

Understanding the Informativeness of Book-Tax Differences

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Abstract: We contribute to the literature attempting to understand the specifics of the information contained in book-tax differences. We begin by illustrating that the relation found in the literature between book-tax differences, earnings growth and persistence stems from uncorrelated measurement error in the accounting systems developed to report income for tax filings and financial statements. Using a series of counterfactual tests and simulation analyses, we show that the information contained in book-tax differences is not necessarily unique. We also develop a theoretical model that incorporates a report of taxable income in the Fischer and Verrecchia (2000) reporting bias framework. The model suggests that large book-tax differences are particularly informative when there is greater noise in the measurement of book and/or taxable income. However, manipulation of earnings by managers *reduces* the information content of book-tax differences. Ultimately, we find evidence consistent with our theory. Namely, that book-tax differences are informative because they provide information regarding the potential inability of the accounting systems underlying book and taxable incomes to capture economic performance.

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1. Introduction

Book-tax differences (BTDs) have been studied extensively. One vein of the literature presumes that BTDs provide a signal regarding the “informativeness” of earnings. Hanlon (2005) and Lev and Nissim (2004) are contemporaneous papers that provide evidence that BTDs provide information regarding the persistence and growth, respectively, of pre-tax income. This work essentially argues that greater BTDs signal poor earnings quality, or have unfavorable consequences for future performance. Another stream of literature suggests that BTDs can provide information regarding the extent of firms’ book and/or taxable income manipulation. For example, Desai (2003) and Desai and Dharmapala (2006) argue that BTDs are indicative of tax sheltering activity. Mills (1998) supports this conjecture by providing evidence that large BTDs are associated with a greater likelihood of being audited by the tax authorities and greater settlement payments.

Notice that the general tenor of this stream of literature is that larger spreads between book income and taxable income provide useful information about the manipulation of either book or taxable income. However, despite the evidence in the literature that BTDs are meaningful, it is not at all clear *why* they would be. There currently exist no theoretical models that provide insight specifically into the usefulness of BTD’s to capital market participants¹. In the absence of such a theory, prior research has relied on heuristics to inform both hypothesis development and research design. Thus, BTDs are somewhat of a black box. Our objective is to provide analytical and empirical insight into the economics underlying the BTD.

¹ Shackelford et al. (2011) develop a theory to explain how differences in financial and tax reporting affect corporate behavior. But, their theory does not examine how capital market participants use the information from BTDs. Rather, they assume that capital markets believe BTDs signal potential earnings manipulation.

Recently, work has begun to explore what particular aspects of BTDs provide information to equity investors. Consider that many BTDs simply represent mechanical timing differences generated by differences in GAAP and IRS reporting rules². Arguably, these mechanically-driven BTDs should have little information content beyond the accounting construct (e.g., the allowance for doubtful accounts). Raedy, Seidman, and Shackelford (2011) recognize that if aggregate BTDs are informative about future performance then there should be specific parts of the BTDs that are more informative than others. Interestingly, these authors fail to find any evidence that the market responds differently to those BTDs that are potentially better signals of future performance. Raedy, Seidman, and Shackelford (2011) argue that the lack of market response to specific BTDs is attributable to the complexity of the tax footnote.

Like Raedy, Seidman and Shackelford (2011), we, too, are curious as to the precise BTD signal to which the market is responding. To provide some structure to our thinking, we conceptualize both book and taxable income as measures of “true” firm performance plus error. We begin by considering a setting where there are no agency conflicts or tax planning incentives and “true” earnings evolve via a random walk. In this highly stylized world, mechanical differences in GAAP and IRS rules are the sole determinants of BTDs. BTDs capture the portions of measurement error in both reporting systems that are uncorrelated. Under this conceptualization, BTDs themselves provide no information about actual firm performance. Instead, they provide a signal about the quality of the underlying accounting systems. By construction, we do not allow for there to be a causal relationship between BTDs and future firm performance. Nonetheless, we demonstrate that BTDs predict growth and persistence of book income.

² For example, the BTD for the allowance for doubtful accounts is the firm’s allowance for doubtful accounts multiplied by the blended federal and state tax rate that the firm expects to bear when the bad debt comes to fruition.

The key insight from the model is that BTDs are informative about growth in book income because uncorrelated measurement error in the systems used to report income for tax purposes and for financial statements allows us to estimate a more precise signal of current performance than we would obtain from book income alone. This insight contributes to the debate regarding book-tax conformity (e.g., Hanlon, Laplante, and Shevlin, 2005; Hanlon, Maydew, and Shevlin, 2008); differences between GAAP and the tax code result in the availability of more precise information for both market valuation and governance purposes. Our model also provides insight into the observed relationships between the absolute magnitude of BTDs and earnings persistence. The likelihood of observing extreme BTDs is highest when the underlying accounting systems yield noisier measures of performance. Therefore, we argue that large positive or large negative BTDs are a reasonable proxy for the overall level of noise in the accounting systems.

The inferences from our analysis highlight identification challenges in the BTD literature and suggest that researchers should exercise caution when interpreting the empirical findings related to BTDs. We show mathematically that empirical studies will find associations between BTDs and measures of earnings quality even in the absence of any strategic behavior by managers to manipulate either book or taxable income. To demonstrate this, we revisit the Lev and Nissim (2004) association between BTDs and measures of earnings growth and the Hanlon (2005) association between BTDs and earnings persistence. As our model suggests that the information in BTDs stems from the uncorrelated measurement error in book and taxable income, we develop empirical tests that rely on arbitrarily created alternative performance measures. Essentially, if the informativeness of BTDs stems from measurement error, then we should find the same association between growth and our alternative measures. For example, we

develop an alternative measure of sales by (arbitrarily) grossing up cost of goods sold (COGS) by the statutory tax rate. Similar to the methodology used by researchers studying BTDs, we develop a measure of difference by subtracting our alternative measure of sales from reported sales. We also develop a difference measure using gross margin and sales, general and administrative expenses. Ultimately, we document the same association between our alternative measures of difference and future performance and persistence, suggesting that the Lev and Nissim (2004) and Hanlon (2005) results are attributable to uncorrelated measurement error rather than a BTD signal regarding manipulation of either book or taxable income.

In addition, we undertake a simulation analysis to mitigate concerns that the alternative performance measures used in our empirical analyses contain some signal of future performance. We first replicate the primary findings of Lev and Nissim (2004) and Hanlon (2005). We then randomly assign taxable income and book-tax differences from the empirical distribution. The output from our simulations consistently matches the findings documented in the prior empirical literature. Once again, in a setting without any tax- or book-related bias, we find evidence consistent with uncorrelated measurement error explaining the association between BTDs and the growth and persistence of book income.

Next, we relax our earlier theoretical assumption that BTDs are exogenously determined and investigate how agency conflicts and tax incentives may result in biased reports of firm performance. To do so, we extend the Fischer and Verrecchia (2000) reporting bias framework to include a potentially biased report of taxable income. This extension more closely maps with the conventional wisdom in the literature that BTDs are indicative of the manipulation of either book or taxable income (e.g., Badertscher et al., 2009; Ayers et al., 2010 etc.). As in our stylized setting, we present a model where firms' underlying economic performance is not directly

observable but can be measured with error by an accounting system. We assume that firms provide two different measures of performance, book income and taxable income. The noise component in both of these income measures is due to either the inability of the measurement system to capture firms' true economic performance or manipulation by managers.

In our model, both book and taxable income provide information to the market about the value of the firm. But reporting a higher taxable income also decreases firm value because it increases firms' tax liabilities and thus lowers future cash flows to investors. Therefore, when choosing how aggressively to avoid taxes, managers face a tradeoff between lowering firms' tax liabilities and increasing the market's assessment of firm performance. When managers face strong incentives to upwardly manage book income the market anticipates earnings management and thus reduces the market value accordingly. This leads managers to report a smaller BTB when the net benefit of biasing book income (the market value received from biasing income less the cost of biasing) is higher than the net benefit of biasing taxable income. Therefore, we conjecture that BTBs do not provide a reliable signal of earnings manipulation.

We perform empirical tests to investigate this conjecture. First, to study whether BTBs are associated with earnings manipulation, we test whether firms that are more likely to be managing earnings also have larger BTBs. To proxy for earnings management activity, we rely on a sample of firms that have been identified ex post as having reported fraudulent earnings. Ultimately, we fail to find evidence that these firms report larger BTBs while committing fraud. Rather, consistent with Erickson et al. (2004), we find that the sample of fraudulent firms has relatively smaller BTBs. These results suggest that BTBs are a poor proxy of earnings manipulation.

Overall, our model implies that the information content of BTDs stems from their ability to provide a signal about the ability of accounting systems to measure firm performance. We can think of both book and taxable income as measures of “true” firm performance plus error. Because a portion of the error that stems from different standards is uncorrelated, a combination of the two reports provides a more precise signal of firm performance than either report would individually. We argue that the validity of this proxy stems from differences between GAAP and the tax code and that managerial manipulation of either book or taxable earnings limits the proxy’s usefulness.

It is important to note that nothing in this paper refutes the empirical results in the above studies. Rather, our innovation is to provide a theoretical explanation for *why* these results exist. We argue that BTDs do not need to provide any information regarding future growth to generate the previously documented empirical results; they only need to provide information regarding the efficacy of the underlying accounting systems in measuring true economic earnings. Moreover, the information provided by BTDs regarding the efficacy of the underlying accounting systems does not need to be driven by manipulation of either book or taxable income. None of our tests can explicitly rule out that BTDs provide some information regarding earnings quality. Nonetheless, our results do suggest that the association between BTDs and measures of earnings quality is far more nuanced than suggested in the extant literature.

Our paper proceeds as follows. Section 2 provides background, Section 3 develops our simple model of the relation between book and taxable income, and Section 4 describes the data, research design and empirical results of tests of our simple model. In Section 5, we present a theoretical model to examine how managers’ reporting and tax planning incentives are likely to affect reported BTDs and provide empirical tests of the model. Section 6 concludes.

2. Background Literature/Motivation

Mills (1998) is the first study to empirically investigate whether BTDs could be incrementally informative to book income and taxable income.³ She conjectures that tax authorities may view larger spreads between book and tax income as evidence of tax planning. Ultimately, she finds that proposed IRS audit adjustments are increasing in the spread between book and taxable incomes. Her evidence suggests that the tax authorities rely on BTDs to signal that firms are potentially managing taxable income downward.⁴

Relying on Mills' findings, a series of papers, including Desai (2003), Desai and Dharmapala (2006), Frank, Lynch, and Rego (2009), and Seidman (2010) use an estimate of BTDs as their measure of tax sheltering activity. These authors recognize that the spread between book and taxable incomes is a function of tax planning and earnings management. In some of this work, the authors attempt to strip out either the tax planning or earnings management component of the BTD in order to study the remaining component. Like Mills (1998), this work generally finds support for BTDs capturing tax sheltering activity.

Hanlon (2005) and Lev and Nissim (2004) concurrently realized that, if BTDs are a function of firms' tax planning and/or earnings management, they should provide information regarding future GAAP earnings. Hanlon (2005) specifically investigates the relation between large BTDs and the persistence of pre-tax earnings, whereas Lev and Nissim (2004) find that

³ Cloyd (1995) and Cloyd, Pratt and Stock (1997) provide survey evidence consistent with tax advisors believing that spreads between book and taxable income provides a red-flag to tax authorities. Amir et al. (1997) also study deferred tax assets/liabilities. However, they investigate whether these amounts are value-relevant.

⁴ IRS Form 8886, introduced in 2003, requires firms to report all "listed transactions" as described in the Treasury Regulation §1.6011-4. Initially, these regulation required taxpayers to report all transaction with a large book-tax difference. However, in 2006, the IRS removed the requirement to report large BTDs on Form 8886 through Notice 2006-6, 2006-5 I.R.B. 385, presumably because these large BTDs were not useful to the tax authorities in identifying tax shelter activity.

BTDs provide a signal regarding future growth in pre-tax income.⁵ These two papers spawned a literature on the relationship between BTDs and earnings quality. For example, Phillips, Pincus and Rego (2003), Badertscher, Phillips, Pincus and Rego (2009) and Blaylock, Shevlin and Wilson (2012) provide evidence suggesting that BTDs capture management of book income. This has led to papers such as Dhaliwal, Huber, Lee and Pincus (2008), Ayers, Laplante, and McGuire (2010) and Crabtree and Maher (2009), which investigate the association between BTDs and the cost of capital, changes in credit ratings and levels of credit ratings, respectively. In the absence of an economic theory for the information content of tax reporting, all of these studies rely on the heuristic that BTDs signal something about management's manipulation of book income. For example, Ayers et al. (2010) explicitly states that a "widening book-tax difference represents a potential danger as it might indicate deteriorating earnings quality." Interestingly, this literature suggests that BTDs are less informative when they are a greater function of tax planning (see Blaylock et al. 2012).

However, what is curious about this line of research is that it is never explicit regarding the attribute of the BTDs' from which the market is garnering information. Many deferred tax assets and liabilities simply capture an accounting difference in the measurement of book and taxable income (e.g., allowance for doubtful accounts, warranty, pensions, and compensation). It is puzzling that financial statement users wouldn't rely on the underlying accrual generating the BTD rather than the BTD. Guenther (2011) and Raedy, Seidman, and Shackelford (2011) both recognize this apparent hole in the literature and attempt to address it in different ways.

⁵ Note that Lev and Nissim (2004) investigate the ratio of taxable income to book income as their proxy of book-tax differences.

Guenther (2011) revisits Hanlon's (2005) analysis to ascertain which firms are driving the persistence results. In an exploratory analysis, Guenther (2011) documents that the results are attributable to 113 observations that are predominantly young and/or small firms with either net operating losses or special items (i.e., firms that are more likely to have transitory earnings). Guenther (2011) concludes that there are some firm-year observations (34) for which there does appear to be information content in BTDS. However, after including controls for special items, firm age, the presence of large accruals, and the pre-tax return on assets in the persistence model, there is no longer any evidence that earnings of firms with large book-tax differences are less persistent than those firm years with small BTDS.

Raedy, Seidman, and Shackelford (2011) take a different approach to investigating the information content of BTDS: they break the aggregate BTDS into its parts. These authors implicitly argue that if aggregate BTDS provide information then the specific components that are more likely to signal about management manipulation should be informative. Although the authors find that firms with higher earnings persistence have smaller BTDS associated with accruals quality (revenue recognition, asset impairments, employee benefits and mark-to-market accounting), the authors do not find any evidence that the market uses these detailed BTDS in its assessment of firm value. Ultimately, the authors conclude that BTDS information in the tax footnote is simply too complicated to be used for valuation purposes.

Guenther (2011) and Raedy et al. (2011) provide some information regarding what BTDS do not represent but we still do not understand what they do capture. We hope to fill this void in our understanding of the informativeness of BTDS.

3. A Simple Model of Book and Taxable Earnings

We begin with a simple model of book and taxable earnings.⁶ We assume that a firm engages in activities that result in pre-tax economic earnings of $\tilde{x}_t = \mu_x + \tilde{\varepsilon}$, where $\tilde{\varepsilon}$ is independent and normally distributed with mean 0 and variance σ_ε^2 .⁷ Without loss of generality, we set $\mu_x = 0$. We then assume that economic earnings evolve according to a random walk, that is, $\tilde{x}_{t+1} = \tilde{x}_t + \tilde{\varphi}$, where $\tilde{\varphi}$ is independent and normally distributed with mean 0 and variance σ_φ^2 . The firm has two separate accounting systems. Book income conforms with rules for external financial reporting and is represented by $\widetilde{BI}_t = \tilde{x}_t + \tilde{v}_t$. Taxable income conforms with rules for tax reporting and is represented by $\widetilde{TI}_t = \tilde{x}_t + \tilde{\eta}_t$. We assume that \tilde{v}_t and $\tilde{\eta}_t$ are independently distributed with 0 means and respective variances of σ_v^2 and σ_η^2 . Thus, each accounting system measures the firm's true economic performance with error, and this error is uncorrelated between the two accounting systems.⁸ In the second period, the firm reports book income of $\widetilde{BI}_{t+1} = \tilde{x}_{t+1} + \tilde{v}_{t+1}$.⁹ As with the previous period, we assume that \tilde{v}_{t+1} is independently distributed with mean 0 and variance of σ_v^2 .

Before continuing, we highlight three assumptions that are implicit in our analysis. First,

⁶ We do not intend for this model to capture all of the facets of the mechanics of the accounting for BTDs. Rather, our intention is to create a highly-stylized model that can succinctly illustrate how the conventional wisdom regarding the informativeness of BTDs may not be correct.

⁷ We follow the standard convention and denote random variables with a tilde, and their realizations without a tilde.

⁸ We abstract away from the portion of the measurement error in firms' book and tax income reports that is common to both accounting systems because we are interested in understanding what drives the information content of book-tax differences, and the common error is cancelled out of the book-tax difference when taxable income is subtracted from book income. Furthermore, if the error terms have non-zero means our inferences are unchanged.

⁹ As constructed, measurement error from one period to another does not reverse. Therefore, the book-tax differences we model could be either permanent or temporary. If we allow measurement error from the previous period to reverse, then our results are strengthened.

we assume that both book and taxable income measure the same underlying construct.¹⁰ We believe that this assumption is generally maintained throughout the BTD literature. Second, we assume that true earnings follow a random walk. Prior empirical studies on the time-series properties of earnings consistently find evidence that earnings follow an autoregressive process.¹¹ Our results hold for any autoregressive process, but the random walk assumption allows for clearer insights. Finally, we assume that book and taxable income are exogenously determined. This implies that neither agency conflicts nor tax incentives affect their outcome. We recognize that this is a strong assumption, but believe that it provides us with a useful base case for thinking about the information content of book and taxable earnings. We relax this assumption in our extension of the Fischer and Verrecchia (2000) model in Section 5.

Under our assumptions, the book-tax difference, $\widetilde{BTD} = \widetilde{BI}_t - \widetilde{TI}_t = \tilde{v}_t - \tilde{\eta}_t$. By itself, the book-tax difference provides no information about underlying firm performance. In fact, by construction, the book-tax difference is uncorrelated with both future economic and book income. Nonetheless, simple application of Bayes' Rule implies that:

$$E\left[\tilde{x}_{t+1} \mid BI_t, BTD\right] = \frac{\sigma_\varepsilon^2 \sigma_v^2 + \sigma_\varepsilon^2 \sigma_\eta^2}{\sigma_\varepsilon^2 \sigma_\eta^2 + \sigma_\varepsilon^2 \sigma_v^2 + \sigma_\eta^2 \sigma_v^2} BI_t - \frac{\sigma_\varepsilon^2 \sigma_v^2}{\sigma_\varepsilon^2 \sigma_\eta^2 + \sigma_\varepsilon^2 \sigma_v^2 + \sigma_\eta^2 \sigma_v^2} BTD. \quad (1)$$

The coefficient on BTD is unambiguously negative. Thus, we should expect that firms with large book-tax differences experience lower future economic income than firms with small book-tax differences. The reason for the relation between BTDs and future earnings is because BTDs provide a signal of the measurement error in the book and tax accounting systems. A large (i.e., positive) BTD suggests that book income overestimates *current* economic performance. And, if

¹⁰ We do not need to have a set notion of economic earnings for our simple model's inferences to hold. Rather, any notion of performance that would potentially be reflected in both book and taxable incomes would suffice.

¹¹ For a survey of this literature, see Kothari (2001).

true earnings follow an autoregressive process, then current economic performance is the best predictor of future economic performance.

While BTDs in our simplified setting are uncorrelated with future economic performance or future book income, they are mechanically correlated with the growth in book income. To see this, note that we can represent growth in book income by $\tilde{G} = \widetilde{BI}_{t+1} - \widetilde{BI}_t = \tilde{\varphi} + \tilde{v}_{t+1} - \tilde{v}_t$. Observe that any measurement error in book income that is not completely persistent will lead inevitably to a negative correlation with the BTD:

$$E[\tilde{G}|BTD] = -\frac{\sigma_v^2}{\sigma_v^2 + \sigma_\eta^2} BTD. \quad (2)$$

Furthermore, if the measurement error reverses in future periods, then this negative correlation is exacerbated.

Our analysis further extends to the relation between BTDs and persistence. Note that, in our setting, $E[\widetilde{BI}_{t+1}|BI] = \frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + \sigma_v^2} BI$. The persistence parameter one would expect to observe is unambiguously decreasing in σ_v^2 . In an empirical setting, σ_v^2 is unknown. However, the law of large numbers suggests that firms with the largest book-tax differences in absolute magnitude are those where σ_v^2 and σ_η^2 are largest. For example, firms with losses or significant levels of transitory earnings could conceivably have greater σ_v^2 and σ_η^2 . Therefore, we would expect these firms to have less persistent book earnings than firms with smaller book-tax differences.

4. Empirical Implications

Our discussion above suggests that BTDs need only proxy for measurement error in accounting systems to generate a relation between BTDs and earnings growth and persistence.

Conceptually, we lend support to the overall conclusion of Hanlon (2005) and Lev and Nissim (2004) that BTDs provide information regarding earnings quality. We argue, however, that their findings cannot be interpreted solely as evidence that BTDs are a signal that either book or taxable income is manipulated. To illustrate why, we conduct a series of falsification tests to demonstrate the extent to which idiosyncratic measurement error in book and tax income likely contributes to the observed relation between BTDs and earnings quality.

4.1. Uncorrelated measurement error and future growth

For our falsification tests, we examine two alternative measures of firm performance, sales and gross margins. Using a methodology similar to that commonly used in the tax research to generate alternative measures of sales and gross margins, we then demonstrate that the relation between the alternative measures and future firm performance is consistent with the predictions of our model. Stated another way, we create a de facto BTD that is the difference between measures other than book and taxable income. We acknowledge that it is possible that one or more of our alternative measures provides a signal regarding future performance innovations. However, consistent evidence of a relationship between our “synthetic” differences and future performance suggests that researchers should use care in interpreting findings that relate BTDs with earnings attributes.

We begin by using an empirical specification developed in Lev and Nissim (2004) to study the association between BTDs and book income growth. Their measure of BTDs is the ratio of after-tax taxable income over book net income. The authors argue that this ratio is a tax fundamental that can be used to predict future growth in book net income. Their basic story is that higher ratios of the tax fundamental imply less manipulation of net income and, therefore,

greater future increases in net income. Relying on Lev and Nissim, the general specification for our analysis is as follows:

$$G_t = \alpha_{indu} + \beta_1 FUND_t + \varepsilon \quad (3)$$

Where G is the average growth in the performance measure over various periods, scaled by lagged total assets and α_{indu} is an industry fixed effect. Lev and Nissim (2004) investigate the growth in book net income whereas we use two alternative performance measures discussed below. $FUND$ is a Lev and Nissim (2004) style fundamental calculated using an arbitrarily created alternative performance measure. We follow the methodology in Lev and Nissim (2004) and estimate equation (3) using Fama-MacBeth regressions.

The first measure of firm performance that we examine is sales revenue, $SALES$. We create an alternative measure of sales by grossing up firms' cost of goods sold, $COGS$, by the current period tax rate:¹²

$$SALES_ALT_{j,t} = \frac{COGS_{j,t}}{tax_rate_t}. \quad (4)$$

This measure is roughly equivalent to the methodology generally used by researchers to determine firms' taxable income, with $COGS$ serving the role of current tax expense.¹³ While current period $COGS$ is certainly related to current period $SALES$, we find it unlikely that current

¹² We rely on the most basic Lev and Nissim (2004) specification (Table 3, Panel B, rows 1-3) because we do not have any insight as to how to create control variables for our alternative measure specifications. We do replicate their specifications that include measures of deferred tax expense and cash flows in Section 4.4.

¹³ Taxable income is estimated by grossing up current tax expense by the top U.S. statutory tax rate.

COGS provides a signal about future revenue innovations, although we cannot rule out such a possibility.¹⁴

Our second measure of performance is the gross margin, *GROSS*, calculated as the difference between *SALES* and *COGS*, scaled by lagged total assets. We create an alternative measure of gross margin, *GROSS_ALT*, by grossing up firms' sales, general, and administrative (SGA) expenses by the current period tax rate. Once again, we find it unlikely that the current the period's SGA expense will be associated with future growth in the firm's gross margin.

Next, we create Lev and Nissim (2004) style fundamentals based on our arbitrary performance measures:¹⁵

$$FUND = \frac{ALT_PERF(1 - tax_rate)}{PERF}, \quad (5)$$

where *ALT_PERF* is our alternative performance measure, and *PERF* is the performance measure of interest. Our COGS fundamental is *SALES_ALT(1-0.35)/SALES* and our SGA fundamental is *GROSS_ALT(1-0.35)/GROSS*. Lev and Nissim (2004) use the quintile rank of their tax fundamental by industry and year as their treatment variable of interest (*R_TAX*). We follow the same methodology to rank our *FUND* measures resulting in *R_COGS* and *R_SGA*.

4.2. Relationship between large measurement differences and the persistence of reported performance

Hanlon (2005) studies whether large unsigned BTDs are associated with less persistent pre-tax book income. The paper's basic premise relies on conventional wisdom that large BTDs

¹⁴ Abnormally low COGS could signal the opportunity for other firms to earn abnormally large profits, which in turn could lead to increased competition and lower future revenues.

¹⁵ Lev and Nissim's (2004) fundamental is the ratio of estimated-after-tax taxable income over book net income $\left(\frac{\text{Estimated Taxable income}(1-0.35)}{\text{Book Income}}\right)$.

signal some manipulation of book income.¹⁶ We argue that when two alternative signals of performance measure the same underlying phenomenon with idiosyncratic error, the unexpected differences between them will be a function of the aggregate measurement error contained in each signal. Therefore, we expect firms with noisier measures to make up a larger proportion of observations with extreme differences between the two measures. By extension, the persistence of reported performance should be lower for firms with large positive or negative differences between the reported and alternative measure. We expect this relationship to be particularly strong for firms with large (in absolute magnitude) BTDs because book and taxable income aggregate a large number of accruals. However, this relationship likely extends to our alternative measures.

We investigate this possibility by using an approach similar to Hanlon (2005) and testing the following specification:

$$PERF_{t+1} = \beta_0 + \beta_1 LNDIFF_{j,t} + \beta_2 LPDIFF_{j,t} + \beta_3 PERF_{j,t} + \beta_4 LNDIFF_{j,t} \times PERF_{j,t} + \beta_5 LPDIFF_{j,t} \times PERF_{j,t} + \varepsilon \quad (6)$$

In Hanlon (2005), *PERF* is next period's pre-tax book income and *LNDIFF* (*LPDIFF*), her measure of BTDs, are indicator variables equaling one when the ratio of deferred tax expense grossed up by the top statutory tax rate to average total assets is in the bottom (top) quintile by 2-digit SIC industry code and year and zero, otherwise (*LNBTD* and *LPBTD*, respectively).

We adapt the Hanlon (2005) specification by using alternative measures of *PERF* and *LNDIFF*/*LPDIFF*. First, we redefine *PERF* as either next period's *SALES* or *GROSS*. Next, we develop our alternative measures of BTDs. To construct the first measure, *DEFCOGS*, we

¹⁶ See Hanlon (2005) p. 137-38 for further discussion.

subtract *SALES_ALT* from *SALES* and scale the difference by average total assets. The construction of *DEFCOGS* mimics the construction of book-tax differences frequently observed in the literature (e.g. Hanlon 2005). If our alternate sales measure contains measurement error that is independent of the measurement error in the reported sales number, then we would expect to observe a negative relation between *DEFCOGS* and future revenues. To construct our second measure, *DEFSGA*, we take the difference between the *GROSS* and *GROSS_ALT*, and then scale it by average total assets. Similar to Hanlon (2005), *LNDIFF* is an indicator variable equal to one for firms for which differences between the performance measure and the alternate performance (*COGS* and *SGA*) are in the bottom quintile by 2-digit SIC industry code and year, and *LPDIFF* is an indicator variable equal to one when the difference is in the top quintile by 2-digit SIC industry code and year.

4.3. Empirical Tests

We construct a sample to conduct our falsification tests by downloading all firms from the Compustat database for fiscal years between 2001 and 2012. We eliminate firms in the financial services or utilities industries, and firms that do not have one-year ahead data. In addition, as with prior work, we require non-negative performance in the current year (though not future years) for each of our performance measures. Finally, for each set of analyses, we require the existence of variables necessary to calculate each of our alternative performance metrics (i.e., *SALES_ALT*, *GROSS_ALT*). This results in a final sample containing 19,129 firm-year observations. Summary statistics are provided in Table 1, panel A.

4.3.1. Tests of the relation between uncorrelated measurement error and earnings growth

The results of our tests of the relationship between uncorrelated measurement error of two performance measures and the growth of the measure of interest are presented in Table 2. The first column replicates the Lev and Nissim (2004) results using our sample. As in Lev and Nissim (2004), we find that firms with a higher ratio of estimated-after-tax taxable income to book income experience the highest rate of growth in book income for one to five years (NI_G1 to NI_G5) in the future, and these coefficients are increasing in the growth period.

In the second column, we test whether this relation holds for future sales and the fundamental (R_COGS) based on our alternative measure of sales ($SALES_ALT$). As expected, firms with R_COGS experience higher sales growth ($Sale_G1$ to $Sale_G5$), even five years into the future. This is consistent with the relationship we would expect to observe between two uncorrelated signals of the same underlying construct when that construct follows an autoregressive process. Although the results are consistent with our theory described in Section 3, a potential alternative explanation for this finding is that firms reporting higher cost of goods sold are less likely to be engaging in real earnings management and thus have healthier underlying sales.

Nonetheless, we find the same relationship in the third column between future gross margin ($Gross_G1$ to $Gross_G5$) and our fundamental (R_SGA) calculated using alternative sales, general, and administrative expenses ($GROSS_ALT$). While the relation is insignificant for one year ahead, it becomes significant in the measures of gross margin growth that use three and five year ahead gross margins. We are unable to think of any reason as to why we observe that firms with larger period expenses have higher growth in future gross margins other than the role

that uncorrelated measurement error in the alternative measure plays in helping to resolve uncertainty about actual performance. Taken in aggregate, our results suggest that uncorrelated measurement error between GAAP and the tax code is a major source of the information contained in book-tax differences regarding future performance.

4.3.2. *Tests of the relation between uncorrelated measurement error and earnings persistence*

Our tests of persistence are presented in Table 3. Panel A replicates the Hanlon (2005) results for our sample. Consistent with prior studies, we find that a large positive difference between book and taxable income is associated with less persistent pre-tax book earnings. However, we fail to find a statistically significant coefficient on persistence for firms with a large negative difference between book and taxable income.¹⁷ In panel B, we show that the persistence of sales is also lower when there is a large (in absolute magnitude) difference between reported sales and the alternative measure based on cost of goods sold in panel B. A possible explanation for our finding is that *DEFCOGS*, the difference between reported sales and our alternative measure, is a proxy for real earnings management. For instance, we might observe a particularly small value of *DEFCOGS* when firms offer large discounts. Therefore, we would expect next period sales to be lower for these firms. However, if *DEFCOGS* is a proxy for real earnings management, then we would expect to observe particularly large values of *DEFCOGS* when firms overproduce inventory to allocate fixed costs to a greater number of units. Under this circumstance, next period sales might be higher for firms with large values of *DEFCOGS*, which is the opposite of our findings.

¹⁷ In Section 4.4, we replicate the Hanlon (2005) analysis using her original sample period (1994-2000) and replicate her results of a significant negative coefficients on *LNBTDXPTBI* and *LPBTDXPTBI*.

In panel C we observe that the persistence of gross margins is lower when there is a large difference (in absolute magnitude) between reported margins and the alternative measure based on sales, general, and administrative expenses (i.e., *DEFSGA*). Overall, these results suggest that the findings documented in the tax literature are not unique to issues that arise due to accounting for income taxes.

4.4. Simulated Book-Tax Differences

To mitigate concerns that the alternative performance measures used in our Tables 2 and 3 empirical analyses might contain signals regarding future performance rather than merely uncorrelated measurement error, we undertake an additional series of falsification tests using data from the Lev and Nissim (2004) and Hanlon (2005) sample periods. Specifically, we replicate the main findings of Lev and Nissim (2004) and Hanlon (2005) and then conduct a simulation analysis using the true empirical distribution of taxable income and book-tax differences. In this section, we rely on real data of firms' estimated taxable incomes which is randomly assigned to different firms.

We begin by replicating the main results from Lev and Nissim (2004) in Table 3, panel B rows 10-12, using data for firm years between 1993 and 2000. Our sample composition differs somewhat from the sample in Lev and Nissim's study due to the availability of additional data for long-term growth and Compustat backfilling. As in Lev and Nissim, we calculate additional fundamentals for cash flows, *CFO*, and deferred taxes, *DEF*, and rank the fundamentals by industry-year. Our findings mirror those in the original study; we find significantly positive

coefficients on the ranked *TAX* (R_TAX) and *CFO* (R_CFO) fundamentals, but a significant negative coefficient on the ranked *DEF* (R_DEF) fundamental.¹⁸

We next perform our simulation analysis to illustrate that the relationship between R_TAX and growth is not due to the difference in book and taxable incomes. We randomly assign each firm in the Lev and Nissim sample a BTD scaled by lagged total assets from the empirical distribution.¹⁹ We then subtract the randomly assigned BTD from actual scaled pre-tax book income and multiply this number by total assets to generate a randomly assigned measure of taxable income. We use our random measures of the BTD and taxable income to calculate simulated fundamentals for *TAX* and *DEF* and re-estimate the Lev and Nissim (2004) tests to estimate coefficients for R_TAX and R_DEF . We repeat this procedure 1,000 times. The average coefficients from the simulation are reported in Table 4 panel B. The average results from the simulations have the same signs and similar magnitude as the coefficients we report in our replication. We find a significantly positive coefficient on R_TAX in every one of our simulations. We obtain similar results in untabulated tests when we run our simulations using only out-of-sample data. These results suggest that researchers should exercise caution when interpreting the Lev and Nissim (2004) findings.²⁰

We also replicate the main findings of Hanlon (2005) in panel A of Table 5. As with the Lev and Nissim (2004) replication, our sample is significantly larger than the sample used in Hanlon's (2005) original paper, most likely due to backfilling of Compustat data. Nonetheless,

¹⁸In untabulated results, we are able to replicate each of the alternative specifications used to estimate the relation between *TAX* and growth from Lev and Nissim (2004).

¹⁹The BTD is estimated as pre-tax income (Compustat *pi*) less total current federal and foreign tax expense grossed up by 0.35 (Compustat variables (*txfed* + *txfo*)/0.35).

²⁰In untabulated results, we are also able to generate the returns results in Lev and Nissim's (2004) Table 5 and Table 6 results using our simulated sample.

our findings are consistent with prior studies—pre-tax book income is less persistent when BTDs are large in absolute magnitude.

Next, we conduct our simulations by randomly assigning each firm in the sample estimated taxable income from the empirical distribution.²¹ We then create an indicator variable, *LNBTD*, for observations with simulated BTDs in the lowest quintile and *LPBTD*, for observations with simulated BTDs in the highest quintile. We then interact *LNBTD* and *LPBTD* with the first period book earnings report. For each sample, we then perform persistence regressions as in Hanlon (2005). The average regression coefficients are provided in panel B of Table 5. We consistently find negative coefficients on each of the interaction terms and reject the null hypothesis of no difference in persistence in roughly twenty percent of the simulations. In panel C, we replicate the original Hanlon (2005) result where pre-tax book income is decomposed into pre-tax accruals, *PTACC*, and pre-tax cash flows, *PTCF*. Using the same simulation procedure, once again, we consistently replicate Hanlon’s findings when the BTDs are pure noise and reject the null hypothesis of no difference in persistence in over sixty percent of our simulations. Consider that Hanlon (2005) notes that it was a puzzle as to why large BTDs provided a signal about the persistence of firms’ cash flows (see pg. 152). But if BTDs represent uncorrelated measurement error in the accounting systems, then we would expect BTDs to provide information regarding the persistence of both the accrual and cash flows components of pre-tax book income.

²¹ We randomly assign each firm a total tax expense (Compustat *txt*) and deferred tax expense (Compustat *txdi*). We then estimate taxable income as $(txt-txdi)/0.35$. We can then estimate our simulated BTDs as the difference between pre-tax book income and our randomly assigned estimated taxable income.

5. The Effect of Biased Reporting on BTDs

Next, we relax our assumption from Section 3 that BTDs contained no managerial biasing of either book or tax incomes. Recall that the conventional wisdom, adopted by most researchers, is that book-tax differences are the result of earnings management, tax aggressiveness, differences in GAAP and taxable reporting standards, or a combination of these forces. The maintained assumption in much of the literature that followed Hanlon (2005) and Lev and Nissim (2004) is that non-conforming manipulation of either book or taxable income widens the gap between the two measures and, therefore, a large BTD is indicative of such activity. To gain insight into the effects that these forces have on firms' reporting choices, we construct a parsimonious model similar to that used by Fisher and Verrecchia (2000), Beyer (2009), and Ewert and Wagenhofer (2011; 2013).

5.1. Basic Structure

In our model, a firm produces a terminal pre-tax cash flow consisting of two components, \tilde{x}_1 , and \tilde{x}_2 . The first, \tilde{x}_1 , is normally distributed with mean μ_x and variance σ_x^2 . The second, $\tilde{x}_2 = \rho\tilde{x}_1 + \tilde{\varepsilon}$, is correlated with the first and contains an independent innovation, $\tilde{\varepsilon}$, that is normally distributed with mean 0 and variance σ_ε^2 . Before the terminal cash flow is realized, the firm's manager obtains private information about it over two periods via two accounting systems. The first system is used for financial reporting. It produces two signals, $\tilde{e}_{f,1} = \tilde{x}_1 + \tilde{v}_1$ and $\tilde{e}_{f,2} = \tilde{x}_2 + \tilde{v}_1 - \tilde{v}_2$, that the manager observes privately in the first and second periods, respectively. We assume that \tilde{v}_1 and \tilde{v}_2 are independent and normally distributed with mean 0 and variance σ_v^2 . The accounting system used for financial reporting purposes thus generates a

noisy signal of the underlying pre-tax cash flows. The accounting system used for tax purposes also produces two signals, $\tilde{e}_{\tau,1} = \lambda\tilde{x}_1 + \tilde{\eta}_1$ and $\tilde{e}_{\tau,2} = \lambda\tilde{x}_2 + \tilde{\eta}_2 - \tilde{\eta}_1$, that the manager observes privately in the first and second periods, respectively. We assume that $\lambda \in (0,1)$ and that $\tilde{\eta}_1$ and $\tilde{\eta}_2$ are independent and normally distributed with mean μ_η variance σ_η^2 . Thus, we allow the tax accounting system to measure a different construct than the financial reporting system, but which may be correlated with it. Without loss of generality, we set $\mu_\eta = 0$.

After observing the signals in each period, the manager prepares two publically observable reports $\tilde{r}_{f,t}$ and $\tilde{r}_{\tau,t}$, where $t \in \{1,2\}$ denotes the period.²² The first report, $\tilde{r}_{f,t}$, is prepared to satisfy financial reporting requirements and the second, $\tilde{r}_{\tau,t}$, is prepared to satisfy tax reporting requirements. The tax authority bases its tax charge on the two tax reports, resulting in a terminal after-tax cash flow of $\tilde{x}_1 + \tilde{x}_2 - \tau(\tilde{r}_{\tau,1} + \tilde{r}_{\tau,2})$. In the first period, the manager can exercise discretion and bias each of the reports²³. We denote the observable report for financial reporting purposes as $\tilde{r}_{f,1} = \tilde{e}_{f,1} + b_f$, and the observable tax report as $\tilde{r}_{\tau,1} = \tilde{e}_{\tau,1} + b_\tau$. We assume a clean surplus relation for the bias; therefore, it reverses in the subsequent period. The second period reports are thus $\tilde{r}_{f,2} = \tilde{e}_{f,2} - b_f$, for financial reporting purposes, and $\tilde{r}_{\tau,2} = \tilde{e}_{\tau,2} - b_\tau$, for tax reporting purposes

The manager chooses the bias term for each report to maximize his objective function, which is given by:

²² We note that, while the tax report is not directly observable in reality, investors can infer firms' taxable income from their financial statements.

²³As in Ewert and Wagenhofer (2011), we only allow the manager to decide on the bias in the first period for simplicity. However, we note that allowing the manager choose a bias term in the second period does not substantively change our inferences.

$$U_M = \kappa P - \pi \tilde{r}_{\tau,1} - \frac{c_f (b_f - \tilde{y})^2}{2} - \frac{c_\tau (b_\tau - \tilde{y})^2}{2} \quad (7)$$

Where P represents the market valuation of the firm's terminal value after the first period reports are issued, and \tilde{y} is a normally distributed random variable with mean μ_y and variance σ_y^2 that represents a stochastic shock (that only the manager observes) in incentives to bias the reports.²⁴ This shock can have many different interpretations, such as the weight that the manager places on influencing the market price versus other contracting considerations or unobservable, but innate, attributes such as honesty. The key factor for our analysis is that the uncertainty prevents market participants from perfectly removing managers' biases from the reported tax and book signals. In addition, we include a parameter, κ , that measures the strength of the manager's incentive to provide information to market participants that increases their perception of firm value. We also include a parameter, π , that measures the manager's incentives to lower the firm's period one tax burden. The other two cost parameters are, c_f and c_τ , which represent the known costs of biasing the firm's financial and tax reports, respectively. We exclude the second period market price from the manager's utility function to simplify our analysis, but note that including it does not materially affect our inferences.

After the manager reports both taxable and book earnings in the first period, the market assigns an after-tax price for the firm that is based on the two reports:

$$P = E \left[\tilde{x}_1 + \tilde{x}_2 - \tau (\tilde{r}_{\tau,1} + \tilde{r}_{\tau,2}) \middle| r_{f,1}, r_{\tau,1} \right]. \quad (8)$$

²⁴ While Fisher and Verrecchia (2000) introduce uncertainty regarding managers' reporting incentives by adding a stochastic weight on price in the manager's utility function, other papers such as Dye and Sridhar (2004) and Beyer (2009) model uncertainty via the manager's costs to bias the report. If we model uncertainty as a stochastic weight on price it greatly increases the complexity of the model but does not affect the general tenor of our inferences.

Note that the report generated by the tax system provides market participants with value-relevant information even if it is uncorrelated with the pre-tax cash flows (i.e., $\lambda = 0$). In any equilibrium, the market bases its clearing price on both observable reports and its conjecture about the manager's biasing strategy. The manager, in turn, chooses the bias for each report to maximize his utility function, which is dependent on his expectation of the market price.

5.2. A linear equilibrium

To solve the model, we conjecture the existence of a linear rational expectations equilibrium such that:

$$b_f = \phi_1 e_{f,1} + \phi_2 e_{\tau,1} + \phi_3 y + \phi_4$$

$$b_\tau = \gamma_1 e_{f,1} + \gamma_2 e_{\tau,1} + \gamma_3 y + \gamma_4$$

$$P = \alpha + \beta_f r_{f,1} + \beta_\tau r_{\tau,1}$$

If rational expectations hold, then the manager conjectures that $P = \hat{\alpha} + \hat{\beta}_f r_f + (\hat{\beta}_\tau - \tau) r_t$ to solve his optimization problem. We can characterize the optimal biases to the financial and tax earnings reports by the first-order conditions with respect to each bias on the manager's objective function, which respectively imply that:

$$b_f = y + \frac{\kappa \hat{\beta}_f}{c_f}$$

and

$$b_\tau = y + \frac{\kappa \hat{\beta}_\tau - \pi}{c_\tau}$$

Given our earlier conjecture, in an equilibrium, it must be that $\phi_1 = \phi_2 = \gamma_1 = \gamma_2 = 0$, $\phi_3 = \gamma_3 = 1$,

$\phi_4 = \frac{\kappa\hat{\beta}_f}{c_f}$, and $\gamma_4 = \frac{\kappa\hat{\beta}_\tau - \pi}{c_\tau}$. Therefore, we only consider such cases when determining the

market pricing function.

In equilibrium, the market sets the firm's price given observable information:

$$P = E\left[\tilde{x}_1 + \tilde{x}_2 - \tau(\tilde{r}_{\tau,1} + \tilde{r}_{\tau,2}) \middle| r_{f,1}, r_{\tau,1}\right]$$

Solving for the price, and assuming rational expectations, our linear conjecture then implies that:

$$\alpha = (1 + \rho - \beta_f - \lambda\beta_\tau)\mu_x - \left[(\beta_f + \beta_\tau)\mu_y + \frac{\kappa\beta_f^2}{c_f} + \frac{\kappa\beta_\tau^2 - \pi\beta_\tau}{c_\tau} \right],$$

$$\beta_f = A\sigma_x^2 \frac{\sigma_\eta^2 + (1-\lambda)\sigma_y^2}{\sigma_\eta^2\sigma_v^2 + \sigma_\eta^2\sigma_y^2 + \sigma_\eta^2\sigma_x^2 + \sigma_v^2\sigma_y^2 + (1+\lambda)^2\sigma_x^2\sigma_y^2 + \lambda^2\sigma_v^2\sigma_x^2}$$

and,

$$\beta_\tau = A\sigma_x^2 \frac{\lambda\sigma_v^2 + (\lambda-1)\sigma_y^2}{\sigma_\eta^2\sigma_v^2 + \sigma_\eta^2\sigma_y^2 + \sigma_\eta^2\sigma_x^2 + \sigma_v^2\sigma_y^2 + (1+\lambda)^2\sigma_x^2\sigma_y^2 + \lambda^2\sigma_v^2\sigma_x^2}$$

where,

$$A = (1 + \rho)(1 - \lambda\tau).$$

Because β_f and β_τ are uniquely determined, it must be that $\hat{\beta}_f = \beta_f$ and $\hat{\beta}_\tau = \beta_\tau$. Therefore

there exists a unique linear equilibrium for which they are the solution.

5.3. Model implications for BTDs

What does our model tell us about the relation between BTDs and earnings quality? Note that we can write the BTD as:

$$btd = r_{f,t} - r_{\tau,t} = (1 - \lambda)\tilde{x}_1 + \tilde{v}_1 - \tilde{\eta}_1 + b_f - b_\tau \quad (9)$$

Upon casual inspection, this equation suggests that firms reporting the largest BTDs in absolute terms are likely to be those for which both the financial and tax accounting systems report economic performance with the most error—either due to measurement error in the reporting systems or to a low correlation between the tax report and the underlying cash flow. To see this, note that $\text{var}(btd) = (1 - \lambda)^2 \sigma_x^2 + \sigma_v^2 + \sigma_\eta^2$. But much of the literature uses BTDs as a proxy for earnings management or tax aggressiveness, which assumes, respectively, that $b_f > 0$ or $b_\tau < 0$. Therefore, it is of interest to ask how earnings management or tax aggressiveness is likely to be reflected in BTDs.

Because we assume that the inherent measurement error in both the financial accounting and tax accounting systems is zero in expectation²⁵, this implies that the expected book-tax difference is equal to the expected difference between the bias chosen by the manager in the financial report and the bias chosen by the manager in the tax report:

$$E[btd] = (1 - \lambda)\mu_x + b_f - b_\tau = (1 - \lambda)\mu_x + \frac{\kappa\beta_f}{c_f} - \frac{\kappa\beta_\tau - \pi}{c_\tau} \quad (10)$$

Consistent with the benefit to tax planning increasing in tax rates, we observe that this formulation yields the intuitive result that the expected book tax difference is increasing in managers' incentive to reduce their current period tax expense, π , and the rate assessed by the

²⁵ Allowing the measurement error of either reporting system to be biased does not affect our inferences.

tax authority, τ . We provide additional comparative statics on the expected BTD in proposition

1.

Proposition 1: *The expected book-tax difference is increasing in the manager's incentives to lower current period taxes, and increasing (decreasing) in the manager's incentives to increase share price when the value relevance of the financial report relative to the costs of biasing the financial report is greater (less) than the value relevance of the tax report relative to the costs of biasing the tax report.*

Proof:

The proof is obtained by taking the respective derivatives of (10). Note that:

$$\frac{d}{d\pi} E[btd] = \frac{1}{c_\tau} > 0$$

and

$$\frac{d}{d\kappa} E[btd] = \frac{\beta_f}{c_f} - \frac{\beta_\tau}{c_\tau} > (<) 0 \text{ when } \frac{\sigma_\eta^2 + (1-\lambda)\sigma_y^2}{c_f} > (<) \frac{\lambda\sigma_v^2 + (\lambda-1)\sigma_y^2}{c_\tau}.$$

The economic intuition for our results follows from the tension that comes from managers' desire to simultaneously increase the market's expectations regarding future cash flows and to reduce the real effects of taxes that are assessed based on the report of taxable income. When the measurement error in the financial accounting system has a higher variance, it has less value relevance to market participants. This increases the relative value relevance of the tax report, assuming that the tax report is reasonably correlated with the underlying pre-tax cash flows of the firm.

Because managers are concerned about the market assessment of firm value, they are willing to incur real tax costs and to reduce downward biases in taxable income when the tax report is sufficiently value relevant. Thus, consistent with the findings of Erickson, Hanlon, and

Maydew (2004), we find that managers will be willing to pay taxes on non-existent earnings when the incentives to manage book income and the value relevance of taxable income are sufficiently high.²⁶

5.4. Empirical Implications

The results of our model are generally consistent with extant empirical findings, related to book and taxable income. Similar to Lev and Nissim (2004), we can define growth in book income as $\tilde{G} = \tilde{r}_{f,2} - \tilde{r}_{f,1}$. In the context of our model, the relationship between book-tax differences and the growth in book income can be expressed as follows:

$$E[\tilde{G}|btd] = \Omega + \frac{-2\sigma_v^2 - (1-\lambda)(1-\rho)\sigma_x^2}{(1-\lambda)^2\sigma_x^2 + \sigma_v^2 + \sigma_\eta^2} btd ,$$

where Ω is a constant.

The coefficient on the book-tax difference is unambiguously negative. Note, however, that the relationship is mechanical, as both sides of the equation are a linear function of $\tilde{r}_{f,1}$. To address this issue, we consider whether book-tax differences are associated with future book income:

$$E[r_{f,2}|btd] = \Psi + \frac{-\sigma_v^2 + \rho(1-\lambda)\sigma_x^2}{(1-\lambda)^2\sigma_x^2 + \sigma_v^2 + \sigma_\eta^2} btd ,$$

where Ψ is a constant. The relationship between book-tax differences and future book earnings is ambiguous. If, however, taxable income is sufficiently correlated with the underlying pre-tax

²⁶ We can think of managers as having aggregate incentives that place more emphasis on the market price when $\mu_y > 0$ and as having aggregate incentives that place more emphasis on the tax expense when $\mu_y < 0$.

cash flows (i.e., λ large), then we will observe the negative relationship between book-tax differences and future book earnings documented in the empirical literature. Note, however, that the magnitude of this relationship is a function of measurement error; biasing incentives do not affect the slope coefficient.

Likewise, book-tax differences do not directly affect the expected persistence component. However, uncertainty regarding biasing incentives does affect the expected persistence coefficient, which is:

$$\frac{\rho\sigma_x^2 - \sigma_v^2 - \sigma_y^2}{\sigma_x^2 + \sigma_v^2 + \sigma_y^2}$$

In the context of our model, BTDs have an ambiguous relationship with σ_y^2 , and do not necessarily provide information regarding manipulation of either accounting report. If the book and tax noise components are independent, then the variance of the BTD is equal to the sum of the variance of each of the noise components. All else equal, the BTD of a firm with a noisier accounting system will have a higher variance than the BTD of a firm with a less noisy accounting system. Therefore, after controlling for the expected BTD we should expect to observe more extreme values of BTDs for firms with accounting systems that inherently measure firm performance with greater error²⁷. This increased measurement error suggests noisier earnings measures and, therefore, less persistent earnings relative to firms where the earnings process contains less measurement error.

In addition, our model has implications that should be of interest for researchers in this area—particularly those who use BTDs as a proxy for earnings quality. First, one can think of

²⁷ This follows from the Law of Large Numbers.

β_τ as a measure of the informativeness of firms' disclosures regarding taxable income. In our model, the additional information content that taxable income provides relative to book income derives from the assumption that the measurement errors in the financial and tax accounting systems are uncorrelated. Consistent with the book-tax conformity opponents (see Hanlon, Laplante, and Shevlin, 2005; Hanlon, Maydew, and Shevlin, 2008), our results indicate that there is information in taxable income incremental to that in book income.

Second, our comparative statics cast doubt on researchers' interpretation of large BTDs as a proxy for firms' management of reported book earnings. As noted earlier, if markets perceive that book income is noisy, then markets will place more emphasis on the firm's reported taxable earnings for valuation purposes. This creates an incentive for managers to report higher taxable earnings, and thus we may observe *lower* BTDs when managers are engaging in earnings manipulation—even if the manipulation is non-conforming.²⁸ We test this hypothesis empirically.

Our comparative statics also suggest that when incentives to manage taxable income are high, the BTDs increase and there is a greater downward bias in reported taxable income. In addition, when there is more "opportunity" to tax plan, due to subjectivity in the rules or organizational complexity, firms are more likely to do so. This suggests that observed book-tax differences may be a reasonable proxy for firms' tax aggressiveness. However, this proxy also captures the fundamental noisiness of firms' accounting systems, which may be correlated with key variables of interest in empirical studies. Therefore, we urge researchers who use BTDs as a

²⁸ This is consistent with the results in Badertscher et al. (2009). We expect to observe a large BTD when the accounting system is noisier, which is also likely to be correlated with restatement risk. The correlation with *intentional* misreporting, however is theoretically ambiguous.

proxy for tax aggressiveness to incorporate controls for the noisiness of underlying accounting systems into their research designs.

5.5. Empirical evaluation of earnings manipulation and the book-tax gap

Our theoretical model suggests that the relation between managers' incentives to upwardly bias book earnings and BTDs is ambiguous. If one believes that book income is generally more value relevant and less costly to manipulate than taxable income—the heuristic most commonly implied in prior research—then our model predicts that BTDs will be *decreasing* in managers' incentives to bias earnings upward. This conclusion runs counter to the prevailing view in the empirical literature that uses BTDs as a proxy for earnings management. We test our hypothesis using the following reduced form model:

$$BTD_{it} = \alpha_i + \alpha_t + \beta EarnMgmt_{it} + \gamma' X_{it} + \varepsilon_{it} \quad (11)$$

The dependent variable, *BTD*, is the difference between pre-tax book earnings and taxable income, which—following the literature in this area—is calculated by grossing up the current tax expense by the statutory rate. The main variable of interest is *EarnMgmt*, which is a proxy for firm-years during which firms manage earnings. Our proxy for earnings management is an indicator variable equal to one for firm-years during which a firm misreported book earnings.

We rely on three sources to identify these instances: the SECs AAER database, Audit Analytics restatement data, and the Stanford Class Action Litigation Clearinghouse. We only count fiscal years from the Audit Analytics restatement database that are due to fraud to distinguish between intentional and unintentional misreporting (Hennes et al. 2008). And, we only include observations from the Stanford Litigation data when the lawsuit relates to a GAAP violation or accounting irregularity. An advantage to this approach is that we have a high degree

of certainty that the years we classify as manipulation years are indeed years when managers engaged in accounting manipulation. A disadvantage is that regulators and market participants might use large book-tax differences as a screening mechanism to identify firms that manipulate book earnings. We note, however, that this sample bias works against our prediction, as it would result in a positive relation between earnings management and BTDs. Another disadvantage is that we likely include manipulation years in our control sample, as we only identify manipulation years where managers have subsequently been caught. However, we note that alternative proxies for earnings management, such as discretionary accruals, may also proxy for measurement error of the fundamental accounting system, which our analytical model suggests will be positively correlated with BTDs.

The i and t subscripts denote individual firms and years, respectively. Therefore, the α_i coefficient denotes firm fixed effects and the α_t coefficient denotes year fixed effects. This effectively converts our research design into a differences-in-differences specification. We are thus able to show how firm-specific BTDs change when firms engage in earnings manipulation.

In addition, we include a vector of control variables, X , to account for time-variant characteristics that the prior literature suggests might contribute to differences in book and taxable earnings. Prior literature (Manzon and Plesko 2002, Seidman 2010) suggests that differences BTDs arise due to both economic activity and fundamental differences between the accounting systems for book and taxable income. In all specifications, we include controls for firm size, which could proxy for a wide number of constructs. Seidman (2010) suggests that industry specific general business conditions lead to variation in BTDs. We follow her lead and include the following industry-adjusted factors that might result in a wedge between book and

tax income: growth in sales, capital expenditures, and the cost of debt. In addition, we control for fundamental economic performance by including stock returns. Finally, auditor preferences might limit a firms' ability to engage in either tax aggressive behavior or earnings manipulation. Therefore, we include controls for auditor type and tenure.

Both Manzon and Plesko (2002) and Seidman (2010) identify several differences between GAAP and tax reporting rules that are likely to contribute to BTDs. Manzon and Plesko (2002) note that firms with positive pre-tax book income are able to take advantage of tax deductions and exemptions. Manzon and Plesko (2002) and Seidman (2010) also identify several differences between GAAP and taxable reporting requirements that create a mechanical difference between the two measures. These include differences in accounting for post-retirement obligations and differences in reporting asset impairments. Finally, the existence and use of net operating loss carryforwards also contributes to differences in book and taxable income.

5.5.1 Tests of the relation between earnings management and book-tax differences

Table 6 provides the results from our tests of the relationship between earnings management and book-tax differences. In each set of tests, we consider five different measures of book-tax differences commonly used in the literature. In panel A, we use AAERs as our proxy for earnings management. We find a weakly significant positive relationship between AAERs and the deferred tax expense. For all of our other BTD measures the relationship is negative, but insignificant. In panel B, we use restatements as our proxy for earnings management. In this case, we find a negative relation between earnings management and BTDs across all specifications, although none are statistically significant. Finally, in panel C, we use class action litigation as our proxy for earnings management. In this case, we find highly significant negative

coefficients for all of our BTD measures except for the deferred tax expense, which has a negative but insignificant coefficient.

The inclusion of firm fixed effects suggests that, once the average firm begins manipulating book income, it reports a lower difference between book and taxable income than when it is not manipulating book income. These results are consistent with Lennox et al. (2013), who find that managers of tax aggressive firms are less likely to commit fraud than managers of firms that are not. Our theoretical analysis, however, suggests that the causality may run the opposite direction. Consistent with the findings of Erickson et al. (2004), our results suggest that the incentives that lead managers to manipulate book income also lead them to report higher taxable income than they might otherwise. In other words, managers of firms who commit fraud may be less willing to engage in tax aggressive behavior. We acknowledge that the validity of our tests is limited by concerns regarding endogeneity and omitted variables. Nonetheless, our findings should cast serious doubt on the prevailing view that large BTDs are indicative of earnings manipulation.

6. Conclusion

We present a framework to help clarify issues related to the information content of book-tax differences and the forces that shape them. We demonstrate that the previously documented empirical findings regarding book-tax differences arise even when BTDs themselves provide no information regarding future book income and there is no manipulation of either book or taxable income. We then develop a theoretical model that suggests that, when deciding how to bias book and taxable income, managers face a tension between increasing the market's perception of firm value and the real costs to firm value imposed by the tax authority. Given this tension, the extent

to which managers manipulate reported book and taxable income reports is a function of their incentives, the known costs of manipulating either report, the value relevance of the report, and the tax rate. The value relevance of book and taxable income, in turn, will be a function of the precision of the underlying measurement systems and uncertainty regarding managers' incentives. Because the combination of the two earnings signals provides market participants and regulators with a more precise signal of underlying firm value than one signal alone, managers who intend to manipulate earnings may face incentives to *decrease* BTDs. Both our empirical findings and simulations lend support to this argument.

In broader terms, our study highlights the importance of linking economic theory with empirical studies. In the absence of theory, empirical researchers often rely on heuristics to generate both hypotheses and research designs. Heuristic reasoning leaves researchers blind to potential identification challenges that a robust theory will illuminate. Our analysis suggests that the information content of BTDs is derived primarily from uncorrelated measurement error between book and taxable income that arises due to differences between GAAP and the tax code. We provide evidence that uncorrelated measurement error between the two accounting systems is sufficient to drive many of the empirical results commonly found in the literature. The combination of our analytical, empirical, and simulated findings suggests that research that attempts to infer earnings management from large book-tax differences risks drawing incorrect conclusions, as the associations measured in such studies likely apply to the *ability* of accounting systems to measure firm performance rather than managerial malfeasance.

Of course, we cannot rule out the possibility that BTDs provide some information about firms' tax planning and earnings management. BTDs, by design, capture facets of these

activities. However, our results should certainly give researchers pause about relying on BTDs as a signal of earnings quality.

Nonetheless, we believe that highlighting BTDs' ability to capture attributes of the accounting systems creates a research opportunity. Extreme BTDs may be a particularly powerful proxy for inherent measurement error in the accounting system precisely because managerial manipulation of earnings tends to reduce the BTDs. Thus, research such as Guenther (2011), which examines specific properties of firms that report extreme BTDs, may be a first step towards contributing to Dechow, Ge and Schrand's (2010) call for research into the effect of fundamental performance on earnings quality.

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Appendix A: Variable Descriptions

<i>BTD1</i>	The total book-tax difference, calculated as Compustat items $(pi-mii) - (txfed+txfo)/.35$, or, where missing $(pi-mii)-(txt-txdi)/.35$, scaled by lagged total assets.
<i>BTD2</i>	The temporary book-tax difference, calculated as Compustat items $(txdfed+txdo)/.35$, or, where missing, $txdi/.35$, scaled by lagged total assets.
<i>BTD3</i>	The total book-tax difference, calculated as Compustat items $(pi-mii) - txt/.35$, scaled by lagged total assets.
<i>BTD4</i>	The total book-tax difference, calculated as Compustat items $(pi-pifo-mii) - txfed/.35$, scaled by lagged total assets.
<i>BTD5</i>	The total book-tax difference, calculated as Compustat items $(pi-mii)-txfed/.35-txfo/Ave_foretr$, where <i>Ave_foretr</i> is calculated as the average of the prior three years' Compustat items $txfo/pifo$, or, where missing $pifo$, $(pi-mii)-txfed/.35$.
<i>PTBI</i>	Compustat items $pi-mii$, scaled by lagged total assets.
<i>PTCF</i>	Compustat items $oanfc-xidoc+txpd$, scaled by lagged total assets.
<i>PTACC</i>	<i>PTBI-PTCF</i>
<i>SALES</i>	Compustat item <i>sale</i> , scaled by lagged total assets.
<i>GROSS</i>	Compustat items $sale - cogs$, scaled by lagged total assets.
<i>R_TAX</i>	The industry-year rank of the Lev and Nissim Tax fundamental (after-tax net income over net income), calculated as Compustat items $(txfed+txfo)/(1-0.35)/(0.35*ib)$ or, where missing $txt(1-0.35)/(0.35*ib)$.
<i>R_DEF</i>	The industry-year rank of $-1*BTD2$.
<i>R_CFO</i>	The industry-year rank of the ratio of operating cash flows to book income.
<i>R_COGS</i>	The industry-year rank of the COGS fundamental, calculated as Compustat items $cogs(1-0.35)/(0.35*sale)$.
<i>R_SGA</i>	The industry-year rank of the SGA fundamental, calculated as Compustat items $sga(1-0.35)/(0.35*Gross)$.
<i>DEF COGS</i>	Compustat items $sale - cogs/0.35$, scaled by average total assets.
<i>DEF SGA</i>	<i>Gross</i> minus Compustat item $sga/0.35$, scaled by average total assets.
<i>LNBTD</i>	An indicator variable equal to one for firms with values of <i>BTD2</i> in the bottom quintile of the sample distribution.
<i>LNDIFF_{COGS}</i>	An indicator variable equal to one for firms with values of <i>DEF COGS</i> in the bottom quintile of the sample distribution.
<i>LNDIFF_{SGA}</i>	An indicator variable equal to one for firms with values of <i>DEF SGA</i> in the bottom quintile of the sample distribution.
<i>LPBTD</i>	An indicator variable equal to one for firms with values of <i>BTD2</i> in the top quintile of the sample distribution.
<i>LPDIFF_{COGS}</i>	An indicator variable equal to one for firms with values of <i>DEF COGS</i> in the top quintile of the sample distribution.
<i>LPDIFF_{SGA}</i>	An indicator variable equal to one for firms with values of <i>DEF SGA</i> in the top quintile of the sample distribution.
<i>NI_G1</i>	One-year ahead growth in net income defined as year-ahead Compustat item <i>ib</i> minus current year <i>ib</i> , scaled by lagged total assets.
<i>NI_G3</i>	Three-year ahead growth in net income defined as the average three years ahead Compustat item <i>ib</i> minus current year <i>ib</i> , scaled by lagged total assets.
<i>NI_G5</i>	Five-year ahead growth in net income defined as the average five years ahead Compustat item <i>ib</i> minus current year <i>ib</i> , scaled by lagged total assets.
<i>Sale_G1</i>	Year-ahead Compustat item <i>sale</i> minus current year <i>sale</i> , scaled by lagged total assets.
<i>Sale_G3</i>	The average three years ahead Compustat item <i>sale</i> minus current year <i>sale</i> , scaled by lagged total assets.

<i>Sale_G5</i>	The average five years ahead Compustat item <i>sale</i> minus current year <i>sale</i> , scaled by lagged total assets.
<i>Gross_G1</i>	Year-ahead Compustat <i>sale-cogs</i> minus current year Compustat <i>sale-cogs</i> , scaled by lagged total assets.
<i>Gross_G3</i>	The average three years ahead Compustat <i>sale-cogs</i> minus current year Compustat <i>sale-cogs</i> , scaled by lagged total assets.
<i>Gross_G5</i>	The average five years ahead Compustat <i>sale-cogs</i> minus current year Compustat <i>sale-cogs</i> , scaled by lagged total assets.
<i>AAER</i>	An indicator variable equal to one for firm years with manipulated earnings as identified in the SEC's AAER database.
<i>Lawsuit</i>	An indicator variable equal to one for firm years with manipulated earnings as identified in the Stanford Securities Class Action Litigation database.
<i>Restatement</i>	An indicator variable equal to one for firm years with manipulated earnings as identified in the Audit Analytics Restatement database.
<i>AbsDA_MJ</i>	The absolute value of the residual calculated from the modified Jones accrual model estimated by 2-digit SIC code.
<i>Total Assets</i>	Compustat item <i>at</i> .
<i>MVE</i>	Compustat <i>prcc_f*csho</i> .
<i>Leverage</i>	Compustat $(dlc+dltt)/at$.
<i>BM</i>	Compustat $ceq/prcc_f*csho$.
<i>Size</i>	The natural log of a firm's market value of equity. Calculated as the natural log of Compustat items <i>prcc_f*csho</i> .
<i>Ret</i>	Buy and hold stock returns calculated from the CRSP dataset for the concurrent fiscal year.
<i>Big4</i>	An indicator variable equal to one for firms who employ a Big 4 auditing firm (inclusive of Arthur Anderson)
<i>AuditorTenure</i>	The number of years the firm has been audited by its current auditor.
<i>ΔSales</i>	The average 2-digit SIC code growth rate in sales, multiplied by lagged firm-specific sales, scaled by lagged total assets.
<i>Cost_Debt</i>	The average 2-digit SIC code interest rate (Compustat items $xint/(dlc+dltt)$), multiplied by firm-specific total debt (Compustat items $dlc+dltt$), scaled by lagged total assets.
<i>Cap_Ex</i>	The average 2-digit SIC code capital expenditure rate (Compustat items $capxv/ppegt$) multiplied by firm-specific <i>ppegt</i> , scaled by total assets.
<i>PosIncome</i>	An indicator variable equal to one when <i>PTBI</i> is greater than zero.
<i>ΔOPEB</i>	The change in Compustat item <i>prba</i> , scaled by lagged total assets.
<i>Impair</i>	Compustat item <i>wda</i> for fiscal years after 2002, $wda+gdwlia$ for fiscal year prior to 2002, scaled by lagged total assets.
<i>GW_Impair</i>	Compustat item <i>gdwlia</i> , scaled by total assets. This item set to zero for fiscal years prior to 2002.
<i>ΔIntang</i>	The change in Compustat items $intan-gdwl$, scaled by lagged total assets.
<i>NOL</i>	An indicator variable equal to one for firms with non-zero tax loss carryforwards.
<i>ΔNOL</i>	The change in Compustat item <i>tlcf</i> , scaled by lagged total assets.
<i>PIDOM</i>	Compustat item <i>pidom</i> , scaled by lagged total assets.
<i>PIFO</i>	Compustat item <i>pifo</i> , scaled by lagged total assets.

Table 1
Summary Statistics

Panel A: Summary Statistics for Falsification Sample

Variable	Mean	Std Dev	25th Pctl	Median	75th Pctl	N
<i>MVE</i>	5957.33	18355.20	123.05	597.46	2659.95	17,855
<i>TotalAssets</i>	5310.38	16292.88	122.80	510.15	2262.86	19,129
<i>BM</i>	0.609	0.499	0.291	0.479	0.758	17,387
<i>Leverage</i>	0.204	0.206	0.010	0.166	0.320	19,127
<i>PTBI</i>	0.163	0.291	0.050	0.100	0.177	19,129
<i>PTCF</i>	-0.037	0.109	-0.082	-0.042	-0.004	17,049
<i>PTACC</i>	0.181	0.187	0.085	0.146	0.227	17,049
<i>SALES</i>	1.487	1.514	0.685	1.135	1.768	19,129
<i>GROSS</i>	0.532	0.649	0.247	0.394	0.608	19,129
<i>BTD1</i>	0.040	0.069	0.004	0.024	0.055	19,129
<i>BTD2</i>	0.005	0.045	-0.009	0.001	0.020	19,092
<i>DEFCOGS</i>	-1.285	1.932	-1.722	-0.789	-0.173	19,129
<i>DEFSGA</i>	-0.407	0.621	-0.580	-0.262	-0.033	17,912
<i>NI_G1</i>	-0.014	0.113	-0.028	0.004	0.026	19,129
<i>NI_G3</i>	-0.010	0.123	-0.038	0.004	0.037	15,980
<i>NI_G5</i>	-0.003	0.135	-0.044	0.005	0.048	12,048
<i>Sale_G1</i>	0.128	0.319	-0.006	0.074	0.211	19,129
<i>Sale_G3</i>	0.293	0.571	0.008	0.157	0.419	15,980
<i>Sale_G5</i>	0.477	0.859	0.032	0.247	0.650	12,048
<i>Gross_G1</i>	0.041	0.127	-0.012	0.025	0.080	19,129
<i>Gross_G3</i>	0.096	0.217	-0.009	0.052	0.149	15,980
<i>Gross_G5</i>	0.161	0.323	-0.001	0.083	0.222	12,048

Table 1 (Cont.)
Summary Statistics

Panel B: Summary Statistics for BTD and Earnings Management Sample

Variable	Mean	Std Dev	25th	Median	75th	N
<i>Total Assets</i>	2445.02	6603.30	78.71	341.99	1478.01	25,488
<i>AbsDA_MJ</i>	0.208	0.199	0.066	0.160	0.281	25,488
<i>Size</i>	5.846	2.140	4.350	5.876	7.302	25,488
<i>Ret</i>	0.137	0.687	-0.272	0.035	0.359	25,488
<i>Big4</i>	0.773	0.419	1.000	1.000	1.000	25,488
<i>AuditorTenure</i>	10.363	8.836	4.000	8.000	14.000	25,488
<i>ΔSales</i>	1.543	4.756	0.103	0.291	0.863	25,488
<i>Cost_Debt</i>	0.106	0.233	0.001	0.031	0.096	25,488
<i>Cap_Ex</i>	0.276	0.900	0.039	0.078	0.156	25,488
<i>PosIncome</i>	0.629	0.483	0.000	1.000	1.000	25,488
<i>ΔOPEB</i>	0.000	0.002	0.000	0.000	0.000	25,488
<i>Impair</i>	-0.003	0.013	0.000	0.000	0.000	25,488
<i>GW_Impair</i>	-0.005	0.023	0.000	0.000	0.000	25,488
<i>ΔIntang</i>	0.008	0.051	-0.003	0.000	0.002	25,488
<i>NOL</i>	0.656	0.475	0.000	1.000	1.000	25,488
<i>ΔNOL</i>	-0.058	0.273	-0.011	0.000	0.000	25,488
<i>PIDOM</i>	-0.034	0.262	-0.071	0.025	0.094	25,488
<i>PIFO</i>	0.011	0.035	0.000	0.000	0.011	25,488
<i>BTD1</i>	-0.079	0.240	-0.077	0.003	0.034	25,488
<i>BTD2</i>	0.001	0.052	-0.008	0.000	0.015	25,488
<i>BTD3</i>	-0.087	0.244	-0.066	-0.006	0.010	25,488
<i>BTD4</i>	-0.077	0.236	-0.069	0.001	0.030	25,488
<i>BTD5</i>	-0.082	0.247	-0.083	0.002	0.034	25,488
<i>AAER</i>	0.009	0.096	0.000	0.000	0.000	25,488
<i>Restatement</i>	0.013	0.115	0.000	0.000	0.000	25,488
<i>Lawsuit</i>	0.012	0.107	0.000	0.000	0.000	25,488

This table presents summary statistics for the observations used in our analyses. Panel A contains summary statistics for 19,129 firm years between 2001 and 2012 used in our falsification tests for the relation between BTDs and earnings growth and persistence, which require that current period pre-tax income be positive. Panel B contains summary statistics for 25,488 firm years between 2001 and 2012 used in our analysis of the relation between BTDs and earnings management. All variables are defined as in Appendix A.

Table 2
Alternative Measures of Performance and Growth

<i>G</i>	<i>R_TAX</i>		<i>R_COGS</i>		<i>R_SGA</i>		<i>Mean R</i> ²	<i>Mean n</i>
	(1)		(2)		(3)			
	<i>Coeff</i>	<i>t-stat</i>	<i>Coeff</i>	<i>t-stat</i>	<i>Coeff</i>	<i>t-stat</i>		
<i>NI_G1</i>	0.558***	(11.23)					0.093	1,446
<i>NI_G3</i>	0.766***	(7.95)					0.104	1,286
<i>NI_G5</i>	0.725***	(5.74)					0.105	1,023
<i>Sale_G1</i>			0.643	(1.60)			0.109	1,715
<i>Sale_G3</i>			1.162**	(1.99)			0.115	1,518
<i>Sale_G5</i>			1.239**	(2.02)			0.100	1,198
<i>Gross_G1</i>					0.140	(1.57)	0.099	1,593
<i>Gross_G3</i>					0.454***	(3.57)	0.112	1,405
<i>Gross_G5</i>					0.743***	(3.36)	0.096	1,101

This table presents the results from Fama-MacBeth regressions of growth on various measures of firm performance as a function of the Lev and Nissim (2004) style fundamentals calculated from the alternative measures, *FUND*, for firms between 2001 and 2012.

$$G = \alpha_{indu} + \beta FUND + \varepsilon$$

In column (1), we replicate the Lev and Nissim (2004) analysis in our sample period. Columns (2) and (3) report the results of our alternative measures (*R_COGS*, *R_SGA*). All variables are as defined in Appendix A. t-statistics appear in parentheses and are calculated using standard errors clustered by firm and year. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 3
Alternative Measures of Performance and Persistence

Panel A: Persistence of Pre-Tax Book Income

Dependent variable = $PTBI_{t+1}$

<i>Intercept</i>	<i>LNBTD</i>	<i>LPBTD</i>	<i>PTBI</i>	<i>LNBTD</i> × <i>PTBI</i>	<i>LPBTD</i> × <i>PTBI</i>
0.034 (20.50)	0.002 (0.77)	0.006 (1.76)	0.545 (58.22)	-0.001 (-0.08)	-0.040 (-2.19)
					R ² 0.300
					n 14,681

Panel B: Persistence of Sales

Dependent variable = $SALES_{t+1}$

<i>Intercept</i>	<i>LNDIFF</i> _{COGS}	<i>LPDIFF</i> _{COGS}	<i>SALES</i>	<i>LNDIFF</i> _{COGS} × <i>SALES</i>	<i>LPDIFF</i> _{COGS} × <i>SALES</i>
0.236 (23.02)	0.857 (40.20)	0.096 (6.10)	0.793 (93.21)	-0.326 (-30.91)	-0.225 (-16.05)
					R ² 0.626
					n 22,415

Panel C: Persistence of Gross Margins

Dependent variable = $GROSS_{t+1}$

<i>Intercept</i>	<i>LNDIFF</i> _{SGA}	<i>LPDIFF</i> _{SGA}	<i>GROSS</i>	<i>LNDIFF</i> _{SGA} × <i>GROSS</i>	<i>LPDIFF</i> _{SGA} × <i>GROSS</i>
0.092 (24.46)	0.257 (36.57)	0.090 (15.26)	0.768 (94.24)	-0.278 (-27.73)	-0.474 (-35.09)
					R ² 0.603
					n 20,785

This table presents the results from replicating Hanlon (2005) and our Hanlon-style regressions of performance persistence as a function of the spread between the measure of interest and its alternate measure for firm years between 2001-2012. Panel A presents the results for the Hanlon (2005) analysis in our sample periods. Hanlon (2005) investigates the role of large differences between book and taxable income on persistence (*LNBTD* and *LPBTD*). Panel B presents the

persistence results for large differences between sales and our alternative sales measures (*DEFCOGS*). And, panel C presents the results for large differences between gross margins and our alternative gross margins measure (*DEFSGA*). All variables are as defined in Appendix A. t-statistics appear in parentheses and are calculated using standard errors clustered by firm and year. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 4
Earnings Growth and the Lev and Nissim Tax Fundamental

Panel A: Replication of Lev and Nissim (2004) Table 2: Panel B

	<i>NI_G1</i>	<i>NI_G3</i>	<i>NI_G5</i>
<i>R_TAX</i>	0.895*** (9.13)	1.204*** (17.28)	1.501*** (16.57)
<i>R_DEF</i>	-0.214** (-2.58)	-0.508*** (-4.44)	-0.658*** (-3.61)
<i>R_CFO</i>	0.496*** (4.79)	0.828 (5.90)	1.018*** (8.62)
Mean R ²	0.088	0.108	0.117
Mean n	1,672	1,428	1,219

Panel B: Simulated Tax Fundamentals and Earnings Growth

	<i>NI_G1</i>	<i>NI_G3</i>	<i>NI_G5</i>
<i>R_TAX</i>	0.461*** (7027.91)	0.523*** (5120.21)	0.622*** (5029.54)
<i>R_DEF</i>	-0.006*** (-2.89)	-0.017*** (-5.74)	-0.035*** (-8.98)
<i>R_CFO</i>	0.433*** (7152.10)	0.675*** (7395.74)	0.921*** (7459.74)
Simulations with Positive <i>R_TAX</i>	1,000	1,000	1,000
Simulations with Significant Positive <i>R_TAX</i>	1,000	1,000	1,000
Total Number of Simulations	1,000	1,000	1,000

This table examines the relation between the Lev and Nissim (2004) tax fundamental and earnings growth. The reported results are the Fama-MacBeth coefficients obtained from estimating the following model for firm-years between 1993 and 2000.

$$G = \alpha_{indu} + \beta_1 R_TAX + \beta_2 R_DEF + \beta_3 R_CFO + \varepsilon$$

Panel A presents the results from replicating Lev and Nissim (2004). Panel B presents the average coefficients from 1,000 replications of the Lev and Nissim (2004) growth results using simulated data, where, in order to estimate taxable income, book-tax differences (defined as $(pi - (txfed + txfo)/0.35)$) are randomly assigned with replacement from the empirical distribution. t-statistics appear in italics. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 5
Earnings Persistence and Book-Tax Differences

Panel A: Replication of Hanlon (2005) Table 3 Panel B

Dependent variable = $PTBI_{t+1}$					
<i>Intercept</i>	<i>LNBTD</i>	<i>LPBTD</i>	<i>PTBI</i>	<i>LNBTD</i> × <i>PTBI</i>	<i>LPBTD</i> × <i>PTBI</i>
0.001	0.009**	0.009**	0.718***	-0.052**	-0.180***
(0.73)	(2.49)	(2.13)	(56.85)	(-2.37)	(-6.92)
				R ²	0.133
				n	15,782

Panel B: Simulated Earnings Persistence and Book-Tax Differences

Dependent variable = $PTBI_{t+1}$					
<i>Intercept</i>	<i>LNBTD</i>	<i>LPBTD</i>	<i>PTBI</i>	<i>LNBTD</i> × <i>PTBI</i>	<i>LPBTD</i> × <i>PTBI</i>
0.004***	-0.001***	0.001***	0.675***	-0.009***	-0.013***
(99.62)	(-6.38)	(5.33)	(1863.19)	(-8.37)	(-10.83)
Simulations with negative coefficient				604	629
Simulations with significant negative coefficient				136	182
Total Simulations				1,000	1,000

Table 5 (Cont.)
Earnings Persistence and Book-Tax Differences

Panel C: Replication of Hanlon (2005) Table 4 Panel B

Dependent variable = $PTBI_{t+1}$

<i>Intercept</i>	<i>LNBTD</i>	<i>LPBTD</i>	<i>PTCF</i>	<i>LNBTD</i> × <i>PTCF</i>	<i>LPBTD</i> × <i>PTCF</i>	<i>PTACC</i>	<i>LNBTD</i> × <i>PTACC</i>	<i>LPBTD</i> × <i>PTACC</i>
-0.007*** (-3.65)	0.003 (0.75)	-0.003 (-0.84)	0.760*** (60.71)	-0.030 (-1.38)	-0.106*** (-4.03)	0.526*** (32.68)	-0.075*** (-2.80)	-0.180*** (-5.68)
							R ²	0.171
							n	15,782

Panel D: Simulated Regressions of Future Earnings Performance and the Accrual and Cash Flow Components of Earnings with the Coefficients Allowed to Vary for Firm-Years with Large Book-Tax Differences

Dependent variable = $PTBI_{t+1}$

<i>Intercept</i>	<i>LNBTD</i>	<i>LPBTD</i>	<i>PTCF</i>	<i>LNBTD</i> × <i>PTCF</i>	<i>LPBTD</i> × <i>PTCF</i>	<i>PTACC</i>	<i>LNBTD</i> × <i>PTACC</i>	<i>LPBTD</i> × <i>PTACC</i>
-0.007*** (-145.64)	-0.001*** (-8.99)	0.001*** (3.55)	0.733*** (2190.54)	-0.005*** (-4.97)	-0.011*** (-10.98)	0.476*** (1063.67)	-0.017*** (-12.16)	-0.012*** (-8.50)
Simulations with negative coefficient				571	641		654	590
Simulations with significant negative coefficient				571	641		654	590
Total Simulations				1,000	1,000		1,000	1,000

This table presents the results of estimating future performance as a function of current performance when book-tax differences are large. Panel A is a replication of Table 3, Panel B in Hanlon (2005), for firm years between 1994 and 2000. Panel B presents the average coefficients from 1,000 replications of the Hanlon (2005) results, where, in order to simulate taxable income, deferred tax expense (Compustat *txdi*) and total tax expense (Compustat *txi*) are randomly assigned with replacement from the empirical distribution. Our simulated BTB is then the different between pre-tax book income and our simulated taxable income. Panel C is a replication of Table 4, Panel B in Hanlon (2005). And, Panel D presents the average coefficients from 1,000 replications of the Hanlon (2005) Table 4, Panel B results, where simulated book-tax differences are estimated in the same manner as in Panel B.

Table 6
Earnings Management and Book-Tax Differences

Panel A: AAERs

	<i>BTD1</i>	<i>BTD2</i>	<i>BTD3</i>	<i>BTD4</i>	<i>BTD5</i>
<i>AAER_t</i>	-0.004 (-0.70)	0.009* (1.66)	-0.018 (-1.51)	-0.004 (-0.78)	-0.012 (-1.38)
<i>AbsDA_MJ_t</i>	-0.021*** (-4.35)	-0.011*** (-4.05)	-0.006 (-0.92)	-0.020*** (-4.28)	-0.025*** (-4.56)
<i>Size_t</i>	0.004*** (2.93)	-0.003*** (-3.81)	0.006*** (3.76)	0.005*** (3.36)	0.005*** (3.05)
<i>Ret_t</i>	0.004*** (4.27)	-0.002** (-2.45)	0.007*** (5.31)	0.004*** (4.24)	0.003*** (2.58)
<i>Big4_t</i>	-0.000 (-0.00)	0.000 (0.11)	-0.001 (-0.22)	0.000 (0.07)	-0.002 (-0.50)
<i>AuditorTenure_t</i>	0.000 (0.57)	0.000 (0.12)	-0.000 (-0.01)	0.000 (0.41)	0.000 (1.41)
<i>ΔSales_t</i>	0.000 (0.29)	-0.000 (-0.02)	0.000 (0.70)	0.000 (0.15)	0.000 (0.27)
<i>Cost_Debt_t</i>	0.006* (1.71)	0.004** (1.98)	0.004 (0.83)	0.008** (2.22)	0.009** (2.14)
<i>Cap_Ex_t</i>	-0.000 (-0.19)	0.000 (0.08)	-0.001 (-0.61)	-0.000 (-0.24)	0.001 (0.75)
<i>PosIncome_t</i>	-0.003 (-1.52)	0.014*** (9.29)	-0.015*** (-4.71)	-0.004* (-1.78)	-0.003 (-1.25)
<i>ΔOPEB_t</i>	0.438** (2.32)	0.206 (0.91)	0.083 (0.23)	0.377** (2.13)	0.367 (1.17)
<i>Impair_t</i>	1.027*** (11.17)	0.222*** (4.94)	0.772*** (6.89)	0.925*** (10.36)	1.026*** (10.50)
<i>GW_Impair_t</i>	0.715*** (16.62)	0.122*** (4.20)	0.567*** (9.07)	0.618*** (15.37)	0.721*** (15.21)
<i>ΔIntang_t</i>	0.069*** (4.04)	-0.015* (-1.81)	0.091*** (4.39)	0.080*** (4.85)	0.049** (2.28)
<i>NOL_t</i>	-0.004* (-1.86)	-0.000 (-0.16)	-0.003 (-1.07)	-0.004* (-1.89)	-0.005** (-2.07)
<i>ΔNOL_t</i>	0.010** (2.22)	-0.004** (-2.25)	0.017*** (3.18)	0.008* (1.72)	0.010** (2.18)
<i>PIDOM_t</i>	0.702*** (56.39)	0.014*** (3.41)	0.687*** (46.41)	0.717*** (60.09)	0.714*** (55.48)
<i>PIFO_t</i>	0.722*** (19.13)	-0.030* (-1.68)	0.769*** (16.03)	-0.209*** (-7.22)	0.617*** (11.25)
Year Effects	yes	yes	yes	yes	yes
Firm Effects	yes	yes	yes	yes	yes
Observations	25,488	25,488	25,488	25,488	25,488
R ²	0.843	0.914	0.871	0.911	0.080

Table 6 (Cont.)
Earnings Management and Book-Tax Differences

Panel B: Restatements

	<i>BTD1</i>	<i>BTD2</i>	<i>BTD3</i>	<i>BTD4</i>	<i>BTD5</i>
<i>Restatement_t</i>	-0.006 (-0.92)	-0.000 (-0.04)	-0.002 (-0.23)	-0.002 (-0.41)	-0.002 (-0.19)
<i>AbsDA_MJ_t</i>	-0.021*** (-4.34)	-0.011*** (-4.04)	-0.006 (-0.93)	-0.020*** (-4.28)	-0.025*** (-4.57)
<i>Size_t</i>	0.004*** (2.95)	-0.003*** (-3.75)	0.006*** (3.70)	0.005*** (3.36)	0.005*** (3.02)
<i>Ret_t</i>	0.004*** (4.26)	-0.002** (-2.48)	0.007*** (5.33)	0.004*** (4.24)	0.003*** (2.60)
<i>Big4_t</i>	0.000 (0.01)	0.000 (0.07)	-0.001 (-0.18)	0.000 (0.08)	-0.002 (-0.48)
<i>AuditorTenure_t</i>	0.000 (0.55)	0.000 (0.15)	-0.000 (-0.05)	0.000 (0.39)	0.000 (1.38)
<i>ΔSales_t</i>	0.000 (0.29)	-0.000 (-0.02)	0.000 (0.70)	0.000 (0.15)	0.000 (0.27)
<i>Cost_Debt_t</i>	0.006* (1.71)	0.004** (1.98)	0.004 (0.83)	0.008** (2.22)	0.009** (2.14)
<i>Cap_Ex_t</i>	-0.000 (-0.19)	0.000 (0.08)	-0.001 (-0.60)	-0.000 (-0.24)	0.001 (0.75)
<i>PosIncome_t</i>	-0.004 (-1.53)	0.014*** (9.27)	-0.015*** (-4.69)	-0.004* (-1.79)	-0.003 (-1.25)
<i>ΔOPEB_t</i>	0.439** (2.32)	0.208 (0.92)	0.079 (0.22)	0.377** (2.13)	0.365 (1.16)
<i>Impair_t</i>	1.028*** (11.18)	0.222*** (4.93)	0.773*** (6.90)	0.925*** (10.36)	1.026*** (10.50)
<i>GW_Impair_t</i>	0.715*** (16.62)	0.122*** (4.19)	0.567*** (9.08)	0.618*** (15.37)	0.722*** (15.22)
<i>ΔIntang_t</i>	0.069*** (4.04)	-0.015* (-1.80)	0.091*** (4.39)	0.080*** (4.85)	0.049** (2.27)
<i>NOL_t</i>	-0.004* (-1.86)	-0.000 (-0.15)	-0.003 (-1.08)	-0.004* (-1.89)	-0.005** (-2.08)
<i>ΔNOL_t</i>	0.010** (2.22)	-0.004** (-2.25)	0.017*** (3.18)	0.008* (1.72)	0.010** (2.18)
<i>PIDOM_t</i>	0.702*** (56.40)	0.014*** (3.41)	0.687*** (46.41)	0.717*** (60.10)	0.715*** (55.49)
<i>PIFO_t</i>	0.722*** (19.14)	-0.030* (-1.69)	0.769*** (16.04)	-0.209*** (-7.22)	0.617*** (11.25)
Year Effects	yes	yes	yes	yes	yes
Firm Effects	yes	yes	yes	yes	yes
Observations	25,488	25,488	25,488	25,488	25,488
R ²	0.843	0.914	0.871	0.911	0.080

Table 6 (Cont.)
Earnings Management and Book-Tax Differences

Panel C: Class Action Litigation

	<i>BTD1</i>	<i>BTD2</i>	<i>BTD3</i>	<i>BTD4</i>	<i>BTD5</i>
<i>Lawsuit_t</i>	-0.020*** (-4.02)	-0.003 (-0.73)	-0.018** (-2.42)	-0.020*** (-4.01)	-0.022*** (-3.08)
<i>AbsDA_MJ_t</i>	-0.021*** (-4.39)	-0.011*** (-4.05)	-0.006 (-0.95)	-0.020*** (-4.32)	-0.025*** (-4.60)
<i>Size_t</i>	0.004*** (3.06)	-0.002*** (-3.69)	0.007*** (3.79)	0.005*** (3.48)	0.005*** (3.14)
<i>Ret_t</i>	0.004*** (4.26)	-0.002** (-2.48)	0.007*** (5.32)	0.004*** (4.23)	0.003*** (2.58)
<i>Big4_t</i>	0.000 (0.08)	0.000 (0.09)	-0.001 (-0.13)	0.001 (0.15)	-0.002 (-0.42)
<i>AuditorTenure_t</i>	0.000 (0.56)	0.000 (0.15)	-0.000 (-0.05)	0.000 (0.39)	0.000 (1.38)
<i>ΔSales_t</i>	0.000 (0.29)	-0.000 (-0.02)	0.000 (0.69)	0.000 (0.14)	0.000 (0.26)
<i>Cost_Debt_t</i>	0.006* (1.72)	0.004** (1.98)	0.004 (0.84)	0.008** (2.24)	0.009** (2.16)
<i>Cap_Ex_t</i>	-0.000 (-0.21)	0.000 (0.07)	-0.001 (-0.61)	-0.000 (-0.26)	0.001 (0.73)
<i>PosIncome_t</i>	-0.003 (-1.49)	0.014*** (9.28)	-0.015*** (-4.68)	-0.004* (-1.75)	-0.003 (-1.22)
<i>ΔOPEB_t</i>	0.443** (2.34)	0.209 (0.92)	0.084 (0.23)	0.382** (2.16)	0.371 (1.18)
<i>Impair_t</i>	1.027*** (11.18)	0.222*** (4.93)	0.773*** (6.90)	0.925*** (10.36)	1.026*** (10.51)
<i>GW_Impair_t</i>	0.715*** (16.62)	0.122*** (4.19)	0.567*** (9.08)	0.618*** (15.38)	0.721*** (15.23)
<i>ΔIntang_t</i>	0.070*** (4.09)	-0.015* (-1.79)	0.091*** (4.42)	0.080*** (4.90)	0.049** (2.31)
<i>NOL_t</i>	-0.004* (-1.87)	-0.000 (-0.15)	-0.003 (-1.08)	-0.004* (-1.90)	-0.005** (-2.09)
<i>ΔNOL_t</i>	0.010** (2.24)	-0.004** (-2.24)	0.018*** (3.19)	0.008* (1.74)	0.010** (2.20)
<i>PIDOM_t</i>	0.702*** (56.43)	0.014*** (3.41)	0.687*** (46.43)	0.717*** (60.14)	0.715*** (55.53)
<i>PIFO_t</i>	0.722*** (19.12)	-0.030* (-1.70)	0.769*** (16.02)	-0.209*** (-7.23)	0.617*** (11.23)
Year Effects	yes	yes	yes	yes	yes
Firm Effects	yes	yes	yes	yes	yes
Observations	25,488	25,488	25,488	25,488	25,488
R ²	0.843	0.915	0.871	0.911	0.080

Table 6 (Cont.)
Earnings Management and Book-Tax Differences

This table presents the results from an OLS regression of book-tax differences as a function of earnings management. Panel A presents the results with AAERs as the proxy for earnings management. Panel B presents the results with restatements as the proxy for earnings management. And, Panel C presents the results with class-action litigation as the proxy for earnings management. All variables are as defined in Appendix A. t-statistics appear in parentheses and are calculated using standard errors clustered by firm. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.