

DISCUSSION PAPER SERIES

No. 4850

EARNINGS MANIPULATION AND INCENTIVES IN FIRMS

Guido Friebel and Sergei Guriev

***FINANCIAL ECONOMICS and
INDUSTRIAL ORGANIZATION***



Centre for **E**conomic **P**olicy **R**esearch

www.cepr.org

Available online at:

www.cepr.org/pubs/dps/DP4850.asp

EARNINGS MANIPULATION AND INCENTIVES IN FIRMS

Guido Friebel, IDEI, Toulouse and CEPR
Sergei Guriev, CEFIR and New Economic School, Moscow and CEPR

Discussion Paper No. 4850
January 2005

Centre for Economic Policy Research
90–98 Goswell Rd, London EC1V 7RR, UK
Tel: (44 20) 7878 2900, Fax: (44 20) 7878 2999
Email: cepr@cepr.org, Website: www.cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programme in **FINANCIAL ECONOMICS and INDUSTRIAL ORGANIZATION**. Any opinions expressed here are those of the author(s) and not those of the Centre for Economic Policy Research. Research disseminated by CEPR may include views on policy, but the Centre itself takes no institutional policy positions.

The Centre for Economic Policy Research was established in 1983 as a private educational charity, to promote independent analysis and public discussion of open economies and the relations among them. It is pluralist and non-partisan, bringing economic research to bear on the analysis of medium- and long-run policy questions. Institutional (core) finance for the Centre has been provided through major grants from the Economic and Social Research Council, under which an ESRC Resource Centre operates within CEPR; the Esmée Fairbairn Charitable Trust; and the Bank of England. These organizations do not give prior review to the Centre's publications, nor do they necessarily endorse the views expressed therein.

These Discussion Papers often represent preliminary or incomplete work, circulated to encourage discussion and comment. Citation and use of such a paper should take account of its provisional character.

Copyright: Guido Friebel and Sergei Guriev

January 2005

ABSTRACT

Earnings Manipulation and Incentives in Firms*

We study the effect of earnings manipulation on incentives within the corporate hierarchy. When top management manipulates earnings, it must prevent information leakage from corporate insiders to the outside world. If an insider (e.g. a division manager) gains evidence about earnings manipulation, the threat to blow the whistle can provide them with an additional payment. We show that it is easier for division managers to prove top management's manipulations when the performance of their own divisions is low. Earnings manipulation therefore undermines division managers' incentives to exert effort and destroys value. We show that earnings manipulation is more likely to occur in flatter hierarchies; we also discuss implications of the auditing and whistle-blowing regulations of the Sarbanes Oxley Act.

JEL Classification: D23, G30, M40 and M52

Keywords: agency costs, flat hierarchies, Sarbanes Oxley act and whistleblowing

Guido Friebel
IDEI
Université Sciences Sociales
deToulouse
Place Anatole-France
F31042 Toulouse CEDEX
FRANCE
Tel: (33 1) 6112 8605
Fax: (33 1) 6112 8637
Email: friebel@cict.fr

Sergei Guriev
New Economic School
Nakhimovsky pr. 47
Moscow 117418
RUSSIA
Tel: (7 095) 129 3911
Fax: (7 095) 129 3722
Email: sguriev@nes.ru

For further Discussion Papers by this author see:
www.cepr.org/pubs/new-dps/dplist.asp?authorid=126612

For further Discussion Papers by this author see:
www.cepr.org/pubs/new-dps/dplist.asp?authorid=144054

*We thank Uwe-Wilhelm Bloos, Patrick Bolton, James Brickley, Mike Burkart, Mathias Dewatripont, Denis Gromb, Barry Ickes, Christian Laux, Andy Leone, Fausto Panunzi, Canice Prendergast, Michael Raith, Andrei Shleifer, Jean Tirole, Dimitri Vayanos, Joanna Wu and Luigi Zingales for helpful discussions. We also thank seminar participants at the ESSFM at Gerzensee 2004, CEFIR/NES (Moscow), University of Rochester, London School of Economics, and University of Frankfurt. All errors are ours.

Submitted 17 December 2004

1 Introduction

Recent corporate scandals have reinforced existing skepticism about the efficiency of financial markets and have triggered regulatory reforms like the *Sarbanes-Oxley Act*. Our understanding of these numerous and sizeable corporate misfortunes is far from complete.

In this paper, we offer a new perspective on earnings manipulation. We open the “black box” of the corporate hierarchy, and investigate explicitly the intra-firm agency conflicts that are associated with earnings manipulation. Our paper is motivated by a number of questions that are now increasingly discussed: Why did the mechanisms of corporate governance fail to detect massive earnings manipulation by management? What are the costs of earnings manipulation for society? What effect can regulatory reforms have on avoiding earnings manipulation in the future?

The corporate governance literature has traditionally focused on external gatekeepers such as auditors, non-executive board members, and financial institutions. We look at the role of corporate insiders as *internal* gatekeepers. As they often have direct evidence that executives engage in manipulation, they can play a crucial role. However, it appears that this inside information rarely reaches the outside world. We do not investigate the external costs of earnings manipulation, such as the transfer of utility from less sophisticated players to more sophisticated players or the shattered confidence of shareholders in financial markets. Rather, we identify a very direct cost: earnings manipulation undermines the functioning of companies, because it destroys incentives within firms and thus obstructs value creation. Our perspective provides some new insights about the role of regulations like *Sarbanes-Oxley*, and it highlights the importance of organisational structure as a determinant of earnings manipulation. In particular, we show that the recent tendency to flatten hierarchies has made earnings manipulation easier.

A growing literature has shown that executive stock options and other short-term incentives have played an important role in explaining the incidence of earnings manipulation.¹ In our theory, both top management and initial shareholders have an interest in

¹Peng and Roell (2004) provide an overview of empirical literature on the relationship between the structure of managerial incentives and earnings manipulation. Bergstresser and Philippon (2002) and Gao and Shrieves (2002) measure earnings manipulation through the value of discretionary current accruals and find that it is related to stock holdings and options of executives. Interventions by the SEC are another measure: Johnson et al. (2003) find that in 43 firms that committed fraud, stock-based compensation and vested options were higher than in a matched control sample. Erickson et al. (2003) control for endogeneity of stock-based compensation and find similar effects. Peng and Roell (2004) themselves use yet a different measure, namely, allegations of executive misbehavior in shareholder class actions. They show that the incidence of such lawsuits are positively related to stock option components in executive compensation.

overreporting short-term earnings, because they can sell stocks at inflated prices to uninformed outside investors. We assume that the latter base their valuations of the stock (at least to certain extent) on the accounting reports. This assumption is in line with empirical evidence showing that even sophisticated investors may fail to fully account for the possibility of earnings manipulation (for instance, Louis, 2004). Yet it is important to note that our results would also hold in a game with rational investors and asymmetric information. In such a setting some bad firms pool with better firms and some investors buy stocks based on reported earnings. This is, for instance, the case in Bebchuck and Bar-Gill (2003) and Povel et al. (2003). Also, our results do not hinge on the original shareholders' incentive to sell to outsiders. Any other reason for short-term incentives (discussed in the next section) will have similar effects in our model.

In the model, short-term incentives of top management affect the incentives inside firms via two channels. First, as top managers have incentives to report high earnings even if outcomes are low, they provide weaker incentives to their subordinates. The second, more interesting, channel relates to the policies top management undertakes in order to prevent the leakage of information to the outside world. A division manager may have evidence that top management inflates earnings. Then, if she can prove that top management tries to lie about earnings, the threat of blowing the whistle allows her to claim a share in top management's benefits of hiding the truth from the public. Our theory thus explains why it is costly to maintain two accounting systems, one for the outside world, potentially reporting inflated figures, and one as the basis of internal decisions and incentives for insiders. Insiders with sensitive information would have a credible threat to blow the whistle unless their compensation relates to the reported, rather than the true earnings.

The important feature of the model is that it is easier for a division manager to prove earnings manipulation by the top management if her own division has underperformed. The knowledge about earnings manipulation and the threat of blowing the whistle can provide division managers with an additional payment. Hence, there is a smaller difference between the division's payoffs associated with high *vs* low output. This distorts the division managers' effort choices.

Whistle-blowers do not have to be silenced *ex post*, at the bargaining table. Rather, we show that top managers can neutralize the incentive to blow the whistle *ex ante* – by providing lower level managers with short-term incentives. This may explain why in recent booms, stock options and other short-term incentives propagated in corporate hierarchies. In the light of our theory, short-term incentives align insider incentives with those of top managers and ensure that sensitive information does not reach the outside

world.

From the point of view of initial shareholders, the trade-off is as follows. On the one hand, if top managers manipulate earnings, stocks can be sold at inflated prices. On the other hand, earnings manipulation weakens internal incentives and reduces firm value in the long run. We show that in some parameter range, shareholders may encourage short-termism and manipulation through the provision of short-term incentives. Then, in equilibrium, division managers face suboptimal incentives and less value is created.

The problem we look at – earnings manipulation and its effect on value creation – is important, not only because the value of manipulations often amounts to several billions of USD, but also because there are many more than a few isolated cases. Beyond such household names as *Enron*, *Tyco*, *WorldCom* (in the US) or *Ahold* and *Parmalat* (in Europe), there are many other, less known cases of earnings manipulation. The *Forbes*' Corporate Scandal Sheet, for instance, lists more than 20 large corporate scandals (Patsuris, 2002). *Xerox*, for instance, inflated its earnings over five years. Its earnings manipulation reached 1.5 billion USD. *HealthSouth Corp.* overstated profits by 2.5 bn USD between 1997 and 2003; *Waste Management* manipulated earnings by 1.7 bn USD by overstating the value of their trucks. (Levitt and Dwyer, 2003).

To illustrate the results of our theory, consider the quintessential example of corporate governance troubles: *Enron*, once the world's seventh largest company, now bankrupt, with several top managers facing legal charges. Earnings manipulation in *Enron* was so widespread, that CFO Andy Fastow (backed by CEO/COO Jeff Skilling) perceived his job being mostly, if not exclusively, about arranging “structured finance”: the use of aggressive accounting to deliver high earnings quarterly reports (Maclean and Elkind, 2003, ch. 10).² *Enron*'s ubiquitous book-cooking resulted in the inability to monitor projects even internally. A deputy CEO once complained about Fastow's aggressive accounting: “With Fastow, you could never tell whether [individual] deals were clean because they were too complicated” (Maclean and Elkind, 2003, p. 152). Healy and Palepu (2003) document how widespread earnings manipulation induced *Enron* managers to take unfounded and often excessively risky decisions. This may explain why despite very talented staff and profitable core business, *Enron* ended up not only having its value below the reported numbers but simply destroyed (Maclean and Elkind, 2003, Partnoy 2002, 2003).

Enron's top management had substantial equity stakes or options (allegedly, the top executives managed to cash stock options for USD 35-250 million each, Maclean and Elkind, 2003), and hence little incentives to communicate earnings truthfully. But, there

²The sheer scale of Fastow's activities is striking. Between 1997 and 2000 he created about 3000 corporate entities, including more than 800 of which were offshore (Maclean and Elkind, 2003, p. 310).

were a few attempts of blowing the whistle by those who were not enjoying the stock option bonanza. The famous “smoking gun memo” by Vice President Sherron Watkins to the Chairman Kenneth Lay opens with “Has *Enron* become a risky place to work? For those of use who *didn't get rich over the last few years*, can we afford to stay?” (Watkins, 2001, our italics.) Even though it appears that Sherron Watkins had been aware of the scale of Enron’s earning manipulation, she did not insist on disclosing to public; the memo never reached outsiders before the collapse (Ackman, 2002).

Another (*post* Sarbanes Oxley) example of the threat of whistle-blowing is the case of Matthew Whitley and *Coca Cola*. After being laid off, Whitley asked his former employer for a settlement payment of \$44.4 million. He argued he had been fired in retaliation for raising concerns about accounting fraud (*CFO Magazine*, 2003). When *Coca Cola* dismissed the settlement proposal, the case became public. *Coca Cola* and other companies are now facing charges by the SEC (*CFO Magazine*, 2004a); Whitley and *Coca Cola* have settled in the meantime. Many firms seem to be quite vulnerable against whistle-blowing. New York’s attorney general, Eliot Spitzer, built his case against Wall Street firms doctoring their reports on (e-mail) information from insiders. (*Time Magazine*, 2002).

Whistle-blowing nonetheless seems a rather rare phenomenon given the size and range of earnings manipulation and other corporate fraud, but this does not speak against our theory. Whistle-blowing may occur seldom in equilibrium, because there are many ways to avoid it: by aligning *ex ante* incentives of potentially dangerous insiders with top management; by settling privately *ex post*. Furthermore, top management may decide to monitor certain firm insiders less, allowing them to enrich themselves in illegal ways. This neutralizes future threats to blow the whistle.

The paper proceeds as follows. In Section 2, we discuss related literature. In Section 3, we set up a simple model. In Section 4 we establish the main result. In Section 5 we discuss extensions that allow to investigate the role of organisational structure and monitoring intensity. In particular, we argue that at given size, it is harder for firm insiders to provide evidence of earnings manipulation in flatter hierarchies. Section 6 discusses the *Sarbanes-Oxley Act* in the light of our theory. We argue that the Act will reduce the frequency of earnings manipulation, because it decreases insiders’ costs of whistle-blowing and induces auditors to monitor more carefully. This reduces top management’s benefit from earnings manipulation as they have to share with a larger number of firm insiders and auditors. Section 7 concludes.

2 Related literature

There is a growing literature that investigates the effects of short-termism and earnings manipulation on managerial incentives. In Stein (1989), both short-termism and earnings manipulation emerge in a non-cooperative equilibrium between managers and rational investors. Bebchuk and Stole (1993) show ambiguous effects of short-term incentives on managerial effort depending on the structure of asymmetric information. Bolton et al (2004) show that in the presence of overconfident shareholders, managers may choose sub-optimal projects with higher variance. Jensen (2004) argues that overvalued equity aggravates the agency problems between investors and managers.

While these papers point to the agency relationship between the outside world and corporate management, we explicitly analyze the effect of earnings manipulation on the agency relationship *inside* firms. Our model of a corporate hierarchy highlights the potential role of corporate insiders as gatekeepers; it shows how distortions propagate throughout the hierarchy and how earnings manipulation obstructs value creation by undermining internal incentives. It also highlights the importance of organisational structure for the feasibility of earnings manipulation.

In our theory, top management has short-term incentives to manipulate earnings because outside investors value the company on the basis of accounting reports. There are at least two explanations why full unravelling of earnings manipulation does not occur. First, in the presence of short-sale constraints and some overconfident investors, the stock price will to some extent reflect the company's valuation by investors that rely on the most optimistic signals (Harrison and Kreps, 1978, Scheinkman and Xiong, 2003, Bolton et al, 2003). The other prominent explanation is based on rational but uninformed investors (Bebchuk and Bar-Gill, 2003, Povel et al., 2003). The equilibrium in an asymmetric information game may involve partial pooling and therefore rewards for companies over-reporting earnings. If overreporting is costly, investors know that the worst companies will not report the highest possible outcome. This is why they do value positive reports even though they know that the pool of companies with good reports include both good and intermediate firms. For the sake of simplicity, we choose a setting with overconfident investors, but the asymmetric information framework would produce the same results.

Managerial short-termism can also be driven by the costs of long-term arbitrage (Shleifer and Vishny, 1990), and managerial risk aversion and demand for liquidity (Holmstrom and Tirole 1998, Aghion et al, 2004, Axelson and Baliga, 2004). Whatever the source of CEO short-termism, our theory would still imply weaker incentives for his subordinates.

To the extent that we look at rent-seeking and incentives inside a firm, our model has some similarity to the model in Scharfstein and Stein (2000). However, in our model, the potential rents for division managers are created by CEO's earnings manipulation. Moreover, we allow for cash compensations inside the firm; our main interest is information diffusion to the outside world rather than allocation of capital between divisions. Also related is the paper by Faure-Grimaud and Gromb (2004) who study the role of large shareholders as a different type of insiders in providing information about a firm.

Earnings misreporting may also be carried out for tax optimization purposes (Misai, 2003). In this case, managers tend to underreport rather than overreport the earnings. Desai and Dharmapala (2004) build a model of interaction between managers, owners and government. The effect of high-powered incentives on tax avoidance is ambiguous; tax sheltering is complementary to diversion of profits from shareholders. On the other hand, by paying less taxes, manager may increase shareholder value. Hence, the effect of incentives on reported earnings depends on corporate governance, namely to what extent management is controlled by shareholders. Desai and Dharmapala do not model corporate hierarchy, but our analysis suggests that tax avoidance should not distort internal incentives. Indeed, as management tends to underreport earnings, keeping two sets of books is incentive compatible. The potential whistle-blowers are the successful rather than the failing divisions; these divisions get a bonus on top of their official compensations and are happy not to report the fraud. This is the result obtained in Chen and Chiu (2005, Proposition 1) who study internal incentives in tax-evading firms. Chen and Chiu also show that if the risk-averse managers are personally liable for tax evasion, their incentives are even too strong (for the natural case of decreasing absolute risk aversion).

Finally, our paper contributes to literature on whistle-blowing (Miceli and Near, 1992) that discusses costs and benefits of blowing the whistle. This literature has been largely descriptive except for Leppamaki (1998) who studies whistle-blowing in a rather specific context of bilateral monitoring and for Friebel and Raith (2004) who look at whistle-blowing and conflicts between different layers in the hierarchy. Our paper complements this literature by modelling the effect of potential whistle-blowing on corporate governance.

3 The model

We consider a publicly traded firm which is held by initial shareholders (“ S ”). The firm is run by a CEO (“ M ”) who reports to S , and there are two division managers, A and B , who report to M . There are also potential new investors (“ I ”). Agents M , A and

B are risk-neutral, but have limited liability; their reservation payoffs are normalized to zero. Both initial investors S and overconfident potential investors I are financially unconstrained and, in dealing with M , risk-neutral.

3.1 Production and information

The division managers exert effort e_i , $i = A, B$, which increases the expected value of the firm. Output of each division y_i can take two values: 1 (with probability e_i) and 0 (with probability $1 - e_i$). The aggregate output of the divisions is

$$y = y_A + y_B.$$

Effort is private information of the respective division manager. The cost of effort is $c(e_i)$, which is an increasing, convex function. For simplicity, we assume that $c(e) \sim e^{1+\sigma}$, so that the elasticity of the marginal cost of effort $\sigma = ec''(e)/c'(e)$ is positive and independent of the level of effort. Division manager i observes her own output, but not that of the other division manager. In what follows, we assume that division managers cannot engage in any side-contracting and, in particular, that they cannot share information.³

The CEO observes both divisions' outputs, while the outside world – S and new investors I , who may buy stocks from S – cannot observe the true value of the firm. Rather, they have to rely on M 's report, which may or may not be truthful. This setting captures the idea that certain information is only available within the boundaries of a firm. The role of auditors, who at some cost can generate additional information about the true value of the firm, is discussed in Section 6.

Besides gathering and reporting information, M also exerts effort $E = \{0, 1\}$ which is complementary to that of division managers. For simplicity we make an extreme assumption of perfect complementarity: the firm's gross output is yE . If M chooses high effort, $E = 1$, the output of divisions adds value y . If the top manager shirks, the firm's value is nil. The top manager's cost of exerting $E = 1$ is c_M . We shall assume throughout the paper that this cost of effort is sufficiently low and that shareholders will provide the top manager with incentives (short-term, long-term, or both) such that M never shirks. Thus we will solve the model for the case $E = 1$, and then check for M 's incentive not to deviate to $E = 0$.

³We discuss this issue further in 4.7.

3.2 Timing

There are three dates: $t = 0$ (contracting stage), $t = 1$ (short run), and $t = 2$ (long run). At $t = 0$, S hold 100% shares. They keep at least $\alpha_{S2} \geq 0$ shares in the long run (e.g. for risk management purposes, or for preserving non-pecuniary benefits of control). In our model, α_{S2} is an exogenous parameter. The initial shareholders offer M a contract; then M offers a contract to A and B . The compensation package of M includes a fixed salary and bonuses that are contingent on earnings reported at $t = 1$ and $t = 2$. These bonuses can be interpreted as stock grants or stock options to be exercised at $t = 1$ (short term) and $t = 2$ (long term). For simplicity, we assume that the manager receives α_{M1} shares that can be sold in the short term (to new investors I), and α_{M2} shares that must be kept until the end; β is the present value of all fixed salaries M receives. The division managers' contracts are contingent on their individual output $y_{A,B}$. We assume that either M or a division manager can make verifiable the division's output before a court if they wish to. Date $t = 1$ has several stages:

1. The CEO chooses E .
2. Division managers A and B choose their effort levels e_A, e_B and division outputs realize.
3. The CEO observes y_A and y_B , and prepares a report about aggregate earnings. The reported earnings x may or may not be manipulated by M . Given W , the sum of all wage payments to M, A and B , the reported short-term value of the firm is

$$V_1 = x - W.$$

Here $x = y$ if there is no overreporting, and $x > y$ otherwise. Obviously, W depends on whether or not there is earnings manipulation. We assume that inflating short-term earnings by $x - y$ units has costs C_{x-y} with $C_2 > C_1 > 0 = C_0$. These costs reduce the firm's long-run V_2 , but do not affect short-run value V_1 .⁴

4. The division managers learn about the report before it is sent to potential investors.⁵ Subsequently, if they believe that there is some overreporting, they can bargain

⁴Two comments: First, this may be considered as a reduced form of the net present value of stochastic costs of earnings manipulation. Second, the costs may be incurred by the firm, for instance, as consulting fees to auditors or misallocation of resources, or by the manager, for instance, as an effort cost or the expected costs of potential imprisonment. We take the former route, as it is more in line with the literature, e.g. Stein (1989).

⁵We could also allow for A and B to receive noisy signals about the report.

individually with M for a wage raise. The bargaining power of either division manager (vis-a-vis the CEO) is $\gamma \in [0, 1]$. If M and one or several of the division managers disagree, they can make available to the public verifiable information about their division output. This whistle-blowing drives down the stock price that the potential investors are willing to pay. We further specify the whistle-blowing game in Section 4.

5. The CEO can sell up to α_{M1} shares to the new investors at a price based on reported output x . Initial shareholders can sell a total of $1 - \alpha_{S2} - (\alpha_{M1} + \alpha_{M2})$ to new investors. Potential new investors are overconfident, so that they value the firm based on the reported earnings. This allows an alternative interpretation for the parameter α_{S2} as a measure of market sophistication. If some of the new investors are overconfident while others figure out the true value of the firm, an increase in the proportion of smart investors is equivalent to higher α_{S2} in our model.⁶
6. Finally, A , B and M receive their first-period wages according to the initial contract and whatever additional revenues accrue through exercise of short-term options or through bargaining.

At $t = 2$ (long run) the true value becomes public information. The market value at this point is based on y . There is no additional production. The firm is liquidated and all remaining shareholders (including managers and original shareholders if holding long-term stock) receive their part of the true value, $V_2 = y - W - C_{x-y}$.

Remark 1 *For our results, it is not crucial that the new investors (I) are overconfident. We only need the presence of some investors who buy stocks based (at least to some extent) on reported earnings. This would also be the case in a game with rational investors and asymmetric information (Bebchuck and Bar-Gill, 2003, Povel et al., 2003). We choose the setup with overconfident investors to keep the model tractable.*

3.3 Contracts and payoffs

Contracts between M and A , B are simple. There is a wage in case of success, w_1 , and a wage in case of failure, w_0 .⁷ Owing to limited liability, $w_{0,1} \geq 0$. The contract of M can

⁶We assume that new investors observe wages, but cannot infer from wages on whether or not earnings manipulation has occurred. This is not an important assumption; we discuss it in Section 5.

⁷The sufficient statistic theorem (Holmstrom, 1979) suggests that division manager i 's contract will be contingent *only* on y_i .

be written as $\langle \beta, \alpha_{M1}, \alpha_{M2} \rangle$, so the payoff is

$$U^M = \beta + \alpha_{M1}V_1 + \alpha_{M2}V_2 - c_M E. \quad (1)$$

Here, E is either 1 or nil. Limited liability implies $\beta = 0$. The contract between shareholders and M must deal with a two-dimensional moral hazard problem: M chooses effort E and decides what to report. Incentives for high effort are provided by a sufficiently high *total* of short-term and long-term stakes. Incentives for earnings manipulation depend on the contract's *structure*, that is, the ratio of short versus long-term incentives. The more short-termist the contract, the more likely M is to inflate earnings. If the contract only includes long-term compensation, M will file truthful reports. Notice that new investors, who buy shares at $t = 1$, do not renegotiate M 's long-term contract, because all choices and decisions have already been made at that point.

4 Equilibrium earnings manipulation and internal incentives

We here establish the main result of the paper: earnings manipulation may reduce incentives within the firm. We solve the model backwards.

4.1 Market valuation

At $t = 2$, the price of the firm's equity is $V_2 = y - \beta - W - C_{y-x}$, where $y = y_A + y_B$ is total output by two divisions, W is the total wage paid to divisions, and C_{y-x} is the cost related to earnings manipulation. At $t = 1$, the price of the firm's equity is $V_1 = x - \beta - W$ where x is the total *reported* output.

4.2 Threat of whistle-blowing and bargaining

We assume that C_2 is very high so that the manager never manipulates earnings by two units.⁸ We also use the limited liability constraint ($w_0 = \beta = 0$). Suppose that the manager has chosen to report $x = y + 1$ whenever $y \leq 1$. This costs him $\alpha_{M2}C_1$ in the

⁸In Section 5 we investigate the situation where this is not the case.

long-run, and provides him with short-run benefits according to the table below.

y_A	y_B	Prob.	y	x	M 's payoff $\alpha_{M1}V_1 + \alpha_{M2}V_2$
0	0	$(1 - e_A)(1 - e_B)$	0	1	$\alpha_{M1} - \alpha_{M2}C_1$
1	0	$e_A(1 - e_B)$	1	2	$\alpha_{M1} - \alpha_{M2}C_1 + (\alpha_{M1} + \alpha_{M2})(1 - \tilde{w}_0 - w_1)$
0	1	$e_B(1 - e_A)$	1	2	$\alpha_{M1} - \alpha_{M2}C_1 + (\alpha_{M1} + \alpha_{M2})(1 - \tilde{w}_0 - w_1)$
1	1	e_Ae_B	2	2	$(\alpha_{M1} + \alpha_{M2})(2 - 2w_1)$

(2)

Under the assumption that division managers cannot side-contract, the threat of whistle-blowing is only relevant when $x = 2$ and $y = 1$. Only then, one division – the one that produced nil – has evidence of manipulation. This division threatens M with reporting the evidence to the market. The wage \tilde{w}_0 is the result of bargaining between M and this division manager, as explained below. In Section 5, we discuss the effect of relaxed assumptions concerning output.

Consider the second row in the table. Here, B has evidence about earnings manipulation. We assume the division manager to receive a part $\gamma \in (0, 1)$ of the joint surplus for not blowing the whistle. At the time of bargaining, C_{y-x} has been realized,⁹ so if B blow the whistle, the market value will be based on $y = 1$, and the sum of utilities of M and B is

$$(\alpha_{M1} + \alpha_{M2})(1 - w_1) - \alpha_{M2}C_1.$$

If B does not blow the whistle, the market value will be based on $y = 2$, so the sum of utilities is

$$\alpha_{M1}(2 - 1) + (\alpha_{M1} + \alpha_{M2})(1 - w_1 - \tilde{w}_0) - \alpha_{M2}C_1 + \tilde{w}_0.$$

The CEO and the division manager share the surplus, that is the difference between the latter and the former expression. As B receives a share of γ , we find

$$\tilde{w}_0 = \frac{\gamma\alpha_{M1}}{1 - \gamma(1 - \alpha_{M1} - \alpha_{M2})} \quad (3)$$

As expected, this wage increases in γ and α_{M1} and decreases in α_{M2} . If the threat of whistle-blowing were not important ($\gamma = 0$), then \tilde{w}_0 would be nil.

As we have pointed to in the Introduction, top managers can choose to avoid bargaining at the *interim* stage, simply by aligning the incentives of division managers with their own. Top management can *ex ante* choose a renegotiation-proof contract that is equivalent to the outcome of the *interim* bargaining game. This contract would give employees short-term incentives contingent on *reported* earnings. It can be implemented via contracts or short-term stock grants or options. The division's *ex ante* contract would be

⁹Considering that C_{y-x} is not sunk at the bargaining stage would not make any qualitative difference.

as follow: “The division’s compensation is a sum of (i) a bonus contingent on the division performance y_i and (ii) a bonus contingent on the short-term stock price. The former is $w_1 - \tilde{w}_0$ whenever the division’s output is high ($y_i = 1$), and 0 otherwise. The latter is \tilde{w}_0 if the short-term price is high (based on $x = 2$), and 0 otherwise.” It is worth noting that these short-term incentives emerge endogenously: M makes division managers accomplices by aligning their incentives not to tell the truth to the public in a way similar as the initial shareholders do with M . Put differently, the potentially harmful short-term incentives propagate through the hierarchy.

4.3 Earnings manipulation

When M observes $y_A = y_B = 0$, he chooses to report $x = 1$. While this involves costs of $\alpha_{M2}C$, M need not share the benefits of earnings manipulation, because there is no risk of whistle-blowing. When M observes $y_A + y_B = 1$, the benefit of misreporting are shared with the potential whistle-blower, i.e., M receives $\alpha_{M1} - (\alpha_{M1} + \alpha_{M2})\tilde{w}_0$. Using (3), we find that CEO chooses to misreport whenever

$$\alpha_{M2}C_1 < \frac{(1 - \gamma)\alpha_{M1}}{1 - \gamma(1 - \alpha_{M1} - \alpha_{M2})} \quad (4)$$

i.e., whenever cost of manipulation C_1 , bargaining power γ , and long-term incentives α_{M2} are sufficiently low and short-term incentives α_{M1} are sufficiently high.

4.4 Choice of effort by division

In any subgame perfect equilibrium, the earnings manipulation decision depends on the realized output y_A, y_B and on whether condition (4) holds. Suppose that the latter is the case. Then A expects to receive \tilde{w}_0 if she produces nil and the other division produces 1. If a division succeeds it always receives w_1 . If both divisions fail, they receive nil. Given the effort e_B by B , manager A chooses her effort level e_A to solve:

$$\max_{e_A} [e_A w_1 + \tilde{w}_0(1 - e_A)e_B - c(e_A)].$$

Hence,

$$\begin{aligned} c'(e_A) &= w_1 - e_B \tilde{w}_0. \\ c'(e_B) &= w_1 - e_A \tilde{w}_0 \end{aligned}$$

There is a unique symmetric equilibrium $e_A = e_B = e$, where e satisfies the incentive compatibility constraint:¹⁰

$$c'(e) + e\tilde{w}_0 = w_1. \quad (5)$$

The equation above shows what bonus w_1 should be paid to a successful division if M wants to implement a given effort level e . Now let us consider the case where (4) does not hold. The division is only paid w_1 if she is successful and $w_0 = 0$ otherwise. Thus, the effort solves

$$c'(e) = w_1. \quad (6)$$

4.5 Optimal contract for division managers

When M designs contracts for the division managers, he takes into account whether or not he will manipulate the earnings later, see (4).

Truthful reporting: If (4) does not hold, M expects that he will have incentives to report truthfully $x = y$. He chooses a contract w_1 that maximizes

$$(\alpha_{M1} + \alpha_{M2}) [(2 - 2w_1) e^2 + 2e(1 - e)(1 - w_1)]$$

subject to the incentive compatibility constraint (6). The f.o.c. is $c'(e^*) = 1/(1 + \sigma)$. In this case

$$\begin{aligned} w_1^* &= c'(e^*) = \frac{1}{1 + \sigma}; \\ V_1^* &= V_2^* = 2e^*(1 - c'(e^*)) = \frac{2e^*\sigma}{1 + \sigma}. \end{aligned} \quad (7)$$

The effort e^* is below the first-best level that would solve $c'(e) = 1$. However, e^* is the optimal effort chosen in the conventional principal agent model with limited liability. Even if the divisions' contract were set up by shareholders S directly, (7) would still be the case.

Earnings manipulation: If (4) holds, M expects to manipulate earnings, so he maximizes his expected payoff according to (2):

$$(\alpha_{M1} - \alpha_{M2}C_1)(1 - e^2) + (\alpha_{M1} + \alpha_{M2}) [(2 - 2w_1) e^2 + 2e(1 - e)(1 - \tilde{w}_0 - w_1)]$$

¹⁰For some $c(\cdot)$ there may also be asymmetric equilibria $e_A \neq e_B$. However, for power functions $c(e) \sim e^{1+\sigma}$ as well as for any cost function with either concave or convex marginal cost $c'(e)$ the equilibrium is unique and symmetric. The only exception is the non-generic case $c(e) = \tilde{w}_0 e^2/2$ where there is a continuum of equilibria $e_A + e_B = w_1/\tilde{w}_0$.

subject to the incentive compatibility constraint (5). Substituting w_1 from (5), we obtain the first order condition:¹¹

$$\frac{\alpha_{M1} - \alpha_{M2}C_1}{\alpha_{M1} + \alpha_{M2}}e = 1 - \tilde{w}_0 - c'(e) - ec''(e).$$

The equilibrium effort is $e = \tilde{e}$ where \tilde{e} solves

$$\frac{\alpha_{M1} - \alpha_{M2}C_1}{\alpha_{M1} + \alpha_{M2}}\tilde{e} + c'(\tilde{e})(1 + \sigma) = 1 - \tilde{w}_0. \quad (8)$$

The left-hand side is increasing in \tilde{e} hence there is a unique solution. Our main result follows from (8): the equilibrium level of effort \tilde{e} is decreasing in \tilde{w}_0 , and in α_{M1} (keeping $\alpha_{M1} + \alpha_{M2}$ constant). This shows that M 's short-termism – induced by the initial shareholders who want to benefit from inflated share prices – undermines incentives within the hierarchy and involves less effort and less value creation.

Eq. (8) also describes how short-term incentives propagate through the hierarchy. Even if whistle-blowing were not important (e.g. if divisions had no bargaining power $\gamma = 0$, and $\tilde{w}_0 = 0$), the effort level would still be distorted, $\tilde{e} < e^*$. The distortion is driven by the first term in (8) which is large whenever the top manager's incentives are predominantly short-term. In this case, M is not willing to pay much for higher effort, because he is going to overreport the earnings anyhow.¹² Since rewarding high effort is costly for M , he will prefer to provide weaker incentives.

We can now compute the market value in case of earnings manipulation:

$$\begin{aligned} \tilde{V}_2 &= 2\tilde{e} - 2\tilde{e}w_1 - 2\tilde{e}(1 - \tilde{e})\tilde{w}_0 - C_1; \\ \tilde{V}_1 &= 2\tilde{e} - 2\tilde{e}w_1 - 2\tilde{e}(1 - \tilde{e})\tilde{w}_0 + (1 - \tilde{e}^2). \end{aligned} \quad (9)$$

4.6 Optimal contract for the CEO

The shareholders S choose α_{M1} and α_{M2} in order to maximize their payoff

$$U^S = [\alpha_{S2}V_2 + (1 - \alpha_{M1} - \alpha_{M2} - \alpha_{S2})V_1]E.$$

subject to CEO's optimal response to α_{M1} and α_{M2} .

¹¹We use the standard first-order approach to solving principal-agent problem. The principal knows the agent's IC constraint, and therefore can calculate how much it costs to implement a given level of effort e . Then the principal's problem is to choose the effort level that involves maximum payoff. Notice that (4) implies $\frac{\alpha_{M1} - \alpha_{M2}C_1}{\alpha_{M1} + \alpha_{M2}} > 0$.

¹²It is crucial that M cannot boost earnings in the high states by as much as in the low states. Investors are overconfident but not stupid. They know that $y > 2$ can never occur. This is certainly an implication of the specific setup. We discuss this further in Section 5.

The shareholders want to (i) provide incentives for manager's effort $E = 1$; (ii) make sure that the CEO reports or misreports earnings in the interests of the shareholders. To solve (i), S have to increase both α_{M1} and α_{M2} so that M 's overall contingent compensation exceeds his cost of effort c_M . As under limited liability the fixed salary is nil, this requires that M 's equilibrium wage is at least c_M . In order to solve the other moral hazard problem (ii) the shareholders should increase α_{M1}/α_{M2} if they prefer overreporting or decrease α_{M1}/α_{M2} otherwise. In particular, the shareholders can choose to discourage earnings manipulation by setting $\alpha_{M1} = 0$. In this case (4) does not hold, so M reports truthfully. Shareholders set $\alpha_{M2} = c_M/V_1^*$ and receive the following payoff:

$$\alpha_{S2}V_2^* + (1 - \alpha_{M1} - \alpha_{M2} - \alpha_{S2})V_1^* = V_1^* - c_M.$$

Shareholders benefit from misreporting if $\tilde{V}_1 - V_1^*$ is sufficiently large, and α_{S2} is small. That is, even though manipulation reduces the long-term value ($\tilde{V}_2 < V_2^*$), shareholders may be mostly interested in selling to the overconfident investors in the short-term at a higher price \tilde{V}_1 .

Using (7) and (9) we can check when this is possible:

$$\tilde{V}_1 - V_1^* = (1 - \tilde{e}^2) + 2\tilde{e}^2 \frac{\alpha_{M1} - \alpha_{M2}C_1}{\alpha_{M1} + \alpha_{M2}} + 2\sigma [\tilde{e}c'(\tilde{e}) - e^*c'(e^*)]$$

The first two terms are benefits of manipulation while the last term is the loss due to lower incentives ($\tilde{e} < e^*$). For some parameter values $\tilde{V}_1 - V_1^*$ is positive so earnings manipulation occurs in equilibrium if market is sufficiently overconfident.

Proposition 2 *There exists $\bar{\alpha}$ such that for all $\alpha_{S2} \leq \bar{\alpha}$ the equilibrium involves earnings manipulation. The threshold level $\bar{\alpha}$ (weakly) decreases in γ and C_1 .*

As we already mentioned, higher α_{S2} is tantamount to longer-term orientation of initial shareholders, and to a lower share of uninformed outside investors. Proposition 1 implies that earnings manipulation is more likely to occur if initial shareholders are more short-term-oriented, if there are many overconfident investors around, and if the costs of earnings manipulation are not too high. It is also worth noting that earning manipulation occurs when the bargaining power of division managers, γ , is low. In particular, if there is no internal incentive cost due to earnings manipulation ($\gamma = 0$), earnings manipulation is more likely to improve S 's welfare, especially if the shareholders want to sell all the shares as soon as possible (low α_{S2}) and/or negative long-term consequences C_1 of earnings manipulations are low. It is interesting that even if the direct cost of manipulation C_1 is small or nil, the implicit cost of distorted incentives may be sufficiently large to make shareholders prefer no earnings manipulation as the following example shows.

Example 1 Suppose $c(e) = e^2/2$, $\gamma = 0.5$, $C_1 = 0.3$, $c_M = 0.1$. Shareholders S can choose between two options:

- (i) To discourage earnings manipulation and to provide M with long-term incentives only ($\alpha_{M1} = 0, \alpha_{M2} = 0.2$). Then, each division manager's effort is $e_i^* = 0.5$ and the market value is $V_1^* = V_2^* = 0.5$. The CEO receives a payoff of 0.1, and S receives 0.4.
- (ii) To provide M with short-term incentives. The optimal contract is independent of α_{S2} and involves $\alpha_{M1} = 0.078, \alpha_{M2} = 0$. Then effort is lower $\tilde{e} = 0.31$, and the market values in short- and long-term differ: $\tilde{V}_1 = 1.287, \tilde{V}_2 = 0.083$. Shareholders receive $\tilde{V}_1(1 - \alpha_{M1} - \alpha_{M2}) - (\tilde{V}_1 - \tilde{V}_2)\alpha_{S2} = 1.187 - 1.204\alpha_{S2}$.

Comparing S 's payoffs with and without earnings manipulation we find that S will prefer earnings manipulation whenever $\alpha_{S2} < \bar{\alpha} = 0.65$. If $C_1 = 0$, then $\bar{\alpha}$ increases to 0.87. Hence, even if the direct costs of manipulation are nil, the implicit cost of distorted incentives makes shareholders prefer long-term incentives whenever $\alpha_{S2} \in (0.87, 1)$.

4.7 Robustness

We here discuss alternative modelling strategies concerning i) pooling between good and bad firms, rather than overconfident investors, ii) the observability of wages by shareholders, iii) the costs of earnings manipulation, iv) technology and the generation of evidence on earnings manipulation.

i) Overconfident shareholders: The Proposition and the example illustrate why our theory does not rely on the assumption that some shareholders are overconfident. Notice first that earnings manipulation may or may not occur in equilibrium depending on the parameters. Suppose that investors are rational but uninformed, and there is continuum of heterogeneous firms. Then, exactly as in Bebchuck and Bar-Gill (2003) or Povel et al. (2003), the equilibrium may involve partial pooling of firms. Investors will reward good reports, but they will not buy them at face value. The least productive firms do not inflate earnings and the best firms truthfully report high profits. But, intermediate firms may want to pool with the best firms via overreporting. While investors rationally expect this, they will also know that the firms with good reports (i.e. best and intermediate) are still on average better than the firms with bad reports (the worst firms). In this setting, our results obtain.

ii) Observability of wages by shareholders: We have assumed that outside investors observe wages but cannot infer whether or not earnings have been manipulated. This may

appear an extreme assumption, but it is not crucial for our results. Suppose that outside investors would indeed infer from observing certain wages that earnings manipulation has occurred and that division managers have been bribed. Then top management could decide to pay only two wages: nil in case there is low output and no credible threat to blow the whistle, and some other wage if either the division has performed well or when it has a whistle-blowing threat. Notice that this would not destroy incentives entirely, because the division managers still do better *ex post* with a high rather than with a low output (as they receive a wage of nil in case they have both produced an output of nil).

iii) Costs of manipulation: We have solved the model taking C_2 to be prohibitively high. This ruled out a situation where the manager reports $x = 2$ even though the true state is $y = 0$. In this case, the cost of earnings manipulation is even higher. First, the firm bears a long-term cost C_2 . Second, the manager has to negotiate with *both* divisions since either of them can whistle-blow. Therefore the CEO gets to keep a smaller share of the surplus. Indeed, as there is no side-contracting, each division bargains with M separately. The share of A , ξ^A , is γ per cent of the joint surplus of coalition M, A : $\xi^A = \gamma(1 - \xi^B)$. Similarly, $\xi^B = \gamma(1 - \xi^A)$, hence $\xi^A = \xi^B = \gamma/(1 + \gamma)$, so M only keeps $1 - 2\gamma/(1 + \gamma) = (1 - \gamma)/(1 + \gamma)$ per cent of the surplus which is below $1 - \gamma$.

iv) Technology and evidence on manipulation: We have assumed that there is no coordination between division managers and that in some states of the world, a division manager may gain, costlessly, evidence about manipulation. We have looked at a more general model¹³ in which output is continuous and division managers do not automatically obtain hard information on earnings manipulation. Rather, they have to pay a cost for learning the aggregate output, for instance, by inquiring about the true earnings with their colleagues. In this model of costly state verification, the incentives of division managers to generate evidence on earnings manipulation are inversely related to their individual performance. Each division observes its own output. Whether divisions' outputs are correlated (due to the presence of a common shock) or independently distributed, each division's output is by definition correlated with aggregate performance. Given the reported earnings, the division can infer the expected level of overreporting (based on her own individual performance) and decide whether it is would like to pay the cost of checking out the aggregate performance and holding up the CEO. The higher the reported earnings, the higher the returns to inquiring. On the other hand, given the report, the higher the individual performance, the higher the expected aggregate performance, and the lower the incentives to find out. Therefore the better performing divisions will prefer not to inquire, while the failing divisions will certainly check out aggregate performance.

¹³The formal setup and proofs of results are available upon requests.

Hence, our main argument holds: it is rather the underperforming divisions that can blow the whistle, which results in weaker incentives in the firm.

5 Extensions

5.1 Organisational structure

Our analysis also contributes to the literature on the advantages of steep *vs* flat hierarchical structures. Early research studied optimal information processing (e.g. Radner, 1993), more recent work has emphasized the trade-off between incentives and loss of control in settings.¹⁴ Our model can be readily extended to show that management's incentives to manipulate earnings are stronger in a flat hierarchy.

Suppose that the firm consists of four production units. If the hierarchy is flat and each unit reports directly to M , each unit knows that it observes only 1/4 of aggregate output. Hence, there may be not enough ground to undertake the cost of learning other divisions' performance. In a nutshell, in this flat hierarchy, there is a coordination failure that allows the management to appropriate all the surplus without sharing with the subordinates. This is a similar effect to Rajan and Zingales (2001) where flat hierarchies allow the management to 'divide and conquer' in order to establish control and appropriate a larger share of (quasi-)rents.

Consider now a steeper hierarchy, in which two intermediate supervisors are each in charge of 2 lower-level units. Here, each of the supervisors observe 1/2 of the firm's business. Therefore if the supervisor knows that his divisions failed, learn about the other divisions' output is more likely to pay off. Hence, M 's costs of earnings manipulation are higher. Effectively, the intermediate supervisors aggregate information and overcome the coordination failure among subordinates. Here, the supervisors provide checks and balances on M 's urge to inflate earnings – they play the role of gatekeepers as pointed out by Jensen (2004). Notice also that the other effect – propagation of weak incentives through the hierarchy – makes earnings manipulation more expensive in steeper hierarchies. Indeed, the more layers of potential agency costs, the greater the ultimate incentive distortion at the level of production units. Also, the costs of finding out the aggregate performance certainly increase with the number of CEO's subordinates (see 4.7, point iii). The smaller

¹⁴Qian (1994) builds a model where this trade-off determines the optimal structure of the hierarchy. Aghion and Tirole (1997) show how the formal structure of the hierarchy (span of control) affects real authority. Rajan and Zingales (2001) show that the choice of structure may be driven by appropriability considerations. Flat hierarchies should be expected to perform better in human capital intensive industries, while firms in industries with more physical assets should be organized as steeper hierarchies.

each division, the more costly for its manager to learn the aggregate performance in a flatter hierarchy.

Further, in flatter hierarchies, there are higher costs of coordination at the bargaining table. As the number of divisions increase, it is harder for them to coordinate holding up the CEO. Compare two situations (a) there are 4 divisions and 2 of them are informed, and (b) there are 2 divisions and only 1 is informed. CEO should obtain higher share of surplus in (a).

The above points are consistent with *Enron's* strategy to foster the new corporate culture of 'entrepreneurial' corporation. *Enron's* CEO Jeff Skilling wanted to empower human capital via flatter hierarchies and was "openly scornful of steady, asset-based businesses" (Maclean and Elkind, 2003). As Rajan and Wulf (2003) show, *Enron* was certainly not the only firm that made its hierarchy flatter. However, for many human resource management gurus, *Enron* was a role model (Michaels et al., 2001). While it is hard to deny multiple benefits of flatter structure, our theory suggests that this flattening has created more scope for earnings manipulation.

5.2 Manipulation by division managers

In the model above, we assume that only the CEO can cheat. In order to maintain symmetry between top and division managers, one may consider a possibility of diversion of corporate resources (or earnings manipulation) by division managers as well. It is an empirical fact that manipulations happen on many levels in firms (see Leone et al, 1999). Interestingly, the CEO may actually be willing to allow such behavior, as it is an efficient protection against the threat of whistle-blowing.

The reason is quite simple: when a division manager lies or steals a part of the firm's revenues, he cannot credibly threaten to whistleblow on the CEO. Whistleblowing on the CEO also reveals the wrong-doing of the division manager, and exposes him to risks of being held responsible to a similar extent as the CEO. Therefore when choosing whether to monitor the subordinates intensively, the CEO will be happy to exert less monitoring effort tacitly agreeing to cheating by division managers. Thus earnings manipulation would have an additional cost of greater diversion of company's revenues in equilibrium.

5.3 Dynamic extensions

In a dynamic setting, manager's incentives to manipulate earnings depend on his previous choices. Jensen (2004) suggests that overvalued equity can result in "managerial heroin". A manager who inflated earnings today may have to overreport even more tomorrow

to cover up today's manipulation. Essentially, managers can embark on the gambling-for-resurrection strategy, increasing overreporting over time and hoping for a miracle (a "Big Enchilada", in *Enron's* internal jargon) to rescue the company. Our model helps to understand the internal life of an "addicted" company. As top management engages in more and more manipulation, they have to compensate subordinates for not blowing the whistle. The amount of compensation grows over time (as potential disclosure becomes costlier for the manager). Since this compensation suppresses incentives to exert effort and therefore destroys value, the manager's need for manipulation grows even faster. In other words, once the internal hierarchy is explicitly modeled, the addiction to "managerial heroin" is even more irreversible than it would seem.

6 Sarbanes-Oxley and earnings manipulation

The *Sarbanes-Oxley Act* of 2002 has introduced a number of new regulations concerning the corporate governance of publicly listed companies. The ultimate goals of the Act are to restore investor confidence by increasing corporate transparency. The Act regulates the compensation of top management in order to avoid short-termism; it requires higher monitoring standards; and it increases the responsibilities of managers and auditors for corporate transparency. It also imposes stricter penalties in the case of misconduct of managers and auditors. As there are many good discussions of the *Sarbanes-Oxley Act* (e.g. Holmstrom and Kaplan, 2003), we here only discuss a small number of implications that are directly related to our theoretical analysis. They concern whistle-blowing and the effects of better auditing on earnings management and incentives in firms.

6.1 Whistle-blowing

Whistle-blowing has costs *ex ante* (preparing the evidence) and *ex post*. While the *ex ante* costs may be small, whistle-blowers may fear the *ex post* costs of top management's retaliation. Experience also shows that whistle-blowers are ostracized on the job market. The *Sarbanes-Oxley Act* entails a number of prescriptions that are supposed to make whistle-blowing easier and less risky for the whistle-blower.¹⁵ In particular, Sec. 806 increases protection for employees who provide evidence about violations of regulations of the Securities and Exchange Commission or other regulations relating to fraud against shareholders. Sarbanes-Oxley hence makes the threatpoint of potential whistle-blowers who bargain with top management more attractive. Top management thus appropriates

¹⁵See Block and Hoff (2003) for a summary.

a smaller share of the surplus: the mere risk of whistle-blowing reduces top management's incentives to manipulate earnings.

6.2 Auditing

Auditors constitute an important interface between what happens within the firm and outside investors. If auditors do their job well, investors are subject to less risks of earnings manipulation. Corporate scandals have shed doubt on the degree to which auditors' reputational concerns are sufficiently strong to create adequate incentives for performing these duties. The *Sarbanes-Oxley Act* strengthens auditor independence and makes it harder to strike side deals (Section 201); auditors are not allowed to provide—and get paid for—consulting services to their clients. It requires higher quality standards of auditing, and imposes new and more effective sanctions against auditors that fail to supervise their clients, both “intentionally or in repeated instances of negligent conduct, resulting in a violation of the applicable statutory, regulatory, or professional standard” (Sec. 105.) These changes may indeed increase the effort of auditors and, in turn, improve incentives within the firm.

A modified framework of our model can capture this as follows. Prior to the bargaining stage between CEO and division managers, an auditor receives the report that CEO plans to send to investors. The auditor either rubberstamps it or checks whether division outputs are in line with the report. Presume that the auditor learns the true division output with some probability and that this probability is concave in the auditor's effort, which is unobservable. Hence the auditor may shirk, and just cash in the auditing fee without doing their job. At the end of the second period, the true value of the firm is revealed. This allows imperfect inference on whether there has been earnings manipulation in the first period; even an auditor who exerts high effort, may be unlucky and learn nothing. Clearly, when penalties are more severe, auditors have better incentives to monitor. Furthermore, when the effort of auditors increases, the odds to penalize an innocent auditor decrease. Hence, higher quality standards and harsher penalties reinforce each other. This also implies that, *ceteris paribus*, the costs of auditing increase, a point that has been made before, for instance, by Holmstrom and Kaplan (2003) and by practitioners.¹⁶

¹⁶According to a study reported in CFO Magazine (2004b), “compliance costs of going public for smaller firms with annual revenue under \$1 billion climbed from \$1.24 million before the passage of Sarbanes-Oxley to \$2.13 million in 2002 and \$2.86 million in 2003.” It is beyond the scope of our paper to evaluate whether or not the improvements in transparency and corporate governance are worth this price. A complete welfare analysis should include among others the implication for the market for human

Higher auditor effort can thus increase the incentives in the firm. If the auditor exerts high effort and learns the true output, he joins the bargaining table between top management and the division manager. But, as we discussed above (see 5.2), it becomes more likely that bargaining collapses when there is an additional party that needs to be pacified. In that case, the auditor will always be interested in reporting earnings manipulation to the outside world in order to avoid being penalized. Beyond the simple fact that an informed auditor adds an additional person to the bargaining problem, auditors will demand a higher bribe than division managers because of the very fact that they can be penalized by law (while this may be harder to do in the case for division managers) and because the side payments to auditors are now more costly.

7 Concluding remarks

Earnings manipulation does not only redistribute value and raises the cost of capital; it also results in the destruction of value. Whenever a CEO has short-term incentives and inflates earnings, there is a risk of whistle-blowing. Hence, top management may have to share with subordinates to reduce the risk of information leakage to the outside world. This may take a form of bargaining over a monetary or non-pecuniary bribe, or a propagation of short-term incentives inside the firm.

The framework of our model allows to show that earnings manipulation is easier to undertake in flat hierarchies. If top management supervises many units, each unit has too little information to threaten blowing the whistle. If there is a steeper hierarchy with fewer middle level managers, they aggregate information across their subordinates and can serve as internal gatekeepers for the fraudulent management. In equilibrium, top management may then decide not to manipulate earnings, as the returns to this behavior are too low when the surplus must be shared with other insiders. Hence, while flatter hierarchies may have many benefits that are outside of the scope of our theory, we show that they come at the cost of making it harder for insiders to blow the whistle on corporate fraud.

capital. As firms that manipulate earnings offer higher compensation, they are able to attract better talent ('guys with spikes', as Enron's CEO used to put it). As the talent is not used efficiently, this reduces aggregate labor productivity in the economy.

References

- ACKMAN, DAN (2002) “Sherron Watkins Had Whistle, But Blew It.” *Forbes*, Feb 14.
- AGHION, PHILIPPE, PATRICK BOLTON AND JEAN TIROLE (2004) “Exit Options in Corporate Finance: Liquidity versus Incentives.” *Review of Finance*, 8: 327-53.
- AGHION, PHILIPPE, AND JEAN TIROLE (1997) “Formal and Real Authority in Organizations.” *Journal of Political Economy*, 105: 1-29.
- AXELSON, ULF, AND SANDEEP BALIGA (2004) “Transparency, Manipulation, and the Liquidity of Executive Compensation.” *Mimeo*, SIFR, Stockholm.
- BEBCHUK, LUCIAN, AND OREN BAR-GILL (2003) “Misreporting Corporate Performance.” *Harvard Law School Discussion Paper* No. 400.
- BEBCHUK, LUCIAN AND LARS A. STOLE (1993) “Do Short-term Objectives Lead to Under- or Overinvestment in Long-term Projects.” *Journal of Finance*, 68: 719-29.
- BERGSTRESSER, DANIEL AND THOMAS PHILIPPON (2003) “CEO Incentives and Earnings Management.” *Mimeo*, Harvard Business School.
- BLOCK, DENNIS AND JONATHAN HOFF (2003). “Whistle-blower Protection Under the Sarbanes-Oxley Act.” *New York Law Journal*, 229: no 122.
- BOLTON, PATRICK, JOSE SCHEINKMAN, AND WEI XIONG (2004) “Executive Compensation and Short-termist Behavior in Speculative Markets.” *Mimeo*, Princeton.
- CFO MAGAZINE (2003) “Whistle-Blower Woes.”, by Alix Nyberg, <http://www.cfo.com/article.cfm/3010455>, October 2003
- CFO MAGAZINE (2004A) “Coke Whistle-Blower Inspires SEC Probe.” by Stephen Taub, <http://www.cfo.com/article.cfm/3011439>, January 2004.
- CFO MAGAZINE (2004B) “Sarbox Costs ‘Unpredictable’, Still Rising.” by Stephen Taub, <http://www.cfo.com/article.cfm/3013947>, May 2004.
- CHEN, KONG-PIN, AND C. Y. CYRUS CHU (2005) “Internal Control vs External Manipulation: A Model of Corporate Income Tax Evasion.”, *Rand Journal of Economics*, forthcoming.
- DESAI, MIHIR A. (2003) “The Divergence Between Book and Tax Income.” *Tax Policy and the Economy* (17), edited by James Poterba, MIT Press, 169-206.

- DESAI, MIHIR A. AND DHAMMIKA DHARMAPALA (2004) “Corporate Tax Avoidance and High Powered Incentives.” *NBER Working Paper* No. 10471.
- ERICKSON, MERLE, MICHELLE HANLON AND EDWARD MAYDEW (2003) “Is There a Link between Executive Compensation and Accounting Fraud? *Mimeo*, University of Michigan.
- FAURE-GRIMAUD, ANTOINE AND DENIS GROMB (2004) “Public Trading and Private Incentives”, forthcoming in *Review of Financial Studies*.
- FRIEBEL, GUIDO AND MICHAEL RAITH (2004) “Abuse of Authority and Hierarchical Communication.”, *Rand Journal of Economics*, 35: 224-44.
- GAO, PENGJIE AND RONALD E. SHRIEVES (2002) “Earnings Management and Executive Compensation: A Case of Overdose of Option and Underdose of Salary?” *Mimeo* , University of Tennessee, Knoxville, TN.
- HARRISON, J. MICHAEL, AND KREPS, DAVID M. (1978) “Speculative Investor Behavior in a Stock Market with Heterogeneous Expectations.” *Quarterly Journal of Economics*, 92: 323–36.
- HEALY, PAUL M. AND KRISHNA G. PALEPU (2003) “The Fall of ENRON.”, *Journal of Economic Perspectives*, 17: 3-26.
- HOLMSTROM, BENGT (1979). “Moral Hazard and Observability.” *Bell Journal of Economics*, 10: 74-91.
- HOLMSTROM, BENGT, AND STEVEN N. KAPLAN (2003) “The State of U.S. Corporate Governance: What’s Right and What’s Wrong?” *NBER Working Paper* No. 9613.
- JENSEN, MICHAEL (2004) “Agency Costs of Overvalued Equity.” *Mimeo*, Harvard Business School.
- JOHNSON, MARILYN F., KAREN K. NELSON AND ADAM C. PRITCHARD, (2002) “Do the Merits Matter More? Class Actions under the Private Securities Litigation Reform Act.” Working Paper no. 70, Olin Program in Law & Economics, UC Berkeley.
- LEONE, ANDY, FLORA GUIDRY AND STEVE ROCK (1999) “Earnings-based Bonus Plans and Earnings Management by Business-unit Managers.” *Journal of Accounting and Economics*, 26: 113-41.

- LEPPAMAKI, MIKKO (1998) “Breaking Collusion by Task Assignment and Whistle-Blowing.” Chapter 3 of Ph.D. Dissertation, London School of Economics.
- LEVITT, ARTHUR AND PAULA DWYER (2003), *Take on the Street: How to Fight for Your Financial Future*. Vintage Books.
- MACLEAN, BETHANY, AND PETER ELKIND (2003) *The Smartest Guys in the Room: The Amazing Rise and Scandalous Fall of Enron*. NY: Portfolio.
- MICELI, MARCIA, AND JANET NEAR (1992) *Blowing the Whistle*. Lexington Books.
- MICHAELS, ED, HELEN HANDFIELD-JONES, AND BETH AXELROD (2001) *The War for Talent*. Harvard Business School Press, Boston.
- PARTNOY, FRANK (2002) “Testimony to the US Senate Committee on Governmental Affairs.” January 24, 2002.
- PARTNOY, FRANK (2003) *Infectious Greed: How Deceit and Risk Corrupted the Financial Markets*. Times Books.
- PATSURIS, PENELOPE (2002) “The Corporate Scandal Sheet.” *Forbes*, Aug 26.
- PENG, LIN AND AILSA ROELL (2004) “Executive Pay, Earnings Manipulation and Shareholder Litigation.” *Mimeo*, Princeton University.
- POVEL, PAUL, SINGH, RAJDEEP, AND WINTON, ANDREW (2003) “Booms, Busts, and Fraud.” *Mimeo*, University of Minnesota.
- QIAN, YINGHI (1994) “Incentives and Loss of Control in an Optimal Hierarchy.” *Review of Economic Studies*, 61, pp. 527-44.
- RADNER, ROY (1993) “The Organization of Decentralized Information Processing.” *Econometrica*, 61: 1109-46.
- RAJAN, RAGHURAM G., AND JULIE WULF (2003). “The Flattening Firm: Evidence from Panel Data on the Changing Nature of Corporate Hierarchies.” *Mimeo*, GSB University of Chicago.
- RAJAN, RAGHURAM G., AND LUIGI ZINGALES (2001) “The Firm as a Dedicated Hierarchy: A Theory of the Origins and Growth of Firms.” *Quarterly Journal of Economics*, 116: 805-51.

- RAPOPORT, NANCY, AND DHARAN, BALA (EDS.), (2003) *Enron: Corporate Fiascos and their Implications*. Foundation Press.
- SCHARFSTEIN, DAVID, AND JEREMY STEIN (2000) “The Dark Side of Internal Capital Markets: Divisional Rent-Seeking and Inefficient Investment.” *Journal of Finance*, 55: 2537-64.
- SCHEINKMAN, JOSE, AND WEI XIONG (2003) “Overconfidence and Speculative Bubbles.” *Journal of Political Economy*, 111: 1183-1219.
- SHLEIFER, ANDREI, AND ROBERT VISHNY (1990) “Equilibrium Short Horizons of Investors and Firms.” *American Economic Review*, 80:148-53.
- STEIN, JEREMY (1989). “Efficient Capital Markets, Inefficient Firms: A Model of Myopic Corporate Behavior.”, *Quarterly Journal of Economics*, 104: 655-69.
- TIME MAGAZINE (2002). “Wall Street’s Top Cop”, <http://www.time.com/time/personoftheyear/2002/poyspitzer.html>
- WATKINS, SHERRON (2001) “Memo to Enron Chairman Kenneth Lay”, August 2001.