Financial accounting measures of tax reporting aggressiveness[*]

Anja De Waegenaere[†]   Richard Sansing[‡]   Jacco L. Wielhouwer[§]

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[†]Department of Accountancy, Tilburg University. P.O. box 90153, 5000 LE Tilburg, The Netherlands.

[‡]Tuck School of Business at Dartmouth and CentER, Tilburg University. Corresponding author. Tuck School of Business at Dartmouth, 100 Tuck Hall, Hanover, NH 03755. richard.c.sansing@tuck.dartmouth.edu

[§]Department of Accounting, VU University, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands.

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Abstract-This study examines a setting in which a tax reporting decision is delegated to a firm's tax manager. The use of financial accounting measures of tax expense arises endogenously as an efficient way of providing contemporaneous incentives to the manager when the consequences of the tax reporting decision will occur in the future. The study also examines the relations between the firm's tax aggressiveness and three accounting measures of tax aggressiveness: cash taxes paid, book tax expense, and the unrecognized tax benefit. The unrecognized tax benefit is the best measure of taxpayer aggressiveness if compliance with FIN 48 is high, but is the worst measure if compliance with FIN 48 is low.

1 Introduction

The financial accounting consequences of tax reporting decisions are of first-order importance. Numerous papers have documented the importance of the effect of a tax reporting decision on a firm's financial accounting earnings in understanding firm behavior, as reviewed by Shackelford and Shevlin (2001) and Hanlon and Heitzman (2009). The reason why firms focus on the financial accounting consequences instead of the cash flow consequences of tax reporting decisions is a puzzle that we explore in this paper.

We examine a setting in which a firm delegates the task of identifying and evaluating tax return reporting positions to a tax manager. The firm can take a tax reporting position that would reduce its current taxes, but later may be audited by the tax authority. The manager can identify and learn the degree to which the facts and the law support a tax reporting position by exerting unobservable costly effort. We first analyze an agency model in which the firm must provide incentives to the manager to work in order to identify and evaluate tax reporting positions, and then use the information in the way the firm prefers. This requires a delicate balancing of incentives, so that the manager both works and takes the reporting position that the firm would prefer if it had the information.

In our model, there may be strong, weak, or no support for a tax reporting position. All firms want to take positions with strong support; no firm wants to take positions with no support. We distinguish two types of reporting strategies when the support is weak. Firms that prefer to take the position if the facts are weak are

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aggressive; firms that prefer to not take the position when facts are weak are *conservative.* If managerial effort were observable, both the firm and the manager would only care about the current and future cash taxes paid and the cost of the manager's effort. However, because the manager's efforts to research the issue to determine the likelihood of success in case of a future audit cannot be observed, the manager must be given contemporaneous incentives to both engage in costly effort and make the tax reporting decision that the firm prefers. We show that, both for the aggressive and for the conservative firm, the manager's optimal compensation features a bonus for a taking a reporting position that reduces the firm's income tax expense for financial reporting purposes, but imposes a penalty for generating an unrecognized tax benefit. This combination of bonus and penalty provides the manager with incentives to acquire information, avoid tax positions with little chance of being sustained upon audit, and claim uncertain tax benefits that are likely to be sustained upon audit. The aggressive firm can have a smaller penalty in its optimal contract because it only wants to deter the manager from taking aggressive tax positions that have zero support, whereas the conservative firm wants to deter the manager from taking aggressive tax positions unless they have strong support.

Our results show that basing the manager's compensation on current financial accounting measures of tax expense and unrecognized tax benefits is sufficient to motivate the manager to identify and evaluate tax-saving reporting positions, and choose the tax reporting position that the firm would make if it had the information. Therefore, a desire on the part of the manager to achieve lower current book tax

expense, as opposed to lower current cash taxes paid, arises endogenously in our setting as a solution to the manager's moral hazard problem.

We then extend our analysis to examine the relation between a firm's tax aggressiveness and three accounting measures – cash taxes paid, book income tax expense, and the unrecognized tax benefit. A firm's book income tax expense is often normalized by its pretax financial accounting income to yield an effective tax rate (ETR). Originally proposed by Surrey (1973), the ETR is a common measure of the extent to which activities are taxed in a favorable manner. The effective tax rate has been used as a measure of tax planning effectiveness. Surveys suggest that the most important objective of corporate tax departments and their advisors has become reducing a firm's effective tax rate (Clark, Martire & Bartolomeo, Inc. 2000; Manufacturers Alliance 1998). Mintz (1999) uses a firm's effective tax rate as a measure of tax planning efficiency in his "Tax Efficiency Scoreboard."

Academic research has used the ETR as a measure of a firm's tax planning effectiveness. Mills et al. (1998) uses a firm's ETR as a measure of tax planning effectiveness in their study of the returns to investments in tax planning. Phillips (2003) uses the ETR as a tax planning effectiveness measure in his study of motivating managers using after-tax performance measures. Rego (2003) uses the ETR to examine the relation between a firm's size, extent of multinational activities, and tax planning effectiveness. Robinson, Sikes and Weaver (2010) and Armstrong, Blouin and Larcker (2010) report that reductions in the ETR, not reduction in cash taxes paid, are the basis on which tax directors are evaluated.

A variation of the effective tax rate is the cash ETR, in which cash taxes paid replace book income tax expense in the numerator. Dyreng, Hanlon and Maydew (2008) use the cash ETR measured over a ten-year period as their measure of corporate tax avoidance.

The third measure of tax aggressiveness we examine is the firm's unrecognized tax benefit (UTB). Financial Accounting Standard Board (FASB) Interpretation No. 48, *Accounting for Uncertainty in Income Taxes* (FIN 48), provides rules for recognizing a tax benefit in current accounting earnings even though that benefit could be lost (in whole or in part) due to a subsequent audit. Although claiming the tax benefit reduces the firm's taxes paid when the tax return is filed, FIN 48 provides rules under which uncertain tax benefits either reduce the firm's tax expense for financial accounting purposes or create a liability, called the unrecognized tax benefit. Paragraph 21(a)(2) of FIN 48 requires that firms disclose the unrecognized tax benefits that arise as a result of tax positions taken during the current period. Cazier et al. (2009) and Dunbar and Schultz (2009) examine the levels and changes in firm's unrecognized tax benefits. Lisowsky, Robinson and Schmidt (2010) examine the exent to which participation in a tax shelter is reflected in an increase in the firm's unrecognized tax benefit.

We show that the three measures—a reduction in cash taxes paid, a reduction in book tax expense, and an increase in the unrecognized tax benefit—can be ranked in terms of how likely they are to correctly distinguish between an aggressive firm and a conservative firm. The reduction in book tax expense is always a less sensitive measure

than current taxes paid, because what distinguishes aggressive firms from conservative firms is that they will also take positions with weak facts. Although taking a position with weak support always leads to a decrease in current taxes paid, it does not lead to a decrease in book tax expense when the position is recorded in accordance with FIN 48. In contrast, the increase in the unrecognized tax benefit is the most sensitive measure if compliance with FIN 48 is high. The reason is that an aggressive firm that took a position with weak support and records an unrecognized tax benefit in accordance with FIN48 has a higher unrecognized tax benefit than a conservative firm that took a position with strong support. The two firms, however, would have the same reduction in cash taxes paid because they both took the position. Reduction in cash taxes paid is in this case less sensitive to the firm's tax aggressiveness than is the increase in the unrecognized tax benefit, but is always more sensitive than is than is the reduction in book tax expense. However, if compliance with FIN 48 is low, the unrecognized tax benefit is the least sensitive of the three measures.

We present the model in Section 2. In section 3 we characterize an efficient compensation contract for the tax manager of a conservative and an aggressive firm, respectively. Section 4 examines measures of tax planning aggressiveness. Section 5 concludes.

2 Model

2.1 Tax reporting decision

Firm i has an opportunity to reduce its current taxes paid by V_i by taking tax return reporting positions that reduce taxes, but that may be challenged by the tax authority. For expositional convenience only, we normalize V_i to one in the next two sections of the paper, so all monetary values should be interpreted as being per dollar of tax benefit available. There can be strong, weak, or zero facts supporting the position. We let the strength of the position be denoted $\phi \in \{s, w, z\}$, where the proportion of positions supported by strong facts is σ, the proportion of positions supported by weak facts is ω, and the proportion of positions with zero support is $\zeta = 1 - \sigma - \omega$. The probability that a particular tax return position of firm i is audited in a future year is γ_i, $0 < \gamma_{\min} \leq \gamma_i \leq 1$; if the position is not audited, the taxpayer retains the benefit of one that was claimed on the tax return. If the position is audited, the consequences of claiming the tax benefit depend on ϕ. If $\phi = s$, then the taxpayer retains $\widetilde{x}(s)$, a random variable with realizations from the interval $[0, 1]$. The taxpayer's expected payoff from taking the tax reporting position when the facts are strong is

$$1 - \gamma_i + \gamma_i E[\widetilde{x}(s)] > 0. \tag{1}$$

If $\phi = w$, then the taxpayer retains $\widetilde{x}(w)$, a random variable with realizations from the interval $[0, 1]$. In addition, the taxpayer incurs a negligence penalty $\widetilde{\pi}(w)$. We assume that the expected negligence penalty is sufficiently large that the taxpayer's expected

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payoff is negative when it claims the tax benefit, the facts are weak, and the taxpayer is audited, i.e.,

$$E[\widetilde{x}(w) - \widetilde{\pi}(w)] < 0. \tag{2}$$

This assumption ensures that negligence penalties have some deterrent effect because a taxpayer who knows that the facts are weak prefers not to take the position if the audit probability γ is sufficiently high. Finally, if $\phi = z$, then the taxpayer retains $\widetilde{x}(z)$, a random variable with realizations from the interval $[0, 1]$. In addition, the taxpayer incurs a negligence penalty $\widetilde{\pi}(z)$. We assume that the expected negligence penalty when $\phi = z$ is sufficiently large that even the taxpayer facing the lowest audit probability prefers not to take a position when it has zero support, i.e.,

$$1 - \gamma_{\min} + \gamma_{\min} E[\widetilde{x}(z) - \widetilde{\pi}(z)] < 0. \tag{3}$$

We let ς denote the probability that there is zero support.

The firm delegates the task of identifying and evaluating the possible tax return reporting position to a tax manager who learns the realization of ϕ. This allows the manager to condition the firm's tax reporting decision on the realization of ϕ.

Because $\widetilde{x}(s)$ is always positive, all firms prefer to take tax reporting positions with strong facts, regardless of their audit probabilities. Similarly, no firm prefers to take the tax reporting position with zero support. In contrast, because $E[\widetilde{x}(w) - \widetilde{\pi}(w)] < 0$, only firms with sufficiently low audit probabilities want to take

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the position when the facts are weak. Specifically, firm i wants to claim the tax benefit if and only if

$$\gamma_i < \frac{1}{1 - E[\widetilde{x}(w) - \widetilde{\pi}(w)]}. \tag{4}$$

We define a firm as aggressive if the above condition is satisfied, and conservative otherwise. The conservative firm only wants to take tax reporting positions that will not incur negligence penalties. The aggressive firm is willing to take positions that could result in negligence penalties. We emphasize that the labels conservative and aggressive do not represent intrinsic firm characteristics, but simply reflect the economic incentives that the firm faces, given the expected audit probability γ_i.

2.2   Tax manager compensation

The firm delegates the task of identifying and evaluating a tax-saving reporting position to a tax manager. The manager can identify and evaluate the positions at a personal cost $c > 0$; if the manager does not engage in costly effort, no tax-saving reporting positions are identified. The firm must pay the tax manager enough to compensate him for the cost of effort, so that the manager identifies and evaluates tax-saving reporting positions, and to provide incentives to the manager to make the tax reporting decision that is best for the firm, i.e., take the position if the (aggressive or conservative) firm prefers the position to be taken.

2.3   Financial reporting

The firm reports the effects of any uncertain tax benefits on its financial statements in accordance with Financial Accounting Standard Board (FASB) Interpretation No. 48, *Accounting for Uncertainty in Income Taxes* (FIN 48). Although claiming the tax benefit reduces the firm's taxes paid by one when the tax return is filed, FIN 48 requires that the firm records a liability for financial reporting purposes for an unrecognized tax benefit to account for the possibility that the tax benefit could be lost (in whole or in part) due to a subsequent audit. We let BTE represent the reduction in book tax expense that the firm should recognize in its current accounting earnings under FIN 48, and let UTB represent the unrecognized tax benefit. If the firm did not take the position (i.e., $T = 0$), then $UTB = BTE = 0$; if the firm took the position (i.e., $T = 1$), then $UTB = 1 - BTE$.

FIN 48 determines the amount of the uncertain tax benefit the taxpayer may recognize as a reduction in book tax expense when the tax return is filed by applying a two-step process: recognition and measurement. In the recognition step, taxpayers may only recognize tax benefits that are more than 50 percent likely to be sustained by the court of last resort based solely on the technical merits of the filing position. We assume that the firm's position passes the recognition step when the facts are strong, and does not pass the recognition step when the facts are weak or when there is zero support. Therefore, if $\phi \in \{w, z\}$, $BTE = 0$ if the firm's financial statements conform to FIN 48.

If the taxpayer learns that the position is strong, $\phi = s$, the measurement step

then determines the amount of the tax benefit that should be recognized in the firm's financial statements. The tax benefit recognized in the financial statements is the largest tax benefit that cumulatively is greater than 50 percent likely to be sustained on audit, taking into account likely settlements with the government, assuming that the position is audited. This means that the firm should recognize under FIN 48 as a current period reduction in tax expense the value m that solves

$$\int_0^m f_s(x)dx = \frac{1}{2},$$

where $f_s(x)$ is the density function of $\tilde{x}(s)$, the fraction of the tax benefit that the taxpayer retains if audited and the facts are strong, i.e., $\phi = s$. We allow $f_s(x)$ to have a mass point at $x = 1$, which implies that there is a positive probability that the taxpayer retains the full tax benefit claimed. If the probability that $x = 1$ is higher than 50%, then $m = 1$; otherwise, $0 < m < 1$. We emphasize that the expected tax benefit that the taxpayer will retain is

$$1 - \gamma_i + \gamma_i \int_0^1 x f_s(x)dx,$$

which reflects the audit probability γ_i and the mean value of $\tilde{x}(s)$ instead of its median value. The expected tax benefit can deviate substantially from the tax benefit recognized in the financial statements for two reasons. First, the recognized benefit does not account for the possibility that the tax authority will not audit the position. Second, the recognized tax benefit reflects the median outcome, not the mean outcome.

FIN 48 requires the taxpayer to recognize a liability for the unrecognized tax benefit to offset some or all of the total tax benefit claimed on the tax return. Because the recognized benefit is the median value of the taxpayer's retained tax benefit (the more likely than not amount), the unrecognized tax benefit $1 - BTE$ should be one when $\phi \in \{w, z\}$ and should be $1 - m$ when $\phi = s$.

Although we allow perfect compliance with FIN 48 as a special case, we consider the more general case in which the reporting and auditing processes are imperfect. We allow for the possibility that the firm that is aggressive for tax reporting purposes is able to mimic the financial reporting of a conservative firm that only takes positions with strong facts. First, we assume that a firm that took a weak position ($\phi = w$) is able to recognize a reduction in book tax expense of $BTE = m$ with probability $\varepsilon < 1$, even though that is not in accordance with FIN 48. With probability $1 - \varepsilon$, the firm reports a reduction in book tax expense of $BTE = 0$ in accordance with FIN 48. Similarly, we assume that a firm that took a position with zero support ($\phi = z$) is able to recognize a book tax expense of $BTE = m$ with probability $\theta < \varepsilon$.[1] With probability $1 - \theta$, the firm reports a reduction in book tax expense of $BTE = 0$. We interpret ε and θ as measures of financial reporting quality, as they measure the extent to which a firm that takes a position with weak facts or zero support is able to mimic the financial reporting of a firm that took a strong position. Perfect compliance with FIN 48 corresponds to the special case where $\varepsilon = \theta = 0$.

Table 1 summarizes the probabilities of the two possible financial reporting

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[1]In equilibrium, no firm will take a position with zero support. However, the financial reporting treatment of these positions is important to determine the off-equilibrium payoffs in the compensation contract.

outcomes, conditional on the position being taken, i.e., $T = 1$. We denote $\psi = F$ for the *favorable* outcome that reduces book tax expense (i.e., $BTE = m, UTB = 1 - m$), and $\psi = U$ for the *unfavorable* outcome in which book tax expense is unaffected (i.e., $BTE = 0, UTB = 1$).

ϕ	$\text{Prob}(\psi = F)$	$\text{Prob}(\psi = U)$
$\phi = s$	1	0
$\phi = w$	ε	$1 - \varepsilon$
$\phi = z$	θ	$1 - \theta$

Table 1

3 Accounting measures of tax manager performance

3.1 The contracting problem

The firm cannot observe the manager taking the costly action and choosing the tax return position that the firm prefers. Instead, the firm must design a contract that induces the manager to work to identify and evaluate the tax reporting opportunity and make the decision that the firm prefers. If the firm could wait until either the tax position is audited or the statute of limitations expires to compensate the manager, then a contract that induces the preferred actions could be written on the basis of the eventual cash flows. Given the length of time between when a tax return is filed and the statute of limitations has expired, this approach is impractical. We seek a contract

that is based on current financial accounting information, which in this case is BTE, the reduction in book tax expense that is reflected in current accounting earnings, and UTB, the unrecognized tax benefit.

Given the FIN 48 reporting rules, there are three states of the world on which the firm and the manager can contract. First, the manager might not claim the tax benefit, $T = 0$. In this case, $BTE = 0$ and $UTB = 0$. If this outcome occurs, the firm agrees to pay the manager y_0. Second, the manager might claim the tax benefit, $T = 1$, and the firm's audited financial statements show $BTE = 0$, so $UTB = 1$. If this outcome occurs, the firm agrees to pay the manager y_1. Finally, the manager might choose $T = 1$ and the firm's audited financial statements show $BTE = m$, so the unrecognized tax benefit is $1 - m$. If this outcome occurs, the firm agrees to pay the manager y_m. We note that salary payments y_1 and y_m are each associated with the same level of cash taxes paid; they differ only with respect to the way the reduction in cash taxes paid is reflected in the firm's accounting earnings.

Both the manager and the firm are risk-neutral. The manager chooses the actions to maximize the expected salary less the cost of effort. The firm designs a contract that minimizes its expected salary payments given that the contract induces the manager to engage in costly effort and make the tax planning choice that the firm prefers.

The optimal contract offered by the conservative firm solves the following

program.

$$\min_{y_0,\; y_1,\; y_m} \quad \{(1-\sigma)y_0 + \sigma y_m]\}$$

$$\text{s.t.} \qquad (1-\sigma)y_0 + \sigma y_m - c \geq 0 \quad (PC)$$

$$(1-\sigma)y_0 + \sigma y_m - c \geq y_0 \quad (IC1)$$

$$y_m \geq y_0 \qquad\qquad\qquad (IC2)$$

$$y_0 \geq \varepsilon y_m + (1-\varepsilon)y_1 \qquad (IC3)$$

$$y_0 \geq \theta y_m + (1-\theta)y_1 \qquad (IC4)$$

The participation constraint (PC) ensures that the contract provides an expected payoff that is at least as high as the manager's cost of effort.[2] The four incentive compatibility constraints provide the manager with the incentives to work hard to identify and evaluate the tax reporting opportunities and to use the information to make the decision that the firm prefers. $IC1$ ensures that the expected payoff is as least as high as the payoff the manager could get from not working; not working ensures that no tax reporting opportunities are identified, in which case the manager would receive y_0. $IC2$ ensures that once the manager has learned $\phi = s$, the manager prefers to claim the tax benefit. $IC3$ ensures that once the manager has learned $\phi = w$, the manager prefers to not claim the tax benefit. Finally, $IC4$ ensures that once the manager has learned $\phi = z$, the manager prefers to not claim the tax benefit. A solution to this problem is presented in Proposition 1.

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[2]Without loss of generality, we have normalized the manager's reservation utility to zero.

Proposition 1 *The following contract is optimal for a conservative firm:*

$$y_0 = 0,$$

$$y_1 = -\frac{c\varepsilon}{\sigma(1-\varepsilon)} < 0,$$

$$y_m = \frac{c}{\sigma} > 0.$$

The expected cost of compensation is c.

Substituting the values of y_0, y_1, and y_m into the constraints show that all the constraints are satisfied. The PC, $IC1$, and $IC3$ constraints bind; the $IC2$ and $IC4$ constraints do not bind. The fact that the expected cost is c is sufficient to show that the contract is optimal, because the expected cost must be at least c to satisfy the PC constraint.

The three salary payments can be ordered, $y_1 < y_0 < y_m$. We interpret the payments as a contract with a reward for taking tax-saving reporting positions that reduce, at least in part, book tax expense, combined with a penalty for generating an unrecognized tax benefit on the balance sheet without any corresponding reduction in book tax expense. The payments that involve the reduction of current cash taxes paid, y_1 and y_m, are the lowest and highest payments; the outcome in which current cash taxes paid are not reduced is associated with a payment between these two extremes.

Some intuition for the bonus and penalty aspects of the optimal contract becomes clear in the special case in which $\varepsilon = 0$. In that case, a claimed tax benefit that increases accounting earnings is a perfect signal regarding the manager's action; it could only have arisen if the tax manager had worked hard and made the tax planning

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decision that the firm prefers. The penalty portion is then zero and the reward for claiming the high tax benefit when it also increases accounting earnings is $\frac{c}{\sigma}$, the cost of effort divided by the probability of increasing accounting earnings, given high effort. When $\varepsilon > 0$, both the penalty for generating an entirely unrecognized tax benefit and the reward for generating a recognized tax benefit increase, as the recognized tax benefit becomes a less precise signal regarding the manager's action.

The manager receives a lower salary for claiming a tax benefit that does not increase financial accounting earnings than for not claiming a tax benefit in the first place. This is necessary to satisfy the $IC3$ constraint.

The optimal contract offered by the aggressive firm solves the following program.

$$\min_{y_0, \, y_1, \, y_m} \quad \{\zeta y_0 + (\sigma + \omega\varepsilon)y_m + \omega(1 - \varepsilon)y_1\}$$

$$\text{s.t.} \quad \zeta y_0 + [\sigma + \omega\varepsilon]y_m + \omega(1 - \varepsilon)y_1 - c \geq 0 \quad (PC)$$

$$\zeta y_0 + [\sigma + \omega\varepsilon]y_m + \omega(1 - \varepsilon)y_1 - c \geq y_0 \quad (IC1)$$

$$y_m \geq y_0 \quad (IC2)$$

$$\varepsilon y_m + (1 - \varepsilon)y_1 \geq y_0 \quad (IC3)$$

$$y_0 \geq \theta y_m + (1 - \theta)y_1 \quad (IC4)$$

The difference between this program and the preceding program is that the aggressive firm must give the manager an incentive to take the tax reporting position when the facts are weak. A solution to this problem is presented in Proposition 2.

Proposition 2 *The following contract is optimal for an aggressive firm:*

$$y_0 = 0,$$

$$y_1 = -\frac{c\theta}{\sigma(1-\varepsilon) + \omega(\varepsilon-\theta)},$$

$$y_m = \frac{c(1-\theta)}{\sigma(1-\varepsilon) + \omega(\varepsilon-\theta)} > 0.$$

The expected cost of compensation is c.

Substituting the values of y_0, y_1, and y_m into the constraints show that all the constraints are satisfied. The PC, $IC1$, and $IC4$ constraints bind; the $IC2$ and $IC3$ constraints do not bind. The fact that the expected cost is c is sufficient to show that the contract is optimal, because the expected cost must be at least c to satisfy the PC constraint.

We note that the penalty for claiming a tax benefit that generates no reduction in book tax expense, y_1, is larger in the contract in Proposition 1 than in the contract in Proposition 2. The aggressive firm can have a smaller penalty in its optimal contract because it only wants to deter the manager from taking aggressive tax positions that have zero support, whereas the conservative firm wants to deter the manager from taking aggressive tax positions unless they have strong support.

Finally, we note that the solutions we present in Propositions 1 and 2 are not unique. In particular, the contract in Proposition 1 is also a solution to the aggressive firm's contracting problem; in contrast, the contract in Proposition 2 is not a solution to the conservative firm's contracting problem. The reason is that for the aggressive firm, if either $IC3$ or $IC4$ bind, the other constraint is automatically satisfied. In

contrast, satisfying $IC3$ for the conservative firm automatically satisfies $IC4$, but the converse does not hold.

3.2   The role of FIN 48

We conclude this section by considering the role that FIN 48 plays in the analysis. If managerial effort were observable, both the principal and the manager would only care about cash taxes and effort. The preference for a reduction in book tax expense arises endogenously as a solution to the optimal contracting problem. Thus, on the surface, FIN 48 plays a key role by providing a contracting variable that allows the firm to provide the tax manager with the right incentives. Surely this overstates the effect of FIN 48. Consider a pre-FIN 48 setting. The firm always had the ability to hire an independent expert to examine the tax manager's decisions, offer an opinion, and compensate the manager based on the expert's opinion. However, the firm would have had to incur an additional cost K to hire the independent expert. Under FIN 48, the auditor needs to evaluate the support for the manager's decision to ensure that the firm is complying with generally accepted accounting principles. Therefore, the firm receives a signal that can be used to implement the optimal contract at no incremental cost. Thus, an unintended side effect of FIN 48 has been to reduce the cost of implementing the optimal contract.

4   Measuring tax aggressiveness

In this section, we examine the properties of accounting measures that arise in our setting and ask how sensitive these measures as to whether a firm is conservative or aggressive. We determine the probability that an aggressive firm has a greater reduction in cash taxes paid (CTP), a greater reduction in book tax expense (BTE), and a greater increase in unrecognized tax benefit (UTB) than a conservative firm. We then rank these three measures in terms of their sensitivity to a firm's type.

The analysis in Sections 2 and 3 was based on the tax manager having the ability to discover one tax-saving opportunity. In this section, we assume that the tax manager has n such opportunities during the year, where n is a known large number. As before, each opportunity can have three outcomes that the manager can observe–strong support ($\phi = s$), weak support ($\phi = w$), and zero support ($\phi = z$)–and two financial reporting outcomes that the manager cannot observe–a *favorable* ($\psi = F$) outcome that subsequently reduces book tax expense, and an *unfavorable* ($\psi = U$) outcome in which book tax expense is unaffected.

As in Section 3, we normalize the dollar value of each opportunity to one. Therefore, for any given tax reporting opportunity, there are five possible outcomes, depending on the strength of the position ($\phi \in \{s, w, z\}$) and the financial accounting treatment ($\psi \in \{F, U\}$). Recall from Table 1 that $\phi = s$ implies $\psi = F$. Table 2 summarizes the probability of each outcome and the corresponding values of the three accounting measures for the two types of firms, where the subscript A refers to an

aggressive firm and C to a conservative firm.

Outcome (ϕ, ψ)	Prob	BTE_A	BTE_C	CTP_A	CTP_C	UTB_A	UTB_C
(s, F)	σ	m	m	1	1	$1-m$	$1-m$
(w, F)	$\omega\varepsilon$	m	0	1	0	$1-m$	0
(w, U)	$\omega(1-\varepsilon)$	0	0	1	0	1	0
(z, F)	$\zeta\theta$	0	0	0	0	0	0
(z, U)	$\zeta(1-\theta)$	0	0	0	0	0	0

Table 2

Table 2 reflects the result of a single tax reporting opportunity for the three

measures. Because each firm faces a large number of opportunities, n, the aggregate

value of a measure over all the tax reporting opportunities approximately has a normal

distribution, with mean and variance depending on the measure and on the type of

firm. Specifically, let us denote $M \in \{BTE, CTP, UTB\}$ for a measure, and

$i \in \{A, C\}$ for a type of firm. Moreover, for any given M and i, we let $M_i(j, k)$ denote

the outcome of measure M for a type i firm in case outcome $(\phi, \psi) = (j, k)$

realizes. Then the mean and variance of the corresponding distribution are given by:

$$
\begin{aligned}
\mu(M_i) &= n \cdot \left[\sum_{j \in \{s,w,z\}} \sum_{k \in \{F,U\}} P\left((\phi, \psi) = (j, k)\right) \cdot M_i(j, k) \right] \\
\sigma^2(M_i) &= n \cdot \left[\sum_{j \in \{s,w,z\}} \sum_{k \in \{F,U\}} P\left((\phi, \psi) = (j, k)\right) \cdot M_i^2(j, k) - \mu^2(M_i) \right],
\end{aligned}
$$

for $i \in \{A, C\}$. These means and variances are given in the Appendix.

We measure the quality of a tax aggressiveness measure by the probability that the measure yields a higher outcome for aggressive firms than for conservative firms, i.e., by

$$P\left(M_A > M_C\right) = P\left(M_A - M_C > 0\right).$$

A measure is of higher quality if this probability is higher. In order to determine the quality of a measure, we therefore first determine, for each measure, the probability distribution of the difference $M_A - M_C$ between the measure for an aggressive firm and for a conservative firm. Because all firms face independent opportunities, the difference $M_A - M_C$ has a normal distribution with mean $\mu(M_A - M_C) = \mu(M_A) - \mu(M_C)$ and with variance $\sigma^2(M_A - M_C) = \sigma^2(M_A) + \sigma^2(M_C)$. These means and variances for the three measures are given in the following table.

Measure	$\mu(M_A - M_C)/n$	$\sigma^2(M_A - M_C)/n$
BTE	$m\omega\varepsilon$	$m^2\left\{(\sigma + \omega\varepsilon)[1 - \sigma - \omega\varepsilon] + \sigma[1 - \sigma]\right\}$
CTP	ω	$(\sigma + \omega)[1 - \sigma - \omega] + \sigma[1 - \sigma]$
UTB	$\omega - m\omega\varepsilon$	$m^2\left\{\sigma[1 - \sigma] + (\sigma + \omega\varepsilon)(1 - \sigma - \omega\varepsilon)\right\}$ $+\ (\sigma + \omega)[1 - (\sigma + \omega)] + \sigma[1 - \sigma]$ $-\ 2m\left\{(\sigma + \omega\varepsilon)\zeta + \sigma[1 - \sigma]\right\}$

Table 3

The sensitivity of measure M is then given by:

$$P\left(M_A - M_C > 0\right) = P\left(\frac{M_A - M_C - \mu(M_A - M_C)}{\sigma(M_A - M_C)} > \frac{-\mu(M_A - M_C)}{\sigma(M_A - M_C)}\right), \quad (5)$$

$$\approx P\left(Z > \frac{-\mu(M_A - M_C)}{\sigma(M_A - M_C)}\right), \quad (6)$$

where Z is a standard normal random variable. This implies that a measure is of higher sensitivity if and only if it has a higher value for

$$S(M) = \frac{\mu^2(M_A - M_C)}{\sigma^2(M_A - M_C)}. \quad (7)$$

4.1 Comparing the measures

The following proposition shows how the sensitivity to tax aggressiveness of CTP, UTB, and BTE depends on audit quality as measured by the probability ε that the financial reporting of tax reporting positions with weak facts is in accordance with FIN48. A higher value of ε represents higher audit quality.

Proposition 3 *Audit quality (ε) affects the sensitivity of tax aggressiveness measures in the following way:*

(i) *CTP is more sensitive to tax aggressiveness than BTE, i.e., $S(CTP) > S(BTE)$ for all ε.*

(ii) *There exist critical values $0 < \varepsilon_1^* \leq \varepsilon_2^*$ such that*

    (a) *if $\varepsilon < \varepsilon_1^*$, then UTB is more sensitive than CTP, so that*

        $S(UTB) > S(CTP) > S(BTE);$

(b) *if $\varepsilon_1^* < \varepsilon < \varepsilon_2^*$, then UTB is more sensitive than BTE but less sensitive than*

CTP, *so that $S(CTP) > S(UTB) > S(BTE)$;*

(c) *if $\varepsilon > \varepsilon_2^*$, then UTB is less sensitive than BTE, so that*

$S(CTP) > S(BTE) > S(UTB)$.

First, Proposition 3 shows that CTP is always a more sensitive measure of tax aggressiveness than BTE. The intuition is that what distinguishes aggressive firms from conservative firms is that they will also take positions with weak support. Although taking a position with weak support always leads to an increase in CTP, it only leads to a reduction in BTE in case the transaction is not recorded in accordance with FIN 48.

Next, the relative sensitivities of CTP and UTB can be expressed in terms of ε, the probability that the accounting system incorrectly fails to record an unrecognized tax benefit for the full amount of the benefit claimed when the support for the position is weak. Perfect audit quality ($\varepsilon = 0$) guarantees that $S(UTB) > S(CTP) > S(UTB)$. When audit quality is imperfect ($\varepsilon > 0$), which measure is more sensitive depends on two effects. First, for any given two transactions faced by an aggressive firm and a conservative firm, respectively, audit quality affects the *likelihood* that the effect on UTB (resp., BTE) will be larger for the aggressive firm than for the conservative firm.

Specifically, it can be verified that:

$$P\left(UTB_A > UTB_C | n = 1\right) = \sigma(1 - \sigma) + \omega(1 - \varepsilon\sigma),$$

$$P\left(CTP_A > CTP_C | n = 1\right) = \sigma\left(1 - \sigma\right) + \omega\left(1 - \sigma\right),$$

$$P\left(BTE_A > BTE_C | n = 1\right) = \sigma\left(1 - \sigma\right) + \omega\varepsilon\left(1 - \sigma\right).$$

Thus, the probability that the increase in UTB is higher for the aggressive firm than for the conservative firm is larger than the probability that the decrease in CTP is higher for the aggressive firm than for the conservative firm, which in turn is larger than the probability that decrease in BTE is higher for the aggressive firm than for the conservative firm. Second, audit quality also affects noise in the *size* of the difference between the two types, conditional on two independent tax reporting opportunities yielding a higher value for the aggressive firm than for the conservative firm. Whereas the difference is always 1 for CTP, and always m for BTE, it is sometimes 1 and sometimes $1 - m$ for UTB. Thus UTB in a sense is more noisy. Because this effect becomes weaker when m is lower, a lower value of m makes it more likely that UTB is the most sensitive measure, and less likely that UTB is the least sensitive measure. As can be seen from the Proof of Proposition 3, the critical values of ε, are both decreasing in m.

5 Conclusions

Prior tax research has clearly established the importance of financial reporting effects of tax reporting decisions. This study shows that a compensation system that rewards tax managers for tax reporting positions that decrease book tax expense and punishes tax managers for claiming tax benefits that generate unrecognized tax benefits provides incentives for a tax manager to work hard to identify and evaluate tax-saving reporting positions, while at the same time refraining from taking positions that would increase the firm's expected tax costs due to the possibility of future audits and penalties. Therefore, a focus on the financial reporting consequences of tax reporting decisions arises endogenously in a setting in which all parties just care about current and future taxes and effort costs.

We investigate financial accounting measures of tax reporting decisions to evaluate the sensitivity of these measures regarding whether a firm is aggressive or conservative. We examine three measures–reduction in current cash taxes paid, reduction in book tax expense, and the increase in the unrecognized tax benefit. We find that when financial reporting quality is sufficiently high, the increase in unrecognized tax benefit is the most sensitive measure; when financial reporting quality is sufficiently low, the increase in unrecognized tax benefit is the least sensitive measure. Current taxes paid is always more sensitive than book tax expense.

6 References

Armstrong, C., J. Blouin and D. Larcker. 2010. Incentives to Tax Plan. Working paper, University of Pennsylvania.

Cazier, R., S. Rego, X. Tian and R. Wilson. 2009. Early evidence on the determinants of unrecognized tax benefits. University of Iowa working paper.

Clark, Martire, & Bartolomeo, Inc. 2000. A study of Fortune 1000 tax directors.

Dunbar, A. and T. Schultz. 2009. FIN 48 "look-forward" disclosures: can firms forecast tax reserve changes? University of Connecticut working paper.

Dyreng, S., M. Hanlon, and E. Maydew. 2008. Long-run corporate tax avoidance. Long-run corporate tax avoidance. *The Accounting Review* 83(1): 61-82.

FASB Interpretation No. 48, *Accounting for Uncertainty in Income Taxes*, June 2006.

Hanlon, M. and S. Heitzman. 2009. A review of tax research. Simon School Working Paper No. FR 09-23.

Lisowsky, P., L. Robinson, and A. Schmidt. 2009. An examination of FIN 48: Tax shelters, auditor independence, and coporate governance. Tuck School of Business working paper No. 2009-73.

Manufacturers Alliance Survey of Corporate Tax Departments. 1998. Manufacturers Alliance.

Mills, L., M. Erickson, and E. Maydew. 1998. Investments in tax planning. *Journal of the American Taxation Association* 20 (Spring): 1-20.

Mintz, S. 1999. A taxing challenge: The 1999 tax efficiency scoreboard identifies

companies adept at slicing rates. CFO Magazine (November): 62-64, 69.

Phillips, J. 2003. Corporate tax planning effectiveness: the role of compensation-based incentives. *The Accounting Review* 78 (July): 847-874.

Rego, S. 2003. Tax-avoidance activities of U.S. multinational corporations. *Contemporary Accounting Research* 20 (Winter): 805-833.

Robinson, J., S. Sikes and C. Weaver. 2010. Performance measurement of corporate tax departments. *The Accounting Review*: Forthcoming.

Shackelford, D. and T. Shevlin. 2001. Empirical tax research in accounting. *Journal of Accounting and Economics* 31:321-387.

Surrey, S. 1973. Pathways to Tax Reform. Cambridge, MA: Harvard University Press.

7 Appendix

The following table presents the means of the three measures for the two types of firms.

Measure	$\mu(M_A)$	$\mu(M_C)$
BTE	$m(\sigma + \omega\varepsilon)$	$m\sigma$
CTP	$\sigma + \omega$	σ
UTB	$\sigma + \omega - m(\sigma\alpha + \omega\varepsilon)$	$\sigma - m\sigma$

The following table presents the variances of the three measures for the two types of firms.

Measure	$\sigma^2(M_A)$	$\sigma^2(M_C)$
BTE	$m^2(\sigma + \omega\varepsilon)[1 - (\sigma + \omega\varepsilon)]$	$m^2\sigma[1 - \sigma]$
CTP	$(\sigma + \omega)\zeta$	$\sigma[1 - \sigma]$
UTB	$m^2(\sigma\alpha + \omega\varepsilon)(1 - \sigma\alpha - \omega\varepsilon)$ $-2m(\sigma\alpha + \omega\varepsilon)\zeta) + (\sigma + \omega)\zeta$	$m^2\sigma(1 - \sigma) - 2m\sigma(1 - \sigma) + \sigma[1 - \sigma].$

Proof of Proposition 3.

(i) CTP is more sensitive than BTE if and only if $S(CTP)$ is greater than $S(BTE)$.

Using Table 3 and (7), we find that:

$$S(CTP)-S(BTE) = \frac{\omega^2(1-\varepsilon)[2\sigma(1-\sigma+\varepsilon\zeta)+\varepsilon\omega]}{[(\sigma+\omega)\zeta+\sigma(1-\sigma)][\sigma(1-\sigma)+(\sigma+\varepsilon\omega)(1-\sigma-\varepsilon\omega)]} > 0.$$

(ii) First, we compare the sensitivity of UTB and CTE. Using Table 3 and (7), we find that

$$S(UTB) - S(CTE) =$$
$$\frac{m\omega^2(1-\varepsilon)[2\sigma(1-\sigma)(2-m)-2\varepsilon m\sigma\zeta-2\sigma\omega-m\omega\varepsilon]}{[\zeta(\sigma+\omega)+\sigma(1-\sigma)]X}, \tag{8}$$

where

$$X = \{\xi[\sigma(1-m)^2+\omega(1-\varepsilon m)^2]+\sigma(1-\sigma)(1-m)^2+(1-\varepsilon)m^2 w[\sigma+\varepsilon(1-\sigma)]\} > 0.$$

The sign of (8) is equal to the sign of

$$2\sigma(1-\sigma)(2-m) - 2\sigma\omega - [2m\sigma\zeta + m\omega] \cdot \varepsilon. \tag{9}$$

Using $\omega = 1 - \sigma - \zeta$, it can be verified that

$2\sigma(1-\sigma)(2-m) - 2\sigma\omega = 2\sigma[(1-m)(1-\sigma)+\zeta]$. Therefore, it follows that

$S(UTB) > S(CTE)$ if and only if

$$\varepsilon < \varepsilon_1^* = \frac{2\sigma[(1-m)(1-\sigma)+\zeta]}{m(2\sigma\zeta+\omega)}.$$

Next, we compare the sensitivity of UTB and BTE. Using Table 3 and (7), we find that

$$S(UTB) - S(BTE) =$$
$$\frac{\omega^2(1-\varepsilon)[2(\sigma-\varepsilon^2 m\omega)(1-\sigma)+2\sigma(1-\sigma)(1-2m)\varepsilon+\omega(1-2\sigma)\varepsilon]}{[(1-\sigma-\varepsilon\omega)(\sigma+\varepsilon\omega)+\sigma(1-\sigma)]X}, \text{(10)}$$

where $X > 0$. The sign of (10) is equal to the sign of

$$-m\omega(1-\sigma)\cdot\varepsilon^2 + [2\sigma(1-\sigma)(1-2m)+\omega(1-2\sigma)]\cdot\varepsilon + \sigma(1-\sigma). \qquad \text{(11)}$$

The expression in (11) is positive when $\varepsilon = 0$ and is strictly concave in ε, with a unique global maximum. Therefore, there exists an $\varepsilon_2^* > 0$ such that (11) is strictly positive for all $\varepsilon < \varepsilon_2^*$ and strictly negative for all $\varepsilon > \varepsilon_2^*$. Finally, it follows from part (i) that $\varepsilon_1^* \le \varepsilon_2^*$.

∎