UNIVERSIDAD CARLOS III DE MADRID working papers

Working Paper 09-13
Economic Series (08)
March 2009

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Audit Contracts and Reputation*

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Abstract

This paper characterizes the contractual relationship between an external auditor and a manager of a client firm when the incentives for both agents are implicit as in the career concerns framework. The main result is that the earning management and the audit effort are decreasing over time because the incentives to build a reputation also decline for both agents in spite of a managers first mover advantage. This suggests that the audit effort should be higher when the auditor is an emerging firm and the future employment opportunities for the client firm´s manager are larger.

Key words. Contract theory; career concerns; reputation; auditing.

Journal of Economic Literature. Classification Number: C73, G38, D82, D83.

* I thank Luis Úbeda for helpful comments and insigthful discussions. This work has also benefited from the participants in the 32th Conference on Spanish Economic Association (Granada, 2007). Any remaining shortcoming is, of course, my own responsability.

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1 Introduction

External auditors are frequently paid according to a scale of fees set for each class of worker-hours used during the audit, which in turn depends on the ability and/or the historical productivity of the human resources engaged in the process. Although the total number of worker-hours can be different for each client firm according to its size, the unitary fees are the same for all clients and the fulfillment of this plan of hours is indeed not certified ex post by other agents. Furthermore, the task of the auditor is considered fully attained with the preparation of a report about the truthfulness or the veracity of the financial statements. However, the audit process that constitutes the background for the opinion contained in this report is seldom evaluated or audited by a third party.[1] All of this means that in practice the audit firm is rewarded *in advance* and that its compensation scheme is *no* contingent neither on the quantity nor on the quality of the audit effort actually exerted.

Both the no contingent nature of this reward scheme and the lack of monitoring on the audit activity rise interesting questions about the actual incentives that external auditors have to do their job properly. The central hypothesis of this paper is that the answer to this issue seems to come from the prospective opportunities offered to the auditors by the market. These opportunities can materialize through the incorporation of new clients or the renovation of the contracts open with the current ones. Accordingly, they can be interpreted as *implicit* and *dynamic* incentives similar to those known in contract theory as *career concerns*.

On the other side of the auditing contract, we have the client firm, and more specifically, its manager. In the context of the audit relationship, the main action undertaken by the manager concerns the announcement of the company's financial statements, which constitutes the major input for the auditor's task. Nevertheless, the plenty of scandals related to the manipulation of these statements observed especially during the last decade, supports strongly the choice of modelling the manager's report as a non-truthtelling and strategic behavior referred to as *earning management*. As an important part of the manager's incentives seems to come from his future employment opportunities, it is reasonable to conjecture that the stimulus of earning management also stems from his implicit incentives.[2] As a consequence, we argue that career concerns also offer a suitable approach to explain the main driving force of this managerial

[1] In 2002, U.S. Congress past the Sarbanes-Oxley Act (SOX, hereafter), the most important securities exchange legislation over the last two decades in order to guarantee the transparency in financial markets. Nevertheless, there is no law that demands the existence of an independent firm that certifies external auditor' reports.

[2] In this case, the implicit incentives for the manager are given by perspectives of promotions or better outside opportunities.

behavior.

This paper characterizes the contractual relationship between an audit firm and a client firm's manager when the incentives for both agents are implicit. To this end, starting from a career concerns model in the spirit of Holmström (1999), we innovate by allowing in each period a sequential game between both parties with a strategic interaction through their respective disutility functions. In such a game, on the one side, the leader position is held by the manager, who has to decide about the disclosure of information on his company's financial situation through the accounting statements. On the other side, the auditor observes this signal and has to make a choice about how much effort he is willing to undertake in order to verify if such a signal represents reasonably the audited firm's financial position.

Our main finding is that earning management and audit effort are *decreasing* over time because the incentives to build a reputation also decline for both agents. However, as our innovation introduces a new source of (current) incentives for both agent's actions, the increasing lazy behavior of the auditor may be offset if his counterpart is in an earlier stage of its career. As a result, the model predicts a continuum of cases depending on which stage of their careers contractual parties are, with two polar cases. On the one side, we have the *best* scenario from a social point of view, that is, the case in which the probability of having *non-detected earning management* is minimized. Accordingly, our results suggest that auditing efforts should be high when the auditor is an emerging firm and/or the future employment opportunities for the manager are large. On the other side, our model also predicts the *worst* scenario from a social viewpoint, that is, the situation in which the probability of having *non-detected earning management* is maximized. In fact, under our double-career-concerns approach, non-detected earning management actions are expected to be higher as long as the manager is at a very early stage of his career, and the auditor is an old firm in the market.

Thus, our model provides an *alternative* explanation to recent scandals involving collusion between auditors and managers to manipulate financial statements in U.S.[3] In fact, most of the previous literature has accounted for these scandals based on the possible conflict of interests that audit firms face when providing jointly auditing and consulting services (see, among others, Antle, 1984; Simunic, 1984; Firth, 1997; and Ruiz Barbadillo et al., 2006). In contrast, our approach highlights the relevance of career concerns held by *both* parties of audit contracts, but focusing only on the auditing

[3] These scandals include, among others, Enron, WorldCom, Tyco, Imclone and Adelphia. It is important to note that our model delivers two conditions to be tested when manipulations were performed: (i) if these companies were run by manager teams with large career concerns, and (ii) if these audit firms were old participants in the market.

services. Although a multi-task approach can contribute to improve the understanding of these scandals, this should constitute the aim of future research.

Our analysis also contributes to clarify the incentives behind the relationship among shareholders, auditors and managers. Under certain circumstances, our theoretical framework show inefficiencies in the auditing process given the two-sided career concern framework. This result supports the existence of either an independent firm or an independent audit committee inside the board that certifies the audit process. This would improve the quality of the information revealed to financial markets and mitigate these inefficiencies.

This paper is related to the abundant literature on career concern for executives (Fama, 1980; Holmström, 1999; and Meyer and Vickers, 1997). However, to the best of our knowledge, so far this approach has not be used to model the relationship between an external auditor and a client firm. Furthermore, a two-sided career concern framework remains almost unexplored within the contract theory literature. One recent exception is Song and Thakor (2006), who study the relationship between the Chief Executive Officer (CEO) and the Board of Directors when both of them have implicit incentives in a career concerns fashion. They contemplate a project selection setting in which the CEO has the responsibility for generating project ideas and providing the board with the information necessary to evaluate them. Their main result is that whereas the board's career concerns cause it to distort its investment recommendation pro-cyclically, the CEO's career concerns cause her to sometimes reduce the precision of the board's information. Nevertheless, and in contrast to our paper, this work does not model the relationship between both parties by means of a strategic and dynamic interaction. Thus, our paper contributes to the contract theory literature by exploiting a richer environment that incorporates two innovations: a bilateral career concern setting, and a first-mover advantage for one the career-concerned agents (the manager).

This paper proceeds as follows. Section 2 constructs a career concerns model of audit contract in the spirit of Holmström (1999), but with a sequential game played by the auditor and the manager in each period. Section 3 characterizes the equilibrium of the game and discusses the principal results. Finally, Section 4 concludes and points up some limitations and extensions. All the proofs are contained in the Appendix.

2 The Model

In this section we characterize the relationship between three agents with infinite horizon: an audit firm, the manager of a client firm, and the market.

2.1 The manager

The client firm's manager decides about the announcement of a signal that we summarize as x_t, the account earnings in period t, and whose "technology" is defined as follows

$$x_t = \theta + a_t + \epsilon_t \quad \forall t = 1, 2, ... \tag{2.1}$$

where θ represents some managerial characteristic like talent or ability which is unknown not only for the market but also for the manager. However, all agents share the same prior distribution of this managerial ability described by

$$\theta \sim N(m_1, \frac{1}{h_1}),$$

where $m_1 \equiv E(\theta)$ and $h_1 \equiv 1/V(\theta)$ corresponds to the level of precision of θ. Moreover, $a_t \in \mathbb{R}$ represents the level of *earning management* chosen by the manager at period t . Finally, ϵ_t is a stochastic noise term which is independent and identically distributed as follows

$$\epsilon_t \sim N(0, \frac{1}{h_\varepsilon}),$$

where h_ε corresponds to the level of precision of ε.

We assume that the manager is risk neutral and exhibits the following separable utility function

$$U_M(c, a) = \sum_{t=1}^{\infty} \delta^{t-1}[c_t - g(a_t, e_t)], \tag{2.2}$$

where $c_t > 0$ is the consumption at period t and $g(.)$ is an increasing and convex function in a_t that represents the disutility of earning management actions to the manager. In addition, $g(.)$ depends on e_t, the current auditing effort decision made by the auditor, what we will detail later. For now, we suppose that $g(.)$ is an increasing and convex function in e_t. This reflects the idea that the earning management actions are more costly when the level of anticipated auditing efforts are large because in this case it is more difficult to fool the auditor. Furthermore, we assume that the marginal disutility of the managerial actions is increasing in the auditing effort. All these assumptions can be summarized as follows

$$\begin{aligned}
g_a(.) &\equiv \frac{\partial g(.)}{\partial a_t} > 0; \;\; g_{aa}(.) \equiv \frac{\partial g_a(.)}{\partial a_t} > 0; \\
g_e(.) &\equiv \frac{\partial g(.)}{\partial e_t} > 0; \;\; g_{ee}(.) \equiv \frac{\partial g_e(.)}{\partial e_t} > 0; \\
g_{ae}(.) &\equiv \frac{\partial g_a(.)}{\partial e_t} > 0.
\end{aligned}$$

The earning management decision has two objectives. The first one has a current effect and the second one has a long run effect. First, we assume that in each period

the manager and the auditor play a sequential game in which the manager exhibits a first mover's advantage. Thus, in each period t, the manager chooses a level of a_t, and according to (**??**) also a signal x_t, with the aim of influencing the effort level exerted by the auditor in this period. Since the auditor only observes x_t, we need to assume that the level of earnings announced by the manager is a "good" signal for the level of earning management actions in the sense of that the joint density $f(x;a)$ satisfies the *monotone likelihood ratio property* (MLRP).[4]

Second, the manager decides a level of earning management as a try to influence, through the signal x_t, the learning process of the market about the managerial ability θ. As in the career concerns literature, the link between the past managerial decision and the unknown managerial characteristic is given by the prospective incomes of top executives. These may be associated to future employment opportunities for the manager given by promotions or better outside opportunities. In consequence, we assume that the incomes associated to future employment opportunities for the manager depend on the past realizations of the signal x_t. This signal in turn depends stochastically on the manager's past decisions about a_t as pointed out by equation (**??**). We summarize these future incomes in the wage function $w_t(x^{t-1})$ that represents the wage paid in period t based on the vector $x^{t-1} = (x_1, ...x_{t-1})$. This vector represents a sequence of realizations of the signal x up to time $t-1$, what we call *history* of x.

Since there are a double causality between today earning management actions and future wages, both the decision rule $a_t(.)$ and the wage functions $w_t(.)$ are determined simultaneously in equilibrium.

2.2 The Auditor

Since we assume that the audit firm is managed by its owner, we do not distinguish between the audit firm's manager and the audit firm itself, and thus hereafter we only talk generically about *the auditor*. The auditor must elaborate a report with his opinion about the thruthfulness of the signal x_t disclosed by the manager. We model this situation as a new signal r_t, the *adjusted earnings report* at period t, that is, a number that depends stochastically on the audit efforts in the following fashion:

$$r_t = \phi + e_t + \xi_t \quad \forall t = 1, 2, ... \tag{2.3}$$

where ϕ represents some auditor's characteristic like ability or productivity which is unknown not only for the market and the client firm but also for the auditor. However,

[4] That is, we assume that $f_a(x;a) > 0$ and that

$$\frac{\partial}{\partial x}\left(\frac{f_a(x;a)}{f(x;a)}\right) > 0.$$

all agents share the following prior distribution of the auditor's ability

$$\phi \sim N(n_1, \frac{1}{k_1}),$$

where $n_1 \equiv E(\phi)$ and $k_1 \equiv 1/V(\phi)$ corresponds to the level of precision of ϕ. In addition, $e_t \geq 0$ represents the level of auditing effort chosen by the auditor at period t. Finally, ξ_t is a stochastic noise term which is independent and identically distributed as follows

$$\xi_t \sim N(0, \frac{1}{k_\xi}),$$

where k_ξ corresponds to the level of precision of ξ.

The auditor is risk neutral and has the following separable utility function

$$U_A(\tau, e) = \sum_{t=1}^{\infty} \delta^{t-1}[\tau_t - \psi(e_t, x_t)] \tag{2.4}$$

where $\tau_t \in \mathbb{R}$ represents the auditor's income at period t and $\psi(.)$ is an increasing and convex function in e_t that measures the disutility of the auditing effort. The function $\psi(.)$ also depends on x_t, the current signal announced by the manager. We assume that $\psi(.)$ is an increasing and convex function in x_t. This assumption is based on the idea that the auditing effort is more costly as long as the level of earning management actions, underlying in higher level of x_t, is larger. This is because it is more difficult for the auditor to detect a cheating behavior.[5] Moreover, we suppose that the marginal disutility of the auditing effort is decreasing in the signal announced by the manager. In sum, we are assuming the following situation

$$\begin{aligned}
\psi_e(.) &\equiv \frac{\partial \psi(.)}{\partial e_t} > 0; \;\; \psi_{ee}(.) \equiv \frac{\partial \psi_e(.)}{\partial e_t} > 0; \\
\psi_x(.) &\equiv \frac{\partial \psi(.)}{\partial x_t} > 0; \;\; \psi_{xx}(.) \equiv \frac{\partial \psi_x(.)}{\partial x_t} > 0; \\
\psi_{ex}(.) &\equiv \frac{\partial \psi_e(.)}{\partial x_t} < 0.
\end{aligned}$$

As in the case of the manager, the auditing effort decision has two objectives. Again, there is one objective that has a current effect and another which has a long run effect. First, in each period t, the auditor chooses a decision rule (s reaction function) of e_t, and according to (2.3) also a signal r_t. Since the manager has a first mover's advantage, he can anticipate this decision rule, which implies finally that the auditor can influence the level of earning management actions undertaken by the manager in this period through the disutility function $g(a_t, e_t)$.

In addition, the auditor also decides a level of auditing effort as an attempt to influence, through the signal r_t, the market's future perception about ϕ. In this case,

[5] Again, the assumption of MLRP is crucial for this fact to be held.

the underlying driving force that permits the relationship between the past decision about e_t and the unknown auditor's characteristic ϕ are his implicit incentives. These career concern-based incentives are given by the auditor's incomes associated to the prospective opportunities arisen from contracts with new clients, and/or the renovation of relationships maintained with some current clients. Thus, we assume that these incomes depend on the past realizations of the signal r_t, which in turn depend stochastically on the auditor's past decisions about e_t as (2.3) establishes.[6] We summarize these future opportunities in the income function $\tau_t(r^{t-1})$ that represents the incomes obtained in period t based on the vector $r^{t-1} = (r_1, ...r_{t-1})$. This vector describes the history of the signal r up to time $t-1$.

Given the interaction between today auditing efforts and future incomes, both the decision rule $e_t(.)$ and the income functions $\tau_t(.)$ are determined simultaneously in equilibrium.

2.3 The Market

We suppose that the future opportunities for both the manager and the auditor depend on the assessment of their abilities made by the market. This is an abstract agent who gathers all available information concerning not only the signals disclosed by the other two agents in *previous* periods, but also is able to anticipate *perfectly* the decision rule chosen by them in *all* periods. These two sources of information are though not enough to reveal fully the realization of the random variables θ and ϕ. Thus, the market can only to improve its perception of these unknown characteristics over time through the following learning processes.

For the managerial ability, given the assumptions made on normality and independence, the market's learning process is characterized by the following posterior distribution[7]

$$\theta \mid x^t \sim N(m_{t+1}, \frac{1}{h_{t+1}})$$

with

$$m_{t+1} \equiv E(\theta \mid x^t) = \frac{h_t m_t + h_\epsilon z_t}{h_t + h_\epsilon} = \frac{h_1 m_1 + h_\varepsilon \sum_{s=1}^{t} z_s}{h_1 + t h_\epsilon}, \tag{2.5}$$

$$h_{t+1} \equiv 1/V(\theta \mid x^t) = h_t + h_\epsilon = h_1 + t h_\epsilon, \text{ and} \tag{2.6}$$

$$z_t \equiv x_t - a_t^*(x^{t-1}) \tag{2.7}$$

[6] Now we assume implicitly that $f_e(r;e) > 0$ and that the level of reported adjusted earnings r_t is a "good" signal for the level of auditing effort in the sense of that the joint density $f(r;e)$ satisfies the MLRP defined as follows

$$\frac{\partial}{\partial r}\left(\frac{f_e(r;e)}{f(r;e)}\right) > 0.$$

[7] See DeGroot (1970).

Notice that the mean process $\{m_t\}$ is a random walk with incremental variance which declines to zero as $t \to \infty$, which means that in the limit θ will become fully known.

The intuition of this learning process is that at period t the market observes the earnings x_t announced by the manager, but the former filters this public signal through the perfect inference of the optimal decision rule a_t^*. In other words, the manager tries to manipulate the earnings in order to influence the market's posterior perception about his managerial ability, and in this way, to affect his future wages. However, we assume that in equilibrium the market is able to anticipate perfectly this cheating behavior and improve the signal received. This improved signal is denoted by z_t, which however does not reveal fully the realization of the managerial ability because it still keeps a source of noise arisen from the term ϵ_t.[8]

On the auditor side, the market's learning process on the auditing ability is characterized by the following posterior distribution[9]

$$\phi \mid r^t \sim N(n_{t+1}, \frac{1}{k_{t+1}})$$

with

$$n_{t+1} \equiv E(\phi \mid r^t) = \frac{k_t n_t + k_\xi l_t}{k_t + k_\xi} = \frac{k_1 n_1 + k_\xi \sum_{s=1}^{t} l_s}{k_1 + t k_\xi}, \tag{2.8}$$

$$k_{t+1} \equiv 1/V(\phi \mid r^t) = k_t + k_\xi = k_1 + t k_\xi, \text{ and} \tag{2.9}$$

$$l_t \equiv r_t - e_t^*(r^{t-1},\ x_t^*) \tag{2.10}$$

As in the case of the managerial ability, the mean process of the audit ability $\{n_t\}$ is also a random walk with incremental precision that diverges as $t \to \infty$. Hence, in the limit ϕ also becomes completely known.

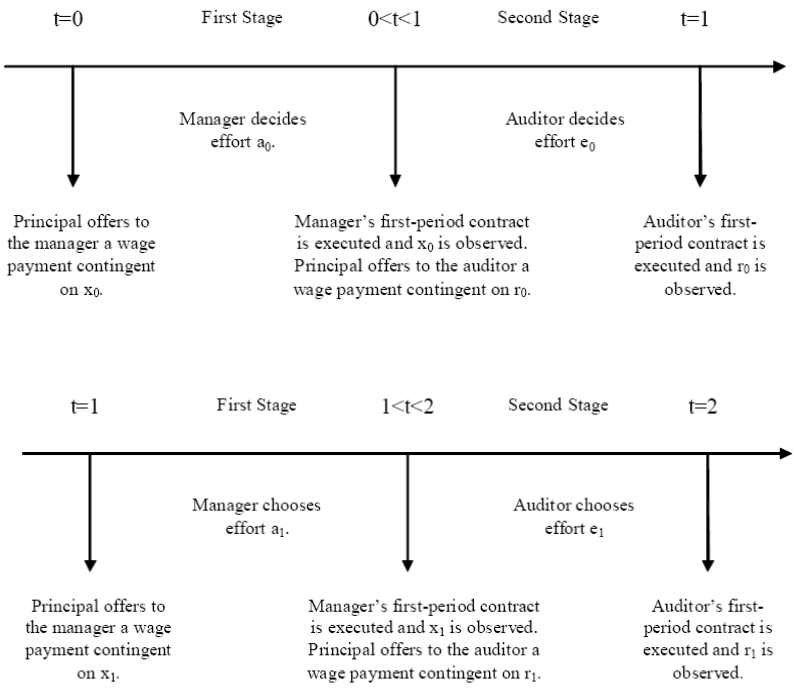
The intuition behind of this learning process is the following one. At period t, the market observes the adjusted earning report r_t disclosed by the auditor, but the former improves this public signal anticipating perfectly the optimal decision rule chosen by the latter concerning to the level of auditing effort. Despite the auditor's attempts to influence the market's assessment of his ability and his future incomes, we assume that in equilibrium the market cannot be confused by the auditor's decision. Consequently, the market constructs an improved signal denoted by l_t, which still contains a noisy element ξ_t that prevents to know perfectly the realization of the auditing characteristic ϕ.[10]

An illustration of the timing of the game is given by the following figure when $T = 2$.

[8] In fact, from (2.1) and (2.7) we know that $z_t = \theta + \epsilon_t$, and hence, $z_t | x^{t-1} \sim N(m_t, \frac{1}{h_t} + \frac{1}{h_\epsilon})$.

[9] See DeGroot (1970).

[10] In fact, from (2.3) and (2.10) we known that $l_t = \phi + \xi_t$, and thus, $l_t | r^{t-1} \sim N(n_t, \frac{1}{k_t} + \frac{1}{k_\xi})$.



3 Characterization of the Equilibrium

According to the timing of the problem, the manager's optimal decision $a_t^*(x^{t-1}, r^{t-1})$ and the auditor's optimal decision $e_t^*(r^{t-1},\ x_t^*)$ are the result of a sequential game played by both agents at period t. In this game, the manager exhibits a first mover's advantage. In consequence, we need to apply backward induction in each period, which means to characterize the solution of this game as a problem with two stages.

Likewise, since we assume that the agents are risk neutral and forward looking for infinite periods, and that there is neither borrowing nor saving, this problem can be written as a dynamic program at $t = 1$. In this formulation, the agents choose a sequence of actions that maximizes their expected utilities and characterizes the path of sub-perfect Nash equilibria (SPNE) of this game.[11] Furthermore, we assume that shareholders assess both manager's ability and auditor's productivity inside each of both competitive labor markets. This means that shareholders are the principals in the two agency relationships. In addition, we restrict our model to the case when all the bargaining power is on the agent's hands in both markets.

[11] The assumption that there is neither saving nor borrowing for the manager means that $c_t = w_t$ for all t. Notice that this assumption implies that we do not need to assume that the capital market is perfect.

Since the relevant variables are functions of the history of the signals r and x -unknown at time $t = 1$-, we apply the unconditional expectation to the objective functions. Finally, all this leads us to the problem described by the following two steps.

I. The Auditor's Problem. For a given sequence of random variables $\{x_t\}_{t=1}^{\infty}$, which has implicit a sequence of manager's actions $\{a_t\}_{t=1}^{\infty}$, the auditor chooses the non-stochastic sequence of reaction functions $\left\{e_t(r^{t-1}, x_t)\right\}_{t=1}^{\infty}$ that solves the following program:

$$\max_{\{e_t(.)\}_{t=1}^{\infty}} EU_A(\tau, e) = \sum_{t=1}^{\infty} \delta^{t-1}[E\tau_t(r^{t-1}) - E\psi(e_t(r^{t-1}), x_t)] \quad (3.1)$$

$$s.t.$$

$$\tau_t(r^{t-1}) = E(r_t \mid r^{t-1}) = E(\phi \mid r^{t-1}) + e_t(r^{t-1}) \quad \forall t = 1, 2, ... \quad (3.2)$$

where constraint (3.2) represents the auditor's incomes that a competitive and risk neutral principal sets in each period t. Notice that we assume that the prospective incomes for the auditor depend on the level of past reported adjusted earnings r^{t-1}. This modelling choice is based on the idea that the external auditor are hired directly by the shareholders or other body autonomous of the manager such as the board of directors or the controller of the company. This justifies that we can model the future opportunities the market offers to the auditor as dependent on his adjusted earnings report.

II. The Manager's Problem. Taking into account the sequence of non-stochastic reaction functions $\left\{e_t(r^{t-1}, x_t)\right\}_{t=1}^{\infty}$, the manager chooses the sequence of non-stochastic earning management actions $\left\{a_t^*(x^{t-1}, r^{t-1})\right\}_{t=1}^{\infty}$, which in turn determines the sequence of random signals $\{x_t^*\}_{t=1}^{\infty}$ so that

$$\max_{\{a_t(.)\}_{t=1}^{\infty}} EU_M(w, a) = \sum_{t=1}^{\infty} \delta^{t-1}[Ew_t(x^{t-1}) - Eg(a_t(x^{t-1}), e_t(r^{t-1}, x_t))] \quad (3.3)$$

$$s.t.$$

$$w_t(x^{t-1}) = E(x_t \mid x^{t-1}) = E(\theta \mid x^{t-1}) + a_t(x^{t-1}) \quad \forall t = 1, 2, .. \quad (3.4)$$

where now constraint (3.4) represents the managerial wages that a competitive and risk neutral principal sets in each period t. Thus, the prospective incomes for the auditor depend on the level of earnings announced by the manager in the past. In this contract, the principals are the shareholders or the board of directors, who are assumed to be autonomous of the manager.

The next statement characterizes the equilibrium of this game.

Proposition 3.1. *The equilibrium of the game described by the auditor's and the manager's problem is characterized by the vector of sequences* $\{(a_t^*, e_t^*(x_t^*), w_t^*, \tau_t^*)\}_{t=1}^{\infty}$.

In this equilibrium, $\left\{\left[a_t^*(x^{t-1}, r^{t-1}), e_t^*(r^{t-1}, x_t^*)\right]\right\}_{t=1}^{\infty}$ represents the sequence of non-stochastic SPNE profiles of the game played between the manager and the auditor at each period. Moreover, $\{x_t^*\}_{t=1}^{\infty}$ denotes the sequence of random signals announced by the manager when he decides to exert the sequence of optimal earning management actions $\{a_t^*\}_{t=1}^{\infty}$. Finally, w_t^* and τ_t^* represent the wage sequences of the manager and the auditor, respectively.

Notice that the principal anticipates perfectly the SPNE profile $(a_t^*, e_t^*(x_t^*))$ and uses these correct conjectures to filter the signals disclosed by both the manager and the auditor. This implies that the market uses signals z^{t-1} and l^{t-1} instead x^{t-1} and r^{t-1}, respectively. All this together with the learning processes described by (2.6) and (2.9) allow to write the constraints of the problem as follows

$$\tau_t(r^{t-1}) = n_t(l^{t-1}) + e_t^*(r^{t-1}, x_t^*) \quad \forall t = 1, 2, ... \tag{3.5}$$

and

$$w_t(x^{t-1}) = m_t(z^{t-1}) + a_t^*(x^{t-1}, r^{t-1}) \quad \forall t = 1, 2, ... \tag{3.6}$$

where $z^{t-1} = (z_1, ...z_{t-1})$ and $l^{t-1} = (l_1, ...l_{t-1})$. Taking expectations on (3.5), with auditing effort fixed and non-contingent, yields

$$\begin{aligned} E\tau_t(r^{t-1}) &= En_t(l^{t-1}) + Ee_t^*(r^{t-1}, x_t^*) \qquad \forall t = 1, 2, ... \\ &= \frac{k_1 n_1}{k_t} + \frac{k_\xi}{k_t}\sum_{s=1}^{t-1}[n_1 + e_s - Ee_s^*(r^{s-1}, x_s^*)] + Ee_t^*(r^{t-1}, x_t^*) \end{aligned} \tag{3.7}$$

Hence, for a non-stochastic equilibrium path of auditing efforts $\left\{e_t^*(r^{t-1}, x_t^*)\right\}_{t=1}^{\infty}$, the *marginal return* to e_s in period t for all $s < t$ does *not* depend on the past because

$$\frac{\partial E\tau_t(r^{t-1})}{\partial e_s} = \frac{k_\xi}{k_t} \equiv \beta_t \tag{3.8}$$

A similar line of reasoning for the manager's problem leads to the marginal return to a_s in period t for all $s < t$ does not depend on the past neither since

$$\frac{\partial Ew_t(x^{t-1})}{\partial a_s} = \frac{h_\epsilon}{h_t} \equiv \alpha_t. \tag{3.9}$$

Thus, the next lemma states a useful property concerning marginal returns to both agents' actions for characterizing the equilibrium.

Lemma 3.2. *The present value of the marginal return to both auditing effort and earning management is decreasing over time.*

On the side of costs, note that the *marginal expected cost* to e_s is equal to $\Psi(e_s)$, the expected marginal cost to e_s so that

$$\frac{\partial E\psi(e_s, x_s)}{\partial e_s} = E\psi'_e(e_s, x_s) \equiv \Psi(e_s, x_s).$$

Moreover, the marginal expected cost to managerial actions a_s is given by

$$g'_a(a_t^*, e_t^*(x_t^*)).$$

After combining the properties of marginal returns and marginal disutility, the following proposition characterizes the major feature of the equilibrium path of both parties' actions.

Proposition 3.3. *The optimal level of auditing effort and earning management decreases over time.*

Let us explain the intuition of this result for the auditor case. As long as the auditor's career elapses -the manager's career *ceteris paribus*-, his auditing effort exhibits a *decreasing* (present value of) marginal return and an *increasing* marginal disutility. Since only the incremental disutility depends on effort, the only way to maintain the marginal condition of optimality is by means of decreasing auditing actions. Notice that it is crucial for the auditor exert less effort over time since his incentives to build a reputation also decline. In fact, the learning process on the precision of his ability described by expression (2.9) means that the uncertainty about the auditing ability, $1/k_t$, goes to zero. As a consequence, the implicit incentives provided by futures opportunities for the auditor are dissipated over time and thereby, auditing actions become useless.

It is important to point out that this analysis is true for a given level of optimal announced earnings x_t^*, that is, assuming that the manager's career is fixed. Nevertheless, as Proposition 3.3 establishes, when $t \to \infty$ for the manager, earning management actions a_t^* also go to zero. Accordingly, the optimal signal x_t^* *declines* in a stochastic sense because. Note that the assumption $\psi_{ex}(.) < 0$ guarantees that the marginal disutility function to the auditing effort *shifts in* when $t \to \infty$ for the manager. Thus, this also drives the level of optimal auditing effort to zero even in cases in which the auditor be in early stages of his career and his marginal return be far away from zero. All this implies directly the following result.

Corollary 3.4. *For a given level of prospective opportunities for the audit, he will spent lower effort when he faces a manager with lower career concerns incentives.*

Proposition 3.3 also states that financial statement manipulations decrease over time as the incentives to build a reputation for the manager decline as well. Again, these implicit incentives disappear because of the uncertainty about the managerial ability vanishes as the manager's career passes. According to (2.1), this induces stochastically a smaller x_t^* over time, which, as we discussed above, has effects on auditing effort decisions.

Furthermore, we can observe from the marginal optimality conditions of the auditor's problem that when $t \to \infty$, and for a given level of optimal signal x_t^*, the optimal auditing effort e_t^* goes to zero. The assumption $g_{ae}(.) > 0$ implies that the marginal disutility function to the managerial action *shifts out* when $t \to \infty$ for the auditor, which increases the level of optimal earning management. This suggests that a contractual relationship with an auditor with low career concerns could offset the lack of incentives by the manager to manipulate financial statements when he is at the last stages of his career and the marginal return to these actions is small. The next result follows then directly.

Corollary 3.5. *For a given level of prospective opportunities for the manager, he will follow higher earning management actions when he faces an auditor with lower career concerns incentives.*

4 Concluding Remarks

This paper characterizes the contractual relationship between an auditor and a client firm's manager when the incentives for both parties are implicit as in the career concerns literature. Our results are twofold. First, earning management and auditing effort are decreasing over time as the present value of the marginal return to these actions is also decreasing, and thus, incentives to build a reputation decline for both agents. Second, as a result of a strategic interaction between the auditor and the manager through their disutility functions, the actions undertaken by each agent in a given period are additionally influenced by the current actions or signals chosen by his counterpart.

As a consequence, the combination of these two findings suggests that the effort exerted by each agent will depend not only on the incentives provided by his own career concerns, but also on the implicit incentives of his counterpart. This implies, on the one hand, that audit effort in a given period should be higher when the auditor is an emerging firm and/or the future employment opportunities for the client firm's manager are larger. On the other hand, one should expect that earning management actions be higher as long as the prospective opportunities for the manager are larger and/or the auditor is an older firm in the market.

Two key underlying assumptions allow these results to emerge. First, we suppose that market's learning processes of both managerial talent and auditor ability are so that uncertainty about these abilities vanishes over time. Hence, the usefulness of actions undertaken and signals disclosed by agents is also dissipated. Second, we model the manager-auditor relationship in each period as a sequential game in which

the strategic interaction is provided through the effort's disutility functions of both agents. Thus, the assumptions made in connection with the cross-effects of actions and signals on the marginal disutilities are crucial to obtain the second result.

All this suggests some extensions that could jeopardize the robustness of the conclusions attained here. The first one is the inclusion of a learning process in which ability follows a noisy process and thus, varies over time. Since this additional noise prevents that ability can be known with full precision, the sequence of optimal efforts could not be necessarily decreasing over time. The second avenue of extensions is modelling the manager-auditor relationship under other frameworks, either by modifying the nature and timing of the game played between both agents or by considering other strategic interaction links between them.

Finally, a third line of future research is to take into account different types of auditing efforts. This extension is especially relevant if one considers that in practice audit testing is typically categorized according to the type of risk that auditor faces: inherent risk, control risk and detection risk. In this sense, the extension of our model to a multi-task career concerns environment à la Dewatripont, Jewitt and Tirole (1999) seems pertinent. This could be a good starting point for examining how any complementarity and substitutability between these three class of auditing activities could affect the strength of implicit incentives.

5 Appendix

Proof of Proposition 3.1. Substituting the solution $\left\{a_t^*(x^{t-1}, r^{t-1})\right\}_{t=1}^{\infty}$ of the Manager's Problem into the accounting earnings process given by (2.1), we obtain the sequence of optimal random signals $\{x_t^*\}_{t=1}^{\infty}$. Then, incorporating this sequence in the reaction function $e_t(.)$ described by (3.2), we get the sequence of non-stochastic optimal auditing efforts $\left\{e_t^*(r^{t-1}, x_t^*)\right\}_{t=1}^{\infty}$. Similarly, after substituting the last sequence into the audit earnings report process described by (2.3), the sequence of optimal random reports $\{r_t^*\}_{t=1}^{\infty}$ is attained. Next, plugging sequences a_t^* and x_t^* into (2.5) allows us to get the conditional expectations of θ. A similar substitution of e_t^* and r_t^* into (2.8) yields the conditional expectation of ϕ. Finally, replacing all of these previous sequences into constraints (3.2) and (3.4) allows us to find the vector of salary sequences $\{w_t^*, \tau_t^*\}_{t=1}^{\infty}$. □

Proof of Lemma 3.2. From (3.8), let us define ζ_t, the present value of the marginal return to auditing effort at period t, as follows

$$\zeta_t = \sum_{s=t}^{\infty} \delta^{s-t} \beta_s, \quad \forall t = 1, 2, ... \tag{5.1}$$

Similarly, using (3.9), define γ_t, the present value of the marginal return to earning management at period t, as

$$\gamma_t = \sum_{s=t}^{\infty} \delta^{s-t} \alpha_s, \ \ \forall t = 1, 2, ... \tag{5.2}$$

Given the learning processes about the precision h_t and k_t described by expressions (2.6) and (2.9), both sequences β_t and α_t converge to zero as $t \to \infty$. Hence, and since $\delta < 1$, ζ_t and γ_t decline in turn to zero as $t \to \infty$, which completes the proof.□

Proof of Proposition 3.3. First, the first-order condition to the auditor's problem, evaluated at the equilibrium path, is given by

$$\zeta_t = \sum_{s=t}^{\infty} \delta^{s-t} \beta_s = \Psi(e_t^*, x_t^*) \ \ \forall t = 1, 2, ...$$

From Lemma 3.2, ζ_t is a declining sequence as $t \to \infty$. Moreover, the function $\Psi(.)$ is increasing in e_t as, by assumption, $\psi(.)$ is a convex function in e_t. This implies that for a given level of optimal announced earnings x_t^*, the equilibrium level of auditing effort decreases over time.

Second, the first-order condition to the manager's problem, evaluated at the equilibrium path, corresponds to

$$\gamma_t = \sum_{s=t}^{\infty} \delta^{s-t} \alpha_s = g'_a(a_t^*, e_t^*(x_t^*)) \quad \forall t = 1, 2, ... \tag{5.3}$$

Lemma 3.2 implies that γ_t is a declining sequence as $t \to \infty$ for the manager. Finally, the convexity of the function $g(.)$ with respect to a_t ensures that, for a given level of auditing effort, the optimal level of earnings management a_t^* decreases over time. □

6 References

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