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Misreporting, Optimal Incentives, and Auditing

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ABSTRACT

We propose a model that rationalizes the adoption of a misreporting system allowing managerial earning manipulation. A key element of our approach is the possibility of a tacit collusion between the board and the top management at the expense of shareholders and outside investors. Our framework predicts that the adoption of a misreporting system is mainly related to (i) the cost to the management of implementing such a system, (ii) the level of incentives and punishment the board faces, and (iii) the degree of independence/integrity of external auditors.

JEL Codes: D86; G34; J33; M41; M42

I. INTRODUCTION

This article proposes an optimal contracting model between the board of directors and the top management that analyzes the conditions under which a company adopts an either truthful or misreporting system. Whereas under the first system the true level of profits is always disclosed, under the second the management overstates profits.

We show that the class of reporting system finally implemented mainly depends on a cost–benefit analysis, which includes (i) the managerial cost of implementing a misreporting system, (ii) the detecting probability of the external auditing technology, (iii) the level of fines the board must pay if a misreporting system is detected by auditors, and (iv) the pay-performance sensitivity of the board's compensation scheme.

There is a large body of previous literature modeling earning management behavior (Lacker and Weinberg 1989; Evans and Sridhar 1996; Goldman and Slezak 2006; Povel et al. 2007; Baglioni and Colombo 2011; Andergassen, 2010, 2016). However, this literature differs from our setup in that it does not consider the possibility that the board incentivizes the manager to manipulate earnings, as most of these works assume that truthful reporting is always superior to falsification. In contrast, we identify here conditions

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under which the board optimally prefers and encourages the implementation of a misreporting system.[1]

This work has, therefore, two main contributions. First, it accounts for recent accounting scandals in which managerial compensation schemes seem to have been designed to induce a sort of tacit collusion between the board and the top management at the expense of dispersed shareholders and outside investors. Second, this work illustrates how different corporate governance mechanisms interact to affect the likelihood of fraudulent misreporting, especially those mechanisms related to the expected benefits (incentives) and expected costs (auditing and legal punishment) of such managerial misconduct.

This paper proceeds as follows. Section II presents a contracting model between the board and the management according to which the choice of a reporting system is delegated; Section III characterizes the implementation of an either truthful or misreporting system; and Section IV discusses the main implications of the model. All the proofs are collected in the Appendix.

II. THE MODEL

Consider the following contracting model between the board of directors (she) and the manager (he) of a firm. First, the board, on behalf of shareholders, offers the manager a wage contract represented by w, which can be contingent on verifiable outcomes, through a take-it-or-leave-it offer. If the manager accepts such an offer, he makes a decision on implementing a reporting system $a \in \{t, m\}$, which is unverifiable by the board. Action t represents implementing a *truthful* reporting system, which implies no cost for the manager. In contrast, action m represents implementing a *misreporting* system according to the scheme described subsequently, which implies a fixed setup cost $c > 0$ for the manager. After implementing one of these two accounting systems, the manager privately observes x, the *true* profits of the company, which are distributed as follows:

$$x = \begin{cases} y & \textit{with probability } p \\ 0 & \textit{with probability } 1-p \end{cases},$$

where $y > 0$ and $p > 0$. Then, the manager announces $\hat{x}$, the *reported* profits, to the board and the capital market through the financial statements. These profits are disclosed according to the class of reporting system chosen by the manager previously. Consequently, if $a = t$, the manager always reports the true level of profits (i.e., $\hat{x} = x$). By contrast, if $a = m$, the manager always

1 An exception is Goldman and Slezak (2006), who study stock-based compensation but, contrary to our approach, do not characterize the optimal managerial incentive scheme.

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reports positive profits (i.e., $\hat{x} = y$) even when their true value is zero. Thus, conditional on $x = 0$, the misreporting system allows the manager to inflate the reported profits.

Then, the board's and the manager's compensation are paid. Whereas the board payment is given by an exogenous fraction $\beta \in (0, 1)$ of reported profits net of the managerial payment, the manager's compensation is paid in accordance with the optimal contract earlier designed by the board. Lastly, an external auditor verifies financial statements and detects with probability θ whether reported profits are equal or not to the true profits. If the auditor detects that $\hat{x} \neq x$, the board must pay a fine $\phi|\hat{x} - x|$ to a regulatory agency such that $\phi > 0$.

A natural concern regarding the feasibility of this game arises when true profits are zero, but the manager reports y: How are the payments of shareholders, the board, and the manager funded despite having no real output? We assume that in this case the board convinces new bondholders to fund a false project with an initial investment of y. Furthermore, we assume that the potential penalty $\phi|\hat{x} - x|$ paid by the board can be used to compensate these bondholders if they successfully sue her for fraud.[2] For simplicity, we suppose that once the external auditor detects inflated reporting, the lawsuit is successful with certainty. Therefore, the board bets that, with probability $1 - \theta$, the external auditing will fail, the fraud will remain without sanction, and, consequently, bondholders will not be compensated at all.

In addition, we adopt the following assumptions: (1) there is universal risk neutrality; (2) the board has zero reservation payoff, and the manager's reservation payoff is given by $\underline{U} > 0$; (3) shareholders and the manager have limited liability, that is, $0 \leq w \leq \hat{x}$, and zero initial wealth; (4) $\max\left\{\frac{\underline{U}}{p}, \underline{U} + c\right\} < \frac{c}{1-p} < \min\left\{\left(1 - \frac{\theta\phi(1-p)}{\beta}\right)y, y\right\}$; and (5) a full franchise contract is not allowed.

III. THE RESULTS

Our main result is that the model is sufficiently general to allow for a situation in which it is optimal for the board to encourage the manager to implementing a misreporting accounting system. The next proposition characterizes the condition ensuring this outcome.

2 Notice that ϕ can be greater than or equal to 1 and that we do not assume limited liability for the board. It is worthy to note that this way of linking earning management and fraud is very close to what has happened in several real-world accounting scandals. Consider, for instance, the case of Empresas La Polar S.A. mentioned in footnote 5.

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Proposition 1. *Consider the threshold*

$$\overline{\phi} \equiv \frac{\beta\left[(1-p)y - \frac{c}{1-p} + \underline{U}\right]}{\theta(1-p)y}$$

and the condition

$$\phi \geq \overline{\phi}. \tag{1}$$

Then the board-management game has two possible equilibria:

(i) *Truthtelling equilibrium. If condition* (1) *holds, a truthful reporting system is implemented.*
(ii) *Misreporting equilibrium. If condition* (1) *does not hold, a misreporting system is implemented.*

Thus, there is a minimum level of marginal fine $\overline{\phi}$ that deters the board from encouraging a misreporting system. However, if actual penalties are below this threshold, there will be an equilibrium in which the manager overreports profits with the tacit support of the board. A richer intuition behind the result of Proposition 1 can be obtained rearranging the converse of condition (1) as follows:

$$(1-p)\beta y > \beta\left(\frac{c}{1-p} - \underline{U}\right) + \theta(1-p)\phi y. \tag{2}$$

This condition establishes that in equilibrium the board compares the incremental expected benefits (left-hand side) and the incremental expected costs (right-hand side) from implementing a misreporting instead of a truthful reporting system.[3] Thus, as long as benefits exceed costs, the board will design a managerial incentive scheme encouraging the adoption of a misreporting system.

From Proposition 1, the next result follows directly.

Corollary 1. *A misreporting system is more likely as:*

(i) *the board's marginal fine ϕ decreases*
(ii) *the manager's cost of implementing a misreporting system c decreases.*
(iii) *the probability of being detected by the auditor θ decreases.*
(iv) *the board's pay-performance sensitivity β increases.*

3 Notice that the expected cost considers two terms: the incremental expected managerial payment and the expected fine paid by the board.

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Thus, it is more likely that a company adopts a misreporting system if the parameter associated to the incremental expected benefits the board experiences when implementing this class of system (i.e., β) increases, being true the opposite in the case of the parameters associated to their expected costs (i.e., ϕ, c, and θ).[4]

IV. DISCUSSION

Our model provides an economic rationale to recent accounting scandals in which it seems that the board encouraged—at least tacitly—the management to manipulate financial statements at the expense of shareholders. In these scandals, it appears that powerful reward schemes for directors—captured in our setup by the parameter β—led the board to (i) setting very stringent—sometimes unrealistic—managerial performance targets, and (ii) offering either tempting compensation plans (bonuses and stock-based payments) or severe threats (e.g., dismissal) to induce managers to meet these targets. We show that *optimal* managerial incentives can indeed encourage the manager to misreport profits when the implementation of an accounting system allowing this behavior is also in the board's best interest.[5]

Our framework predicts that the implementation of a misreporting system with earning overstatement is more likely as the setup cost of such a system is lower. Consequently, even if there exists a conjecture that a given body of accounting standards allow more managerial discretion to manipulate financial statements, our analysis suggests that the voluntary adoption of this class of standards (e.g., International Financial Reporting Standards) will also depend on how complex or costly its implementation can be for the management. The same analysis also warns over companies that neither impose strict corporate ethical standards from the top nor impose strong social sanctions against improper practices. According to our model, an organizational culture with this lack of tone-from-the-top may reduce c—the managerial cost of adopting a misreporting system—and thereby increase the probability of upward earning management episodes.

Although the previous literature (e.g., Desai et al. 2006) has identified the influence of reputational penalties suffered by managers when they become involved in accounting scandals, in general it has not considered the penalties

4 Although c is the managerial cost of implementing a misreporting system, it is finally paid by the board through the compensation scheme (see Proof of Proposition 1).

5 In the case of tempting managerial incentive schemes as an aligning device between the board and the management at the expense of dispersed shareholders, see, for instance, the fraud involving directors and managers of the Chilean retailer Empresas La Polar S.A. This fraud is considered the biggest accounting scandal in the history of the Chilean capital market (*Financial Times*, Emerging Markets, June 20, 2011). In the case of dismissal as an aligning device, see the recent scandal affecting the vice-chairman and the CEO of Toshiba (*Financial Times*, July 21, 2015).

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directors incur. Our work highlights the role also played by the latter penalties in the implementation of a truthful reporting system, which thus suggests the importance of fine levels and other misreporting-deterring mechanisms over the board when discussing corporate governance regulations. In particular, as our model links earning manipulation and fraud, parameter ϕ is also related with the compensation for new bondholders. Our framework illustrates, therefore, the role played by the legal system as an important external corporate governance mechanism, especially the level of protection of outside investors' rights.

Finally, notice that in our model the detecting probability of the auditing technology can be interpreted as the level of ability, independence, or integrity of the external auditor. As when this probability increases, an equilibrium with a misreporting system is less likely to be implemented; our setup then illustrates the relevance of policies aimed to improve the quality and supervision of the auditing services, and specifically, the ongoing debate over the mandatory rotation of external auditors.

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APPENDIX

Proof of Proposition 1. *The optimal managerial incentive scheme takes the following structure:*

$$w^*(\hat{x}) = \begin{cases} w_s^* & \text{if } \hat{x} = y \\ w_f^* & \text{if } \hat{x} = 0 \end{cases}.$$

We characterize the pair $\left(w_s^*, w_f^*\right)$ considering two cases, depending on which type of reporting system the board prefers that the manager implements.

Case 1. *If the board prefers $a = t$ to $a = m$, the optimal scheme solves the problem*[6]

$$\underset{w_s, w_f}{\text{Max}} \ \beta\left[py - pw_s - (1-p)w_f\right] \tag{A1}$$

subject to

$$pw_s + (1-p)w_f \geq \underline{U} \tag{A2}$$

$$pw_s + (1-p)w_f \geq w_s - c \tag{A3}$$

$$w_f, w_s \geq 0 \tag{A4}$$

$$w_f \leq 0, \ w_s \leq y \tag{A5}$$

where (A2) and (A3) are the participation and the incentive compatibility constraints, respectively, and (A4) and (A5) represent the limited liability to which the manager and shareholders are subject, respectively. The combination of the two limited liability constraints implies that $w_f^* = 0$. In addition, because assumption (2) and the r.h.s. of assumption (4), the previous program can be rewritten as

$$\underset{w_s}{Min} \ p\beta w_s \tag{A6}$$

subject to

$$\frac{\underline{U}}{p} \leq w_s \leq \frac{c}{1-p}, \tag{A7}$$

which is feasible under the l.h.s. of assumption (4). This problem has a corner solution so that $w_s^* = \frac{\underline{U}}{p}$.[7]

6 Notice that whereas conditional on $a = t$, $\Pr(\hat{x} = y) = p$, conditional on $a = m$, $\Pr(\hat{x} = y) = 1$.

7 It can be easily checked that assumption (4) ensures that the board's payoff evaluated at the optimal contract exceeds her zero reservation payoff, and thus, for Case 1, the solution here derived satisfies a participation constraint for the board.

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Case 2. *If the board prefers a = m to a = t, the optimal incentive scheme solves the program*

$$\underset{w_s, w_f}{\text{Max}} \;\; \beta(y - w_s) - \theta(1-p)\phi y \tag{A8}$$

subject to

$$w_s - c \geq \underline{U} \tag{A9}$$

$$w_s - c \geq p w_s + (1-p) w_f \tag{A10}$$

$$w_f, w_s \geq 0 \tag{A11}$$

$$w_f \leq 0, \;\; w_s \leq y, \tag{A12}$$

where conditions (A9)–(A12) represent constraints similar to those identified in Case 1. Again, the combination of limited liability constraints implies that $w_f^* = 0$. Moreover, the fact that $c > 0$ and the l.h.s. of assumption (4) imply that the aforementioned program becomes equivalent to

$$\underset{w_s}{\text{Min}} \;\; \beta w_s$$

subject to

$$\frac{c}{1-p} \leq w_s \leq y, \tag{A13}$$

which is feasible under the r.h.s. of assumption (4). As this problem has a corner solution, the optimal success reward is $w_s^* = \frac{c}{1-p}$.[8]

The board will thus choose *t* rather than *m* as long as the expected payoff from a truthful reporting system exceeds that coming from a misreporting system. By comparing the two cases analyzed earlier, this condition is described by

$$\beta p\left(y - w_{s,t}^*\right) \geq \beta\left(y - w_{s,m}^*\right) - \theta(1-p)\phi y, \tag{A14}$$

where, abusing notation, $w_{s,t}^*$ and $w_{s,m}^*$ represent the optimal success reward under Cases 1 and 2, respectively. After substituting these terms and some simple algebraic manipulations, we get condition (1), which completes the proof.□

Proof of Corollary 1. *All the results are based on condition* (1) *in Proposition 1. Result (i) holds immediately as* ϕ *may decrease to a level below* $\overline{\phi}$, which is the

8 It can be shown that the r.h.s. of assumption (4) guarantees that in Case 2 this solution also satisfies a participation constraint for the board.

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minimum level of marginal fine deterring a misreporting system. Result (ii) holds as simple inspection suggests a decreasing relationship between $\overline{\phi}$ and c. Results (iii) and (iv) follow directly from checking that the partial derivative of $\overline{\phi}$ with respect to θ and β is negative and positive, respectively.[9]□

9 The last two results hold as long as $\overline{\phi} > 0$.

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