Accounting Conservatism and Managerial Incentives

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There are two sources of agency costs under moral hazard: (1) distortions in incentive contracts and (2) implementation of suboptimal decisions. In the accounting literature, the relation between conservative accounting and agency costs of type (1) has received considerable attention (cf. Watts 2002). However, little appears to be known about the effects of accounting conservatism on agency costs of type (2) or trade-offs between agency costs of types (1) and (2). The purpose of this study is to examine this void. In a principal-agent setting in which the principal motivates the agent to expend effort using accounting earnings, this study shows that accounting earnings become more useful for reducing agency costs of type (2) when measured conservatively than when measured aggressively. Combined with the result in Kwon et al. (2001) that agency costs of type (1) decrease with accounting conservatism, this analysis suggests that conservative accounting enhances the incentive value of accounting signals with respect to both types of agency costs.

Key words: accounting conservatism; moral hazard; limited liability; agency costs

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1. Introduction

The separation of ownership and control in publicly held firms often creates incentive conflicts between stockholders and management, which causes agency costs for the firms’ stockholders. Two types of agency costs arise in a standard principal-agent setting: (1) incentive costs and (2) the costs of implementing suboptimal decisions. The former refer to the costs that the principal incurs in motivating the agent to make desired decisions, and the latter to the principal’s welfare loss in implementing decisions that are second best rather than first best.1 This study examines how reported accounting earnings affect agency costs in publicly held firms when the earnings are measured conservatively rather than aggressively.

In the accounting literature, there have been several attempts to explain demands for conservative accounting based on incentive considerations.2

For instance, Antle and Lambert (1988) demonstrate that second-best contracts require different penalties for accountants’ reporting errors depending on whether they are of type 1 or type 2 errors, and that this asymmetry causes accountants to prefer conservative accounting practices. Kwon et al. (2001) analyze conservative accounting as a means to trade-off between two related and yet distinct agency costs of type (1): the costs of suboptimal risk sharing and the agent’s rents. Gigler and Hemmer (2001) explore the relation between conservative earnings measurements and the costs of inducing truthful management disclosures. Venugopalan (2004) discusses conditions under which investment distortions decrease with conservative accounting. Chen et al. (2004) argue that accounting conservatism reduces management’s incentives to overstate reported earnings.

While insightful, these studies are based on the simplifying assumption that the agent’s decisions are exogenous. Thus they focus on the effect of conservative accounting on agency costs of type (1). As a result, they provide little insight regarding the effects of accounting conservatism on agency costs of type (2) or trade-offs between agency costs of types (1) and (2).

Watts (2005) investigate empirically the demands for conservative accounting on the basis of stock market reactions. For an extensive survey, see Watts (2002).
This study contributes to filling this void. The analysis is based on a principal-agent model in which the principal motivates the agent to expend effort based on reported accounting earnings. An important feature is that the agent’s effort level is endogenously determined, rather than exogenously given.\(^3\)

The main result of the analysis is that accounting earnings are more useful for controlling the cost of suboptimal managerial decisions when earnings are measured conservatively as opposed to when they are measured neutrally or liberally. This study differs from Kwon et al. (2001), which examines the principal’s trade-off between the costs of suboptimal risk sharing and the agent’s rents. In contrast, this study focuses on how the principal trades off the agent’s effort against the agent’s rents. In the model, the principal can induce the agent to expend greater effort by increasing the spread between the agent’s rewards for a favorable performance and penalties for an unfavorable performance. However, such an increased spread in the agent’s fee structure is costly to the principal as it increases the agent’s rents when the agent’s liability for a poor performance is limited.\(^4\) Thus, second-best contracts make trade-offs between the agent’s effort and rents in the model.

The remainder of this paper is organized as follows. The following section develops a principal-agent model in which the principal motivates the agent to expend effort on the basis of an accounting performance measure. Section 3 describes the main result: The more conservative the accounting earnings measurements, the higher is the agent’s effort under second-best contracts. A brief summary in §4 concludes the paper.

For expository purposes, proofs are provided in the appendix.

\(^3\) Second-best contracts trade off agency costs of type (1) against agency costs of type (2), and thus the two types of agency costs inextricably interact. In the literature, the relation between accounting conservatism and agency costs of type (1) has been investigated under the simplifying assumption that the agent’s effort level has already been fixed exogenously, and thus the effects of accounting conservatism on agency costs of type (2) are ignored. For tractability, this study adopts the simplifying assumption of risk neutrality. Since the issue of suboptimal risk sharing does not arise with risk neutrality, the interactions between agency costs of types (1) and (2) are reduced but not eliminated.

\(^4\) In addition to increasing the agent’s rents, the fee spread affects the agent’s risk bearing as well. The larger the spread between the agent’s fees for favorable and unfavorable performances, the higher is the risk that is imposed on the agent. Thus, if the agent is risk averse, the principal must trade off the benefits of greater effort against the three related but distinct costs: (1) the agent’s disutility of effort; (2) the agent’s rents; and (3) the risk premium that the agent requires for additional risk bearing.

2. The Economic Setting

2.1. The Model

Consider a principal-agent setting in which the principal delegates to the agent the decision for a productive action and the action is personally costly to the agent. Let \(e \in A = \{e | 0 < e < 1\}\) denote the agent’s choice of action, where \(e\) is interpreted as his level of effort. Agency income (gross of the agent’s fee) is binary: \(x = x_1\) (low) or \(x_2\) (high). Given the agent’s effort \(e\), the probability of high income \(x_2\) being realized is \(p(x_2 | e) = e\), and low income \(x_1\) is realized with a probability of \(p(x_1 | e) = 1 - e\). Thus the agent’s effort is productive in the sense of first-order stochastic dominance.

Let \(G\) and \(H\) represent the respective utility functions of the principal and the agent. Assume that \(G = x - s(m)\) and \(H = s(m) - v(e)\), where \(v'(e) > 0\) and \(v''(e) > 0\). Here, \(s(m)\) denotes the agent’s compensation based on accounting performance measure \(m\).\(^5\) \(v(e)\) represents the agent’s disutility of effort. Since the agent is risk neutral in the model, compensation for his risk bearing is not required. Thus the analysis focuses on the effect of conservative accounting on the trade-offs between the agent’s effort and rents.

The principal motivates the agent to expend effort using accounting performance measure \(m = m_1\) (“low income”) or \(m_2\) (“high income”). Given the setting of binary income levels, an accounting measurement system may be characterized by two conditional probabilities \(\alpha = p(m_1 | x_1)\) and \(\beta = p(m_2 | x_2)\). Throughout the paper, accounting reports are assumed to be informative: \(\alpha + \beta > 1\) but imperfect: \(\alpha + \beta < 2\). In the model, accounting report \(m_2\) is good news and \(m_1\) bad news (Milgrom 1981).

The principal designs the agent’s compensation schedule that is least costly and yet motivates the agent to expend her desired level of effort. More specifically, letting \(s_i = s(m_i)\) for \(i = 1\) and \(2\), the principal’s problem can be described as follows.

The Principal’s Contract Design Problem.

\[
\max_{x_1, x_2, e} \quad EG = (1 - e)[x_1 - \alpha s_1 - (1 - \alpha) s_2] \\
\quad + e[x_2 - (1 - \beta) s_1 - \beta s_2] \tag{1}
\]

subject to \(EH = [(1 - e)\alpha + e(1 - \beta)] s_1\)

\[
+ [(1 - e)(1 - \alpha) + e\beta] s_2 - v(e) \geq \theta, \tag{2}
\]

\(^5\) In this study, actual outcomes are not publicly observable (or more precisely not contractible), and thus the principal motivates the agent to expend effort using an accounting performance measure. As a result, the principal’s cost of hiring and motivating the agent critically depends on the informational characteristics of accounting reports, as in Gigler and Hemmer (2001) and Kwon et al. (2001).
\[ \frac{\partial}{\partial \epsilon} EH = (\alpha + \beta - 1) \left( -s_1 + s_2 \right) - \nu'(\epsilon) = 0, \]
\[ s_1 \geq -L, \]

where \( \theta \) represents the agent’s reservation utility for contract acceptance. Constraint (3) is the (first-order) condition that the principal’s desired implementation plan \( \epsilon \) is compatible with the agent’s effort incentive.\(^6\)

Constraint (4) implies that the principal’s ability to penalize the agent for a poor performance is limited.\(^7\)

Denote by \( e^* \) the first-best effort level that maximizes social welfare, i.e.,
\[ e^* \in \arg \max_{\epsilon} \left( 1 - e \right)x_1 + ex_2 - \nu(\epsilon). \]

Assuming that \( \nu''(0) < x_2 - x_1 < \nu''(1) \), one can show that first-best effort \( e^* \) is unique and characterized by the first-order condition: \( x_2 - x_1 = \nu'(e^*) \). To make the analysis interesting, we impose the additional condition that the agent’s liability limit \( L \) is restricted.\(^8\)

\[ L < -\theta - \nu(e^*) + \left( \frac{1 - \alpha}{\alpha + \beta - 1} + e^* \right) \nu'(e^*). \] \hspace{1cm} (5)

Given condition (5), it is not optimal for the principal to implement first-best effort \( e^* \) as the marginal benefit of effort is lower than its marginal cost of the agent’s rents.

### 2.2. Accounting Conservatism

This study views a firm’s financial reporting as a mapping from disaggregated detailed data to aggregated accounting signals of the firm’s financial statements.\(^9\)

Assume that, upon realization of actual income \( x \), a summary statistic or aggregated accounting signal \( y \) is generated as follows:
\[ y = x + \epsilon, \] \hspace{1cm} (6)

where \( x \) and \( \epsilon \) are independently distributed. Here, signal \( y \) represents a statistic that summarizes disaggregated detailed accounting data from which financial reports \( m \) are to be generated. In particular, assume that accounting noise \( \epsilon \) is normally distributed with mean zero and variance \( \sigma^2 \).

Denote by \( f(y|x) \) and \( F(y|x) \) the probability density and distribution functions of summary statistic \( y \) conditional on true earnings \( x \), respectively. As one can easily show, the probability density function \( f(y|x) \) has the monotone likelihood ratio property (MLRP)
\[ \frac{f(y|z_2)}{f(y|z_1)} < \frac{f(z_2)}{f(z_1)} \]

for all \( y < z \).

The accounting information system \( \{\alpha, \beta\} \) that the principal designs is characterized by a reporting threshold \( w \) such that a high income report of \( m_2 \) is issued if summary statistic \( y \) is above threshold \( w \), and a low income report of \( m_1 \) is given otherwise; that is, \( \alpha = \alpha(w) \) and \( \beta = \beta(w) \), where\(^10\)
\[ \left\{ \begin{array}{l} \alpha(w) = \int_{-\infty}^{w} f(y|x_1) dy = F(w|x_1), \\ \beta(w) = \int_{w}^{+\infty} f(y|x_2) dy = 1 - F(w|x_2). \end{array} \right. \] \hspace{1cm} (8)

To define accounting conservatism, consider accounting system \( \eta_0 \) with a threshold level of \( w_0 = x_1 + x_2/2 \); thus, the system reports \( m_1 \) or \( m_2 \), depending on whether accounting evidence \( y \) is smaller or larger than threshold \( w_0 \). Because the probability density of \( \epsilon \) is symmetric around \( \epsilon = 0 \), accounting system \( \eta_0 \) is neutral or unbiased in the sense that a low income of \( m_1 \) is reported when evidence \( y \) is more consistent with true income being \( x_1 \) than \( x_2 \). Similarly, accounting report \( m_2 \) is issued when statistic \( y \) is more likely to obtain at state \( x_2 \) than at state \( x_1 \) (see Figure 1).

Accounting conservatism is defined in terms of the position of the accounting system’s reporting threshold \( w \) relative to neutral threshold \( w_0 = x_1 + x_2/2 \).

**Definition 1.** An accounting information system \( \{\alpha(w), \beta(w)\} \) is said to be conservative if \( w > w_0 \), neutral if \( w = w_0 \), and liberal if \( w < w_0 \). Given two accounting information systems \( \eta_1 = \{\alpha(w_1), \beta(w_1)\} \) and \( \eta_2 = \{\alpha(w_2), \beta(w_2)\} \), system \( \eta_2 \) is said to be more conservative than system \( \eta_1 \) if \( w_2 > w_1 \).

Thus, if the principal chooses \( w_0 \) as the reporting threshold, the probability of issuing a correct accounting report conditional on actual income is the same for both income levels of \( x_1 \) and \( x_2 \). On the
enhances the quality or informativeness of account-
accounting, one may wonder whether conservatism
olds
in the following form:
rewritethe principal’s contract design problem (1)–(4)
level:
other hand, if the principal chooses a higher threshold
level, then \( w > w_0 \), then \( \alpha(w) > \beta(w) \). Thus, a conservative
accounting system is more likely to be correct given
an unfavorable outcome \( (x = x_1) \), but only at the cost
of being more likely to be incorrect when a favorable
outcome \( (x = x_2) \) is realized.

Given accountants’ preference for conservative
accounting, one may wonder whether conservatism
enhances the quality or informativeness of accounting
reports. In this regard, it is noted that, given two
accounting systems \( \eta_1 = [\alpha_1, \beta_1] \) and \( \eta_2 = [\alpha_2, \beta_2] \),
accounting signals from system \( \eta_2 \) are weakly more
informative than those from system \( \eta_1 \) in the sense
of Blackwell (1953) if, and only if, the following two
inequalities hold:
\[
\frac{\alpha_2}{1-\beta_2} \geq \frac{\alpha_1}{1-\beta_1} \quad \text{and} \quad \frac{\beta_2}{1-\alpha_2} \geq \frac{\beta_1}{1-\alpha_1}.
\]
Lemma 1 describes the relation between accounting
conservatism and financial statement quality.

**Lemma 1.** Consider two accounting information sys-
tems \( \eta_1 = [\alpha_1, \beta_1] \) and \( \eta_2 = [\alpha_2, \beta_2] \),
accounting signals from system \( \eta_2 \) are more conservative than system
\( \eta_1 \) (i.e., \( w_2 > w_1 \)), then the following inequalities hold:
\[
\frac{\alpha_2}{1-\beta_2} < \frac{\alpha_1}{1-\beta_1} \quad \text{and} \quad \frac{\beta_2}{1-\alpha_2} > \frac{\beta_1}{1-\alpha_1}.
\]
Thus accounting conservatism neither increases nor
decreases the information content of accounting reports.

**Proof.** See the appendix.

### 3. Analysis

This section examines the main question: What is the
effect of conservative accounting on the agent’s effort
choice. To address the question, it is convenient to
rewrite the principal’s contract design problem (1)–(4)
in the following form:
\[
\max_{s_1, \hat{e}} \quad EG = (1-e)x_1 + ex_2 - s_1 - \left[ \frac{1-\alpha}{\alpha+\beta-1} + e \right] v'(e)
\]
subject to
\[
s_1 \geq \theta + v(e) - \left[ \frac{1-\alpha}{\alpha+\beta-1} + e \right] v'(e) \quad (11)
\]
\[
s_1 \geq -L. \quad (12)
\]
Denote by \( \tilde{e} \) the level of the agent’s effort at which
two constraints (11) and (12) are equivalent:
\[
\theta + v(\tilde{e}) - \left[ \frac{1-\alpha}{\alpha+\beta-1} + \tilde{e} \right] v'(\tilde{e}) = -L. \quad (13)
\]
Note that \( \tilde{e} < e^* \) (cf. (5)).

Consider the principal’s contract design problem
(10)–(12) for \( e < \tilde{e} \). Because constraint (12) is redun-
dant, the optimal fee schedule of the agent has the form
\[
\begin{align*}
\begin{cases}
  s_1 &= \theta + v(e) - \left[ \frac{1-\alpha}{\alpha+\beta-1} + e \right] v'(e), \\
  s_2 &= \theta + v(e) - \left[ \frac{-\alpha}{\alpha+\beta-1} + e \right] v'(e).
\end{cases}
\end{align*}
\]
As a result, the principal’s expected utility \( EG = (1-e)x_1 + ex_2 - v(e) - \theta \) is strictly increasing in \( e \) for
all \( e < \tilde{e} \), and the effort that the principal implements
is greater than or equal to \( \tilde{e} \).

Therefore we turn to the case where the principal
implements \( e \geq \tilde{e} \). Maximizing \( EG \) in (10) subject to
constraint (12) yields \( s_1 = -L \) and \( s_2 = -L + v'(e)/ (\alpha+\beta-1) \). As a result, the respective expected utilities
of the principal and the agent have the forms
\[
\begin{align*}
\begin{cases}
  EG &= (1-e)x_1 + ex_2 + L - \left[ \frac{1-\alpha}{\alpha+\beta-1} + e \right] v'(e), \\
  EH &= -L - \left[ \frac{1-\alpha}{\alpha+\beta-1} + e \right] v'(e) - v(e).
\end{cases}
\end{align*}
\]
Proposition 1 characterizes the effect of accounting
characteristics \([\alpha, \beta] \) on second-best contracts.

**Proposition 1.** Assume that the agent’s liability
limit \( L \) is restricted
\[
L < -\theta - v(e^*) + \left( \frac{1-\alpha}{\alpha+\beta-1} + e^* \right) v'(e^*). \quad (15)
\]
Then, the solution of the principal’s contract design problem (1)–(4) has the form
\[
\begin{align*}
\begin{cases}
  e^* &= \tilde{e}, \\
  s_1^* &= -L, \\
  s_2^* &= -L + \frac{v'(\tilde{e})}{\alpha+\beta-1}.
\end{cases}
\end{align*}
\]
Here, the agent’s effort \( \tilde{e} \) has the property
\[
\hat{e} \in \arg \max_{\tilde{e} \leq e^*} \left\{ (x_2 - x_1)e - \left[ \frac{1-\alpha}{\alpha+\beta-1} + e \right] v'(e) \right\}. \quad (17)
\]
\(^{11}\) If Equation (13) has no solution in the set of possible efforts
\( A = \{e | 0 < e < 1\} \), then constraint (11) is redundant.
where $\tilde{e}$ is the unique root of the equation\footnote{If the left-hand side of (18) is negative in $A = \{ e | 0 < e < 1 \}$, then set $\tilde{e} = 0$.}
\[
\theta + L + v(\tilde{e}) - \left[ \frac{1 - \alpha}{\alpha + \beta - 1} + \tilde{e} \right] \frac{v'(\tilde{e})}{v'(\tilde{e})} = 0.
\] (18)

In particular, the respective expected utilities of the principal and the agent can be expressed as
\[
\begin{align*}
EG^{**} &= x_1 + \tilde{e}(x_2 - x_1) + L - \left[ \frac{1 - \alpha}{\alpha + \beta - 1} + \tilde{e} \right] v'(\tilde{e}), \\
EH^{**} &= -L + \left[ \frac{1 - \alpha}{\alpha + \beta - 1} + \tilde{e} \right] v'(\tilde{e}) - v(\tilde{e}).
\end{align*}
\] (19)

**Proof.** See the appendix.

Three observations are made regarding the results in Proposition 1. First, note that $\hat{e} > \tilde{e}$, and thus $EH^{**} > \theta$. As a result, the principal allows the agent to obtain rents under second-best contract (16). In particular, the magnitude of the agent’s rents,
\[
EH^{**} - \theta = -\theta - L + \left[ \frac{1 - \alpha}{\alpha + \beta - 1} + \hat{e} \right] v'(\hat{e}) - v(\hat{e}),
\] (20)
is strictly increasing in $\hat{e}$. To induce the agent to expend greater efforts, the principal must allow the agent to obtain higher rents. Thus, the principal must trade off the benefit of increased effort not only against the agent’s disutility of effort but also against the agent’s increased rents.

Second, observe from (3) that the greater the agent’s effort, the larger is the spread between the agent’s low and high salaries. Specifically, the spread between the agent’s high and low fees has the form
\[
s_2^{**} - s_1^{**} = \frac{v'(\hat{e})}{\alpha(\omega) + \beta(\omega) - 1},
\] (21)
which is strictly increasing in $\hat{e}$. Thus, to motivate the agent to increase his effort, the principal must impose additional risk on the agent’s fee structure. Given the assumption that the agent is risk neutral in the model, increasing the agent’s risk bearing has no effects on the principal’s welfare. However, when the agent is risk averse, the principal must take into account the risk premium that the agent requires for increased risk bearing. Finally, observe that the right-hand side (RHS) of (21) is strictly increasing in $w$ for all $w \geq w_0$, which implies that, as the accounting system’s reporting threshold $w$ increases beyond the neutral level of $w_0$, the agent’s risk bearing strictly increases.

Proposition 2 describes the effect of conservative accounting on second-best efforts.

**Proposition 2.** Consider the situation in which (1) the agent’s liability bound is limited in the sense that
\[
L < -\theta - v(e^*) + \left( \frac{1 - \alpha}{\alpha + \beta - 1} + e^* \right) \frac{v'(e^*)}{v'(e^*)},
\]
and (2) second-best effort in (17) is an interior point, and thus characterized by the first-order condition
\[
x_2 - x_1 = \tilde{v}(\hat{e}) + \left[ \frac{1 - \alpha}{\alpha + \beta - 1} + \hat{e} \right] v'(\hat{e}).
\]

Then, the principal becomes strictly better off with conservative accounting than with neutral or liberal accounting. In particular, second-best efforts increase with accounting conservatism.

**Proof.** See the appendix.

The results in Proposition 2 can be interpreted as follows. First, note from Proposition 1 that second-best contracts require the principal to trade off between the agent’s effort and rents. More specifically, decompose the principal’s expected utility into the form
\[
EG^{**} = [(1 - \tilde{e})x_1 + \tilde{e}x_2 - v(\hat{e}) - \theta] - [EH^{**} - \theta].
\]

Assuming an interior solution, one can differentiate $EG^{**}$ and obtain the first-order condition for a second-best effort $\dot{e}$ as follows:
\[
\frac{\partial}{\partial e} [EH^{**} - \theta] = \left[ \frac{1 - \alpha}{\alpha + \beta - 1} + \hat{e} \right] v''(\hat{e}).
\] (22)

Thus the principal trades off the marginal benefits of effort (net of the agent’s marginal disutility of effort) against the agent’s marginal rents. Note that the agent’s marginal rents decrease with accounting conservatism, i.e., the RHS of (22) strictly decreases with accounting conservatism
\[
\left[ \frac{1 - \alpha}{\alpha + \beta - 1} + \hat{e} \right] v''(\hat{e})\downarrow \text{ as } w \uparrow.
\]

As a result, second-best effort $\hat{e}$ increases with accounting conservatism.

Also, it is interesting to note that the principal’s expected costs of compensating the agent can be written in the form
\[
Es^{**} = -L + p(m_2 | x_2)[s_2^{**} - s_1^{**}]
= -L + \left[ \frac{1}{\beta/(1 - \alpha) - 1} + \hat{e} \right] v''(\hat{e}).
\] (23)

As the accounting system’s reporting threshold $w$ increases in $w \geq w_0$, the probability of getting a
favorable report given a favorable outcome, \( p(m_2|x_2) \), decreases. However, it follows from (21) that the agent’s fee spread \([s^*_2 - s^*_1]\) increases in \( w \) for \( w \geq w_0 \). Consequently, it is unclear as to whether the agent’s expected compensation \( E^* \) increases or decreases as the reporting threshold \( w \) increases. As the last expression in (23) shows, however, the decrease in \( p(m_2|x_2) \) dominates the increase in \([s^*_2 - s^*_1]\). Thus the principal’s expected costs of compensating the agent strictly decreases with accounting conservatism.

Focusing on the principal’s trade-off between the agent’s effort and rents in a risk-neutral setting, the analysis thus far has shown that accounting conservatism enhances agency welfare by increasing the agent’s equilibrium effort. However, when the agent is risk averse, it is unclear whether accounting conservatism is still desirable. Note from (21), that as reporting threshold \( w \) increases, a second-best contract imposes increased risk on the agent for all \( w \geq w_0 \), and the principal’s cost of compensating the agent for increased risk bearing may outweigh the benefit of greater effort.\(^{13}\)

4. Conclusion

This study has examined the question of whether accounting conservatism enhances the incentive value of accounting signals and, if so, why. The analysis has focused on the effect of conservative accounting on the agency costs of the agent’s suboptimal effort choice under moral hazard.

The main results are as follows. First, second-best contracts require that the principal trades off the benefits of effort not only against the agent’s disutility of effort, but also against the agent’s rents. Next, the second-best efforts that the principal motivates the agent to put forth increase as accounting reports become more conservative.

Kwon et al. (2001) have shown that conservative accounting reduces agency costs of type (1). In combination with this result, the analysis of this study suggests that accounting conservatism reduces agency costs of both types (1) and (2). However, when the agent is risk averse, the principal must trade off the benefit of greater effort against three distinct types of costs to the principal: (1) the agent’s disutility of effort; (2) the agent’s rents; and (3) the costs of suboptimal risk sharing. Thus, analyzing the effect of accounting conservatism on the agent’s effort choice gets considerably more complicated. In particular, the risk premium required for the agent’s risk bearing may render extreme conservatism undesirable from the perspectives of agency welfare.

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Appendix

Proof of Lemma 1. Using (8), one can write

\[
\frac{\alpha(w)}{1 - \beta(w)} = \frac{F(w|x_1)}{F(w|x_2)}. \tag{A.1}
\]

Differentiating this expression with respect to \( w \), one can show

\[
\frac{d}{dw} \left[ \frac{\alpha(w)}{1 - \beta(w)} \right] < 0 \quad \text{if, and only if,}
\]

\[
\frac{f(w|x_2)}{f(w|x_1)} > \frac{f(w|x_2)}{f(w|x_1)}. \tag{A.1}
\]

On the other hand, the MLRP in (7) implies

\[
f(y|x_2) < \frac{f(w|x_2)}{f(w|x_1)} f(y|x_1)
\]

for all \( y < w \). Integrating this inequality with respect to \( y \) for \( y < w \) then yields

\[
F(w|x_2) < \frac{f(w|x_2)}{f(w|x_1)} F(w|x_1). \tag{A.2}
\]

Combining (A.1) and (A.2), one can conclude that the fraction \( \alpha(w)/(1 - \beta(w)) \) is strictly decreasing in \( w \). The fact that the fraction \( \beta(w)/(1 - \alpha(w)) \) is strictly increasing in \( w \) can be shown in a similar fashion. This completes the Proof of Lemma 1. \( \square \)

Proof of Proposition 1. As shown in the text, one may assume that \( e \geq \hat{e} \). Given \( e \), maximizing (10) subject to constraint (12) yields

\[
\begin{align*}
    s_1 &= -L, \\
    s_2 &= -L + \frac{\nu'(e)}{\alpha + \beta - 1}.
\end{align*}
\]

Because the principal’s expected utility has the form

\[
EG = (1 - e)x_1 + ex_2 + L - \left[ \frac{1 - \alpha}{\alpha + \beta - 1} + e \right] \nu'(e)
\]

under this fee schedule, second-best effort must have property (17). The Proof of Proposition 1 is thus completed. \( \square \)

Proof of Proposition 2. The first-order condition for \( \hat{e} \) is

\[
x_2 - x_1 = \nu'(\hat{e}) + \left[ \frac{1 - \alpha(w)}{\alpha(w) + \beta(w) - 1} + \hat{e} \right] \nu''(\hat{e}). \tag{A.3}
\]

Note that the RHS of (A.3) is shifted downward as reporting threshold \( w \) increases. Thus, as accounting measurements

\[
\begin{align*}
    f(w|x_2) &< f(w|x_1), \quad \text{if, and only if,} \\
    f(w|x_2) &< f(w|x_1).
\end{align*}
\]

NotethattheRHSof(A.3)isshifteddownwardasreporting
become more conservative, second-best effort \( \hat{e} \) increases. Given second-best contract (16), the principal’s expected utility can be written as

\[
EG^* = x_1 + \hat{e}(x_2 - x_1) + L - \left[ \frac{1 - \alpha}{\alpha + \beta - 1} + \hat{e} \right] v'(\hat{e})
\]

\[= x_1 + \hat{e}(x_2 - x_1) + L - \left[ \frac{1}{\beta/(1 - \alpha) - 1} + \hat{e} \right] v'(\hat{e}). \]

Thus it follows from the envelope theorem that the principal becomes better off as the fraction \( \beta/(1 - \alpha) \) increases with conservative accounting (cf. (9)). This completes the Proof of Proposition 2. \( \square \)

References


