Corporate governance, accounting conservatism, and manipulation*

Judson Caskey and Volker Laux
University of Texas at Austin

October 2013

*We would like to thank Paul Newman, James Spindler, Alfred Wagenhofer, Yong Yu, and workshop participants at Texas, Duke, the Minnesota Theory Conference, and the Basel Accounting Research Workshop for their helpful comments.
Corporate governance, accounting conservatism, and manipulation

Abstract

We develop a model to analyze how board oversight affects firms’ financial reporting choices, and managers’ incentives to manipulate accounting reports. Ceteris paribus, conservative accounting is advantageous because it enables boards to make more cautious project approval decisions. This feature of conservatism, however, causes managers to manipulate the system in an attempt to distort decision making. Effective reporting oversight curtails managers’ ability to manipulate, reducing the negative side effects of conservatism. Our model predicts that stronger reporting oversight leads to greater accounting conservatism, manipulation, and investment efficiency.

Keywords: Corporate governance, conservatism, manipulation, managerial optimism, investment decisions
1 Introduction

In the wake of recent accounting scandals around the world, commentators and regulators have called for stronger governance and board oversight to curb accounting manipulation and fraud. These calls have led to boards with more outside directors and greater financial expertise.\(^1\) Recent empirical evidence suggests that stronger governance and board oversight is associated with more conservative accounting (e.g., Lobo and Zhou 2006; Ahmed and Duellman 2007; Ramalingegowda and Yu 2012; García Lara et al. 2009).\(^2\) We offer a model that provides a rationale for this observation and generates predictions that relate reporting oversight to the optimal choice of conservatism, the magnitude of accounting manipulation, reporting quality, and the efficiency of investment decisions.

Our model is based on the idea that conservative accounting produces information that enables boards of directors to better oversee the firm’s investment strategies (e.g., Watts 2003a; García Lara et al. 2009; Ahmed and Duellman 2011). Fama and Jensen (1983) hypothesize that ratification and monitoring are major roles played by boards of directors, and Bushman and Smith (2001) argue that financial reports can assist the board in these roles. In our model, the board uses conservative accounting to better screen out negative net present value (NPV) investments. However, the very fact that conservatism facilitates board interventions encourages the manager to manipulate the accounting system to mislead the board and distort its decisions. Stronger oversight of financial reporting curtails the manager’s ability to manipulate,

\(^1\)For example, the New York Stock Exchange listed company manual requires an audit committee comprised of “financially literate” independent board members and places restrictions on the number of audit committees on which those members serve. The manual also prescribes reporting oversight responsibilities beyond those required by the Securities and Exchange Commission in, for example, Rule 10-3A.

\(^2\)In contrast, Larcker et al. (2007) find no relation between governance and conservatism.
and thereby reduces the negative side effects associated with conservative accounting. Consequently, we predict that firms with stronger reporting oversight choose more conservative accounting. Surprisingly, better oversight over reporting increases the level of manipulation in our setting. While monitoring has a direct effect that mitigates manipulation, it also increases conservatism which, in turn, encourages manipulation.

We consider a model in which the board faces a strategic investment choice that can be viewed as expanding the firm into a new market or product. The accounting system generates information that guides the board’s decision whether to expand or maintain the status quo. Conservatism increases the verification standards required for good relative to bad reports and, hence, increases the frequency of observing unfavorable accounting reports (e.g., Gigler et al. 2009). This feature of conservatism allows the board to better block bad investments (i.e., avoid Type I errors) but comes at the cost of blocking some good investments (i.e., induces Type II errors). *Ceteris paribus*, directors prefer conservative accounting because it supports their preference for conservative expansion decisions – that it, their strong desire to avoid Type I errors. The board can influence the conservatism of the company’s accounting via the audit committee’s oversight of financial reporting, accounting policies, and internal controls.

In contrast to the board, the manager prefers expansion whenever there is a chance of success and hence is more eager to avoid foregoing good projects (Type II error) and is less worried about implementing bad projects (Type I error). This preference can arise from private benefits of control that are proportional to the gross payoff from expansion (Stein 1997; Scharfstein and Stein 2000), managerial optimism (e.g., Mal-
Because conservatism produces information that facilitates cautious investment strategies (i.e., avoid Type I errors at the cost of Type II errors), the manager has an incentive to manipulate the accounting system to distort the board’s decision. As the level of conservatism increases, the probability of a false alarm (Type II error) increases and the manager has a stronger incentive to manipulate the system to increase the likelihood of expansion.

Coupling these two forces determines the optimal (interior) level of conservatism. On the one hand, an increase in conservatism helps the board to block undesirable expansions, as long as the manager fails to manipulate the system. On the other hand, increased conservatism distorts investment decisions because it increases incentives for manipulation. As the board’s reporting oversight becomes more effective, the manager’s ability to manipulate declines, and the latter (indirect) effect becomes less important relative to the former (direct) effect. As a result, firms with stronger oversight find it optimal to use more conservative accounting systems.\(^3\)

In addition, our model provides insights into the effects of reporting oversight on accounting manipulation and investment efficiency. All else equal, stronger oversight leads to less manipulation, consistent with conventional views. However, the fact that reporting oversight directly curbs manipulation renders it optimal to choose more conservative accounting, which encourages manipulation. This indirect effect on

\(^3\)Malmendier and Tate (2005) show that managerial optimism can lead to overinvestment even when the manager intends to maximize shareholder value. Harris and Raviv (2008) develop a cheap talk model that assumes that managers prefer overinvestment, and show how this affects communication with a board of directors that chooses the size of an investment.

\(^4\)For example, Goh and Li (2011) provide evidence that internal controls facilitate conservative accounting, while Krishnan and Visvanathan (2008) find evidence that financial experts on the board of directors facilitate firm’s use of conservative accounting. Conversely, Chung and Wynn (2008) find evidence that higher D&O coverage, which reduces managers’ personal costs of manipulation, is associated with less conservative accounting.
manipulation via conservatism dominates the direct effect, such that improvements in reporting oversight lead to more accounting manipulation. Manipulation dampens, but does not reverse, the effect of increased conservatism. As a result, better oversight improves the quality of reporting and the firm’s investment decisions. Our model therefore predicts that stronger reporting oversight is associated with greater accounting conservatism, manipulation, reporting quality, and investment efficiency.

We also contribute to recent research on the impact of managerial optimism on accounting conservatism and manipulation. Ahmed and Duellman (2013) find evidence that firms run by optimistic managers exhibit less conservative accounting, which they interpret as due to optimistic managers overvaluing net assets. Our model provides an alternative explanation for their evidence. A manager who is overly optimistic about the performance of expansion has a stronger incentive to distort the accounting system (consistent with Schrand and Zechman 2012) to increase the likelihood that the board approves expansion. While the board cannot control the manager’s optimism, it can control the manipulation incentive that stems from conservative accounting. The board optimally reduces accounting conservatism to mitigate the optimistic manager’s incentive to manipulate, yielding a negative relation between conservatism and manager optimism. In equilibrium, the indirect effect via changes in the level of conservatism dominates, and greater managerial optimism leads to less manipulation, but also lower reporting quality and investment efficiency.

In addition, the model predicts that firms with less valuable growth opportunities rely on more conservative accounting systems. This result follows because when expansion opportunities are less attractive, the board is more eager to avoid bad investments and less concerned about forgoing good investments. Given that managers respond to an increase in conservatism with increased manipulation, the model sug-
gests a higher level of manipulation in firms with weaker growth opportunities. This is consistent with Givoly et al.’s (2007) finding of a negative relation between market-to-book ratios and Basu’s (1997) conservatism measure; however, Roychowdhury and Watts (2007) provide evidence that measurement problems account for some of the observed negative relation.

Our model suggests that the magnitude of manipulation does not always proxy for reporting quality, in terms of the report’s ability to facilitate investment decisions. On the one hand, as discussed earlier, stronger reporting oversight leads to greater investment efficiency, but also leads to more conservative accounting, which induces more manipulation. Reporting oversight can therefore induce a positive relation between manipulation and reporting quality. On the other hand, another driver of reporting quality is the precision of the accounting system. A more informative accounting system reduces the manager’s incentives to manipulate and increases investment efficiency, leading to a negative association between manipulation and reporting quality.

Prior studies develop settings where conservatism reduces incentives for manipulation, consistent with the arguments in Watts (2003a). In Chen et al. (2007), conservatism lowers manipulation incentives by reducing the difference in share prices after favorable and unfavorable accounting reports. In Gao (2013), conservatism reduces the incentives for manipulation by increasing the scrutiny applied to favorable reports. In contrast to these studies, Göx and Wagenhofer (2009) predict that the ability to manipulate reports leads to more conservative accounting, in the sense of stricter thresholds for impairment. Our study differs from these by showing a setting where conservative accounting leads to more manipulation, and the manager’s ability to manipulate renders the optimal accounting system less conservative.\(^5\)

\(^5\)Several studies examine accounting conservatism in debt contracting context where there is no
In a concurrent study, Bertomeu et al. (2013) show that conservative accounting can increase incentives for manipulation in a setting in which the manager’s compensation depends on accounting reports. There, the board designs an accounting system to induce productive effort at the lowest possible compensation cost. Bertomeu et al.’s (2013) results show that contracts can create, rather than eliminate, forces such that conservative accounting leads to manipulation. In contrast, we abstract from optimal contracting, and consider the usefulness of accounting reports for project selection decisions in an environment where the board and the manager have conflicting investment interests and the manager manipulates the report to distort the decision.

Gao and Wagenhofer (2012) also offer a novel explanation for the positive link between governance and conservatism. In their model, the board’s task is to replace untalented executives. The board can base its decision on either an accounting report (which imprecisely signals talent), or a perfect signal obtained from a costly monitoring action. If the board has a low monitoring cost, which represents high governance quality, it optimally chooses a conservative accounting system. The conservative accounting system maximizes the information content of the good report, and the board only monitors after a bad report. If the board has a high monitoring cost, it chooses an aggressive accounting system that maximizes the information content of a bad report. With aggressive accounting, the board fires the manager after a bad report and does not require a corroborating signal from monitoring. We also predict a positive relation between governance and conservatism, but for different reasons. In addition, our model sheds light on the impact of reporting oversight and managerial optimism on the optimal choice of conservatism, accounting manipulation, reporting quality, conflict between managers and shareholders, and there is no earnings manipulation (e.g., Gigler et al. 2009; Caskey and Hughes 2012; Li 2013).
and investment efficiency (firm value).

The next section develops our model. Section 3 studies a benchmark case in which the level of manipulation is exogenously fixed. Section 4 derives the manager’s reporting choice and Section 5 derives the shareholders’ accounting choice, taking into account how it impacts the manager’s behavior. Section 6 analyzes how equilibrium choices vary with the model’s exogenous parameters. Section 7 studies the effects of managerial optimism and Section 8 provides empirical predictions in terms of observable variables. Section 9 concludes. Unless otherwise stated, all proofs are in Appendix A.

2 Model

In our setting, a risk-neutral manager runs a firm owned by risk-neutral shareholders who are represented by a benevolent board. The model has times 0, 1, and 2. At Time 0, the board determines the firm’s accounting policies. At Time 1, the manager provides a report to the board, who decides whether to expand the firm’s operations. The report can be viewed as reflecting the Time 1 results of the firm’s operations.

**Project:** The payoff from expansion depends on the state \( \theta \) of the world, which is either good or bad, \( \theta \in \{ \theta_g, \theta_b \} \). In the good (bad) state, the expansion succeeds (fails) with certainty. If successful, the project generates incremental cash flows of \( X > 0 \), and it generates zero incremental cash flows if it fails. To implement the expansion, shareholders must invest \( I > 0 \), where \( X > I \). We normalize the status quo cash flows, from not expanding the firm, to zero.

The a prior probability of the good state is \( \alpha < 1 \). In the absence of additional information, the project has a negative net present value, \( \alpha X - I < 0 \). In other
words, the board will not make a ‘blind’ approval of expansion, but instead requires information indicating the profitability of doing so. In the context of an accounting report, this can be viewed as representing a low-growth industry where only unexpectedly high earnings would indicate profitable growth opportunities. In a capital budgeting context, this could reflect risky industries, such as pharmaceuticals, where the typical project is likely to fail and it only pays to pursue projects after receiving some preliminary news of their profitability. Grinstein and Tolkowsky (2004) provide evidence that firms in both of these types of industries are more likely to have board committees dedicated to overseeing investment decisions. The assumption of a negative ex ante NPV plays two roles: First, it creates a natural demand for conservative accounting, as we show in Section 3 and, second, it introduces a conflict of interest between the shareholders and the manager as will become clear later.6

**Accounting system:** The firm’s information system produces an accounting signal, $S \in \{S_g, S_b\}$, that is informative about the state $\theta$:

$$
\begin{align*}
P(S_g|\theta_g) &= p + (1-p)(1-c), & P(S_b|\theta_b) &= p + (1-p)c. 
\end{align*}
\tag{1}
$$

The parameter $c \in (0, 1)$ captures the level of conservatism – the higher $c$, the more likely it is that the signal is bad. The parameter $p \in (0, 1)$ captures the precision of the accounting system – the higher $p$, the more informative is the signal.7

---

6This is related to Gigler et al. (2009), who analyze conservative accounting in a setting with debt contracts and an interim abandonment decision. They predict that conservative accounting has value only when the ex ante belief is that the project should be abandoned at the interim stage. Also see a similar prediction in Lu and Sapra (2009), where clients prefer conservative auditors when they have relatively poor ex ante payoffs from investment.

7Several papers use an equivalent notation where $P(S_g|\theta_g) = \lambda + \delta$ and $P(S_g|\theta_b) = \delta$ (e.g., Venugopalan 2004; Li 2013; Bertomeu et al. 2013). Our notation can be equivalently stated using $P(S_g|\theta_g) = p + (1-p)(1-c)$ and $P(S_g|\theta_b) = (1-p)(1-c)$ so that our parameter $p$ is equivalent to $\lambda$, and $\delta = (1-p)(1-c)$. Just as the ‘aggressiveness’ parameter $\delta$ cannot exceed $1-\lambda$, the most aggressive accounting ($c = 0$) in our notation cannot exceed $1-p$. We use our notation for
updated beliefs conditional on the accounting signal $S$ are:

\[
P(\theta_g|S_g) = \frac{\alpha p + (1 - p)(1 - c)}{\alpha p + (1 - p)(1 - c)} \geq \alpha, \tag{2}
\]

\[
P(\theta_b|S_b) = (1 - \alpha) \frac{p + (1 - p)c}{(1 - \alpha)p + (1 - p)c} \geq 1 - \alpha. \tag{3}
\]

The accounting system has several intuitive characteristics. First, when the precision $p$ increases, both good and bad signals become more informative about the state, $\frac{d P(\theta_g|S_g)}{dp} > 0$, $\frac{d P(\theta_b|S_b)}{dp} > 0$. In the extreme, when the accounting system is perfectly informative, $p = 1$, conservatism no longer matters and $P(\theta_g|S_g; p = 1) = 1$ and $P(\theta_b|S_b; p = 1) = 1$. Conversely, when the system is fully uninformative, $p = 0$, the posterior probabilities equal the \textit{a priori} probabilities, $P(\theta_g|S_g; p = 0) = \alpha$ and $P(\theta_b|S_b; p = 0) = 1 - \alpha$.

Second, when the level of conservatism increases, the good signal becomes more informative about the state whereas the bad signal becomes less informative, $\frac{d P(\theta_g|S_g)}{dc} > 0$, $\frac{d P(\theta_b|S_b)}{dc} < 0$. In the extreme, when the level of conservatism is maximized ($c = 1$), the good signal is perfectly informative: $P(\theta_g|S_g; c = 1) = 1$ and $P(\theta_b|S_b; c = 1) = \frac{1 - \alpha}{1 - \alpha p}$. Conversely, when the level of conservatism is minimized ($c = 0$), the bad signal is perfectly informative: $P(\theta_g|S_g; c = 0) = \frac{\alpha}{1 - (1 - \alpha)p}$ and $P(\theta_b|S_b; c = 0) = 1$.

\textbf{Manipulation:} In the absence of manipulation, the publicly observed accounting report $R \in \{R_g, R_b\}$ is identical to the signal $S$ and $R_i = S_i$ for $i \in \{g, b\}$. However, the manager can engage in costly manipulative activities, denoted $m \in [0, 1]$, so that the firm issues a good report with probability $m$ even when the true signal is bad. As we show later, the manager never wishes to increase the probability of a bad report.
report. The resulting probability of producing a good report given a good signal is $P(R_g|S_g) = 1$ while the probability of producing a good report given a bad signal is $P(R_g|S_b) = m$. The conditional probability of observing a good report when the state is good or bad, respectively, is:

$$P(R_g|\theta_g) = P(S_g|\theta_g) + mP(S_b|\theta_g), \quad P(R_g|\theta_b) = P(S_g|\theta_b) + mP(S_b|\theta_b).$$ (4)

Interfering with the accounting system costs the manager $\frac{1}{2}km^2$, with $k \geq 0$. The manager incurs the cost of manipulation activities to bias the accounting system prior to observing the realization of the signal $S$.

For example, the manager creates vulnerabilities in the accounting system that render it possible to misrepresent bad signals, as in Bar-Gill and Bebchuk (2003), and the manager may face sanctions for failing to maintain adequate internal controls (PCAOB 2007, esp. “controls over management override”).

We interpret the marginal manipulation cost ($k$) as an indicator of the quality of board oversight over the reporting process. Greater oversight (higher $k$) discourages manipulation by increasing the likelihood that the board, the auditor, or regulators will discover and penalize the manager for deficiencies in the financial reporting system.

**Expansion decision:** After the board observes the report, it decides whether to expand operations. The board acts in the best interests of the shareholders and approves expansion only when it perceives expansion to be a positive NPV investment.

---

8See Gao (2013) for a similar assumption that the manager incurs manipulation costs *ex ante*. In Appendix B, we discuss an alternative setting in which the manager only incurs manipulation costs after observing a bad signal $S_b$ and show that similar forces apply, although conservatism $c$ always takes a corner solution of zero or one. The comparative statics on the threshold that determines the choice of $c \in \{0, 1\}$ resemble the comparative statics on $c$ in our primary analysis.
Because the manager does not take any actions to manipulate the report downwards, a bad report indicates that the signal is bad \( P(\theta_g | R_b) = P(\theta_g | S_b) \leq \alpha \). Given that \( P(\theta_g | R_b) X - I \leq \alpha X - I < 0 \), the board finds it optimal to reject expansion when \( R = R_b \).

If the report is favorable, the board understands that it might have been distorted. Nevertheless, to ensure that the report is useful for decision making, we assume that it is optimal to implement the project in this case. Specifically, we assume that:

\[
P(\theta_g | R_g) X - I \geq 0,
\]

(5)

where:

\[
P(\theta_g | R_g) = \alpha \frac{m + (1 - m)P(S_g | \theta_g)}{m + (1 - m)P(S_g)} = \alpha \frac{p + (1 - p) (1 - c(1 - m))}{1 - (1 - m) ((1 - p)c + (1 - \alpha)p)},
\]

(6)

and later verify the conditions under which assumption (5) holds. Note that \( P(\theta_g | R_g) \) is declining in \( m \), and exceeds \( P(\theta_g) = \alpha \) for any \( m < 1 \). For the extreme in which \( m = 1 \) we have \( P(\theta_g | R_g) = \alpha \) and \( P(\theta_g | R_g) X - I < 0 \). This is intuitive because the report has no information content when \( m = 1 \). Thus, to ensure that assumption (5) is satisfied, we assume that the parameters are such that \( m \) is not too large.\(^9\)

Preferences: We assume that the manager enjoys private benefits of control or reputation benefits that are proportional to the cash payoff \( x \) from expansion, as in Stein (1997) and Scharfstein and Stein (2000). The manager’s utility function takes the form:

\[
\beta x - \frac{1}{2} km^2,
\]

(7)

\(^9\)Appendix A gives the specific parameter regions that satisfy (5).

11
where $\beta x$ represents the payoff from expansion and $\frac{1}{2}km^2$ is the cost of altering the accounting system. It is convenient to define $B \equiv \beta X$, where $X$ is the outcome in case of success. Thus, the manager enjoys $B$ in the event of successful expansion and zero, otherwise. This preference function has two implications. First, the manager does not internalize the cost $I$, and therefore is eager to expand unless he is certain that expansion will fail ($x = 0$). Second, this inclination is stronger when the manager expects a higher probability of success.

We obtain a similar preference function when the manager is holding stock options.\textsuperscript{10} To see this, let $A$ denote the firm’s initial assets in place, $\beta$ the number of options the manager is holding, $E$ the exercise price of the options, and assume, without loss of generality, that the total number of issued shares of stock is one. When the exercise price equals the firm’s no-expansion value, $E = A$, the value of the manager’s options is $\beta (A + X - I - E) = \beta (X - I)$ in case of a successful expansion and zero otherwise. In this case, we would interpret $B$ as $\beta(X - I)$.

A key feature of our setting is that the manager and the board have different preferences regarding expansion, which creates an incentive for the manager to manipulate the report. The board could eliminate the manager’s investment bias and hence incentives for manipulation by promising a bonus for a low accounting report. For example, if the manager’s expected payoff from successful manipulation is $M$, the board can prevent manipulation by promising the manager a payment of $M$ if and only if the report is unfavorable. Of course, such a contract is not only costly but would also dilute effort incentives in a richer setting where the manager chooses

\textsuperscript{10}See Bertomeu et al. (2013) for a setting that explicitly considers optimal contracts in a moral hazard setting that features the interaction between conservative accounting and manipulation. There, the firm faces no investment decisions but instead constructs the accounting system and a compensation contract in order to minimize the cost of inducing the manager to exert effort.
productive effort \textit{ex ante}. We abstract from these considerations to focus on the incentive effects associated with changes in accounting conservatism and to keep the model tractable.

\textbf{External financing:} Although we package our model in terms of the board overseeing the firm’s investment decisions, we could also interpret the model as a capital market setting where the firm must raise capital \( I > 0 \) from outside investors to implement the project. Based on the public report \( R \), outside investors update their beliefs about the value of the project, decide whether to finance the project and, if so, determine the payback amount \( D \). If the report is unfavorable, investors are not willing to finance the project. If the report is favorable, investors provide capital \( I \) and require a payback amount, \( D \), that satisfies the following equation if investors are perfectly competitive:

\[ P(\theta_g|R_g, \hat{m})D = I, \]

where \( \hat{m} \) is the investors’ conjectured level of manipulation. Assume that investors observe \( c \) and that \( B \) is common knowledge. This allows them to anticipate the level of manipulation \( m = \hat{m} \). Under limited liability, the \textit{ex ante} shareholder value is now given by:

\[ U_s = P(R_g)P(\theta_g|R_g) (X - D) = P(R_g) (P(\theta_g|R_g)X - I), \]

where the second expression follows from (8) and is identical to the objective we utilize in our main analysis.\footnote{In such a setting, shareholders would wish to offer the manager incentives to manipulate the report to the extent that such side payments would be unobservable or unverifiable in court. In principle, such payments would not include compensation from the company because investors can observe compensation plans.}
3 Demand for conservatism

In this section, we develop a benchmark case to study the effects of changes in the accounting system with an exogenously fixed level of manipulation $m$. Ex ante shareholder value is:

$$U_s = P(R_g) (P(\theta_g|R_g)X - I),$$

where $P(\theta_g|R_g)$ is given in (6). It is useful to rearrange expression (10) to obtain:

$$U_s = \alpha (X - I) - (P(R_g, \theta_b)I + P(R_b, \theta_g)(X - I)), \quad (11)$$

where $P(R_g|\theta_b) = P(S_g|\theta_b) + mP(S_b|\theta_b)$ and $P(R_b, \theta_g) = (1 - m)P(S_b, \theta_g)$.

The shareholders’ preference function (11) can be explained in an intuitive way. The first term, $\alpha (X - I)$, is the expected cash flow in an ideal world where the board directly observes the state. The term in parentheses is the expected cost of Type I and Type II decision errors. With probability $P(R_g, \theta_b)$, a Type I error arises such that the accounting system generates a good report that leads to expansion in the bad state. With probability $P(R_b, \theta_g)$, a Type II error arises with the accounting system generating a bad report that leads to rejection in the good state.

When the precision $p$ of the accounting system increases, both the Type I and the Type II errors decline and shareholder value increases:

$$\frac{\partial U_s}{\partial p} = -I \frac{\partial P(R_g, \theta_b)}{\partial p} \bigg|_{\theta} - (X - I) \frac{\partial P(R_b, \theta_g)}{\partial p} \bigg|_{\theta}$$

$$= (1 - m) ((1 - \alpha)(1 - c)I + \alpha c(X - I)) > 0. \quad (12)$$

When the level of conservatism $c$ increases, the information content of the report-
ing system changes such that the board is better able to block expansion when the state is bad. This comes at the cost of forgoing some investments when the state is good. That is, the probability of a Type I error declines but the probability of a Type II error increases. For a negative ex ante NPV, \((I - X \alpha > 0)\), the advantage of avoiding Type I errors dominates the cost of Type II errors and an increase in \(c\) increases shareholder value. Intuitively, the shareholders’ desire to make conservative investment decisions creates a demand for conservative accounting rules. Formally:

\[
\frac{\partial U_s}{\partial c} = (1 - m)(1 - p)(I - \alpha X) > 0. \tag{13}
\]

The positive effect of an increase in conservatism on shareholder value gets weaker as the level of manipulation \(m\) increases because the characteristics of the accounting system only matter if the manager’s manipulation attempt fails. In addition, conservatism plays a weaker role when the accounting system has a higher precision \(p\). In the extreme cases in which \(m = 1\) or \(p = 1\), conservatism has no effect on reporting and hence investment efficiency. Nevertheless, as long as manipulation is fixed and \(m < 1\) and \(p < 1\), it is strictly optimal to choose the maximum level of conservatism \((c = 1)\).

**Lemma 1** *For a fixed level of manipulation, shareholder value is maximized if \(c = 1\).*

The result that conservative accounting rules facilitate decision making is driven by our assumption that expansion is not desirable when there is no additional information. Intuitively, a negative ex ante NPV implies that the expected costs of Type I errors exceeds the expected cost of Type II errors. The board therefore wishes to make conservative expansion decisions in the sense that it prefers to forgo some valuable investments as long as it can avoid pursuing failing investments. These pref-
ferences create a natural demand for conservative accounting rules. However, as we show in the next section, the board’s desire to act conservatively introduces a conflict of interest between the board and the manager. The manager is not concerned about potential overinvestment (Type I errors), but about potential underinvestment (Type II errors) and hence wishes to act aggressively. This conflict of interest can cause the manager to manipulate the system, and implies that it is typically optimal to set $c < 1$ (as we discuss in Section 5).

However, it is useful to note here that if the *ex ante* NPV of the project is positive, the board wishes to make aggressive expansion decisions and therefore prefers aggressive accounting rules, $c = 0$. In this case, there is no conflict of interest between the two parties, and the board does not need to fear manipulation. Consequently, in such a scenario, the optimal solution is trivially characterized by $c = 0$ and $m = 0$.

4 Manager behavior

We now turn to the manager’s manipulation strategy. The manager chooses the level of manipulation to maximize his expected payoff:

$$U_m = P(R_g)P(\theta_g|R_g)B - \frac{1}{2}km^2 = \alpha B - P(R_b, \theta_g)B - \frac{1}{2}km^2, \quad (14)$$

with $P(R_b, \theta_g) = (1 - m)P(S_b, \theta_g) = (1 - m) (1 - p) \alpha$.

The first term in the second expression of (14) is the manager’s expected benefit when the state is observable and the board makes the optimal expansion decision. In this case, there is no conflict between the manager and the board – both players prefer expansion only when the state is good. The second term is the expected cost of a Type II error for the manager – the lost benefit when the board blocks expansion.
after observing a bad report when, in fact, the state is good. A Type II error arises with probability $P(R_b, \theta_g) = (1 - m) (1 - p) c \alpha$ and is less likely when the level of manipulation is higher. In contrast to shareholders, the manager is not concerned about potential overinvestment (Type I errors) because he does not internalize the cost of the investment outlay. The manager’s disregard for Type I errors creates a conflict of interest between the manager and the board, and hence induces him to manipulate the system. The manager’s choice of $m$ satisfies:

$$m = P(S_b, \theta_g) B/k = (1 - p) c \alpha B/k.$$  (15)

The following comparative statics results follow immediately from (15):

**Lemma 2** The manager’s choice of manipulation, $m$, increases if:

(i) the accounting system is more conservative ($c$ is higher),

(ii) the accounting system is less precise ($p$ is lower),

(iii) the quality of reporting oversight is weaker ($k$ is lower),

(iv) the manager enjoys greater private benefits ($B$ is larger).

When the information system becomes more conservative ($c$ increases), the board is better able to avoid bad investments (Type I error) but at the cost of forgoing some good investments (Type II error). By virtue of allowing the board to make more prudent expansion decisions, conservatism creates an incentive for the manager to manipulate the system and distort the board’s decision making. As the accounting system becomes more conservative, the potential for a Type II error increases and the manager has a stronger incentive to override the system to ensure expansion. The board can eliminate manipulation by choosing the lowest level of conservatism ($c = 0$). Setting $c = 0$ maximizes the information content of bad signals, but minimizes the
information content of good signals. It eliminates the risk that valuable investment opportunities are rejected (Type II error). In this situation, the manager no longer has an incentive to manipulate the accounting system because he does not benefit from expansions that will surely fail.

A similar argument applies when the accounting system becomes less precise ($p$ decreases). As precision $p$ declines, the board is more likely to block valuable investments and the manager’s expected cost of a Type II error increases. This effect, in turn, makes manipulation more attractive. However, a perfectly informative system ($p = 1$) eliminates both Type II and Type I errors, leaving the manager with no incentive to engage in manipulation.

When the manager enjoys greater benefits of control, $B$, Type II errors become more expensive for the manager, which triggers greater manipulation to push expansion. Finally, when reporting oversight is stronger ($k$ is larger), the manager chooses a lower level of manipulation.

5 Optimal accounting system

We are now ready to study the optimal design of the accounting system from the shareholders’ perspective.\textsuperscript{12} The board (acting in the best interests of the shareholders) chooses the level of conservatism $c$ to maximize firm value (11), while taking into consideration the effects of $c$ on manipulation incentives.

\textsuperscript{12}Alternatively, we could consider a standard setter that designs the accounting system to maximize social welfare. Social welfare is the aggregate utility of shareholders and the manager. While social welfare includes the manager’s personal cost of manipulation, we are unsure to what extent a standard setter would recognize this cost. We therefore could weight the cost by a multiplier $\lambda \in [0, 1]$ in the standard setter’s preference function. In that case the standard setter would also weight the benefits the manager reaps through manipulation by $\lambda$. In the appendix, we show that our results are robust to this alternative modeling choice (regardless of the weight $\lambda$).
Ceteris paribus, an increase in conservatism allows the board to make more cautious expansion decisions which increases shareholder value as shown in Section 3. However, the very fact that conservative accounting facilitates board interventions causes the manager to manipulate the accounting system to push expansion. Specifically, as conservatism increases, the manager becomes more concerned that valuable projects are rejected based on noisy reports (Type II error) and hence has a stronger incentive to manipulate the system (Lemma 2). Manipulation increases the probability of a Type I error and decreases the probability of a Type II error. Using (11), we can show that the net effect of an increase in \( m \) on shareholder value is negative:

\[
\frac{\partial U_s}{\partial m} = -I \frac{\partial P(R_g, \theta_b)}{\partial m}_{>0} - (X - I) \frac{\partial P(R_b, \theta_g)}{\partial m}_{<0} = -P(S_b, \theta_b)I + P(S_b, \theta_g) (X - I) \\
= -(p(1 - \alpha)I + (1 - p)c(I - \alpha X)) < 0. \tag{16}
\]

When the board designs the accounting system, it has to balance the positive direct effect of conservatism on shareholder value with the negative effect of conservatism via its impact on the manager’s manipulation incentive. Assuming an interior solution, after substituting from (15) for \( m \), the optimal level of \( c \) can be stated as:

\[
c = \frac{1}{2(1 - p)} \left( \frac{k}{\alpha B} - \frac{p(1 - \alpha)I}{I - \alpha X} \right). \tag{17}
\]

From (17), we see that the board chooses conservative accounting \((c > 0)\) when the manager faces sufficiently high reporting oversight \( k \) relative to private benefits \( \alpha B \left( \frac{k}{\alpha B} > p\frac{(1 - \alpha)I}{I - \alpha X} \right) \). If the manager faces relatively low incentives to manipulate \( \left( \frac{k}{\alpha B} > p\frac{(1 - \alpha)I}{I - \alpha X} + 2(1 - p) \right) \), then the board chooses maximum conservatism \((c = 1)\).
The following proposition summarizes the results:

**Proposition 1**  *There is an interior solution, \( c \in (0, 1) \), if and only if:

\[
\frac{p(1 - \alpha)I}{I - \alpha X} < \frac{k}{\alpha B} < \frac{p(1 - \alpha)I}{I - \alpha X} + 2(1 - p). \quad (18)
\]

*In an interior solution, the optimal level of conservatism is:*

\[
c^* = \frac{1}{2(1 - p)} \left( \frac{k}{\alpha B} - \frac{p(1 - \alpha)I}{I - \alpha X} \right), \quad (19)
\]

*with manipulation:*

\[
m^* = \frac{1}{2} \left( 1 - p \frac{(1 - \alpha)I \alpha B}{I - \alpha X} \frac{k}{k} \right) < \frac{1}{2}. \quad (20)
\]

Appendix A gives the parameter regions for which the assumptions (5) and (18) hold. Essentially, the assumptions exclude extreme divergence between the manager’s and board’s preferences to expand. In such cases, the board requires convincing evidence in order to agree to expand (large *ex ante* loss \( I - \alpha X \)), but the manager’s incentive to manipulate is so high (low \( k/(\alpha B) \)) that he is unable to provide convincing evidence.

## 6  Comparative statics

In this section, we study how changes in the parameters of the model affect the optimal design of the accounting system, the equilibrium level of manipulation, and the firm’s reporting quality and investment efficiency. To do so, it is useful to rewrite
the board’s first order condition for an optimal choice of $c$ as:

$$
0 = (1 - m^*)(1 - p)(I - \alpha X) - (p(1 - \alpha)I + (1 - p)c(I - \alpha X))(1 - p)\frac{\alpha B}{k}. \quad (21)
$$

The first term in (21) represents the beneficial direct effect of conservatism on firm value and the second term reflects the indirect effect of conservatism via its impact on accounting manipulation. The equilibrium $c$ equates these two forces.

**Reporting oversight.** The following proposition highlights the links between the board’s oversight over financial reporting and the optimal level of conservatism, the magnitude of manipulation, and the investment efficiency.

**Proposition 2** As the strength of reporting oversight, $k$, increases:

(i) the optimal level of conservatism, $c$, increases,

(ii) the level of manipulation, $m$, increases,

(iii) reporting quality and investment efficiency, $U_s$, increase.

*Ceteris paribus,* stronger oversight over financial reporting (higher $k$), reduces the manager’s temptation to manipulate the accounting system. The manager’s restricted ability to manipulate directly increases the beneficial effects of conservative accounting on investment efficiency ($\frac{\partial^2 U_s}{\partial c \partial k} > 0$). Conservatism $c$ affects investment decisions only when the manager fails to override the system, so that lower manipulation increases the benefit of conservative accounting. In addition, better reporting oversight weakens the positive relation between conservatism and manipulation ($\frac{d^2 m}{dcok} < 0$) and decreases the indirect costs of conservative accounting (from $\frac{\partial U_s}{\partial m} < 0$). Both of these effects – increasing the benefits of conservative accounting and reducing its costs – motivate the board to choose more conservative accounting; hence result (i).
The impact of board oversight in our model is the opposite of that in Gao (2013), where accounting becomes more conservative when earnings are easier to manipulate. Whereas conservatism counteracts accounting manipulation in Gao (2013) and Chen et al. (2007), conservatism induces manipulation in our setting because the manager wishes to prevent the board from blocking potentially valuable investment opportunities.

Result (ii) indicates that the equilibrium level of manipulation increases with better board oversight. Although oversight directly mitigates manipulation incentives, the board optimally reacts to this change by choosing more conservative accounting, which, in turn, increases the manager’s desire to manipulate. The indirect effect via conservatism dominates the direct effect, yielding a positive relation between reporting oversight and manipulation. For the sake of providing some intuition, consider the extreme in which the manager can costlessly manipulate the accounting system \((k = 0)\). In this situation, one might expect that the manager chooses the highest level of manipulation \(m = 1\). However, the board optimally responds to the manipulation concern by choosing an aggressive accounting system with \(c = 1\), leaving the manager with no reason to manipulate \((m = 0)\).

Result (iii) follows from applying the envelope theorem to the board’s objective function. Keeping \(c\) constant, an increase in reporting oversight, \(k\), directly curbs manipulation, and hence increases the quality of the report, the investment efficiency, and shareholder value \(U_s\). The board responds to the change in \(k\) by increasing the level of accounting conservatism, which ultimately leads to more manipulation. But, by the envelope theorem, this indirect effect on \(U_s\) via \(c\) can be ignored and the shareholders’ payoff is increasing in \(k\).

**Agency conflict.** The manager’s ability to reap private benefits of control \(B\)
from successful expansion creates an agency conflict between the manager and the board. *Ceteris paribus*, as private benefits increase, the manager is more eager to manipulate the accounting system to push investment. As a consequence, it can be shown that an increase in $B$ has effects that are identical to the effects of a reduction in oversight quality $k$.

**Value of growth opportunities.** In order to analyze how the reporting system changes with the value of growth opportunities, the next proposition illustrates the effects of increasing the expansion cost $I$, while holding the gross payoffs from expansion constant.

**Proposition 3** As the cost of expansion, $I$, increases:

(i) the optimal level of conservatism, $c$, increases, and

(ii) the level of manipulation, $m$, increases.

When investment opportunities become less attractive (investment cost $I$ increases), the cost of overinvestment (Type I error) increases and the cost of underinvestment (Type II error) decreases. Consequently, a greater investment outlay $I$ increases both the direct benefit of conservatism, $\frac{\partial^2 \mathcal{U}_s}{\partial c \partial I} > 0$, and the cost of increased manipulation, $\frac{\partial^2 \mathcal{U}_s}{\partial m \partial I} < 0$. However, the former effect dominates and it is optimal to choose a more conservative accounting system when investments are less attractive *ex ante*; hence result (i). Result (ii) directly follows from result (i). The investment outlay $I$ has no direct effect on the manager’s manipulation choice, but indirectly affects $m$ via $c$. The presence of less attractive growth opportunities makes it optimal to choose more conservative accounting, which in turn strengthens manipulation incentives.

**Precision.** The following proposition highlights the effects of the underlying precision of the accounting system on both the accounting choices and firm value.
Proposition 4 As the precision $p$ of the accounting system increases:

(i) the optimal level of conservatism, $c$, increases if $\frac{k}{\alpha B} > \frac{(1-\alpha)I}{I-\alpha X}$ and decreases if $\frac{k}{\alpha B} < \frac{(1-\alpha)I}{I-\alpha X}$; 

(ii) the level of manipulation, $m$, decreases,

(iii) reporting quality and investment efficiency, $U_s$, increase.

An increase in the precision $p$ affects the benefits and the costs of conservative accounting. The two effects work in opposite directions implying that the link between $p$ and $c$ is ambiguous. First, when the reporting system becomes more precise, conservatism plays a less important role and hence has a weaker positive affect on investment efficiency, that is, $\frac{\partial^2 U_s}{\partial c \partial p} < 0$. In the extreme, when all signals are perfectly accurate, $p = 1$, conservatism no longer matters. Second, when the accounting system is more precise, the manager is less concerned that valuable investment opportunities are accidentally rejected, and hence has a smaller incentive to manipulate the system. Consequently, the negative side effects of conservative accounting on reporting quality decline as well. When governance is sufficiently effective in constraining manipulation (high $\frac{k}{\alpha B}$), the effect on manipulation dominates so that conservatism is increasing in precision.

Although an increase in precision sometimes increases conservatism, which strengthens manipulation incentives, a more informative system always leads to weaker manipulation incentives. In the extreme, when $p = 1$, the preferences of the manager and the board are aligned and the manager has no longer any reason to manipulate.

The precision $p$ of the accounting system improves investment efficiency in two ways. First, holding conservatism $c$ and manipulation $m$ fixed, a more precise ac-

\[13\text{If the baseline accounting system is insufficiently informative } (p < \sqrt{2} - 1 \approx 0.41), \text{ then } c \text{ is always decreasing in } p. \text{ In other words, when } p < \sqrt{2} - 1, \text{ there are no values of the parameters } (I, X, \alpha, B, k) \text{ such that } c \in (0,1), \text{ assumption (5) is satisfied, and } \frac{k}{\alpha B} > \frac{(1-\alpha)I}{I-\alpha X}.\]
counting system reduces both Type I and Type II errors. Second, keeping \( c \) fixed, we know that manipulation \( m \) is decreasing in \( p \), further reducing Type I errors. By the envelope theorem, we can ignore the effect of \( p \) on \( c \) when assessing the impact on the optimized \( U_s \).

## 7 Managerial optimism

A large body of empirical and survey evidence supports the notion that individuals, and especially executives and entrepreneurs, can have overly optimistic beliefs about the chances that their investment ideas will succeed (Larwood and Whittaker 1977; Cooper et al. 1988; Malmendier and Tate 2005; Landier and Thesmar 2009; Ben-David et al. 2010; Graham et al. 2013).\(^{14}\) To capture managerial optimism, we consider a setting in which shareholders and the manager disagree on the \( a \) priori probability of the good state. Specifically, let \( \alpha_m \) and \( \alpha_s \) denote the manager’s and the shareholders’ prior subjective beliefs about the probability of the good state, respectively, with \( \alpha_s \leq \alpha_m < 1 \). The players’ beliefs \((\alpha_s, \alpha_m)\) are common knowledge. The next proposition shows how managerial optimism affects the optimal design of the accounting system, the extent of manipulation, and investment efficiency.

**Proposition 5** When the manager is more optimistic about future success (\( \alpha_m \) is larger):

(i) the firm chooses a lower level of conservatism, \( c \),

(ii) the manager engages in less manipulation, \( m \), and

(iii) reporting quality and investment efficiency, \( U_s \), decrease.

\(^{14}\)See Van den Steen (2010) for a survey of the rapidly growing literature that models players as having different prior beliefs. Also see Ben-David et al. (2013) for survey evidence on the presence and effects of variation in CFO beliefs.
Optimistic managers have a stronger prior belief that expansion will succeed and hence are more concerned about the risk of a Type II error — i.e., that valuable investment opportunities are mistakenly rejected. Ceteris paribus, optimistic managers are therefore more eager to manipulate the system to push expansion. The board responds to the increased manipulation temptation by lowering the level of conservatism, which, in turn, weakens manipulation incentives. This indirect effect on manipulation via conservatism dominates the direct effect, resulting in a negative relation between managerial optimism and manipulation. Despite the fact that manipulation declines, optimism reduces reporting quality and investment efficiency.

Note that managerial optimism yields similar results to our main analysis even when the manager does not enjoy empire benefits but wishes to maximize shareholder value. When the manager’s prior belief about the probability of success, $\alpha_m$, is sufficiently high, his perceived NPV of unconditional expansion is positive ($\alpha_m X > I > \alpha_s X$). In this case, and in contrast to shareholders, the manager is more concerned about the cost of forgoing valuable investments (Type II error) than about the cost of making bad investments (Type I error). The manager’s optimal level of manipulation is then given by:

$$\max_m P(R_g; \alpha_m) (P(\theta_g|R_g; \alpha_m)X - I) - \frac{1}{2}km^2$$

$$\Rightarrow m = \max \left\{ 0, \frac{(1-p)c(\alpha_m X - I) - p(1 - \alpha_m)I}{k} \right\}, \quad (22)$$

which is positive if $\alpha_m$ and $c$ are sufficiently high. As before, when the level of conservatism declines, the potential for a Type II error declines, and the manager has less incentives to manipulate. Eventually, when $c$ hits $c = \frac{p(1 - \alpha_m)I}{(1-p)(\alpha_m X - I)}$, the manager no longer manipulates, $m = 0$. 26
8 Empirical predictions and discussion

Our analysis of the board’s choice of conservatism in Proposition 1 pertains to the baseline accounting system. However, empiricists observe only the outputs of the accounting system, which also reflect manipulation. Manipulation drives a wedge between the board’s accounting choices and the conservatism reflected in the financial statements. In our setting, the probability $P(R_b|\theta_g)$ of a bad report in the good state is the effective level of conservative accounting.

Expression (4) gives $P(R_g|\theta_g)$, from which we can compute $P(R_b|\theta_g) = (1 - m)P(S_b|\theta_g) = (1 - m)(1 - p)c$. Were it not for the $1 - m$ term, the probability $P(R_b|\theta_g)$ of a bad report in the good state provides a clear proxy for the board’s choice of $c$. However, manipulation $m$ increases with conservatism $c$, so that an increase in $m$ will partially offset the direct effect of an increase in $c$ on $P(R_b|\theta_g)$. The effect on $c$ dominates so that observed conservatism $P(R_b|\theta_g)$ increases in $I$ and $k$, and decreases in $B$ and $\alpha_m$ (in case of managerial optimism), consistent with the effects on $c$ as given in Propositions 2 through 4. Also, while the effect of precision $p$ on $c$ varies with the model’s parameters, $P(R_b|\theta_g)$ always decreases in $p$ because of the presence of a direct effect of precision (the $1 - p$ term).

The effect of $I$ on observed conservatism $P(R_b|\theta_g)$ implies that firms with few profitable growth opportunities will have relatively more conservative accounting. Consistent with this result, Grinstein and Tolkowsky (2004) find that firms with committees that review non-M&A investments tend to have low market-to-book ratios, consistent with lower growth opportunities. They also find that firms with M&A-related board committees tend to have high research and development, consistent with firms in environments with high ex ante risk. This prediction differs from Bagnoli and
Watts (2005), where managers may use conservative accounting to signal private information. In our setting, the prior belief regarding the value of expansion is common knowledge and there is no role for signaling.

Prior empirical studies (e.g., Watts 2003a,b; Ahmed and Duellman 2007; García Lara et al. 2009) and analytical work (e.g., Gao 2013) have portrayed accounting conservatism as a tool that enables boards to perform their monitoring duties, particularly in regard to mitigating earnings manipulation. In our model, accounting conservatism enables boards to make more cautious investments but this feature of conservatism increases the manager’s incentive to manipulate the accounting system. Thus, boards can better exploit the advantages of conservative accounting if they have sufficiently strong oversight to mitigate the negative side effects on manipulation. We predict that accounting becomes more aggressive as agency problems increase, which occurs because conservative accounting exacerbates the manager’s incentive to manipulate reporting.

Summarizing, we have the following predictions regarding the observed level of conservatism:

**Prediction 1** The observed level of conservatism $P(R_b|\theta_g)$ is greater for:

(i) Firms with fewer valuable growth opportunities (higher $I$);

(ii) Firms with effective reporting oversight, precise accounting systems, low private benefits, and low managerial optimism (high $k, p$ and low $B, \alpha_m$).

As was the case with the board’s choice $c$ of conservatism, empiricists cannot directly observe the managers’ manipulation choice $m$. The corresponding observable feature of the reporting environment is detected manipulations. If detection requires a failed expansion, where expansion only follows a good report, the probability of
detected manipulation will be \( P(\theta_b, R_g, S_b) \) – a failed expansion that later investigation reveals to have been based on an underlying bad signal \( S_b \). Direct computations show that the effects of the value of investment opportunities \( I \), oversight \( k \), private benefits \( B \), optimism \( \alpha_m \) (in case the manager is optimistic), and precision \( p \) on detected manipulation \( P(\theta_b, R_g, S_b) \) have the same signs as on the actual manipulation \( m \) given in Propositions 2 through 4. This yields the following predictions, which are in the same direction as those for observed conservatism due to the positive link between conservative accounting and the incentive to manipulate earnings:

**Prediction 2** Detected manipulations \( P(\theta_b, R_g, S_b) \) are greater for:

(i) Firms with fewer valuable growth opportunities (higher \( I \));

(ii) Firms with effective reporting oversight, low private benefits and low managerial optimism (high \( k \) and low \( B, \alpha_m \));

(iii) Firms where current earnings are less informative about future growth opportunities (low \( p \)).

While we predict that firms with stronger reporting oversight experience more accounting manipulation, this does not imply that oversight reduces investment efficiency and firm value. Proposition 2 indicates that company value is increasing in the effectiveness of oversight (high \( k \)). The higher manipulation in firms with strong oversight is a by-product of their choice of more conservative accounting. The effect of higher conservatism dominates the partially offsetting impact of higher accounting manipulation so that firms with effective monitoring make more efficient investments.

All of these predictions are counterintuitive but can be explained by the observation that the board optimally responds to changes in the environment that reduce

---

\(^{15}\) Signing the derivative of \( P_s(\theta_b, R_g, S_b) \) with respect to \( p \) requires accounting for the parameter restrictions that \( \frac{k}{\alpha_m I} > p \left( \frac{1-\alpha_s}{I-\alpha_s X} \right) \) and \( \frac{(1-\alpha_s)}{I-\alpha_s X} > 1 \).
(foster) manipulation incentives by increasing (decreasing) the level of conservatism, which, in turn, strengthens (weakens) manager’s desire to distort the accounting system. In our setting, given that the only goal of the reporting system is to facilitate investment decisions, an accounting system is of better quality if it leads to better investment decisions.

The above analysis demonstrates that the presence of manipulation need not be an indicator of poor reporting quality. On the one hand, manipulation associated with a low level of precision \( p \) indicates poor reporting quality. On the other hand, manipulation can also be associated with effective oversight (high \( k \)), which is also associated with conservative reporting and efficient investment decisions that are indicative of high reporting quality. Our results suggest that empirical researchers should be careful when using the magnitude of manipulation in firms as a proxy for reporting quality – it is not always true that less manipulation actually represents an environment with better financial reporting.

9 Conclusion

We develop a model to analyze the effects of reporting oversight on the optimal choice of conservatism, the magnitude of accounting manipulation, reporting quality, and investment efficiency. The accounting report guides the board’s decision of whether to pursue a new investment opportunity such as expanding the firm. Consistent with previous models, conservative accounting increases the verification standards required for good relative to bad reports and therefore reduces (increases) the information content of bad (good) reports. *Ceteris paribus*, conservatism is valuable because directors (and shareholders) wish to make conservative expansion decisions – that is,
directors are more concerned about the risk of investing in bad projects (Type I error) than they are about the risk of foregoing good investments (Type II error).

In contrast to the board, the manager prefers expansion as long as there is a chance of success and hence is eager to avoid Type II errors. This preference can arise, for example, because the manager enjoys private benefits of control from expansion or is holding stock options. The very fact that conservatism allows the board to more aggressively intervene in the firm’s investment strategy encourages the manager to distort the accounting system. As conservatism increases, the risk of Type II errors increases and the manager has a stronger inclination to manipulate the system to push expansion.

This effect of conservatism on manipulation explains our second main result: firms with stronger oversight over financial reporting choose more conservative accounting. The optimality of conservative accounting depends on boards being able to effectively monitor reporting to mitigate the negative side effects of conservatism. Firms with weak reporting oversight cannot directly curb manipulation, and therefore choose aggressive accounting systems in order to reduce managers’ manipulation incentives.

Paradoxically, we predict that an improvement in oversight is associated with more, rather than less, accounting manipulation. This follows because stronger boards not only directly deter manipulation, but also choose more conservative accounting systems. A higher level of conservatism, in turn, encourages manipulation, and this latter effect dominates the former. Although oversight and manipulation are positively related, improvements in oversight unambiguously lead to higher reporting quality and more efficient investment decisions.

We also generate predictions relating managerial optimism to the optimal level of conservatism, accounting manipulation, quality of reporting, and investment ef-
ficiency. Essentially, when the manager is more optimistic about the probability of successful expansion, he has a stronger direct incentive to manipulate the accounting report, which causes the board to choose less conservative accounting. The reduction in conservatism lowers incentives for manipulation, such that in equilibrium, firms with more optimistic managers exhibit a smaller level of manipulation. Nevertheless, managerial optimism always leads to lower reporting quality and less efficient investments.
References


Gao, Y. and Wagenhofer, A. 2012. Accounting conservatism and board efficiency. Working paper, City University of Hong Kong and University of Graz.


A Proofs and derivations

A.1 Derivation of equilibrium (Lemma 2 and Proposition 1)

For the purposes of deriving the equilibrium, we allow for the possibility that the manager and shareholders have different prior beliefs about the probability of success. We denote the manager’s (shareholders’) beliefs with an \( m \) \((s)\) subscript, with \( P_m(\theta_g) = \alpha_m \geq P_s(\theta_g) = \alpha_s \). Under this structure, we have for \( i \in \{s, m\}\):

\[
P_i(R_g | \theta_g) = p + (1 - p) \left( 1 - c(1 - m) \right), \quad (A.1a)
\]

\[
P_i(R_g | \theta_b) = pm + (1 - p) \left( 1 - c(1 - m) \right), \quad (A.1b)
\]

\[
P_i(R_g) = p (\alpha_i + (1 - \alpha_i) m) + (1 - p) \left( 1 - c(1 - m) \right). \quad (A.1c)
\]

The manager’s expected payoff is:

\[
U_m = P_m(R_g) P_m(\theta_g | R_g) B - \frac{1}{2} km^2 = (1 - (1 - m) (1 - p) c) \alpha_m B - \frac{1}{2} km^2, \quad (A.2)
\]

and gives:

\[
m = P_m(S_b, \theta_g) B/k = (1 - p)c \alpha_m B/k. \quad (A.3)
\]

The shareholders’ payoff, corresponding to (11), is:

\[
U_s = \alpha_s (X-I) - \left( 1 - p \right) \left( 1 - c(1-m) \right) (1 - \alpha_s) I - \left( 1 - p \right) c(1-m) \alpha_s (X-I). \quad (A.4)
\]

The negative \textit{ex ante} NPV assumption \((\alpha_s X < I)\) implies that the second-order condition is satisfied when choosing \( c \) to maximize (A.4) and solving the first-order
condition gives:
\[ c^* = \frac{1}{2(1-p)} \left( \frac{k}{\alpha_mB} - p \frac{(1-\alpha_s)I}{I-\alpha_sX} \right), \]  
(A.5)
which lies in \((0,1)\) if (18) is satisfied. Direct computations give the equilibrium manipulation \(m^*\), in (20), where \(c \in (0,1)\) implies \(m^* \in (0,1/2)\).

This completes the proof of Proposition 1. We now derive the parameter restrictions that guarantee an interior level of conservatism and satisfy the positive \textit{ex post} NPV assumption (5). We first state the parameter restrictions.

Define \(z = \frac{\sqrt{3} - 3p + 2p - 1}{2p}\), where \(z \in (1,1/p)\) and \(p \in (0,1)\). If \(\frac{(1-\alpha_s)I}{I-\alpha_sX} < z\), then there is no equilibrium with interior \(c\) and positive \textit{ex post} NPV. Otherwise, if \(\frac{(1-\alpha_s)I}{I-\alpha_sX} > \frac{1}{p}\), then the positive NPV restriction is not binding and (18) is sufficient for an equilibrium with interior \(c\). If \(\frac{(1-\alpha_s)I}{I-\alpha_sX} \in (z,1/p)\), then the lower bound on \(\frac{k}{\alpha_mB}\) required to satisfy the positive NPV condition exceeds the lower end of the interval (18), and the equilibrium requires:  \(^{16}\)

\[
\frac{p(1-\alpha_s)I}{I-\alpha_sX} + 2 \left( 1 - p \frac{(1-\alpha_s)I}{I-\alpha_sX} + \sqrt{1 - p \frac{(1-\alpha_s)I}{I-\alpha_sX}} \right) < \frac{k}{\alpha_mB} < p \frac{(1-\alpha_s)I}{I-\alpha_sX} + 2(1-p). 
\]

For positive \textit{ex post} NPV  
For \(c < 1\)  
(A.6)

When deriving the parameter ranges, put \(y = \frac{k}{\alpha_mB}\) and \(z = \frac{(1-\alpha_s)I}{I-\alpha_sX}\), where \(X \in (I,I/\alpha_s)\) implies that \(z > 1\). We can write (18) as \(pz \equiv y_0 < y < pz + 2(1-p) \equiv y_1\), \(c = \frac{y-pz}{2(1-p)}\), and \(m = \frac{1}{2} \left( 1-p \frac{z}{y} \right)\). With these substitutions, the \textit{ex post} NPV \(P_s(\theta_g|R_g)X-I\) is proportional to \(y^2 - 2(2-pz)y + p^2z^2\). Denote the \(+\sqrt{\bullet}\) and \(-\sqrt{\bullet}\) roots of the quadratic as \(y_+\) and \(y_-\), respectively, so that the positive \textit{ex post} NPV condition is \(y \notin (y_-,y_+)\). The discriminant of the quadratic is \(1-pz\), which is positive if \(z < \frac{1}{p}\). If \(z > \frac{1}{p}\), then the quadratic is always positive so that the NPV condition

\(^{16}\)The assumptions \(\alpha_sX < I\) and \(X > I\) imply that the lower bound on the left-hand-side of the interval is less than the upper bound on the right-hand-side.
does not place a binding constraint on the parameters. Direct computations show that $p \in (0, 1)$ and $z > 1$ imply that $y_+ < y_0$, so that there is no range of $y < y_-$ with an equilibrium having interior $c$ and positive ex post NPV. The root $y_+ > y_0$ if and only if $z < \frac{1}{p}$. The only range where the positive NPV condition might be binding is $z \in (1, 1/p)$. In order for there to be an equilibrium with some $y > y_+$ satisfying the NPV condition and also giving an interior $c$, it must be the case that $y_+ < y_1$, which, for $z \in (1, 1/p)$, holds if and only if $z \in (z, 1/p)$. The bound $z$ lies between $(1, 1/p)$ for all $p \in (0, 1)$.

### Alternative objective for setting $c$

Here, we derive results in a setting where a regulator determines $c$ to maximize social welfare. Given a weight $\lambda$ that measures the importance of the manager’s utility $U_m$, given by (14), relative to the shareholders’ utility $U_s$, given by (11), we have the regulator’s objective:

$$\max \, U_s + \lambda U_m,$$

(A.7)

which has the following first-order condition:

$$0 = \frac{dU_s}{dc} + \lambda \frac{dU_m}{dc}$$

(A.8)

$$= -p \frac{\alpha_m B}{k} + \frac{I - \alpha_s X}{(1 - \alpha_s)I} \left(1 - 2c(1 - p) \frac{\alpha_m B}{k}\right) + \frac{\lambda k}{(1 - \alpha_s)I} \left(-\frac{\alpha_m B}{k} \left(1 - c(1 - p) \frac{\alpha_m B}{k}\right)\right).$$

Solving (A.8) for $c$ gives the following, which simplifies to (19) when the weight on the manager $\lambda = 0$:

$$c = \frac{1}{2(1 - p)} \frac{k}{\alpha_m B} - \frac{(1 - \alpha_s)I}{I - \alpha_s X} \left(p + \frac{\lambda k}{(1 - \alpha_s)I}\right) \frac{1 - \frac{3}{2} \frac{\alpha_m B}{I - \alpha_s X}}{1 - \frac{3}{2} \frac{\alpha_m B}{I - \alpha_s X}}.$$

(A.9)
Direct computations show that conservatism and manipulation are both lower when the objective also includes the manager’s utility. In other words, conservatism $c$ is decreasing in $\lambda$, which implies that manipulation is decreasing in $\lambda$, as well. This follows directly from the manager perceiving a positive ex ante value of expanding.

Direct computations show that $m, c \in (0, 1)$ if the following holds, where $y = \frac{k}{\alpha_mB}$,

$$z = \frac{(1-\alpha_s)L}{I-\alpha_sX}, \text{ and } \lambda_2 = \frac{\lambda k}{(1-\alpha_s)L};$$

$$(p + \lambda_2)z < y < (pz + 2(1-p))\left(1 + \sqrt{1 + \frac{z^2\lambda_2(2p + \lambda_2)}{(pz + 2(1-p))^2}}\right) + \frac{1}{2}z\lambda_2. \quad (A.10)$$

The above inequalities simplify to (18) as $\lambda \to 0$. Both the upper and lower bounds are shifted upward relative to the bounds in (18).

For any $\lambda > 0$, the comparative statics in Propositions ??, ??, and ?? are the same as given in the main body except for the following exception. In Proposition ??, $k/mB > \frac{(1-\alpha_s)L}{I-\alpha_sX}$ is a necessary and sufficient condition for $c$ to be increasing in $p$, but it is only a necessary condition when the choice of $c$ places positive weight on the manager’s objective ($\lambda > 0$). Proving that $U_s$ is increasing in $\frac{(1-\alpha_s)L}{I-\alpha_sX}$ requires first establishing that $\frac{d^2U_s}{d\left(\frac{(1-\alpha_s)L}{I-\alpha_sX}\right)d\lambda_2} < 0$, and then taking the limit $\lim_{\lambda_2 \to -\infty}dU_s/d\left(\frac{(1-\alpha_s)L}{I-\alpha_sX}\right)$, which equals zero. Because $U_s$ is increasing in $\frac{(1-\alpha_s)L}{I-\alpha_sX}$ for $\lambda = 0$ case in the main body, this implies that $U_s$ is increasing in $\frac{(1-\alpha_s)L}{I-\alpha_sX}$ for all positive $\lambda$. $\blacksquare$

**Proof of Proposition ??**

The statements on the effects of parameters follow directly from computations of the derivatives of $c^*$ as given in expression (19). The parameter restrictions for $dc/dp > 0$ follow because $\frac{k}{\alpha_mB} > \frac{(1-\alpha_s)L}{I-\alpha_sX}$ requires that $\frac{(1-\alpha_s)L}{I-\alpha_sX} < p\frac{(1-\alpha_s)L}{I-\alpha_sX} + 2(1-p)$, the highest possible value of $\frac{k}{\alpha_mB}$, for cases with an interior solution. The inequality $\frac{(1-\alpha_s)L}{I-\alpha_sX} <
\[ p \frac{(1 - \alpha_s)I}{I - \alpha_sX} + 2(1 - p) \text{ holds if and only if } \frac{(1 - \alpha_s)I}{I - \alpha_sX} < 2. \] The derivation of the parameter ranges states that we obtain interior solutions for \( \frac{(1 - \alpha_s)I}{I - \alpha_sX} > \frac{1}{2p} \left( \sqrt{5 - 4p} + 2p - 1 \right). \) For there to be any parameters with \( \frac{dc}{dp} > 0 \) we must have \( \frac{1}{2p} \left( \sqrt{5 - 4p} + 2p - 1 \right) < 2, \) which holds if \( p < \sqrt{2} - 1 \approx 0.41. \]

**B Alternative cost function**

In this Appendix, we discuss an alternative formulation where the manager incurs the manipulation cost only when attempting to manipulate following a bad signal \( S_b. \) In this setting, the manager’s objective function is:

\[
\frac{(1 - p)c \alpha_m}{(1 - p)c + p(1 - \alpha_m)} P_m(\theta_b|S_b) - \frac{m}{2} k - \frac{k}{2} m^2. \tag{B.1}
\]

Solving the manager’s first-order condition gives \( m = \frac{(1 - p)c}{(1 - p)c + p(1 - \alpha_m)p} \alpha_m B, \) bounded above by 1. The second-order condition is satisfied by \( k > 0. \) The board’s objective is identical to (10). This setting affects how \( m \) reacts to \( c. \) Direct computations show that \( \frac{dm}{dc} \geq 0, \) with equality for \( m = 1, \) and that the board’s second-order condition is never satisfied:

\[
\frac{d^2U_s}{dc^2} = \frac{2(1 - p)p \left( (X - I)\alpha_s + \alpha_m(I - \alpha_s X) \right)}{(1 - p)c + (1 - \alpha_m)p} \frac{dm}{dc} \geq 0
\tag{B.2}
\]

because \( I < X < \frac{1}{\alpha_s} I \)
The board therefore adopts a corner solution of \( c \in \{0, 1\} \). The board chooses between:

\[
U_s(c = 0) = \alpha_s X - I + p(1 - \alpha_s)I, \quad (B.3)
\]

where \( c = 0 \) implies that \( m = 0 \), and:

\[
U_s(c = 1) = \alpha_s X - I + (1 - m)(p(1 - \alpha_s)I + (1 - p)(I - \alpha_sX)). \quad (B.4)
\]

The board’s choice then depends on:

\[
U_s(c = 1) - U_s(c = 0) = (1 - p)(I - \alpha_sX) - m ((1 - p)(I - \alpha_sX) + p(1 - \alpha_s)I).
\]

Expression (B.5) implies that the board chooses conservative accounting \( (c = 1) \) if:

\[
m < \frac{1}{1 + \frac{p}{1 - p} \frac{1 - \alpha_s}{1 - \alpha_sX}} \Leftrightarrow \frac{k}{\alpha_mB} (1 - \alpha_m p) > 1 + p \left( \frac{1 - \alpha_s}{{I - \alpha_sX}} - 1 \right). \quad (B.6)
\]

In our primary setting, conservatism and manipulation both increase in the strength \( k \) of governance and the investment amount \( I \) (See Propositions ?? and ??). Here, a sufficiently high \( k \) and/or \( I \) are needed to satisfy (B.6) so that conservatism and manipulation will occur.

\[\text{17 If } p \text{ is too small, a positive report does not sufficiently alter the board’s prior beliefs that expansion has a negative NPV, and the board never expands. Formally, } U_s(c = 0) \text{ is positive only when } \frac{p}{1 - \alpha_s} \frac{1 - \alpha_s}{1 - \alpha_s} < 0.\]