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The effect of tax audit outcomes on the reporting and valuation of unrecognized tax benefits☆

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ABSTRACT

We examine whether firms respond to settlements of their uncertain tax benefits (UTBs) by adjusting the related UTB reserve. A reported UTB settlement indicates that the tax authority challenged at least one of the firm's uncertain tax positions, thereby providing information to managers regarding the sustainability of similar tax strategies and outstanding UTBs. Consistent with expectations, our results suggest that UTB settlements are negatively related to the accrual for new uncertain tax positions. Further, we demonstrate that managers make less downward adjustments to the UTB reserve related to existing uncertain tax positions following settlements with tax authorities. Finally, additional analysis suggests that the valuation of UTBs is lower in the year subsequent to a UTB settlement. Collectively, our results suggest that the information gathered from tax audit outcomes influences firms to be more conservative in their tax reporting, and possibly their future tax planning as well.

1. Introduction

The primary purpose of this study is to examine how tax enforcement mechanisms alter tax planning and reporting behavior. To carry out this objective, we focus on changes to the reserve for unrecognized tax benefits (UTBs). In the annual disclosure of the UTB reserve, firms are required to provide a reconciliation between the beginning and ending balance of the reserve. One component of the reconciliation is the decrease to the reserve due to settlements. The presence of a settlement indicates that a tax authority challenged at least one of the firm's uncertain tax positions. Given that the goal of any enforcement mechanism is to increase cooperation, we test whether the occurrence of a settlement in the current period alters UTB reporting behavior. Specifically, when a tax audit results in a settlement, firms receive new information regarding the sustainability of similar tax strategies and existing uncertain tax positions. As such, we posit that firms experiencing UTB settlements will: 1) engage in less new uncertain tax positions going forward; and 2) revise their expectations regarding the realizability of similar uncertain tax positions taken in prior periods by increasing the related reserve.

In addition, given that UTB settlements, our proxy for audit settlements with tax authorities, are disclosed to financial statement users through the UTB rollforward, we investigate whether reported settlements influence the capital market's valuation of the remaining reserve. We contend that these tax audit outcomes are a signal to investors about the realization of cash tax savings stemming from a firm's uncertain tax avoidance activities. All else equal, firms entering into UTB settlements are retaining less of their cash tax savings relative to firms without settlements. Hence, we posit that the valuation of a company's UTB reserve will decrease in the presence of a settlement.

We test our hypotheses using a sample of firms from 2008 to 2015. To examine the effect of UTB settlements on adjustments to the related reserve, we estimate a series of UTB component models following Drake, Goldman, and Lusch (2016) and include a variable that captures the magnitude of settlements as a percentage of the total UTB reserve in the current period. Consistent with our conjecture, we find that UTB settlements are negatively related to the accrual for new uncertain tax positions. Furthermore, we demonstrate that UTB settlements are positively associated with the UTB accrual related to uncertain tax positions assumed in prior periods. Taken together, our results suggest that the information gathered from tax audit outcomes influence firms to become more conservative in tax reporting, and possibly their future tax planning as well.

To test whether settlements influence the valuation of the UTB

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reserve, we employ a research design similar to Koester (2012) and Koester, Lim, and Vigeland (2015). We first replicate a baseline finding of Koester et al. (2015); namely, we document a positive association between the UTB reserve and firm value. Next, we expand the regression model to include the UTB settlement variable, and we interact this variable with the ending UTB reserve. Our results suggest that the presence of a settlement in the current year significantly attenuates the positive valuation of the UTB reserve. Supplemental analysis suggests that this is because historical UTB settlements are predictive of future UTB settlements.

Our study makes several important contributions to the literature. First, our empirical analyses add to the literature on tax enforcement. Much of the prior literature on tax enforcement has focused on individual taxpayers (e.g., Alm, Jackson, & Mckee, 1992) and/or expected levels of enforcement (e.g., Hoopes, Mescall, & Pittman, 2012). We extend this literature by examining the effect of firm-specific tax audit outcomes on subsequent firm behavior. In particular, our results suggest that, following UTB settlements, firms record a lower magnitude of uncertain tax positions and they revise their expectations about the realizability of uncertain tax positions that were established in prior periods. Hence, our findings support the notion that tax audits appear to serve as a successful monitoring mechanism and lead managers to be more conservative in their tax reporting. Lastly, we contribute to the literature examining the valuation of uncertain tax positions by identifying one facet of the nuanced relationship between the UTB reserve and firm value. In particular, the results of our study suggest that prior realizations of the cash tax benefits associated with UTBs are associated with expected future realizations, making them an important determinant of the valuation of UTBs.

With respect to our focus on tax settlements relating to uncertain tax positions, our study is similar to two concurrent working papers, Finley (2017) and Bauer and Klassen (2017). Specifically, Finley (2017) employs a first-stage regression model to distinguish between the 'favorable' and 'unfavorable' components of interest and penalties relating to UTB settlements. Among other findings, Finley (2017) demonstrates that unfavorable settlements are positively related to the probability of tax-related restatements, and that firms with higher favorable settlements subsequently engage in more tax avoidance activities.

Bauer and Klassen (2017) examine the capital market reaction to the announcement of a UTB settlements in firms' 10-K filings. Similar to Finley (2017), Bauer and Klassen (2017) also differentiate between favorable and unfavorable UTB settlements; however, they employ textual analysis to distinguish between the two types. Consistent with their hypothesis, they find that the unfavorable UTB settlements are negatively related to cumulative abnormal returns surrounding the 10-K filing date, whereas favorable settlements are not.

Our study differs from Finley (2017) and Bauer and Klassen (2017) in two important ways. First, we view all UTB settlements as 'unfavorable' in that all settlements indicate that a portion of the cash tax savings associated with a tax position were not retained. We do note that the GAAP ETR effect of settlements can be favorable or unfavorable, depending on firm's accrual for the position; however, all settlements represent a cash outflow to a taxing authority. Thus, settlements, particularly large settlements, should influence management's future use of the specific tax strategy that was related to the settlement. As such, we assess the effect of all UTB settlements on tax planning and reporting behavior. Second, we examine the impact of UTB settlements on specific components of the UTB reserve, allowing us to provide evidence on how the information gathered during the settlement process influences management behavior with respect to the reporting of uncertain tax positions.

We organize the remainder of our paper as follows. Section 2 discusses the disclosure requirements of UTBs under U.S. GAAP, summarizes the relevant literature, and develops our hypotheses. Section 3 provides an overview of our research design and discuss our sample and related descriptive statistics. Section 4 summarizes the results from the multivariate tests of our hypotheses. Section 5 concludes.

2. Background, literature review, and hypothesis development

2.1. FASB interpretation No. 48

Effective for fiscal years beginning after December 15, 2006, FASB Interpretation No. 48 (i.e., FIN 48), *Accounting for Uncertainty in Income Taxes*, requires companies to estimate and record a contingent liability for unrecognized tax benefits in their financial statements. According to the standard, managers must determine whether it is "more-likely-than-not" that a tax position will be sustained upon examination by the tax authority. If this first prong is met, then managers must determine the amount of the tax position's benefit that may be recognized on the financial statements. The portion that cannot be recognized in the current period increases a contingent liability account, commonly referred to as the UTB reserve.

The UTB reserve is a cumulative account, and yearly changes to the reserve primarily consist of five components: (1) increases to the reserve related to new tax positions taken in the current period; (2) increases to the reserve related to tax positions established in prior periods; (3) decreases to the reserve related to tax positions assumed in prior periods; (4) decreases to the reserve related to settlements with taxing authorities; and (5) decreases in the reserve related to a lapse in the statute of limitations for the particular tax position.[1,2] The intended effect is that if a position is fully reserved for, then the increase in the reserve in the current period will be equal to the decrease in the reserve in a later period when the position is settled with the taxing authority. In this case, the settlement still results in a cash outflow, but will have no effect on the firm's GAAP effective tax rate. However, the standard requires managers to assume that every position will be audited by the tax authority and that the tax authority has complete information about the tax position. Therefore, the standard is quite conservative in nature, an assertion supported by Robinson, Stomberg, and Towery (2016), who demonstrate that, on average, only 24 cents of each dollar of UTB eventually unwinds via settlements.

2.2. Literature review and development of hypotheses

2.2.1. The effect of tax audit outcomes on the reporting of the UTB reserve

Broadly speaking, our research question of how firms alter their behavior in response to tax audit outcomes fits into the stream of research that investigates the effect of enforcement mechanisms on the subsequent behavior of the enforcee. This question has been examined by prior studies in a variety of settings. For example, Gray and Scholz (1993) find that OSHA inspection outcomes resulting in penalties appear to induce a 22% decline in injuries at the inspected plant in subsequent periods. More recently, Ettredge, Huang, and Zhang (2012) demonstrate that firms increase the conservatism of their financial reporting following a restatement; however, the effect is limited to firms that simultaneously improve their corporate governance. Relatedly, Chen, Elder, and Hung (2014) document that increased conservatism following restatements is more pronounced in the post-SOX era. Finally, Drake et al. (2016) find that following the failed remediation of a PCAOB Part II report, audit firms increase scrutiny, which manifests itself in changes in their clients' financial reporting. Taken together, these studies suggest that enforcement, at least to an extent, is successful in modifying the subsequent behavior of the enforcee.

Much of the initial theoretical work on tax compliance (e.g., Graetz, Reinganum, & Wilde, 1986; Reinganum & Wilde, 1988) focuses on the

[1] For the sake of simplicity, we refer to tax positions assumed in the current fiscal year as 'new' uncertain tax positions, and outstanding uncertain tax positions that were established in prior fiscal years as 'existing'.

[2] While these are the primary components of the UTB tabular rollforward, the yearly change in the ending UTB reserve can also be impacted by foreign exchange adjustments as well as the acquisition or disposal of UTBs through a merger or acquisition. We provide an example of a UTB tabular rollforward in Appendix B.

cognizant underpayment of taxes by assuming that the taxpayer knows with certainty the amount of taxes owed. Therefore, any non-compliance is a deliberate decision to under pay relative to the true tax liability. However, due to the ambiguous and complex nature of the U.S. tax code, many taxpayers face uncertainty regarding the "correct" amount of their tax liability. As a result, underpayment may be deliberate and/or a product of the uncertainty in applying complex tax laws to the company's transactions. To this end, Beck and Jung (1989) model tax compliance allowing for uncertainty and determine that if perceived audit probability and penalty severity fall within levels that are in line with what is observed in reality, then risk-neutral taxpayers have incentives to reduce reported income (i.e., engage in more tax avoidance) following an increase in tax uncertainty. In fact, Beck and Jung (1989) demonstrate that it is only at very high levels of perceived audit probability that higher uncertainty is predicted to result in less avoidance. Relatedly, Beck, Davis, and Jung (2000) note that when tax uncertainty arises, taxing authorities may find it more difficult to successfully challenge aggressive tax positions. Accordingly, taxpayers may exploit the uncertainty and report more aggressively than they otherwise would have if the uncertainty did not exist.

There is significant research examining the relation between tax authority monitoring and tax compliance for individual taxpayers (e.g., Allingham & Sandmo, 1972; Alm et al., 1992; Dubin & Wilde, 1988; Slemrod, Blumenthal, & Christian, 2001; Witte & Woodbury, 1985); however, archival research examining this relation in the context of corporations is less common. For example, Hoopes et al. (2012) investigate whether firms classified in years and asset classes with a higher ex ante probability of being audited by the IRS engage in lower levels of tax avoidance. Consistent with their hypothesis, Hoopes et al. (2012) find that ex ante IRS audit probability is negatively associated with the firm's cash effective tax rate. In particular, they estimate that an increase in IRS audit probability from 19% to 37% is associated with a 7% increase in the firm's cash effective tax rate. In addition, DeBacker, Heim, Tran, and Yuskavage (2015) use confidential IRS audit data and find that, on average, firms have lower cash effective tax rates in the years immediately following audit, and these rates subsequently increase over time. They attribute this effect to taxpayers believing that they are less likely to be audited in the years immediately following an audit. Finally, Li, Pittman, and Wang (2018) find that Chinese private companies decrease tax avoidance following settlements with the tax authority.

As previously mentioned, Finley (2017) examines the impact of UTB settlements on a firms' subsequent tax avoidance. Using a regression model to separate 'unfavorable' UTB settlements from their 'favorable' counterparts, Finley (2017) finds that unfavorable settlements are positively related to the probability of tax-related restatements. Further, Finley (2017) finds mixed results when analyzing the effect of UTB settlements on subsequent tax avoidance behavior. Specifically, Finley (2017) demonstrates that favorable UTB settlements are negatively related to changes in the cash ETR, whereas unfavorable UTB settlements are not significantly related to subsequent tax avoidance behavior.

Among other analyses, De Simone, Sansing, and Seidman (2013) model tax compliance behavior for firms outside of voluntary "enhanced-relationship" compliance programs, such as the U.S. Compliance Assurance Program (CAP). In their model, the corporation files a tax return in which it discloses uncertain tax positions. The tax authority then conducts a review of the tax return and decides whether to audit any discovered uncertain tax positions. It is only upon audit that the tax authority is able to determine whether a particular position has strong or weak support. The analysis of De Simone et al. (2013) suggests that when the probability that the tax authority will detect an uncertain tax position is sufficiently low, firms are willing to claim all uncertain tax positions (i.e., positions with strong support and positions with weak support). Thus, their model suggests that the probability of audit influences the tax positions a company takes, which in turn should influence the realizability of UTBs.

In an empirical test of the propositions of Beck et al. (2000) and De Simone et al. (2013), Beck and Lisowsky (2014) test how participation in the CAP program influences the reporting of uncertain tax positions under FIN 48. Building upon the aforementioned prior analytical research, they posit that high audit-detection probability firms are likely to report only tax positions with strong facts; thus, UTB reserves for firms with high audit-detection probability are more likely to signal uncertainty rather than tax aggressiveness. Likewise, firms with low audit-detection probability are likely to report tax positions with strong and weak facts, and therefore their UTB reserves are more likely to signal tax aggressiveness.

The prior research on tax enforcement focuses primarily on the probability of enforcement and the magnitude of potential penalties rather than the outcomes of tax audits themselves. Under FIN 48, firms are required to reserve for tax benefits arising from uncertain tax positions. Whether the firm will ultimately realize the benefits related to the uncertain positions is a function of the probability of audit as well as the tax authority's evaluation of the position. The outcomes of the tax authority's audit of particular uncertain tax positions provides feedback to the firm, allowing the company to update its priors regarding like positions. In essence, the outcome of a tax audit of a particular uncertain tax position, whether the outcome is positive or negative, provides new information to the firm, which should allow the firm to better assess the likelihood of the realizability of like positions. Given that a settlement related to uncertain tax positions provides new information to the firm regarding the realizability of its tax strategies, we expect that a current period UTB settlement will result in management assuming fewer new uncertain tax positions and, therefore, recording a lower magnitude into the UTB reserve. Thus, we state our first hypothesis as follows:

H1. UTB settlements are negatively related to the UTB accrual for new uncertain tax positions.

In addition to influencing new uncertain tax positions, settlements may affect the accrual made for positions assumed in prior periods (i.e., existing positions) because companies are required to reevaluate these positions each year. Given that a current-period UTB settlement provides new information to the firm regarding the realizability of like positions, we expect that the reserve related to existing positions will be adjusted upwards. Likewise, since the information provided through the audit process has reduced the uncertainty regarding like positions, we expect that in the period following a settlement there will be fewer downward revisions to the reserve for existing uncertain tax positions. Thus, we state our second hypothesis (in two parts) as follows:

H2. a. UTB settlements are positively related to increases in the UTB reserve related to existing uncertain tax positions.

b. UTB settlements are negatively related to decreases in the UTB reserve related to existing uncertain tax positions.

2.2.2. The effect of tax audit outcomes on the valuation of the UTB reserve

In their review of the FIN 48 literature, Blouin and Robinson (2014) note that FIN 48 appears to alter firm incentives and behavior. However, the question as to what information is communicated to investors through the UTB reserve remains an open question. Some argue that FIN 48 likely increased investors' focus on tax uncertainty/risk. For example, Blouin, Gleason, Mills, and Sikes (2010) find that prior to FIN 48 becoming effective, firms strategically settled open positions with tax authorities to reduce the visibility of their UTBs upon implementation. Nevertheless, others opine that FIN 48 disclosures may not be particularly value-relevant. For example, Robinson and Schmidt (2013) argue that FIN 48 disclosures are costly for firms that face high proprietary costs (i.e., firms with high levels of tax avoidance). Likewise, FIN 48 requires managerial estimation, and thus is prone to managerial opportunism. Accordingly, De Simone, Robinson, and

Stomberg (2014) find significant cross-sectional variation in how firms applied FIN 48 to the tax benefits received from the alternative fuel credit in the paper industry. Therefore, the conservative nature of the standard, along with the subjectivity of management's estimates of tax position outcomes, may result in a noisy disclosure that does not provide meaningful information to investors.

Despite these concerns, other studies demonstrate that UTB disclosures appear to be value-relevant. For example, Frischmann, Shevlin, and Wilson (2008) investigate the market reaction to initial disclosures of unrecognized tax benefits. Among other findings, they document a positive association between event window abnormal returns and the component of the unrecognized tax benefits that firms indicate would affect their effective tax rates if recognized. Likewise, Koester (2012) finds that, on average, the firm's UTB reserve is positively associated with firm value.

Given that the UTB reserve is a contingent liability, the aforementioned findings puzzle researchers. Blouin and Robinson (2014) posit that there are two potential explanations for the positive association between the UTB reserve and firm value. First, the UTB reserve may communicate information to investors about the firm's propensity for tax avoidance; hence, the positive association between the UTB reserve and firm value is consistent with investors viewing tax planning as value enhancing. Second, capital market participants view the UTB reserve as a signal that the firm's earnings are understated due to the overly conservative nature of FIN 48. In regards to the first explanation, Drake, Lusch, and Stekelberg (2017) find that the ending UTB reserve is positively associated with firm value incremental to effective tax rate based proxies for tax avoidance and tax risk. Therefore, it appears the signal that investors receive from the UTB reserve about tax planning is not a perfect substitute for the information about tax planning that investors can glean from examining effective tax rates. Concerning the second explanation, Robinson et al. (2016) provide evidence that is consistent with the assertion that the accounting for UTBs is overly conservative. Furthermore, Bauer and Klassen (2017) find that unfavorable UTB settlements are negatively related to cumulative abnormal returns surrounding the 10-K filing date, whereas favorable settlements are not.

If market participants view the UTB reserve as a value increasing signal, then the quality of that signal matters. Accordingly, Koester et al. (2015) examine whether the presence of tax-related material weaknesses in internal control influence the market valuation of the UTB reserve. They argue that tax-related material internal control weaknesses are indicative of information risk in the tax accounts, and thus investors should discount their valuation of the reserve for firms that report a tax-related internal control weakness. Consistent with expectations, they find that, on average, the UTB reserve is positively associated with share prices, but the presence of a tax-related material weakness significantly attenuates the positive valuation.

In the UTB setting, investors have information about the audit outcomes of the firm's uncertain tax positions via the settlement line on the UTB tabular rollforward. As previously mentioned, Blouin and Robinson (2014) suggest the positive market valuation of the UTB reserve could be due to the signaling of (1) effective tax avoidance; and/or (2) understated earnings due to an overstated UTB reserve. Regarding the first point, if a firm enters into a UTB settlement with tax authorities, then this may signal to the market that its tax avoidance strategies are less sustainable relative to a firm that does not report a UTB settlement. Moreover, the UTB reserves of firms that report settlements are less overstated relative to companies without any settlements. Therefore, we conjecture the positive market valuation of a company's UTB reserve will be lower following the reporting of a UTB settlement. As such, our third hypothesis is as follows:

H3. The positive valuation of the UTB reserve is decreasing in the magnitude of the firm's reported UTB settlement.

3. Research design, sample, and descriptive statistics

3.1. Regression models – Hypotheses 1 and 2

To test H1 and H2, we build on the model developed by Drake et al. (2016) to explain changes in the various components of the UTB reserve. In particular, we focus on the changes in the reserve stemming from new and existing uncertain tax positions. In addition to the variables from the Drake et al. (2016) models, we include our primary variables of interest, $UTB\_Settle\%_{it}$ and $UTB\_Settle\%_{it\text{-}1}$, to capture the magnitude of UTB settlements reported in the current period and prior period, respectively. Specifically, *UTB_Settle%* is measured as the amount of current period settlements divided by the beginning balance of the UTB reserve for the respective period, with non-settling firms holding a value of zero. Hence, we test our hypotheses by estimating several variants of the following regression model in pooled, cross-section using ordinary least squares (OLS):

$$\begin{aligned} UTBCY_{it} \text{ (or } UTBPY_{it}) = {} & \beta_0 + \beta_1 UTBSettle\%_{it} + \beta_2 UTBSettle\%_{it-1} \\ & + \beta_3 UTBCY_{it-1} \text{ (or } UTBPY_{it-1}) + \gamma' \text{Controls} \\ & + \textit{Year fixed effects} + \textit{Industry fixed effects} + \varepsilon_{it.} \end{aligned} \quad (1)$$

The dependent variable for the test of H1 is UTB_CY_{it}, measured as the net increase in the UTB reserve related to new tax positions assumed during the current year, divided by beginning of the year total assets.[3] In our initial test of H2, the dependent variable is UTB_PY_{it}, calculated as the net adjustment to the UTB reserve related to tax positions established in prior years, divided by beginning of the year total assets. We then conduct direct tests of H2a and H2b by focusing on the two subcomponents of UTB_PY_{it}: $UTB\_PY\_INC_{it}$ and $UTB\_PY\_DEC_{it}$. Specifically, we measure the former (latter) variable as the total increase (decrease) in the UTB reserve related to existing uncertain tax positions, divided by beginning of the year total assets. It is important to note that we code the values of these two variables positively, such that increasing values of $UTB\_PY\_INC_{it}$ ($UTB\_PY\_DEC_{it}$) indicate larger current period increases (decreases) to the UTB reserve.[4]

To isolate the effect of *UTB_Settle%* on the dependent variable, we include a number of control variables in Eq. (1). As noted earlier, Hoopes et al. (2012) demonstrate that the likelihood that the firm will be subject to IRS audit is negatively to its tax avoidance activities. As such, we use publicly available data from Transactional Records Access Clearinghouse (TRAC) to construct a proxy for ex ante IRS audit probability, IRS_TRAC_{ct}, and we include this variable in Eq. (1).[5] Among other data, TRAC collects and reports the number of corporate audits performed by the IRS during the year for 12 groups of companies, where a company is categorized based on its total assets (as denoted by the subscript *c* in the variable acronym). Following Hoopes et al. (2012), we measure *IRS_TRAC* as the number of federal corporate audits performed for each size group in a given year divided by the number of

[3] Following Towery (2017), we net current year position increases against any reported decreases in the reserve due to current year positions. Similar to Towery (2017), we find that non-zero current period decreases in Compustat are rare (approximately 3.5% of our sample observations report a non-zero value for current period decreases). Our results related to current year position increases remain unchanged when we ignore current year decreases or delete observations reporting current year decreases.

[4] As noted above, we scale UTB settlements by the beginning of the period UTB reserve, whereas we deflate the dependent variable by beginning of the period total assets. The results that follow are not materially affected if we also scale the dependent variable by the beginning of the period UTB reserve.

[5] Due to the lack of publicly available data, we are unable to include a variable similar to *IRS_TRAC* for the other jurisdictions in which the firm is required to file a tax return. However, to the extent that tax audit determinants of other jurisdictions are correlated with IRS audit determinants, *IRS_TRAC* may partially capture the ex ante audit probability in those other jurisdictions.

Table 1
Sample selection.

Selection phase	Number of observations	Number of firms
Observations from CRSP-Compustat merged database over 2008–2015 with non-missing beginning and ending balances in the unrecognized tax benefit reserve (i.e., Compustat items TXTUBEGIN and TXTUBEND)	22,721	4422
Delete observations with missing share price or common shares outstanding data	(2905)	(401)
Remove observations that report a zero beginning balance in the unrecognized tax benefit reserve (i.e., TXTUBBEGIN)	(3956)	(871)
Delete observations missing the necessary data to construct the control variables	(5416)	(1018)
Final sample	**10,444**	**2132**

federal corporate returns filed for the size group during the year.[6] Further, due to the documented association between *IRS_TRAC* and firm size in Hoopes et al. (2012), we include the natural log of total assets (*Size*) in the regression model.

Following prior research (e.g., Drake et al., 2016; McGuire, Omer, & Wang, 2012), we include controls for abnormal accruals, tax loss carryforwards, equity and foreign income, R&D expenditures, leverage, growth opportunities, tangible assets, profitability, cash holdings, selling general and administrative (SG&A) expenses, sales growth, and the cash effective tax rate. Finally, to control for unobservable time, industry, and macro-economic effects, we include industry and year indicators in the regression model. Appendix A defines all variables.

3.2. Regression model – Hypothesis 3

To test our third hypothesis, we estimate the following regression model in pooled, cross-section using OLS:

$$\begin{aligned} Price_{it} = {} & \alpha_0 + \alpha_1 UTBEnd_{it} + \alpha_2 UTBSettle\%_{it} + \alpha_3 UTBEnd_{it} \\ & \times UTBSettle\%_{it} + \alpha_4 UTBSettle\%_{it-1} + \alpha_5 UTBEnd_{it} \\ & \times UTBSettle\%_{it-1} + \delta' \text{Controls} + Year\ fixed\ effects \\ & + Industry\ fixed\ effects + \eta_{it} \end{aligned} \quad (2)$$

Following Koester (2012) and Koester et al. (2015), we measure *Price* as the stock price on the day after the 10-K filing date; in addition, we define *UTB_End* as the balance in the UTB reserve at the end of the fiscal year, deflated by the number of common shares outstanding on the day after the 10-K filing date.[7] We interact *UTB_END* with our settlement variables, $UTB\_Settle\%_{it}$ and $UTB\_Settle\%_{it\text{-}1}$, and observe the coefficient estimates on the two interaction terms. If reported settlements lower investors' expectations as to the future cash benefits of UTBs, then we expect the coefficients on the interaction terms between *UTB_End* and *Settle%* (i.e., α_3 and α_5) to be negative.

We include a number of control variables in Eq. (2). As noted earlier, Koester et al. (2015) demonstrate that the UTB reserve is positively related to share prices, but the presence of a tax-related material weakness significantly attenuates the positive association. Therefore, we include an indicator variable *(Tax_MWIC)* that assumes the value of one if the firm reported a tax-related material internal control weakness during the fiscal year, zero otherwise. Consistent with Koester et al. (2015), we interact *Tax_MWIC* with *UTB_End* in the regression model, and we expect the coefficient on the interaction term to be negative. Further, to control for exposure to tax authority monitoring, we include *IRS_TRAC* and its interaction with *UTB_End*, accompanied by the natural log of assets (*Size*) to control for firm size.

Following the Ohlson (1995) framework, we include book value of equity per share in the regression model (*BVE*). However, since we include separate variables for the ending UTB reserve as well as net deferred tax assets (*Net_DTA*) in the regression model, we adjust the book value of equity for *UTB_End* and *Net_DTA*. Moreover, we include net income before extraordinary items on a per-share basis (*NI*) in Eq. (2) because prior research predicts and finds a positive relation between net income and price (e.g., Barth, Beaver, & Landsman, 2001; Ohlson, 1995). Following Koester et al. (2015), we include a dichotomous variable (*Loss*) that assumes the value of one when *NI* is less than zero, and we interact *Loss* with *NI* since losses are less informative to shareholders than profits due to their transitory nature (Hayn, 1995).

3.3. Sample and descriptive statistics

Our sample selection process consists of several phases, and we provide a summary of the process in Table 1. Specifically, we begin with 22,721 firm-years from the CRSP/Compustat Merged Dataset that have non-missing values for the beginning and ending balances in the UTB reserve during the sample period of 2008–2015.[8] Next, we delete 2905 observations with missing share prices and/or common shares outstanding. We also remove 3956 firm-years that report a zero balance in the UTB reserve at beginning of year *t* since it is highly unlikely these firms will incur a UTB settlement during the year. Finally, we delete 5416 observations that do not have the necessary data to construct the control variables in Eqs. (1) and (2). Our final sample consists of 10,444 firm-year observations, corresponding to 2132 distinct firms.

Table 2 reports the industry distribution of our sample as well as descriptive statistics on *UTB_Settle%* by industry. In terms of industry frequency, Table 2 reveals that approximately 48.4% of our observations operate in the business equipment, healthcare, and retail/wholesale industries. In terms of occurrences of UTB settlements, Table 2 reports that over 50% of observations operating in the chemical, consumer durable, manufacturing and retail/wholesale enter into settlements with taxing authorities.[9] Regarding the magnitude of UTB settlements, firms operating in the retail/wholesale and consumer nondurable industries report, on average, the largest UTB settlements as a percentage of the beginning of the year UTB reserve (9.2% and 9.1%, respectively).

In Table 3, we present sample descriptive statistics for all variables included in Eqs. (1) and (2). For the sake of brevity, we focus our discussion on Panel A of Table 3, which reports descriptive statistics related to our primary variables of interest. In particular, Panel A reveals that, on average, new current year positions (i.e., *UTB_CY*) are 0.15% of total assets. Moreover, Panel A of Table 3 shows that the mean adjustment to the UTB reserve due to prior year positions is close to nil; however, we note that this reflects that, on average, increases and

[6] In 2010, TRAC increased the number of its size categories from eight to twelve. Specifically, rather than using $250 million or more of total assets as its largest category, TRAC added the following categories: $250 million – $500 million, $500 million – $1 billion, $1 billion – $5 billion, $5 billion – $20 billion, and $20 billion or more. We use data from 2010 to 2015 to create as-if audit probabilities for those size categories in 2006–2009. Nevertheless, our results are robust to both the exclusion of firm-years prior to 2010 from our sample and the use of the original asset classes throughout the entire sample period.

[7] Our results are robust to the measurement of firm value using the stock prices three months and four months after the fiscal year end (Robinson et al., 2016).

[8] While 2007 was the first year that most firms were required to estimate and accrue the UTB reserve and disclose its related changes in the rollforward, our primary sample begins in 2008 to allow for the incorporation of lagged settlement data in our analyses. Our results are unchanged in untabulated analyses that include 2007 firm-years and exclude the effect of lagged UTB components.

[9] The results that follow are not materially altered if we limit the sample to firm-year observations that reported a non-zero settlement.

Table 2
Industry composition of sample.

Industry	Sample composition		Descriptive statistics for *UTB_Settle%$_{it}$*					
	Number of Obs.	% of Total	Mean	Std. Dev.	% > 0	P25	P50	P75
Business equipment	2378	22.77%	0.049	0.127	36.2%	0.000	0.000	0.023
Chemicals	398	3.81%	0.084	0.160	56.8%	0.000	0.009	0.093
Consumer durable	370	3.54%	0.083	0.162	53.2%	0.000	0.009	0.083
Consumer non-durables	408	3.91%	0.091	0.199	43.9%	0.000	0.000	0.074
Energy	812	7.77%	0.069	0.176	37.3%	0.000	0.000	0.035
Financial services	920	8.81%	0.067	0.165	37.8%	0.000	0.000	0.033
Healthcare	1439	13.78%	0.080	0.167	48.5%	0.000	0.000	0.074
Manufacturing	623	5.96%	0.072	0.150	51.5%	0.000	0.002	0.070
Retail and wholesale	1239	11.86%	0.092	0.178	59.3%	0.000	0.013	0.093
Telecommunications	361	3.46%	0.059	0.163	34.9%	0.000	0.000	0.022
Utilities	43	0.41%	0.025	0.085	20.9%	0.000	0.000	0.000
Other	1453	13.92%	0.072	0.165	40.6%	0.000	0.000	0.050
Pooled sample	**10,444**	**100.00%**	**0.071**	**0.161**	**44.0%**	**0.000**	**0.000**	**0.055**

This table presents the industry composition of our sample as well as descriptive statistics for our primary independent variable of interest, *UTB_Settle%*, by industry. *UTB_Settle%* is defined in Appendix A and is winsorized at the 1st and 99th percentiles.

Table 3
Descriptive statistics (N = 10,444).

Variable	Mean	Std. Dev.	P25	P50	P75
Panel A: Primary variables of interest					
UTB_CY$_{it}$	0.0015	0.0028	0.0000	0.0005	0.0017
UTB_PY$_{it}$	0.0000	0.0028	−0.0003	0.0000	0.0004
UTB_PY_INC$_{it}$	0.0010	0.0022	0.0000	0.0002	0.0010
UTB_PY_DEC$_{it}$	0.0010	0.0024	0.0000	0.0001	0.0008
UTB_Settle%$_{it}$	0.0705	0.1607	0.0000	0.0000	0.0545
UTB_Settle%$_{it-1}$	0.0679	0.1501	0.0000	0.0000	0.0553

Variable	Mean	Std. Dev.	P25	P50	P75
Panel B: Control Variables from Eq. (1)					
UTB_CY$_{it-1}$	0.0017	0.0031	0.0000	0.0005	0.0018
UTB_PY$_{it-1}$	0.0001	0.0029	−0.0003	0.0000	0.0005
IRS_TRAC$_{ct}$	0.3248	0.1973	0.1940	0.2816	0.3640
Size$_{it}$	7.5038	1.6869	6.2911	7.3863	8.5787
AssetGrowth$_{it}$	0.0789	0.2653	−0.0331	0.0377	0.1211
ΔAbnormalAcc$_{it}$	0.0000	0.0007	0.0000	0.0000	0.0000
ΔNOL$_{it}$	0.0213	0.1456	−0.0016	0.0000	0.0082
ΔEquityIncome$_{it}$	0.0000	0.0024	0.0000	0.0000	0.0000
ΔForeignIncome$_{it}$	0.0016	0.0295	−0.0022	0.0000	0.0056
ΔR&D$_{it}$	0.0027	0.0161	0.0000	0.0000	0.0015
ΔLeverage$_{it}$	0.0258	0.1204	−0.0155	0.0000	0.0304
ΔBookMarket$_{it}$	0.1928	1.0544	−0.2326	−0.0283	0.2689
ΔPPE$_{it}$	0.0123	0.0519	−0.0063	0.0025	0.0190
ΔROA$_{it}$	0.0038	0.0945	−0.0186	0.0044	0.0247
ΔCash$_{it}$	0.0125	0.1075	−0.0234	0.0024	0.0374
ΔDepreciation$_{it}$	0.0025	0.0097	−0.0011	0.0013	0.0051
ΔSG&A$_{it}$	0.0127	0.0486	−0.0021	0.0049	0.0234
SalesGrowth$_{it}$	1.0690	0.2320	0.9701	1.0486	1.1390
ΔCashETR$_{it}$	0.1515	5.4020	−0.5930	−0.0864	0.3651
APTS Indicator$_{it}$	0.7763	0.4168	1.0000	1.0000	1.0000

Variable	Mean	Std. Dev.	P25	P50	P75
Panel C: Additional Variables in Eq. (2)					
Price$_{it}$	36.0118	35.4086	12.3300	25.7600	47.7600
UTB_End$_{it}$	0.3616	0.5518	0.0551	0.1617	0.4195
Tax_MWIC$_{it}$	0.0099	0.0988	0.0000	0.0000	0.0000
BVE$_{it}$	16.6312	19.2230	5.7945	11.4869	20.8952
Net_DTA$_{it}$	−0.5817	3.2603	−0.9319	0.0000	0.5651
NI$_{it}$	1.5519	3.1453	0.1326	1.1888	2.6290
Loss$_{it}$	0.2218	0.4155	0.0000	0.0000	0.0000

Panels A – C of Table 3 present descriptive statistics for the variables included in various specifications of Eqs. (1) and (2). All variables are defined in Appendix A and all continuous variables are winsorized at the 1st and 99th percentiles.

Table 4
Correlations (N = 10,444).

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. UTB_CY_{it}	*1.000*	0.018	**0.216**	**0.177**	**−0.054**	**−0.047**	−0.017	−0.013
2. UTB_PY_{it}	0.016	*1.000*	**0.583**	**−0.650**	**0.066**	**0.050**	−0.015	**−0.022**
3. $UTB\_PY\_INC_{it}$	**0.262**	**0.535**	*1.000*	**0.222**	**0.054**	0.005	**0.059**	**0.056**
4. $UTB\_PY\_DEC_{it}$	**0.243**	**−0.510**	**0.256**	*1.000*	**−0.022**	**−0.054**	**0.072**	**0.078**
5. $UTB\_Settle\%_{it}$	**0.085**	**0.041**	**0.220**	**0.170**	*1.000*	**0.165**	**0.057**	**0.068**
6. $UTB\_Settle\%_{it-1}$	**0.086**	**0.056**	**0.195**	**0.121**	**0.415**	*1.000*	**0.066**	**0.083**
7. IRS_TRAC_{ct}	**0.076**	−0.001	**0.225**	**0.233**	**0.269**	**0.267**	*1.000*	**0.868**
8. $Size_{it}$	**0.094**	−0.011	**0.235**	**0.258**	**0.292**	**0.291**	**0.909**	*1.000*

All variables are defined in Appendix A. Pearson (Spearman) correlations reported above (below) the diagonal. All bolded correlation coefficients are significantly different from zero at the 5% level. All continuous variables are winsorized at the 1st and 99th percentiles.

decreases to the reserve for prior year positions are approximately the same (the means of *UTB_PY_INC* and *UTB_PY_DEC* are both 0.10%). Finally, we observe that the average UTB settlement is approximately 7% of the beginning of the year UTB reserve.

Table 4 presents Pearson and Spearman correlations for our primary variables of interest as well as two key control variables: *IRS_TRAC* and *Size*. Overall, we find that 23 (25) of the 28 Pearson (Spearman) correlation coefficients are significantly greater than zero. Notably, Table 4 documents a positive correlation between current and prior-year UTB settlements ($UTB\_Settle\%_{it}$ and $UTB\_Settle\%_{it-1}$). Moreover, we find that the Pearson correlation coefficients between UTB_CY_{it} and current and prior-year UTB settlements are significantly less than zero. Finally, and consistent with Hoopes et al. (2012), we document a positive correlation between *IRS_TRAC* and *Size*.

Table 5
The Effect of UTB Settlements on New Uncertain Tax Positions.

Explanatory variable	Column A		Column B	
	Coefficient	t-statistic	Coefficient	t-statistic
$UTB\_Settle\%_{it}$	−0.0004***	−3.65	−0.0004***	−3.05
$UTB\_Settle\%_{it-1}$	–	–	−0.0003**	−2.12
UTB_CY_{it-1}	0.4242***	17.52	0.4486***	17.88
IRS_TRAC_{ct}	−0.0002	−0.67	−0.0002	−0.71
$Size_{it}$	0.0001*	1.90	0.0001*	1.80
$AssetGrowth_{it}$	0.0015***	4.64	0.0014***	4.40
$\Delta AbnormalAcc_{it}$	−0.0582	−1.16	−0.0633	−1.24
ΔNOL_{it}	0.0004	1.35	0.0004	1.48
$\Delta EquityIncome_{it}$	−0.0019	−0.17	−0.0010	−0.08
$\Delta ForeignIncome_{it}$	0.0028*	1.78	0.0023	1.42
$\Delta R\&D_{it}$	0.0078**	2.41	0.0070**	2.15
$\Delta Leverage_{it}$	−0.0012***	−2.93	−0.0010**	−2.36
$\Delta BookMarket_{it}$	0.0000	−1.43	0.0000	−1.43
ΔPPE_{it}	−0.0010*	−1.67	−0.0010	−1.61
ΔROA_{it}	0.0016***	3.44	0.0016***	3.57
$\Delta Cash_{it}$	0.0000	0.10	−0.0001	−0.29
$\Delta Depreciation_{it}$	0.0003	0.07	−0.0006	−0.15
$\Delta SG\&A_{it}$	0.0008	0.89	0.0004	0.41
$SalesGrowth_{it}$	−0.0003*	−1.76	−0.0003**	−1.76
$\Delta CashETR_{it}$	0.0000	0.74	0.0000	0.59
$APTS\ Indicator_{it}$	0.0001	1.62	0.0001	1.29
Year fixed effects	Yes		Yes	
Industry fixed effects	Yes		Yes	
# of Observations	10,444		10,444	
Adjusted R^2	31.44%		31.45%	

This table summarizes results from the OLS estimation of two variants of Eq. (1). The dependent variable in both specifications is UTB_CY_{it}. Appendix A defines all variables. All continuous variables are winsorized at the 1st and 99th percentiles, and t-statistics are based on standard errors clustered by firm.
***, **, * Indicate that coefficient is significantly different from zero at the 1%, 5%, and 10% levels, respectively (two-tailed tests).

4. Multivariate results

4.1. Tests of Hypotheses 1 and 2

In Table 5, we summarize the results from our multivariate tests of H1.[10] More specifically, we set the dependent variable in Eq. (1) equal to the net increase in the UTB reserve due to new uncertain period positions (UTB_CY_{it}), and examine its association with the magnitude of UTB settlements. The results from Column A of Table 5 reveal that the coefficient on $UTB\_Settle\%_{it}$ is significantly less than zero at conventional levels (t-statistic = −3.65). Further, in Column B, we augment the regression model to include $UTB\_Settle\%_{it-1}$, and find that both current and prior period UTB settlements are negatively related to the net increase in the UTB reserve from new uncertain tax positions (t-statistic = −3.05 and − 2.12, respectively). Overall, the results documented in Table 5 are consistent with the notion that tax authority scrutiny in the form of settlements may induce managers to be more conservative with their tax planning activities.[11]

In Table 6, we report the results of OLS estimation of Eq. (1) as it pertains to current period adjustments to the UTB reserve related to uncertain tax positions established in *prior periods*. A potential concern associated with this specification of the regression model relates to how companies adjust the UTB reserve when an uncertain tax position is settled. More specifically, Finley (2017) notes that some firms may first 'true-up' the reserve related to the position to the actual settlement amount, and then decrease the reserve to reflect the settlement of the position. As such, there may be a mechanical relationship between $UTB\_Settle\%_{it}$ and UTB_PY_{it}. To alleviate concerns about this issue, we focus our tests of H2a and H2b on the coefficient on *UTB_Settle%* in year t − 1 (i.e., β_2).

In Column A, we present summary regression results explaining the net adjustments to the UTB reserve related to existing uncertain tax positions (UTB_PY_{it}), and find a significantly positive coefficient on $UTB\_Settle\%_{it-1}$ (t-statistic = 4.93). In Columns B and C of Table 6, we examine increases and decreases to the UTB reserve related to existing uncertain tax positions ($UTB\_PY\_INC_{it}$ and $UTB\_PY\_DEC_{it}$, respectively). With respect to the former, the results reported in Column B are not consistent with H2a; namely, we do not document a positive association

[10] All t-statistics are based on standard errors clustered at the firm level. The reported results in all regression models are not materially altered if we delete influential observations based on an R-student statistic greater than three in absolute value. In addition, we include firm fixed effects in all regression models and our inferences remain unchanged.

[11] An alternative explanation is that companies continue to employ tax aggressive strategies, but accrue less of a reserve related to the uncertain tax positions. This behavior is consistent with the 'bomb-crater' effect documented in DeBacker et al. (2015); that is, companies may believe that they are less likely to be audited in the period following an audit and, therefore, become more tax aggressive. Although we cannot rule out this alternative explanation, we note that FIN 48 requires firms to assume the taxing authority will audit each uncertain tax position with full knowledge of all relevant information. As such, the probability of the company being audited by the taxing authority should not impact the firm's accrual related to its new uncertain tax positions.

Table 6
The Effect of UTB Settlements on Existing Uncertain Tax Positions.

Explanatory variable	Column A: Dep. Var. = UTB_PY_{it}		Column B: Dep. Var. = $UTB\_PY\_INC_{it}$		Column C: Dep. Var. = $UTB\_PY\_DEC_{it}$	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
$UTB\_Settle\%_{it}$	0.0010***	5.10	0.0007***	3.37	−0.0003**	−2.18
$UTB\_Settle\%_{it-1}$	0.0008***	4.93	−0.0002	−1.17	−0.0010***	−8.54
UTB_PY_{it-1}	0.0413**	2.06	0.0677***	4.86	0.0224	1.35
IRS_TRAC_{ct}	0.0001	0.22	0.0003	0.95	0.0002	0.58
$Size_{it}$	0.0000	−1.15	0.0001**	2.27	0.0001***	3.37
$AssetGrowth_{it}$	0.0007**	2.62	0.0008***	3.91	0.0002	0.78
$\Delta AbnormalAcc_{it}$	0.0535	0.94	−0.0045	−0.09	−0.0531	−1.11
ΔNOL_{it}	0.0003	1.14	0.0004	1.59	0.0000	0.04
$\Delta EquityIncome_{it}$	0.0009	0.07	0.0055	0.79	0.0040	0.45
$\Delta ForeignIncome_{it}$	−0.0011	−0.79	−0.0001	−0.09	0.0009	0.89
$\Delta R\&D_{it}$	−0.0005	−0.18	0.0017	0.78	0.0030	1.26
$\Delta Leverage_{it}$	−0.0001	−0.19	−0.0002	−0.81	−0.0002	−0.52
$\Delta BookMarket_{it}$	0.0000	−0.48	0.0000*	−1.80	0.0000	−0.71
ΔPPE_{it}	−0.0002	−0.29	−0.0007	−1.19	−0.0006	−0.97
ΔROA_{it}	−0.0004	−0.94	0.0004	1.32	0.0009**	2.22
$\Delta Cash_{it}$	−0.0011***	−2.97	−0.0009***	−3.14	0.0002	0.73
$\Delta Depreciation_{it}$	0.0037	0.84	−0.0043	−1.40	−0.0088**	−2.35
$\Delta SG\&A_{it}$	−0.0015*	−1.71	−0.0006	−0.89	0.0011	1.50
$SalesGrowth_{it}$	0.0003*	1.67	0.0000	−0.24	−0.0004***	−2.96
$\Delta CashETR_{it}$	0.0000	−0.32	0.0000	−0.44	0.0000	−0.05
$APTS\ Indicator_{it}$	−0.0001	−1.45	0.0001	1.06	0.0002***	2.63
Year fixed effects	Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes	
# of Observations	10,444		10,444		10,444	
Adjusted R^2	1.46%		4.10%		3.13%	

between settlements in year t-1 and $UTB\_PY\_INC_{it}$.

Lastly, the results in Column C report the results of a regression explaining *decreasing* adjustments to the UTB reserve related to existing uncertain tax positions (i.e., $UTB\_PY\_DEC_{it}$). As noted above, we reverse code $UTB\_PY\_DEC_{it}$, such that a higher value of $UTB\_PY\_DEC_{it}$ represents a larger *decrease* to the UTB reserve in the current period, whereas a smaller value represents a smaller *decrease*. The coefficient on $UTB\_Settle\%_{it-1}$ provides support for H2b, as the negative coefficient (t-statistic = −8.54) suggests that observed settlements reduce the extent of downward adjustments to the UTB reserve related to existing tax positions.

To summarize, Table 6 provides evidence that managers decrease the extent of downward adjustments to the UTB reserve related to existing uncertain tax positions. Overall, these findings provide modest evidence that tax authority scrutiny in the form of settlements may induce managers to be more conservative with their tax reporting activities.[12]

4.2. Test of Hypothesis 3

In Table 7, we report summary regression statistics from the OLS estimation of three different specifications of Eq. (2). As a baseline model, we initially estimate Eq. (2) without *UTB_Settle%*, *IRS_TRAC*, *Size*, and any related interaction terms, as those variables were not included in the empirical analyses conducted by Koester (2012) and Koester et al. (2015). We present the results from the estimation of this first specification in Column A of Table 7. Consistent with Koester (2012) and Koester et al. (2015), we document a positive association between *UTB_End* and share prices (t-statistic = 2.03).

[12] In Tables 5 and 6, we find that the coefficient on *IRS_TRAC* is not significantly different from zero. A potential explanation is the high degree of multicollinearity between *IRS_TRAC* and Size as documented in Table 4. We investigate this possibility using the approach developed in Ciconte, Donohoe, Lisowsky, and Mayberry (2016). In particular, we replace *Size* with *Residual_Size*, where the latter variable is the residual from a regression of *Size* on *IRS_TRAC*. In all regression models, the coefficient on *IRS_TRAC* is significantly different from zero; moreover, the results with respect to our independent variable of interest (*UTB_Settle%*) are not materially altered.

Next, we introduce our primary variable of interest, $UTB\_Settle\%_{it}$, interacted with UTB_End_{it}, along with our *IRS_TRAC* and *Size* to control for ex ante IRS audit probability to the specification reported in Column B of Table 7. The interaction between UTB_End_{it} and $UTB\_Settle\%_{it}$ is negative and significant at the 10% level (t-statistic = −1.68), providing support for the hypothesis that the UTB reserve is valued lower following a reported settlement in the current year. Lastly, in Column C, we expand the model to include an interaction between UTB_End_{it} and $UTB\_Settle\%_{it-1}$. The coefficient on this interaction is also significantly negative (t-statistic = −2.25). Hence, the results are consistent with our third hypothesis; that is, it appears that investors' expectations as to the future cash benefits of a firm's UTB reserve are lower if the company had to return a portion of those cash benefits to tax authorities via settlements in the current period.

A potential reason why investors may discount their valuation of a firm's UTB reserves in the presence of a UTB settlement is that they perceive historical settlements to be predictive of future UTB settlements. Given our findings that UTB settlements affect the new tax positions assumed by management going forward and the size of the accrual estimated by management, our final analysis investigates the ability of historical UTB settlements to predict current year UTB settlements. In particular, we estimate the following regression model in pooled, cross-section:

$$UTBSettle\%_{it} = \beta_0 + \sum_{k=1}^{4} \beta_{1k} UTBSettle\%_{it-k} + \beta_2 UTBCY_{it-1} + \beta_3 UTBPY_{it-1} + \gamma' \text{Controls} + Year\ fixed\ effects + Industry\ fixed\ effects + \varepsilon_{it}. \quad (3)$$

All variables are as previously defined, and the vector of control variables included in Eq. (3) is identical to that from Eq. (1).

Table 8 reports the summary regression results from the OLS estimation of Eq. (3). Most notably, we find that the coefficients on all lags of *UTB_Settle%* are significantly greater than zero, suggesting that historical UTB settlements are predictive of future UTB settlements. In addition, untabulated tests reveal that the coefficient on the fourth lag of *UTB_Settle%* is significantly less than the coefficients on the other three lags. Collectively, our results suggest that historical UTB settlements are predictive of future settlements.

Table 7
The Attenuating effect of UTB settlements on the market valuation of the UTB reserve.

Explanatory variable	Column A		Column B		Column C	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
UTB_End_{it}	2.948**	2.03	−1.295	−0.51	−0.287	−0.12
$UTB\_Settle\%_{it}$	–	–	2.066	0.96	1.326	0.69
UTB_End_{it}* $UTB\_Settle\%_{it}$	–	–	−20.553*	−1.68	−17.300	−1.59
$UTB\_Settle\%_{it-1}$	–	–	–	–	4.286*	1.89
UTB_End_{it}* $UTB\_Settle\%_{it-1}$	–	–	–	–	−22.555**	−2.25
Tax_MWIC_{it}	−6.342***	−2.88	−5.163***	−2.35	−5.125***	−2.40
UTB_End_{it} * Tax_MWIC_{it}	3.215	0.65	3.972	0.79	4.541	1.01
IRS_TRAC_{ct}	–	–	−16.574***	−3.35	−16.389***	−3.32
UTB_End_{it} * IRS_TRAC_{ct}	–	–	6.156	1.19	6.010	1.16
$Size_{it}$	–	–	4.322***	7.97	4.319***	8.03
BVE_{it}	0.179***	2.41	0.167**	2.30	0.172***	2.38
Net_DTA_{it}	−0.632***	−2.36	−0.495*	−1.91	−0.491*	−1.92
NI_{it}	7.886***	15.87	7.660***	15.20	7.669***	15.19
$Loss_{it}$	−5.353***	−4.93	−3.251***	−3.28	−3.233***	−3.27
NI_{it}* $Loss_{it}$	−8.925***	−14.79	−8.312***	−13.41	−8.342***	−13.42
Year fixed effects	Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes	
# of Observations	10,444		10,444		10,444	
Adjusted R^2	56.06%		57.53%		57.69%	

This table summarizes results from the OLS estimation of three variants of Eq. (2). The dependent variable in each specification is $Price_{it}$. Appendix A defines all variables. All continuous variables are winsorized at the 1st and 99th percentiles, and t-statistics are based on standard errors clustered by firm.
***, **, * Indicate that coefficient is significantly different from zero at the 1%, 5%, and 10% levels, respectively.

Table 8
The effect of prior year UTB settlements on current year settlements.

Explanatory variable	Coefficient	t-statistic
$UTB\_Settle\%_{it-1}$	0.1039***	4.89
$UTB\_Settle\%_{it-2}$	0.1372***	5.73
$UTB\_Settle\%_{it-3}$	0.1108***	4.23
$UTB\_Settle\%_{it-4}$	0.0450**	1.97
UTB_CY_{it-1}	−1.6117**	−2.17
UTB_PY_{it-1}	1.6198**	2.36
IRS_TRAC_{ct}	0.0249	0.87
$Size_{it}$	0.0002	0.06
$AssetGrowth_{it}$	0.0023	0.14
$\Delta AbnormalAcc_{it}$	6.2170*	1.92
ΔNOL_{it}	−0.0084	−0.57
$\Delta EquityIncome_{it}$	−0.8405	−0.68
$\Delta ForeignIncome_{it}$	−0.0257	−0.24
$\Delta R\&D_{it}$	−0.1032	−0.71
$\Delta Leverage_{it}$	0.0068	0.24
$\Delta BookMarket_{it}$	−0.0011	−0.41
ΔPPE_{it}	0.0796	1.07
ΔROA_{it}	0.0014	0.04
$\Delta Cash_{it}$	−0.0509**	−2.25
$\Delta Depreciation_{it}$	0.0517	0.15
$\Delta SG\&A_{it}$	0.0127	0.16
$SalesGrowth_{it}$	−0.0124	−0.87
$\Delta CashETR_{it}$	0.0001	0.29
$APTS\ Indicator_{it}$	0.0087	1.29
Year fixed effects		
Industry fixed effects		
# of Observations		
Adjusted R^2		

This table summarizes results from the OLS estimation of Eq. (3). The dependent variable is $UTB\_Settle\%_{it}$. Appendix A defines all variables. All continuous variables are winsorized at the 1st and 99th percentiles, and t-statistics are based on standard errors clustered by firm.
***, **, * Indicate that coefficient is significantly different from zero at the 1 percent, 5 percent, and 10 percent levels, respectively (two-tailed tests).

5. Conclusion

In this study, we examine how tax audit settlements of a company's uncertain tax positions affect its subsequent tax planning and reporting behavior. In the annual UTB disclosure, firms are required to report the amount of the UTB reserve that was settled during the year with tax authorities. In particular, the presence of a settlement suggests that the tax authority challenged at least one of the firm's uncertain tax positions and, therefore, provides the company with new information regarding the sustainability of its tax avoidance strategies and existing uncertain tax positions.

Consistent with expectations, our multivariate tests suggest that UTB settlements are negatively associated with the accrual related to new uncertain tax positions. In addition, we demonstrate that managers appear to respond to UTB settlements by decreasing the extent of downward adjustments to the UTB reserve related to existing uncertain tax positions. Collectively, these findings suggest that tax authority scrutiny in the form of settlements may induce managers to be more conservative with their tax reporting, and possible their tax planning activities as well. Furthermore, we conjecture and find that that the valuation of UTBs is lower in the year subsequent to a UTB settlement.

Our study makes several important contributions to the literature. First, we extend the stream of research focusing on tax enforcement by examining the effect of firm-specific tax audit outcomes on subsequent firm behavior. In particular, our results suggest that, following UTB settlements, firms record a lower UTB accrual related to new uncertain tax positions and they revise their expectations about the realizability of uncertain tax positions that were established in prior periods. As such, our findings support the notion that firms respond to the information received during the tax audit process. In addition, we contribute to the literature examining the valuation of uncertain tax positions by identifying one facet of the nuanced relationship between the UTB reserve and firm value. In particular, the results of our study suggest that prior realizations of the cash tax benefits associated with UTBs are associated with expected future realizations, making them an important determinant of the valuation of UTBs.

Appendix A. Variable definitions

Variable	Definition
Primary variables of interest:	
UTB_CY	The net change in the unrecognized tax benefit reserve related to positions taken in the current fiscal year (TXTUBPOSINC – TXTUBPOSDEC) scaled by beginning of the year total assets
UTB_PY	Net additions (reductions) to the unrecognized tax benefit reserve related to positions taken in prior fiscal years (TXTUBPOSPINC – TXTUBPOSPDEC) scaled by beginning of the year total assets
UTB_PY_INC	Additions to the unrecognized tax benefit reserve related to positions taken in prior fiscal years (TXTUBPOSPINC) scaled by beginning of the year total assets
UTB_PY_DEC	Reductions to the unrecognized tax benefit reserve related to positions taken in prior fiscal years (TXTUBPOSPDEC) scaled by beginning of the year total assets
UTB_Settle%	Adjustments to the UTB reserve during the year related to settlements (TXTUBSETTLE), divided by the beginning of the year balance in the UTB reserve (TXTUBBEGIN)
IRS_TRAC	The number of corporate audits performed for each size group (determined by total assets) in a given year divided by the number of corporate returns filed for the size group during the year. This variable is constructed based on data obtained from the Transactional Records Access Clearinghouse (TRAC)
Size	The natural logarithm of total assets (AT)
AssetGrowth	The annual percentage change in total assets (AT)
ΔAbnormalAcc	The annual change in abnormal accruals based on performance-adjusted modified Jones model (Dechow, Sloan, & Sweeney, 1995)
ΔNOL	The annual change in tax-loss carryforwards (TLCF) divided by prior-year total assets (AT)
ΔEquityIncome	The annual change in equity income (ESUB) divided by prior-year total assets (AT)
ΔForeignIncome	The annual change in pre-tax foreign income (PIFO) divided by prior-year total assets (AT)
ΔR&D	The annual change in research and development expenditures (XRD) divided by prior-year total assets (AT)
ΔLeverage	The annual change in the long-term debt-to-asset ratio. Total long-term debt (DLTT) divided by prior-year total assets (AT).
ΔBookMarket	The annual change in the book-to-market ratio. Book value of equity (CEQ) divided by market value of equity (PRCC_F × CSHO)
ΔPPE	The annual change in net property, plant, and equipment (PPENT) divided by prior-year total assets (AT)
ΔROA	The annual change in return on assets. Ratio of income before extraordinary items (IB) divided by average total assets
ΔCash	The annual change in cash holdings (CHE) divided by prior-year total assets (AT).
ΔDepreciation	The annual change in depreciation and amortization expense (DP) divided by prior-year total assets (AT)
ΔSG&A	The annual change in selling, general, and administrative expenses (XSGA) divided by prior-year total assets (AT)
SalesGrowth	The annual percentage change in total revenues (REVT)
ΔCashETR	The annual change in the cash effective tax rate, calculated as cash taxes paid (TXPD) scaled by pre-tax income less special items (PI – SPI).
APTS Indicator	An indicator variable equal to one if the firm engages their auditor for tax services in year t, and zero otherwise
Price	Share price one day after the 10-K filing date (PRC from CRSP)
UTB_End	Ending balance in the unrecognized tax benefit reserve (TXTUBEND), scaled by common shares outstanding
Tax_MWIC	An indicator variable assuming the value of one when the firm reports a tax-related material internal control weakness for the year; zero otherwise
BVE	Total assets (AT) minus deferred tax assets (TXNDBA) less total liabilities (LT) plus deferred tax liabilities (TXNDBL) and plus the ending UTB balance (TXTUBEND), scaled by common shares outstanding
Net_DTA	Deferred tax assets (TXNDBA) less deferred tax liabilities (TXNDBL), scaled by common shares outstanding
NI	Net income before extraordinary items (IB) scaled by common shares outstanding
Loss	An indicator variable assuming the value of one when *NI* is less than zero; zero otherwise

Changes variables are specified in the text with Δ and are measured as the year-over-year change divided by prior-year total assets. Unless otherwise stated, all mnemonics are those used in the annual Compustat dataset.

Appendix B. Example of UTB tabular rollforward disclosure

The following excerpt is from Ford Motor Company's 10-K filing for fiscal year ended December 31, 2017.

A reconciliation of the beginning and ending amounts of unrecognized tax benefits for the years ended December 31 were as follows (in millions):

	2017	2016
Beginning balance	$ 1586	$ 1601
Increase – tax positions in prior periods	716	12
Increase – tax positions in current period	44	69
Decrease – tax positions in prior periods	(22)	(67)
Settlements	(263)	(23)
Lapse of statute of limitations	(10)	(3)
Foreign current translation adjustment	12	(3)
Ending balance	$ 2063	$ 1586

This table summarizes results from the OLS estimation of three variants of Eq. (1). Appendix A defines all variables. All continuous variables are winsorized at the 1st and 99th percentiles, and t-statistics are based on standard errors clustered by firm.
***, **, * Indicate that coefficient is significantly different from zero at the 1 percent, 5 percent, and 10 percent levels, respectively (two-tailed tests).

Data availability

All data is publicly-available from the sources identified.

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