Earnings Management and Auditor Quality

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Abstract

This paper analyzes the relationship between a firm's demand for different quality auditors and opportunities for earnings management.In our model, the firm simultaneously chooses the bias it introduces into its pre-audited earnings and the quality of its auditor. We show that firms that choose a highlevel of bias also choose a low-quality auditor, even though the market-maker makes a correction for the level of residual bias in audited reports. Firms that choose a low level of bias choose a high-quality auditor.We also study the effect of changes in the regulatory environment on the market equilibrium.Our analysis shows that stricter regulation leads to more firms choosing low-quality auditors, thus it is not in the interest of high quality auditors to support such measures.

Keywords: Audit quality, Earnings management, Accounting standards, Information precision, Bias, Auditor choice

JEL Classification: M40, M41, M42, M49

1. Introduction

Managers of public firms have incentives to manage their earnings report (Note 1), even though their financial reports are certified by public auditors who have a duty toremove any bias they may contain.Given this conflict, one might expect to see management hire auditors (Note 2) who do low quality work, uncover little, if any, bias, and who are inexpensive. In reality, we observe that many firms choose high-quality auditors. (Note 3) One explanation is that because firms employing low quality auditors, on average, introduce more bias in their reported earnings, investors protect themselves by discounting the reported earnings of such firms more. Thus, a strategy of employing a low-quality auditor to allow more reported bias might unravel.

In this paper we present a theoretical model that sheds light on this apparent anomaly by demonstrating a connection between earnings management and the choice of auditors of different quality.Our findings suggest that managers who intend to manipulate their firm's financial statements more would choose a lower quality auditor. (Note 4)The choice of a high-quality auditor then becomes a signal to the market that the manager has introduced little bias into the financial reports.Since the higher quality auditor removes more of the bias from the report and might charge a higher fee, this is an expensive, hence, credible signal. (Note 5)

In our model, firms differ with respect to the cost of earnings management.Firms may vary in their ability to manage earnings due to constraints posed by the firm's internal governance structure (Note 6) (Dechow, Sloan, and Sweeney 1995), previous accounting decisions that limit future discretionary choices (Sweeney 1994), (Note 7) the asset structure of the firm, (Note 8) and reputational concerns in case earnings management is revealed (Note 9) (see DeAngelo 1981, Becker et al 1998), all of which impose a cost on managers reporting biased earnings.

Our main result is that, in a setting in which firms have different costs of managing earnings and therefore exaggerate their earnings to different extents, those who exaggerate more choose an auditor of low quality. (Note 10)More formally, we prove the existence of a unique equilibrium in which earnings management and the choice of a low quality auditor emerge as complementary choices.This is so even though the market punishes such firms by discounting the auditor's report to a greater degree. (Note 11)

Our study also provides a number of comparative statics regarding the sensitivity of the equilibrium to the firm's cost of bias, changes in audit fees and average audit quality.Using a cost parameter as a proxy for the strictness of the regulatory environment, we show that more firms will choose lower quality auditors if accounting rules are strictly enforced, and that high quality auditors are likely to object to stricter enforcement.

The rest of this paper is organized as follows: in Section 2 we present the model and; in Section 3 we derive our main results and discuss properties of the equilibrium; in Section 4 we carry out comparative statics exercises and analyze the economic consequences of changes in the economic setting; we conclude with some suggestions for future research in Section 5.All proofs are provided in the appendix.

2. The Model

We employ a single-period rational expectations model with three participants – an initial public offering (IPO) firm, an auditor who audits the IPO firm's earnings, and a market-maker who sets the firm's stock price based on audited earnings.At the start of the period, the firm introduces bias into its earnings, chooses an auditor, and gives the auditor the biased earnings.The auditor then conducts the audit, removes some of the bias introduced by the firm, and issues the public report.Finally, the market-maker sets the firm's stock price at its expected end-of-period value, taking all publicly available information into account.

Our model is based on the asymmetry of information between firm managers and the market-maker.Since the true state of a firm's financial situation is not public knowledge, the market-maker's valuation relies on public audits.Thus, managers have incentives to intentionally introduce a self-serving bias into the earnings of their firms. This formulation is consistent with Schipper's (1989) description of earnings management. However, introducing such a bias imposes a variety of private costs on managers. A firm biasing its earnings upwards can expect increased entry and competition that might eventually erode the firm's profits (Evans and Sridhar 2002) and jeopardize the management's future with the firm. Also, a firm with biased earnings has to act as if it were more efficient than it really is, thereby engaging in sub-optimal pricing and production quantity decisions to disguise this bias. Such actions can strain both the firm and the other firms in its industry and trigger increased scrutiny of the firm's accounting practices (Sadka 2006) potentially damaging management's credibility and reputation. Reputational concerns and potential loss of credibility in dealings with the shareholders and other concerned parties also impose costs on managers of biasing firms. For example, Fich and Shivdasani (2007) document that the managers and directors of firms subject to shareholder class action lawsuits alleging financial misrepresentation may be terminated by the firm and also lose seats on other boards. These concerns entail potentially large costs for managers who introduce bias into their firm's earnings.

In choosing the bias and the type of auditor, the manager makes a conjecture about how the market price corrects for residual bias in the auditor's report; whereas in setting the price, the market-maker makes a conjecture about the manager's choice of bias level andaudit quality.An equilibrium obtains when each party's choices bear out the other's conjecture.

The firm's intrinsic value, denoted by v, is the present value of its future earnings and is not known at Date 1. Therefore, we assume v to be a random variable with mean v_0 and realization ε^F which is privately observed by the manager at Date 3. We assume that the manager has some discretion over the preauditedreport and may choose to inflate the firm's private earnings signal using creative accounting techniques. Management adds a bias, β, into the firm's earnings, (Note 12) where $\beta \geq 0$. We assume that the management's private cost of introducing a bias of β per share is given by $\kappa C(\beta)$, where $\kappa \in [\kappa_{\min}, \kappa_{\max}] \equiv \mathrm{K}$ is a firm-specific parameter and $C(.)$ a convex function. (Note 13)

At Date 1, the firm's management privately observes its κ. (Note 14) For the market-maker, κ is a random variable with an atomless probability density function, $f(\kappa)$, with support $\kappa \in [\kappa_{\min}, \kappa_{\max}]$ where $\kappa_{\min} = 0$. (Note 15)

At Date 2, the firm makes its auditor choice from a population of low- and high-quality auditors and decides how much bias, β, to introduce into its earnings. High quality auditors remove a greater percentage of bias than lowquality auditors.The quality of any auditor is known to both the firm and the market, and is inferred from the quality of audits performed by the auditor in the past.Thus, based on past performance, high-quality auditors are expected to remove a greater percentage of bias than low-quality auditors. (Note 16)We denote a high quality auditor by $j = H$ and a low quality auditor by $j = L$. An auditor of quality *j* removes, on average, a percentage $\overline{Q}_j$ of the bias in financial statements, where $0 \leq \overline{Q}_L < \overline{Q}_H \leq 1$. (Note 17)However, the quality Q_j of any particular audit is random.In other words, a low-quality auditor can occasionally deliver a high-quality audit, and vice-versa. (Note 18)Thus, the firm's private signal cannot be precisely inferred from the auditor's report, even if the amount of bias that the firm introduced were known (or accurately surmised).

The auditor charges a fee for the audit.We denote the fee for an auditor of quality *j* by Φ_j for $j \in \{L, H\}$.Let $\Delta\Phi$ denote the audit fee premium of high quality auditors: $\Delta\Phi = \Phi_H - \Phi_L$. There does not seem to be a consensus in the literature on whether a price premium exists for high-quality auditors. Simunic (1980) finds that large auditors do not charge higher fees than small auditors for their services, but more recently, Palmrose (1986), Craswell, Francis and Taylor (1995) and Simon (1997) show that large auditors do charge a premium for their services. (Note 19)We assume only that $\Delta\Phi = \Phi_H - \Phi_L \geq 0$.Thus, our model allows for (but does not require) higher fees being charged by higher quality auditors. (Note 20)

At Date 3, the firm observes ε^F, the realization of the firm's intrinsic value before audit fees. Then the firm presents its biased earnings ε^A to the auditor:

$$\varepsilon^A = \varepsilon^F + \beta \tag{2.0}$$

where β is the amount by which the firm inflates its earnings at Date 2.In choosing its earnings bias, the firm must weigh the benefits of a possibly higher market price against the costs of deliberately misrepresenting its earnings.

Thus the firm's overall objective is to maximize the expected market price, less the cost of bias and the auditor's fee: (Note 21)

$$E[p] - \Phi_j - \kappa C(\beta) \tag{2.1}$$

At Date 4, the auditor conducts the audit.An auditor of quality Q_j removes βQ_j portion of the bias the firm has introduced. The earnings reported to the market are:

$$\varepsilon^M = \varepsilon^A - \beta Q_j = \varepsilon^F + (1 - Q_j)\beta \tag{2.2}$$

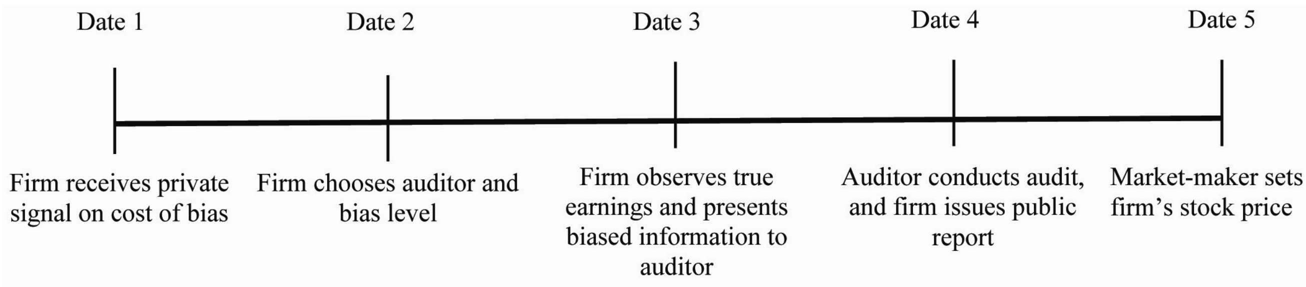
which entails that the higher the quality of the audit, the smaller the discrepancy between the audited value and the unbiased value of the firm. (Note 22)

At Date 5, the market-maker sets the firm's stock price taking into account all publicly available information – the firm's audited earnings and *ex ante*auditor quality choice in addition to the prior distributions of κ and v. The market-maker knows that the firm may have biased its earnings upward and that the auditor may not have fully removed the bias.Hence, the market-maker estimates firm value by adjusting the audited number for any bias that he conjectures may remain.

Since the market is perfectly competitive and the market-maker risk-neutral, the price is the rational expectation of *v* conditional on this information.

$$p = E[v \mid j, \varepsilon^M] \tag{2.3}$$

The sequence of events in our model is shown in the timeline below:



3. Equilibrium with a Linear Pricing Function

In this section, we start by formalizing the notion of an equilibrium for our model.Then we present our main result, that there exists a unique (and simple) equilibrium in which low-cost firms choose low-quality auditors (together with a high bias) and vice-versa.We then analyze properties of the equilibrium. In the next section we study the model's sensitivity to exogenous parameters.

To motivate our definition of equilibrium, consider first the process by which the market-maker sets the price for the firm using the pricing formula (2.3).In order to evaluate the formula, the market-maker must precisely compute the information revealed by the firm's choice of auditor as well as by the auditor's report.At the start of the period,the market-maker has no information about either the firm's private cost or its private signal, apart from their prior joint distribution.Accordingly, the set of possible values for (ε^F, κ) is unrestricted and spans the entire sample space $\mathrm{E} \times \mathrm{K} \equiv \Sigma$ .However, oncethe market-maker observes *j*, the quality of the auditor chosen at Date 2, the set of possibilities narrows to a subset of firm types, viz. those that find it optimal to choose a *j*-quality auditor.Since this partitioning of firm types arises endogenously, the market-maker must start with a conjecture about the types of firms that choose different types of auditors.

Such a conjecture may be represented by a partition (Note 23) $\hat{\Gamma} = \{\hat{\Sigma}_L, \hat{\Sigma}_H\}$ of the sample space Σ .In other words, the market-maker believes that firms of type $(\varepsilon^F, \kappa) \in \hat{\Sigma}_j$ prefer auditors of quality *j*.The dependence of the market price on the market-maker's conjectures can now be made explicit by rewriting (2.3) as:

$$p(j, \varepsilon^M; \hat{\Gamma}) = E[v \mid j, \varepsilon^M; \hat{\Sigma}_j] \tag{3.1}$$

Consider now the firm's decision problems at Date 2.In order to choose the auditor and the level of bias, the firm must anticipate how the market price corrects for any residual bias in the auditor's report.Let $\hat{p}(j, \varepsilon^M)$ represent a conjecture made by the firm about the market price that results when an auditor of type *j* issues a report ε^M .We restrict attention to linear conjectures of the form: (Note 24)

$$\hat{p}(j, \varepsilon^M) = \hat{a}_j \varepsilon^M + \hat{b}_j \tag{3.2}$$

Given this conjecture, a firm with cost of bias κ and private signal ε^F seeks to maximize:

$$\begin{aligned} \Pi(\beta, j; \varepsilon^F, \kappa, \hat{p}) &= E[\hat{a}_j \varepsilon^M + \hat{b}_j \mid \varepsilon^F, \beta] - \Phi_j - \kappa C(\beta) \\ &= E[\hat{a}_j(\varepsilon^F + (1 - Q_j)\beta) + \hat{b}_j] - \Phi_j - \kappa C(\beta) \\ &= \hat{a}_j(\varepsilon^F + (1 - \overline{Q}_j)\beta) + \hat{b}_j - \Phi_j - \kappa C(\beta) \end{aligned} \tag{3.3}$$

Let $\beta^*(j; \varepsilon^F, \kappa, \hat{p})$ denote the optimal bias to introduce if the firm decides to use an auditor of quality *j* at Date 2, i.e.

$$\beta^*(j; \varepsilon^F, \kappa, \hat{p}) = \operatorname{argmax}_\beta \ \Pi(\beta, j; \varepsilon^F, \kappa, \hat{p}) \tag{3.4}$$

and let

$$\Pi^*(j; \varepsilon^F, \kappa, \hat{p}) \equiv \Pi(\beta^*(j; \varepsilon^F, \kappa, \hat{p}), j; \varepsilon^F, \kappa, \hat{p}) \tag{3.5}$$

It should be noted that the firm's conjecture $\hat{p}$ naturally induces a partition $\Gamma(\hat{p}) = \{\Sigma_L(\hat{p}), \Sigma_H(\hat{p})\}$ of firm types into those who prefer low-quality auditors and those whoprefer high-quality auditors:

$$\Sigma_L(\hat{p}) = \{(\varepsilon^F, \kappa) : \Pi^*(L; \varepsilon^F, \kappa, \hat{p}) \geq \Pi^*(H; \varepsilon^F, \kappa, \hat{p})\}$$
$$\Sigma_H(\hat{p}) = \{(\varepsilon^F, \kappa) : \Pi^*(L; \varepsilon^F, \kappa, \hat{p}) < \Pi^*(H; \varepsilon^F, \kappa, \hat{p})\} \quad (3.6)$$

This motivates the following definition:

Definition. *Let* $\hat{\Gamma}$ *and* $\hat{p}$ *denote a pair of conjectures for the market-maker and the manager.These conjectures constitute an equilibrium if, for* $j \in \{L, H\}$*, the following are satisfied:*

$$p(j, \varepsilon^M; \hat{\Gamma}) = \hat{p}$$
$$\Gamma(\hat{p}) = \hat{\Gamma}$$

In other words, an equilibrium for the model is one in which the manager and market-maker anticipate each other's behavior correctly.The firm's conjecture about market prices is borne out by the market-maker's setting of the price according to (3.1) and the market-maker's conjecture about firms' choice of auditor is borne out by the firm's preferences captured by (3.6).

It is not clear *a priori* that an equilibrium exists, since the information conveyed by market signals (the choice of auditor and the audit report) has an endogenous bias as well as a random component.It turns out, however, that not only does an equilibrium exist but it is unique and has a very simple form.We begin by establishing some important characteristics of candidate equilibria.

Proposition 1. *In any equilibrium price conjecture* $\hat{p}(j, \varepsilon^M) = \hat{a}_j \varepsilon^M + \hat{b}_j$*, the coefficients* $\hat{a}_j$*,* $j \in \{L, H\}$ *are both 1.*

Proof: All proofs are given in the Appendix.■

According to Proposition 1, any equilibrium is characterized by two endogenous market adjustments – one for firms that use high-quality auditors, and one for firms that use low-quality auditors.The market adjusts the share price of all firms using a certain quality auditor by the same amount.It is intriguing that the market correction turns out to be independent of the actual value of the audit report.For example, Proposition 1 rules out the possibility that the market price is some fraction of the audit report.

The intuition for this is that the manager's choice of bias (3.4) is independent of thefirm's reported earnings. (Note 25)Hence, to 'back out' the residual bias left in the audited report, the market-maker imputes the same biasto all firm types with a certain cost, regardless of their signal values.The net effect is therefore a reduction of the audited report by the average bias of all firms that choose a given auditor.

We turn now to properties of the market-maker's conjecture in equilibrium.The following lemma is crucial to our analysis.

Lemma 3.1. *Let* $\hat{p}$ *be an equilibrium price conjecture and let* $\kappa_1 < \kappa_2 < \kappa_3$*.Then:*

$$(a)\ \exists \varepsilon^F\ \Pi^*(L; \varepsilon^F, \kappa_2, \hat{p}) \geq \Pi^*(H; \varepsilon^F, \kappa_2, \hat{p}) \Rightarrow \forall \varepsilon\, \Pi^*(L; \varepsilon, \kappa_1, \hat{p}) \geq \Pi^*(H; \varepsilon, \kappa_1, \hat{p})$$
$$(b)\ \exists \varepsilon^F\ \Pi^*(H; \varepsilon^F, \kappa_2, \hat{p}) \geq \Pi^*(L; \varepsilon^F, \kappa_2, \hat{p}) \Rightarrow \forall \varepsilon\, \Pi^*(H; \varepsilon, \kappa_3, \hat{p}) \geq \Pi^*(L; \varepsilon, \kappa_3, \hat{p})$$

According to this lemma, if a manager prefers a low-quality auditor then so would all managers that have a lower cost of bias, irrespective of their private signals; conversely, if a managerprefersa high-quality auditor, then sowould any manager with a higher cost of bias.

A firm chooses a high-quality auditor only if the benefits – a smaller market correction and lowercost of the bias introduced – outweigh the costs – higher audit fees and a higher proportion of bias removed by the auditor.Lower-cost firms will introducemore bias.This reduces the benefits of switching to a higher quality auditor while increasing the costs.

Using this result, we are able to show that equilibrium market-maker conjectures have a particularly simple form.

Proposition 2. *For any equilibrium market-maker conjecture,* $\hat{\Gamma} = \{\hat{\Sigma}_L, \hat{\Sigma}_H\}$*, there exists* $\hat{\kappa}$ *such that* $\hat{\Sigma}_L = \{(\varepsilon^F, \kappa) : \kappa \leq \hat{\kappa}\}$ *and* $\hat{\Sigma}_H = \{(\varepsilon^F, \kappa) : \kappa > \hat{\kappa}\}$.

This result confirms the intuition provided by Lemma 3.1.The market-maker knows that if any firm chooses a low (high) quality auditor then all firms with a lower (higher) cost of bias will also make the same choice.This partitioning of the sample space based on the cost of bias must therefore be reflected in any sustainable conjecture.The following definition motivated by Proposition 2 simplifies the notation related to such conjectures.

Definition. *Let* $\hat{\kappa} \in \mathrm{K}$ *be an arbitrary cost of bias.The* cost-based partition of Σ with splitter $\hat{\kappa}$ *is the partition* $\chi(\hat{\kappa}) = \{S_L(\hat{\kappa}), S_H(\hat{\kappa})\}$ *where:*

$$S_L(\hat{\kappa}) = \{(\varepsilon^F, \kappa) : \kappa \le \hat{\kappa}\}$$
$$S_H(\hat{\kappa}) = \{(\varepsilon^F, \kappa) : \kappa > \hat{\kappa}\}$$

In terms of this definition, Proposition 2 asserts that in every equilibrium, the market-maker's conjecture induces a cost-based partition.

While Propositions 1 and 2 capture important characteristics of an equilibrium, neither ensures its existence (or uniqueness).However, using the characterization they provide, we are able to show our main result:

Proposition 3.*There exist unique constants* κ^* *and* ζ_j, $j \in \{L, H\}$ *such that* $\chi(\kappa^*)$ *and* $\hat{p}(j, \varepsilon^M) = \varepsilon^M - \zeta_j$ *constitute a pair of equilibrium conjectures.*

Recall that firms with low cost choose higher levels of bias.Thus, this proposition asserts that a high-cost firm that wants to introduce a lower level of bias would also choose a high-quality auditor as a signal to the market.This is a costly signal since high-quality auditors remove more of the bias and may charge a higher fee as well.However, the market responds to the signal by subtracting a smaller adjustment for such firms.

From the market-maker's perspective the choice of auditor places the firm in one of two portfolios.The market-maker knows the average bias $\overline{\beta}_j$ among all firms in each portfolio.The market-maker also knows that on average, the auditor removes a fraction $\overline{Q}_j$ of the bias.Hence, the market-makerremoves the remainder ζ_j:

$$\zeta_j = (1 - \overline{Q}_j)\overline{\beta}_j \tag{3.7}$$

Since ζ_j is independent of the auditor's report, this yields a pooling equilibrium in which all firms using auditors of a certain quality receive the same per share adjustment.

While all firms submit inflated values to their auditors, the uniform market correction leaves some of them overvalued and others undervalued.But any firm, even an undervalued firm, engaging in post-equilibrium change would lower its net value.Its bias level is optimal, given the auditor's quality.A low-cost undervalued firm will not switch to a higher quality auditor because the improved market response does not offset the negative effects of such a switch –reduced bias, as well as a higher probability of bias detection by the auditor and possibly a higher audit fee.Similarly, a high-cost undervalued firm will not switch to a lower quality auditor because even if the auditfee would be lower, the firm would have to introduce a larger bias, leading to a higher biasing cost, and the market would discount the auditor's report to a greater extent, resulting in a lower final valuation.

It is interesting to compare the market premium, i.e. the difference in market adjustments, to the fee premium charged by a high-quality auditor.For a non-trivial solution to the model, we must have:

$$\Phi_H - \Phi_L \le \zeta_L - \zeta_H \tag{3.8}$$

If expression (3.8) does not hold, no firm will choose a high-quality auditor since the extra cost of hiring a high-quality auditor is more than the premium the market gives the firm for choosing the high-quality auditor. (Note 26)This corresponds to a degenerate case of Proposition 3 where $\kappa^* = \kappa_{\max}$.

4. Comparative Statics

In this section we analyze the economic implications of changes in the exogenous parameters of our model.In particular, we consider the impact on the model equilibrium due to changes in (a) the regulatory environment (as captured by the cost of bias), (b) the audit fee premium, and (c) the average quality of audits delivered by each type of auditor.

For concreteness, this analysis is carried out using a quadratic cost function:

$$C(\beta) = \alpha\beta^2 \tag{4.1}$$

We interpret α as an exogenous parameter that determines whether the regulatory environment for firms' accounting practices is strict or lax.

4.1 Changes in cost of bias

To analyze the effect due to changes in α, we observe that the equilibrium of Proposition 3 is characterized by a cutoff value of the cost-parameter κ^* such that a firm with cost κ^* is indifferent between auditor types. (Note 27)This gives the following (implicit) equation for κ^*:

$$a\left(\kappa^*,\alpha,\overline{Q}_H,\overline{Q}_L\right)-b\left(\kappa^*,\alpha,\overline{Q}_H,\overline{Q}_L\right)-\Delta\Phi=0 \tag{4.2}$$

where:

$$\begin{aligned} a\left(\kappa^*,\alpha,\overline{Q}_H,\overline{Q}_L\right) &\equiv \frac{\left(1-\overline{Q}_H\right)^2-\left(1-\overline{Q}_L\right)^2}{4\kappa^*\alpha} \\ b\left(\kappa^*,\alpha,\overline{Q}_H,\overline{Q}_L\right) &\equiv \zeta_H\left(\kappa^*\right)-\zeta_L\left(\kappa^*\right) \\ &= \frac{\left(1-\overline{Q}_H\right)^2}{2\alpha\left(1-F\left(\kappa^*\right)\right)}\int_{\kappa>\kappa^*}\frac{f(\kappa)d\kappa}{\kappa}-\frac{\left(1-\overline{Q}_L\right)^2}{2\alpha F\left(\kappa^*\right)}\int_{\kappa\le\kappa^*}\frac{f(\kappa)d\kappa}{\kappa} \end{aligned} \tag{4.3}$$

Differentiating (4.2) with respect to α, we get:

$$\left(\frac{\partial a}{\partial\alpha}+\frac{\partial a}{\partial\kappa^*}\frac{\partial\kappa^*}{\partial\alpha}\right)-\left(\frac{\partial b}{\partial\alpha}+\frac{\partial b}{\partial\kappa^*}\frac{\partial\kappa^*}{\partial\alpha}\right)=0 \tag{4.4}$$

from which:

$$\frac{\partial\kappa^*}{\partial\alpha}=\frac{\dfrac{\partial b}{\partial\alpha}-\dfrac{\partial a}{\partial\alpha}}{\dfrac{\partial a}{\partial\kappa^*}-\dfrac{\partial b}{\partial\kappa^*}} \tag{4.5}$$

Using (4.3) to evaluate the partial derivatives, we find that both the numerator as well as the denominator of (4.5) are positive.In other words, as the cost of bias increases, the cutoff value κ^* shifts to the right.

To get some intuition for this result, consider the firms with the highest bias levels.In response to stricter enforcement policies, these firms reduce their bias, thereby lowering the average bias among firms using low-quality auditors.This causes the market-maker to make less of an adjustment for such firms.Thus, the low quality portfolio becomes more attractive to firms at the margin.As these firms switch over, the cutoff value of κ^* increases.

We use the following lemma to further analyze the effect of this shift in the equilibrium value:

Lemma 4.1. *If a firm with cost k^* switches from a high (low) to a low (high) quality auditor, it raises (lowers) its own bias level and lowers (raises) the average bias level of both portfolios.*

Proof: Consider a firm with the lowest cost among all firms using the high-quality auditor.Since it has the lowest cost among all firms in the high quality portfolio, it must have the highest bias among such firms.If such a firm switches to a low quality auditor, it will increase its bias since the optimal bias for any firm decreases with auditor quality. After the switch it becomes the firm with the highest cost in its new portfolio. Correspondingly, it has the lowest bias in that portfolio.Since it had the highest bias in the high-quality portfolio and has the lowest bias in the low quality portfolio, its switch decreases the average bias of both portfolios. (Note 28)■

From Lemma 4.1 it follows that an increase in α lowers the average bias of both portfolios by inducing an increase in κ^*.Thus, the valuation of all firms is higher, since the market adjusts less for residual bias in the audit report .On the other hand, a larger cost of bias decreases the net value of the firm so the overall effect on firm profit is ambiguous.For auditors, the effect of stricter policies depends on the quality of the auditor.Low quality auditors benefit because they gain the clients who have switched away from high quality auditors.High-quality auditors lose clients; thus, it is not in their interest to see the SEC increase its level of enforcement of securities rules.

4.2 Changes in the audit fee premium

We study the effect of changes in the fee premium by differentiating (4.2) with respect to $\Delta\Phi$.This gives:

$$\left(\frac{\partial a}{\partial \kappa^*}\frac{\partial \kappa^*}{\partial(\Delta\Phi)}\right)-\left(\frac{\partial b}{\partial \kappa^*}\frac{\partial \kappa^*}{\partial(\Delta\Phi)}\right)-1=0 \tag{4.6}$$

from which:

$$\frac{\partial \kappa^*}{\partial(\Delta\Phi)}=\frac{1}{\frac{\partial a}{\partial \kappa^*}-\frac{\partial b}{\partial \kappa^*}}>0 \tag{4.7}$$

Thus the cutoff value κ^* shifts to the right as the difference in the fee charged by the two types of auditors increases.This is what we intuitively expect: if the price premium between high and low quality auditors increases, some firms will shift from high-priced auditors to low-priced ones.Thus, more firms hire lower quality auditors.

From Lemma 4.1, the increase in fee premium has the effect of lowering the average bias, and hence the market correction, for both portfolios.Further analysis of the economic effects depends on the precise cause of the increase in premium.If the price of high-quality auditors increases, low-quality auditors are better off because they have more clients.Firms who hire low-quality are better off because the market assigns them a lower bias.The effect on high-quality auditors and their clients is ambiguous.The auditors earn higher fees per client but the number of clients they have is smaller. Similarly, the market adjustment is smaller for these firms but this positive effect is countered by the higher audit cost.

The second way the price premium can increase is by low-quality auditors lowering their fees.In this case, all firms are better off: firms in the high quality portfolio are better off because their average bias and the market correction is lower, while firms in the low quality portfolio are better off not only because of the lower market correction but also because of smaller audit fees.High quality auditors are worse off because their client base is smaller while the effect on low quality auditors is indeterminate, because although their client base is larger, the fee per client is smaller.

4.3 Changes in the audit quality

Our final comparative static exercise explores the effects of changes in the quality of audits delivered by each type of auditor.Over the past few years, the movement to separate consulting and audit services within the Big N firms has gained momentum.More recently, there have been some demands for mandatory, time-bound rotation of auditors.Such steps would reduce some of the conflicts of interest that auditors face and increase their independence from their clients, presumably leading to improved audit quality.The analysis here sheds some light on the effect of such measures.

Following the approach of the preceding sections, we differentiate (4.2) to get:

$$\frac{\partial \kappa^*}{\partial \overline{Q}_j}=\frac{\frac{\partial b}{\partial \overline{Q}_j}-\frac{\partial a}{\partial \overline{Q}_j}}{\frac{\partial a}{\partial \kappa^*}-\frac{\partial b}{\partial \kappa^*}} \tag{4.8}$$

Again, using (4.3) to evaluate the partial derivatives, we find that the numerator is positive if $j=H$ but negative if $j=L$:

$$\begin{gathered}\frac{\partial \kappa^*}{\partial \overline{Q}_H}>0\\ \frac{\partial \kappa^*}{\partial \overline{Q}_L}<0\end{gathered} \tag{4.9}$$

If the average quality of a high-quality auditor increases, firms that choose them end up reducing their bias levels.The auditor also detects a higher proportion of the bias.Both these effects lead to firms at the margin switching over to low-quality auditors.This leads to a reduction in the average bias of both portfolios, and a smaller market adjustment for each.Lower quality auditors are better off due to their larger client base, while their clients are better off due to the more favorable market valuation.Higher-quality auditors are worse off (Note 29) because they lose clients while the effect on their clients is indeterminate: the auditor removes a larger proportion of their bias (which is smaller to begin with) but they get the benefit of a smaller market correction.

Symmetrically, if the quality of audits delivered by low-quality auditors improves, firms at the margin find it preferable to switch to the high-quality auditor (thereby reducing their market correction.)In this case, it is the high-quality auditors stand to gain at the expense of low-quality auditors.

5. Conclusions

This paper develops a model of an IPO firm that simultaneously introduces bias into its financial reports and chooses an auditor of a given quality level. The firm's management incurs a private cost for biasing financial reports that increases with the bias level. The market-maker does not know the management's private costs of earnings bias and the amount of bias introduced by the firm. We show the existence of an equilibrium where a firm whose management faces a high (low) private cost for biasing earnings chooses a high (low) quality auditor. A firm with high private managerial costs of bias biases its earnings less, and its choice of a high quality auditor attests to the firm's smaller bias, which, in equilibrium, draws a favorable reaction by the market-maker.

Comparative statics of our model predict that stricter enforcement of securities laws results in a better market reaction to the reported earnings of clients of low quality auditors and causes the clients of high quality auditors to switch to low quality auditors. For high quality auditors to remain a viable alternative, they have to reduce the fee premium they charge over low quality auditors. As a result, it is in the economic interest of almost all audited firms (Note 30)and low quality auditors to support measures that strictly enforce securities laws, but it is not in the interest of high quality auditors to support such measures. We find the same results for measures which improve the quality level of auditors. On the other hand, corporate governance changes intended to increase the upper limit of managers' private cost of biasreduce the average bias of firms with high managerial costs who in equilibrium prefer high quality auditors. Consequently, the market-maker responds more favorably to their earnings, allowing high quality auditors to charge a higher premium for their audit services.

6. Research Limitations

Our model makes a number of assumptions, some are critical to the model and some can be relaxed.

Critical assumptions: The paper has two central variables, bias introduced by the firm, and auditor quality. We assume that information on the bias which managers introduce is asymmetric. Managers knowingly introduce the bias, but the bias cannot be detected by the market and cannot be fully removed by the auditor. There is a cost to bias, which is firm specific, and is known only by the firm. We assume the existence of more than one level of auditor quality. We assume everyone (auditee and market) know the level of auditor quality. (Note 31)The equilibrium pricing mechanism uses audit quality in setting prices.

We make a number of assumptions for mathematical tractability. We assume bias is positive and that the market pricing function is linear. (Note 32)We assume that the firm specific cost of bias function of a firm is convex. We model a single period model IPO so that the model can be static, rather than dynamic. We assume there are exactly two, no more no less, different qualities of auditors. This corresponds to the Large vs. Small auditor dichotomy. An alternative model would allow audit quality to vary over a continuous range.

Very critically, our model makes no assumption on audit fees. The model allows for (but does not require) higher fees being charged by higher quality auditors.

7. Recommendations for Future Research

The model of this paper may be extended in two ways.First, our model assumes that the auditor is a passive entity with no strategic decisions to make.In reality, the conflicts of interest that auditors face and their exposure in case of audit errors is well-documented.A more sophisticated model would provide a more active role for the auditor, and incorporate some of the incentives and conflicts of interest that real auditing entails. It is also possible to extend the model by assuming that auditor quality is a continuous, rather than a dichotomous, variable.

A second extension of the model would be to consider more than one period.Earnings management often involves the shifting of costs or revenues from one period to another, and a manager's incentives for biasinginformation could be quite different in a multi-period setting.Also, auditors' interests in developing a long-term relationship with clients is likely to color their decisions and possibly compromise their independence during the audit.Finally, in a multi-period model it may be possible to explain switches between auditors (even of the same quality) by analyzing the firm's reaction when the audit quality turns out todiffer substantially from the auditor's expected quality.

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Appendix

Proofs of Proposition 1: Consider an arbitrary linear price conjecture for the firm, $\hat{p}(j,\varepsilon^M) = \hat{a}_j\varepsilon^M + \hat{b}_j$.If the firm has a cost of bias κ and observes a signal ε^F at Date 1, its choices at Date 2 and 3 would be made to maximize:

$$\begin{aligned}\Pi(\beta, j;\varepsilon^F,\kappa,\hat{p}) &= E\left[\hat{a}_j\varepsilon^M + \hat{b}_j \mid \varepsilon^F,\beta\right] - \Phi_j - \kappa C(\beta)\\ &= E\left[\hat{a}_j\left(\varepsilon^F + (1-Q_j)\beta\right) + \hat{b}_j\right] - \Phi_j - \kappa C(\beta)\\ &= \hat{a}_j\left(\varepsilon^F + (1-\overline{Q}_j)\beta\right) + \hat{b}_j - \Phi_j - \kappa C(\beta)\end{aligned} \tag{1}$$

By convexity of *C*, the optimal bias for a firm who chooses auditor *j* is unique and given by:

$$\beta^*(j;\varepsilon^F,\kappa,\hat{p}) = \arg\max_\beta \Pi(\beta,j;\varepsilon^F,\kappa,\hat{p}) = C'^{-1}\left(\hat{a}_j(1-\overline{Q}_j)/\kappa\right) \tag{2}$$

Note that $\beta^*(j;\varepsilon^F,\kappa,\hat{p})$ is independent of ε^F.

Let $\hat{\Gamma} = \{\hat{\Sigma}_L,\hat{\Sigma}_H\}$ be the market-maker's conjecture.Since ε^F is an unbiased signal of *v*, we have:

$$\begin{aligned}p(j,\varepsilon^M;\hat{\Gamma}) &= E\left[v \mid j,\varepsilon^M;\hat{\Sigma}_j\right]\\ &= E\left[\varepsilon^F \mid j,\varepsilon^M;\hat{\Sigma}_j\right]\end{aligned} \tag{3}$$

Since $\varepsilon^M = \varepsilon^F + (1-Q_j)\beta^*(j;\varepsilon^F,\kappa,\hat{p})$ we can write:

$$\begin{aligned}p(j,\varepsilon^M;\hat{\Gamma}) &= \varepsilon^M - E\left[(1-Q_j)\beta^*(j;\varepsilon^F,\kappa,\hat{p}) \mid j,\varepsilon^M;\hat{\Sigma}_j\right]\\ &= \varepsilon^M - (1-\overline{Q}_j)E\left[\beta^*(j;\varepsilon^F,\kappa,\hat{p}) \mid j,\varepsilon^M;\hat{\Sigma}_j\right]\end{aligned} \tag{4}$$

the second equality following from the independence of Q_j from κ and ε^F. Let $f(\varepsilon^F,\kappa)$ denote the joint probability density function for the pair of random variables (ε^F,κ).We can then rewrite (4) as:

$$\begin{aligned}p(j,\varepsilon^M;\hat{\Gamma}) &= \varepsilon^M - (1-\overline{Q}_j)\frac{\int_{(\varepsilon^F,\kappa)\in\hat{\Sigma}_j}\beta^*(j;\varepsilon^F\kappa,\hat{p})f(\varepsilon^F,\kappa)d\varepsilon^F d\kappa}{\int_{(\varepsilon^F,\kappa)\in\hat{\Sigma}_j} f(\varepsilon^F,\kappa)d\varepsilon^F d\kappa}\\ &= \varepsilon^M - (1-\overline{Q}_j)\frac{\int_{(\varepsilon^F,\kappa)\in\hat{\Sigma}_j} C'^{-1}\left(\hat{a}_j(1-\overline{Q}_j)/\kappa\right)f(\varepsilon^F,\kappa)d\varepsilon^F d\kappa}{\int_{(\varepsilon^F,\kappa)\in\hat{\Sigma}_j} f(\varepsilon^F,\kappa)d\varepsilon^F d\kappa}\end{aligned} \tag{5}$$

Since the second term of (5) is independent of ε^M we must have $\hat{a}_j = 1$ in any equilibrium conjecture.■

Proof of Lemma 3.1: We will prove (a).The proof for (b) is completely analogous.We start with the following claim:

Claim: $\forall \varepsilon,\varepsilon',\kappa,\hat{p}, \Pi^*(L;\varepsilon,\kappa,\hat{p}) < \Pi^*(H;\varepsilon,\kappa,\hat{p}) \Rightarrow \Pi^*(L;\varepsilon',\kappa,\hat{p}) < \Pi^*(H;\varepsilon',\kappa,\hat{p})$

The proof of the claim is by contradiction.Suppose that for some ε,ε' both the following hold:

$$\begin{aligned}&\Pi^*(H;\varepsilon,\kappa,\hat{p}) - \Pi^*(L;\varepsilon,\kappa,\hat{p}) > 0\\ &\Pi^*(H;\varepsilon',\kappa,\hat{p}) - \Pi^*(L;\varepsilon',\kappa,\hat{p}) \le 0\end{aligned} \tag{1}$$

Adding the two inequalities and rearranging yields:

$$\left(\Pi^*(H;\varepsilon,\kappa,\hat{p}) - \Pi^*(H;\varepsilon',\kappa,\hat{p})\right) - \left(\Pi^*(L;\varepsilon,\kappa,\hat{p}) - \Pi^*(L;\varepsilon',\kappa,\hat{p})\right) > 0 \tag{2}$$

which is equivalent to:

$$\int_{\varepsilon'}^{\varepsilon}\left(\frac{\partial\Pi^*}{\partial\varepsilon^F}(H;t,\kappa,\hat{p}) - \frac{\partial\Pi^*}{\partial\varepsilon^F}(L;t,\kappa,\hat{p})\right)dt > 0 \tag{3}$$

By the Envelope Theorem we know that:

$$\frac{\partial\Pi^*}{\partial\varepsilon^F}(j;\varepsilon^F,\kappa,\hat{p}) = \frac{\partial\Pi}{\partial\varepsilon^F}\left(\beta^*(j;\varepsilon^F,\kappa,\hat{p})j;\varepsilon^F,\kappa,\hat{p}\right) = 1 \tag{4}$$

but this contradicts (3) and we're done.

Now suppose, contrary to the assertion of Lemma 3.1 (a), that for some $\varepsilon^F,\varepsilon$, both the following hold:

$$\begin{aligned}&\Pi^*(L;\varepsilon^F,\kappa_2,\hat{p}) \ge \Pi^*(H;\varepsilon^F,\kappa_2,\hat{p})\\ &\Pi^*(L;\varepsilon,\kappa_1,\hat{p}) < \Pi^*(H;\varepsilon,\kappa_1,\hat{p})\end{aligned} \tag{5}$$

Using the claim, (5) implies:

$$\begin{aligned}&\Pi^*\left(L;\varepsilon^F,\kappa_2,\hat{p}\right)\geq\Pi^*\left(H;\varepsilon^F,\kappa_2,\hat{p}\right)\\&\Pi^*\left(L;\varepsilon^F,\kappa_1,\hat{p}\right)<\Pi^*\left(H;\varepsilon^F,\kappa_1,\hat{p}\right)\end{aligned}\qquad(6)$$

Adding the two inequalities and rearranging yields:

$$\left(\Pi^*\left(L;\varepsilon^F,\kappa_2,\hat{p}\right)-\Pi^*\left(L;\varepsilon^F,\kappa_1,\hat{p}\right)\right)>\left(\Pi^*\left(H;\varepsilon^F,\kappa_2,\hat{p}\right)-\Pi^*\left(H;\varepsilon^F,\kappa_1,\hat{p}\right)\right)\qquad(7)$$

which is equivalent to:

$$\int_{\kappa_1}^{\kappa_2}\left(\frac{\partial\Pi^*}{\partial\kappa}\left(L;\varepsilon^F,t,\hat{p}\right)-\frac{\partial\Pi^*}{\partial\kappa}\left(H;\varepsilon^F,t,\hat{p}\right)\right)dt>0\qquad(8)$$

Using the Envelope Theorem, we have:

$$\frac{\partial\Pi^*}{\partial\kappa}\left(j;\varepsilon^F,\kappa,\hat{p}\right)=\frac{\partial\Pi}{\partial\kappa}\left(\beta^*\left(j;\varepsilon^F,\kappa,\hat{p}\right),j;\varepsilon^F,\kappa,\hat{p}\right)=-C\left(\beta^*\left(j;\varepsilon^F,\kappa,\hat{p}\right)\right)\qquad(9)$$

so that (8) is equivalent to:

$$\int_{\kappa_1}^{\kappa_2}\left(-C\left(\beta^*\left(L;\varepsilon^F,t,\hat{p}\right)\right)+C\left(\beta^*\left(H;\varepsilon^F,t,\hat{p}\right)\right)\right)dt>0\qquad(10)$$

We claim that the integrand is negative, thus contradicting (10).Since $C'>0$ it suffices for the claim that $\beta^*\left(L;\varepsilon^F,t,\hat{p}\right)>\beta^*\left(H;\varepsilon^F,t,\hat{p}\right)$.For this it suffices (using (2) from the proof of Proposition 1) that $C'^{-1}\left(\left(1-\overline{Q}_L\right)/\kappa\right)>C'^{-1}\left(\left(1-\overline{Q}_H\right)/\kappa\right)$.But this follows from the convexity of C which implies that C'^{-1} is an increasing function. ■

<u>Proof of Proposition 2</u>: Let $\hat{p}$ be an equilibrium price conjecture.It suffices to show that the induced partition $\Gamma(\hat{p})$ is cost-based.For this, let ε^F be arbitrary (but fixed) and consider the graph of the function:

$$\delta\left(\kappa;\varepsilon^F,\hat{p}\right)=\Pi^*\left(H;\varepsilon^F,\kappa,\hat{p}\right)-\Pi^*\left(L;\varepsilon^F,\kappa,\hat{p}\right)=\delta(\kappa;\hat{p})\qquad(1)$$

The following three cases are exhaustive:

<u>Case 1</u>. $\delta(\kappa_{\min};\hat{p})\geq 0$.By Lemma 3.1 (b) $\delta(\kappa,\hat{p})\geq 0$ for all κ so that $\Gamma(\hat{p})=\chi(\kappa_{\min})$.

<u>Case 2</u>. $\delta(\kappa_{\max};\hat{p})\leq 0$.By Lemma 3.1 (a) $\delta(\kappa;\hat{p})\leq 0$ for all κ so that $\Gamma(\hat{p})=\chi(\kappa_{\max})$.

<u>Case 3</u>. $\delta(\kappa_{\min};\hat{p})<0<\delta(\kappa_{\max};\hat{p})$ .Since $\delta(.;\hat{p})$ is continuous, there is some $\kappa^*\in(\kappa_{\min},\kappa_{\max})$ such that $\delta\left(\kappa^*,\hat{p}\right)=0$ By Lemma 3.1 $\delta(\kappa;\hat{p})\leq 0$ for all $\kappa\leq\kappa^*$ and $\delta(\kappa;\hat{p})\geq 0$ for all $\kappa>\kappa^*$ so that $\Gamma(\hat{p})=\chi\left(\kappa^*\right)$.■

<u>Proof of Proposition 3</u>: By Proposition 2, we need only consider cost-based partitions. For any cost-based partition, we have:

$$p\left(j,\varepsilon^M;\chi(\hat{\kappa})\right)=\varepsilon^M-\zeta_H(\hat{\kappa})\equiv\pi(\hat{\kappa})\qquad(1)$$

where:

$$\begin{aligned}&\zeta_L(\hat{\kappa})\equiv(1-\overline{Q}_L)\frac{\int_{\kappa_{\min}}^{\hat{\kappa}}C'^{-1}\left(\left(1-\overline{Q}_L\right)/\kappa\right)f_\kappa(\kappa)d\kappa}{\int_{\kappa_{\min}}^{\hat{\kappa}}f_\kappa(\kappa)d\kappa}\\&\zeta_H(\hat{\kappa})\equiv(1-\overline{Q}_H)\frac{\int_{\hat{\kappa}}^{\kappa_{\max}}C'^{-1}\left(\left(1-\overline{Q}_H\right)/\kappa\right)f_\kappa(\kappa)d\kappa}{\int_{\hat{\kappa}}^{\kappa_{\max}}f_\kappa(\kappa)d\kappa}\end{aligned}\qquad(2)$$

$f_\kappa(.)$ being the (prior) probability density function for κ .We will show that for some κ^*:

$$\Gamma\left(\pi\left(\kappa^*\right)\right)=\chi\left(\kappa^*\right)\qquad(3)$$

By (1) and (3) $\left\{\pi\left(\kappa^*\right),\chi\left(\kappa^*\right)\right\}$ is an equilibrium.For (3), let

$$\delta\left(\kappa;\varepsilon^F,\pi(\hat{\kappa})\right)\equiv\Pi^*\left(H;\varepsilon^F,\kappa,\pi(\hat{\kappa})\right)-\Pi^*\left(L;\varepsilon^F,\kappa,\pi(\hat{\kappa})\right)=\delta(\kappa;\pi(\hat{\kappa}))\qquad(4)$$

as in the proof of Proposition 2, and consider the graph of $\delta(\kappa;\pi(\kappa))$. The following three cases are exhaustive:

<u>Case 1</u>. $\delta(\kappa_{\min};\pi(\kappa_{\min}))\geq 0$.By Lemma 3.1 (b) $\delta(\kappa;\pi(\kappa_{\min}))\geq 0$ for all κ so that $\Gamma(\pi(\kappa_{\min}))=\chi(\kappa_{\min})$.

<u>Case 2</u>. $\delta(\kappa_{\max};\pi(\kappa_{\max}))\leq 0$.By Lemma 3.1 (a) $\delta(\kappa;\pi(\kappa_{\max}))\leq 0$ for all κ so that $\Gamma(\pi(\kappa_{\max}))=\chi(\kappa_{\max})$.

Case 3. $\delta(\kappa_{\min};\pi(\kappa_{\min})) < 0 < \delta(\kappa_{\max};\pi(\kappa_{\max}))$.Since $\delta(.)$ is continuous, there is some $\kappa^* \in (\kappa_{\min},\kappa_{\max})$ such that $\delta(\kappa^*;\pi(\kappa^*)) = 0$ By Lemma 3.1 $\delta(\kappa;\pi(\kappa^*)) \le 0$ for all $\kappa \le \kappa^*$ and $\delta(\kappa;\pi(\kappa^*)) \ge 0$ for all $\kappa > \kappa^*$ so that $\Gamma(\pi(\kappa^*)) = \chi(\kappa^*)$.■

Notes

Note 1. Incentives for earnings management are created by contracts that are explicitly or implicitly tied to reported earnings, such as debt covenants, stock option grants, security offerings, and proxy contests,see for example, Dechow, Sloan and Sweeney (1995) and Dechow, Sloan and Sweeney (2002).

Note 2. While auditors are technically appointed by shareholders, in practice, managers exert considerable influence over their appointment. For example, shareholders merely vote on whether to accept management's recommendation regarding the appointment of a new auditor or the re-appointment of the incumbent auditor.

Note 3. There is a large body of literature demonstrating that there are auditors of different quality in the market. Numerous studies have investigated the notion that Big Five auditors provide higher quality audits than non-Big Five auditors (see, e.g., DeAngelo (1981), St. Pierre and Anderson (1984) and DeFond and Jiambalvo (1993).) Palmrose (1988) uses litigation rates as a surrogate for quality and shows that litigation rates are lower for large auditors than for small auditors. However, see Boone, Khurana and Rama (2010) for a different perspective.

Note 4. Other studies that model earnings management and obtain biased earnings as an equilibrium outcome include Fischer and Verrecchia (2000), Ewert and Wagenhofer (2005), and Stocken and Verrecchia (2004). In Fisher and Verrecchia (2000) the manager of a firm makes a potentially biased report of earnings to the market, and due to the asymmetric information between the firm and the market, the market can only correct for an expected level of bias in the manager's report.This reduces the value relevance of the report, which could otherwise have been perfectly unraveled endogenously to yield an unbiased signal.However, their model does not consider the impact of biased reporting on the choice of auditor quality. Our paper complements theirs by analyzing audit quality, the extent of the reversal of bias in audited earnings, and the resulting market-maker's reaction to earnings that vary with auditor quality.

Note 5. Titman and Trueman (1986) and Datar, Feltham, and Hughes (1991) have shed some light on the process of auditor selection by appealing to information asymmetry arguments. The quality of the audit is a good from the firm's viewpoint, since higher quality auditors reduce information asymmetry to a greater extent than lower quality ones. Therefore, firms choose a high quality auditor to signal their value to the market.However, neither model addresses how there can be a market for auditors of different quality.

Note 6. According to Dechow Sloan and Sweeney (2002), "Firms whose Board of Directors is dominated by management, where CEO is also the chairman of the board, CEO is the founder of the company, those who have weak or no audit committees and those who do not have an outside block holder find it easier to manipulate earnings."

Note 7. For example, firms can manage earnings more easily in the initial years by simply increasing accruals and revenue, thus staying within GAAP, before resorting to aggressive manipulation techniques.

Note 8. Barton, Simko and Richardson (2005) report that presence of more "soft" assets on the balance sheet gives a manager greater flexibility to manage short term earnings..

Note 9.Karpoffet. al. (2008) estimate that the average firm subject to SEC enforcement for financial reporting violation loses about $381 million in share value through legal and reputational penalties..

Note 10. Our result is consistent with the empirical studies finding a positive relation between earnings quality and auditor quality.For instance, Becker, DeFond, Jiambalvo, and Subramanyam (1998) report that firms audited by Big 6 auditors have lower abnormal accruals, thereby exhibiting less aggressive earning management behavior, Lennox (1999) finds that accounting reports audited by Big 6 exhibit greater accuracy in the United Kingdom. And Balsam, Krishnan, and Yang (2003) and Krishnan (2003) find that firms reporting smaller abnormal accruals have auditors who are experts in the respective industries of the firms.

Note 11. That a lower quality auditor may be a strategic choice even if the market underprices such firms has also been shown by Hogan (1997).

Note 12. We assume that the bias is positive.This is not a major restriction since rarely do managers prefer to report lower earnings.According to the Wall Street Journal (4 June, 2002) a recent settlement case involving Microsoft's overstatement of cash reserves (perhaps to smooth quarterly results) is considered "unusual [for understating]…income, rather than inflating it."See also, Kinney and Martin (1994) who report that audit-related adjustments in their study of more than 1,500 audit irregularities were overwhelmingly negative.

Note 13. Convexity of C ensures that the marginal utility of an additional unit of bias is decreasing.

Note 14. In our model, high cost of bias is akin to low benefits from bias. Assuming uncertain benefits (as in Fischer and Verrecchia 2000) rather than uncertain costs for bias does not qualitatively affect our results.

Note 15. Because A $f(\kappa)$ is atomless, $\kappa = \underline{\kappa}$ is a zero-measure event.

Note 16. A similar model for underwriter quality is used by Carter and Manaster (1990).Shapiro (1983) develops the conditions necessary for the development of reputation equilibrium. Shapiro shows that, even under conditions of perfect competition, suppliers will supply products of different quality and that the price schedule is a function of this quality.

Note 17.Nelson, Elliott, and Tarpley (2003) document that when auditors detect deviations from GAAP, they require adjustments to the earnings reported by the firm. We model these adjustments as bias removal by the auditors.

Note 18. This refines the definition of auditor quality by recognizing that the quality of an auditor is not necessarily identical across audits.The litigation records against auditors (St. Pierre and Anderson (1984) and Palmrose (1988)) demonstrate that large as well as small auditors experience audit failures. For instance, Wu (2002) shows that 83% earnings restatements during 1995-2000 came from companies audited by the Big Five.

Note 19.Palmrose (1986) attributes this to higher quality audits performed by large auditors.

Note 20. Of course, the model is not interesting if the price premium is too high -- no firm will want to choose the high-quality auditor if $\Phi_H \to \infty$ .See the discussion of degenerate cases in the proof of Proposition 2.

Note 21. The results are unchanged if we replace p in (2.1) by any linear function of p.

Note 22. Observe also that the auditor does not know the quality of the audit delivered and cannot therefore correctthe audit report for any residual bias.

Note 23. A partition of a set is a collection of disjoint subsets that cover it.

Note 24. Linear price schedules are standard in the theoretical literature because they are intuitive and easy to characterize. See, for example, Fischer and Verrecchia (2000) or Sansing (1992).

Note 25. This in turn is due to the fact that the bias is additive.

Note 26. If the firm chooses a non-zero bias, there is an additional cost in using a high-quality auditor, viz. the additional bias that such an auditor removes, so in fact, the inequality in (3.8) would have to be strict.

Note 27. See the proof of Proposition 3 for more details.

Note 28.The phenomenon that the average of each and every subset of a population decreases, while the population average increases, is called Simpson's Paradox (see Simpson (1951), Cohen (1986).

Note 29. Thus, our model's prediction is consistent with reports of political lobbying by Big N auditing firms.See, for example, *Sullied Accounting Firms Regaining Political Clout*(Washington Post, 12 May, 2002) states that they "oppose mandatory rotation of auditors among public companies and reject a ban on accounting firms providing consulting services to their audit clients."

Note 30. The only firms worse off are the firms who are directly affected by the SEC enforcement.

Note 31. Auditor reputations are in equilibrium as per Shapiro (1983).

Note 32. Linear price schedules are standard in the theoretical literature because they are intuitive and easy to characterize. See, for example, Fischer and Verrecchia (2000) or Sansing (1992).