(j',Q^a(j' - 1))$, his net benefit is $b_{j'} - \alpha Q^a(j' - 1)$. Since $b_N - b_j > \alpha[Q^a(N - 1) - Q^a(j - 1)]$ for all j, it holds for j' and therefore the manager prefers to offer $(N,Q^a(N - 1))$.

Proof of Proposition 3

We present the proof for $D_N \geq K$. The proof for $D_N < K$ is analogous.

Auditor

Acceptance and rejection are the same for $i = 1$. Given the true state is $2 \leq i \leq N - z$, the manager offers $(i,0)$ and the audit committee offers D_N. The value to the auditor of rejecting is the payment in state 1, $D_N - K$ plus the benefit of conservatism, or K, for a net of D_N. The value of accepting is the payment in state i, D_N, plus zero benefit (and zero cost) since the report is truthful. So, the auditor will accept. For states $N - z + 1$ through N, rejection nets the auditor D_N and acceptance nets the auditor $D_N - D_j + D_j = D_N$, and thus the auditor will accept.

Manager

Consider changing the report/nonaudit service pair. If the true state is i, and the manager offers (j,D_j), then the auditor will accept. This provides no net benefit to the manager (he receives b_j, but it is consumed by the necessary payments to the auditor), and, thus, we can rule out this defection. If the manager offers $y < D_j$ with a report of j, then the auditor will reject. If the manager maintains a truthful report, but tries to shave the cost of the nonaudit services, then the pair will be rejected.

Audit Committee

For $D_N > K$, the audit committee makes positive payments in states $1,...,N - 1$. The payments are increasing from states 1 through $N - z$, and then decreasing from states $N - z$ to N. Consider a reduction in any single payment.

$j = 1 \Rightarrow$ Auditor accepts overreport	Minimum cost $Q^s(1) > K$
$j \in \{2,...,N - z\} \Rightarrow$ Auditor rejects	Savings K
	Minimum cost $Q^s(-1) > K$
$j \in \{N - z,...,N\} \Rightarrow$ Auditor rejects	Savings $< K$
	Minimum cost $Q^s(N - z) > K$

It follows, using the same reasoning as above (and the fact that the payment in state N is already zero) that no reductions in a combination of states is preferred. Since the equilibrium has truthful reporting, the audit committee does not want to increase any payment.

Proof of Proposition 4

Because the manager receives no bonus in state $j \in \{1,...,N - z\}$, reports in this region will come with zero nonaudit service levels ($y_j^m = 0$). The first set of constraints can be reduced to:

$$q_j \beta V \geq q_1 \beta V + K \qquad \text{for} \quad j \in \{2,...,N - z\} \tag{16}$$

It follows directly that $q_2 > q_1$. The second set of constraints can be reduced to:

$$q_j \beta V \leq q_1 \beta V + K + Q^a(1) \qquad \text{for} \quad j \in \{2,...,N - z\} \tag{17}$$

Because of the cost (g) associated with an auditor switch, the cost minimizing q_j will be at the top of the range allowed by the constraint. That is the constraint will be binding, so $q_j \beta V = q_1 \beta V + K + Q^a(1)$ for non-bonus states. The equation does not depend on j in this range, so the q_j s are flat.

For bonus states, the second set of constraints includes a non-zero y_j^m:

$$q_j \beta V \leq q_1 \beta V + K + Q^a(1) - y_j^m \qquad \text{for} \quad j \in \{N - z + 1,...,N\} \tag{18}$$

The constraint will once again be binding, and because the manager's bonus is increasing in j, the y_j^m are increasing in j, so the q_j are decreasing in j for states $N - z + 1$ through N.

Proof of Proposition 5

The audit committee's payment and retention schemes obtain by substituting D_2 for y_2^m in Equations (12) and (13) and is therefore by definition the audit committee's optimal response to the manager's offering (1, 0) when $i = 1$ and $(2,D_2)$ when $i = 2$. Equation (10) is generated by combining the two inequality constraints that the auditor (a) accepts a report of $j = 1$ when $i = 1$ and (b) accepts a report of $j = 2$ when $i = 2$. Given the constraints are met, the auditor will accept the truthful reports. The manager does not want to deviate from this strategy: if he offers (2, y) with $y < D_2$, then the auditor will reject. If $y > D_2$, then he incurs additional (unnecessary) compensation costs. If he offers (1, y) where $y > 0$, then the auditor will accept, but the manager gets no bonus and incurs a compensation cost. He cannot reduce y below zero.

Proof of Proposition 6

This result is derived in a similar manner to Proposition 5. We start with the optimization problem:

$$\min_{y_1^s, q_2} \quad \frac{y_1^s}{2} + \frac{g}{2}(1 - q_2) \tag{19}$$

$$\text{s.t.} \quad K \leq (1 - q_2)\beta V \leq (y_2^m - y_1^s) - Q^a(1) \tag{20}$$

(similar to Equations (9) and (10)). As before, the right-hand constraint will be the one that binds. Solving for V from Equation (5), we get:

$$V = \frac{y_1^s + y_2^m}{2 - \beta(1 + q_2)} \tag{21}$$

Substituting Equation (21) into the constraint above and solving for y_1^s, we get:

$$y_1^s = \frac{2y_2^m(1 - \beta) - 2Q^a(1) + \beta Q^a(1) + \beta q_2 Q^a(1)}{2(1 - \beta q_2)} \tag{22}$$

Now the objective function can be written as a function of q_2 only. The value-maximizing q_2 is given in the proposition. The y_1^s comes from substituting the optimal value of q_2 into Equation (22), with $y_2^m = D_2$.

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