



Empirical implications of incorrect special item tax rate assumptions

William M. Cready¹ · Thomas J. Lopez² · Craig A. Sisneros³ · Shane R. Stinson²

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Abstract

The use of assumed tax rates to adjust special items (e.g., restructuring charges, asset writedowns, etc.) is common in empirical accounting research as these items are reported pre-tax and are often used in research designs that include after-tax earnings. This study explores the potential empirical consequences of assuming an incorrect tax rate in adjusting special items. We focus on special items given their prevalence in the literature as well as the wide variation in tax rate assumptions from these studies. Our investigation shows that the tax rate assumed can be critical to the interpretation of results. Importantly, our evidence suggests extreme tax rate assumptions, in particular the highest statutory rate, are especially problematic and yield dramatically biased estimates. Our review of the tax consequences of special items suggests that, in almost all circumstances, the marginal tax rate is the theoretically correct rate to apply to these items when adjusting for tax. Consistent with this view, our empirical evidence, with a limited exception, suggests that marginal tax rates represent the best estimate of the true tax rate. By providing empirical evidence on the potential empirical consequences of these varied tax rate assumptions, we offer a guide for future researchers on the importance of this critical design choice.

Keywords Special items · Nonrecurring items · Assumed tax rates · Marginal tax rates

JEL Classification M40 · M41 · H25 · H32

✉ William M. Cready
cready@utdallas.edu

Extended author information available on the last page of the article

1 Introduction

The use of assumed tax rates to adjust “special items” to an after-tax value consistent with after-tax earnings is common in empirical accounting research (e.g., Dechow et al. 1994; Dechow and Ge 2006; Cready et al. 2012).¹ Research investigates the impact of special items on a broad range of firm-level outcomes, including subsequent earnings, market returns, analyst forecast revisions, and executive compensation (e.g., Chaney et al. 1999; Burgstahler et al. 2002; Riedl 2004; Dechow and Ge 2006; Riedl and Srinivasan 2010; Bens et al. 2011; Johnson et al. 2011; Curtis et al. 2014). However, despite recognizing special items as a key component of a firm’s information environment, these studies vary widely in the tax rates used to adjust for estimated tax effects.² Since research suggests the market values after-tax earnings (e.g., Gleason and Mills 2008), these tax adjustments are critical in achieving proper alignment between key dependent and explanatory variables for a clear interpretation of results. This study aims to explore the potential empirical consequences of assuming an incorrect tax rate in adjusting special items.

We identify 71 studies published since 1980 that include a special items measure and an earnings measure in the same analyses.³ The majority of these studies adjust special items at the extremes of either a zero tax rate or the highest statutory rate (35 percent and 21 percent of studies, respectively), 13 percent adjust special items using a calculated effective tax rate (ETR), and only one (Riedl 2004) uses an estimated marginal tax rate (MTR). Importantly, two-thirds of the studies we identify are published in either the *The Accounting Review*, *Contemporary Accounting Research*, *Journal of Accounting and Economics*, *Journal of Accounting Research*, or *Review of Accounting Studies*. In addition, research reports that special item reporting frequency has increased dramatically over the past 30 years (e.g., Johnson et al. 2011).⁴ Thus this line of research is clearly important to academics, and, given the number of tax-adjustment methods in prior studies, an investigation into the empirical implications of the various methods of tax-adjusting special items is warranted and relevant.

We model the empirical implications of incorrect tax rate assumptions using the income-transfer framework of Burgstahler et al. (2002) and Cready et al. (2012),⁵ as these models are common in academic research (25 of the 71 studies incorporate similar models) and yield straightforward inferences regarding the consequences of different tax rate assumptions. In so doing, we mathematically demonstrate the expected bias in

¹ Compustat classifies material nonrecurring items that are reported above the line as “special items” and reports aggregate special items on a pre-tax basis. Special items include such items as restructuring charges, asset impairments, plant closing costs, and termination benefits. We discuss special items in greater detail in the next section.

² The tax rate adjustment is to multiply the reported special item by $(1-t)$ where t is the assumed tax rate. Assumed tax rates include zero (no adjustment), the top statutory rate, an estimated marginal rate, a calculated effective tax rate, or using after-tax special item components in Compustat (added in 2001 and discussed further below).

³ We discuss our method for identifying these studies in greater detail in the literature review section.

⁴ Our own analysis finds that the annual reporting of special items almost doubled between 2000 and 2017.

⁵ Commonly known as “persistence” of earnings, though persistence becomes confusing when dealing with negative special items. Burgstahler et al. (2002) use the term “inter-period” transfer, and Cready et al. (2012) use the term “expense” transfer as the latter study focuses solely on negative special items. We use the term “income” transfer throughout as encompassing the fact that special items may include gains, losses, revenues, and expenses.

coefficients from over- or underestimating the true tax rate to adjust special items. Our mathematical model makes clear that, if the assumed tax rate is greater (less) than the true tax rate, the total income-transfer effect for negative (positive) special items will be biased upward (downward).⁶ Overall, our analyses reveal that tax rate assumptions used to match special items with after-tax earnings are critical to the interpretation of empirical results. We find that assuming the highest statutory or zero tax rates is especially problematic, as these rates produce substantially biased estimates in our income-transfer empirical tests. Importantly, when we apply different tax rate assumptions to special item models of executive compensation, analyst forecast revisions, and market returns, we find that altering the tax rate assumption significantly affects the results and can even alter the direction of conclusions.

We estimate the empirical consequences of incorrect tax rate assumptions in four steps. First, we replicate the income transfer model and illustrate how each of the various tax rate assumptions on special items affects the estimation of total income transfer over four quarters after reporting a special item. Second, using a pre-tax model for both earnings and special items, which is unaffected by tax rate assumptions, we examine the relative merits of the various tax rate assumptions in the income transfer framework. As demonstrated in our mathematical model, applying the true tax rate to adjust special items represents a scalar effect, such that the income transfer from the model adjusted at the true tax rate will yield results quantitatively and qualitatively identical to those from a purely pre-tax model. Accordingly, we evaluate the correctness of each tax rate assumption by comparing the coefficients and total income transfer for each assumed tax rate to those from the pre-tax model. In our empirical design, the tax rate that yields similar coefficients and the smallest absolute difference in total income transfer from the pre-tax model represents the best estimate of the true tax rate. Third, we expand the income-transfer analyses to examine the tax rate assumptions for three subsamples of negative special items—restructuring charges, goodwill impairments, and other special items. Fourth, we apply different tax rate assumptions to three additional contexts based on prior research—executive compensation, analyst forecast revisions, and market returns—to assess the implications of altering the tax rate assumption on results and conclusions.

For anything other than permanent book-tax differences, the marginal tax rate is the theoretically correct assumption, as any temporary differences will unwind over time. For example, restructuring charges generally result in temporary book-tax timing differences, suggesting the theoretically correct tax rate is the marginal tax rate. That said, research and our own supplemental analysis suggests that restructuring charges are associated with substantial deferred tax asset valuation allowances (e.g., Christensen et al. 2008).⁷ The high valuation allowances as well as prior research (e.g., Dechow and Ge 2006) suggest the true tax rate for this subsample may approach zero. However, even in this scenario, the theoretically correct tax rate is the marginal tax rate as the calculation of marginal tax rates considers future taxable

⁶ “Income-transfer” refers to firms transferring current or future normal operating expenses (revenue) into special items, thereby increasing (decreasing) current or future earnings before special items (Burgstahler et al. 2002, pp. 590–591).

⁷ We examined the tax footnote of 25 randomly selected large pure restructuring charge observations (where the charge was the only special item reported and at least 1 percent of assets). As reported in Appendix 2, Panel C, of these 25 observations, 22 report negative pre-tax income, and the mean (median) deferred tax valuation allowance for these observations is 65 (88) percent of the deferred tax asset.

income. Thus, if marginal tax rates are estimated based on an unbiased estimate of future taxable income, the MTR will be zero when management recognizes a 100 percent deferred tax asset valuation allowance.⁸ On the other hand, goodwill impairments are generally not deductible for tax purposes (Internal Revenue Code (26 USC §197a), which would create a permanent difference, suggesting zero as the theoretically correct assumption for this subsample.⁹ Other special items, though myriad in nature, are generally either currently deductible (taxable) or represent a book-tax timing difference, and thus the marginal tax rate is the theoretically correct rate for these items.

Our assessment that the marginal rate is the theoretically correct tax rate is, in general, consistent with this tax rate being an unbiased estimate of the true tax rate. For example, we find that adjusting overall positive or negative special items at the estimated marginal tax rate yields empirical results statistically and economically equivalent to those obtained from a pre-tax model (our baseline model). Our goodwill impairments and other special items subsample analyses reflect these results as well. On the other hand, our results for the restructuring subsample are mixed. At the coefficient level, the estimated marginal tax rate coefficients are consistent with those from the pre-tax model at all lags, especially the critical fourth lag.¹⁰ However, in total income transfer, the marginal tax rate appears upwardly biased. Our mixed results with respect to restructuring charges potentially reflect the high incidence of near 100-percent deferred tax valuation allowances for these firms. That is, a 100-percent deferred tax valuation allowance would predict the true tax rate is zero. However, in these circumstances, as we noted above, the marginal tax rate should also be zero. Thus, to the extent that the marginal tax rate is not the best estimate of the true tax rate, there could be error in either the calculation of the marginal tax rate or the amount of the recognized deferred tax asset valuation allowance.¹¹

Finally, in models of executive compensation, analyst forecast revisions, and market returns, we find that altering assumed tax rates can significantly change results. For example, we find that, depending on the assumed tax rate, executive compensation is either fully shielded or not shielded at all from the income-decreasing effect of negative special items.¹² Similarly, with respect to analyst forecast revisions, we find that, depending on the tax rate

⁸ If the deferred tax valuation allowance equals 100 percent of the deferred tax asset, management's expectation of future income is insufficient to realize the deferred tax asset, assuming that management's estimate of future taxable income is unbiased. However, research shows this allowance may be managed (e.g., Frank and Rego 2006).

⁹ However, this situation is complicated by different deductibility rules depending on how the goodwill is acquired. Although most goodwill is nondeductible (i.e., goodwill recognized through stock acquisitions), a nontrivial amount of goodwill is amortized for tax purposes (i.e., goodwill obtained in cash acquisitions).

¹⁰ Quarterly changes in earnings have the largest effect on future earnings in the fourth subsequent quarter, reflecting the seasonality of quarterly earnings. Thus, in the income-transfer model, the largest influence of a special item on future earnings will be reflected in the fourth subsequent quarter. See page 599 Burgstahler et al. (2002) for a thorough discussion.

¹¹ We discuss the effect of valuation allowances in Section III and potential explanations for the restructuring sample differences along with the results of the restructuring subsample tests in Section V.

¹² Shielding is the degree to which compensation committees add a negative special item back to income before setting earnings-based bonuses. Full shielding implies that 100 percent of the charge is added back, no shielding implies that none of the charge is added back, and partial shielding implies that part of the charge is added back. See Dechow et al. (1994, p. 142) for a full discussion of how empirical results are interpreted as no, partial, or full shielding.

assumed, the estimated persistence of negative special items is less than (assuming the marginal or zero tax rates) or equal to (assuming the highest statutory tax rate) the estimated persistence of unexpected earnings before special items. Market return results resemble the forecast revision results. In particular, we find that negative special items are weighted less than the change in earnings adjusted for the negative special item when adjusting the negative special item at the ZERO or MTR tax rate. However, we find that when adjusting at the TOP tax rate the weight on negative special items is statistically indistinguishable from the weight on the change in earnings.

Our evaluation of the tax consequences of special items is consistent with the conclusion that marginal tax rates are, with the sole exception being goodwill impairments, the theoretically correct rate to adjust special items. Consistent with that notion, our empirical results support the supposition that marginal tax rates are the best estimate of the true tax rate. Critically, we provide evidence that extreme tax rate assumptions (i.e., the highest statutory rate and zero), in almost all circumstances, result in significantly biased estimates. Taken together, our results and conclusions offer a guide for authors in designing studies when including special items with after-tax earnings as well as for readers and reviewers when interpreting the results.

The remainder of the paper proceeds as follows. Section 2 discusses the literature and Section 3 models the tax rate assumptions specific to the income-transfer setting and discusses the theoretically correct tax rate assumptions. Section 4 details our sample selection and descriptive statistics. Section 5 presents our research designs and results. Section 6 briefly summarizes and concludes.

2 Literature

Compustat classifies material nonrecurring items that are reported above the line as “special items” (annual data item SPI and quarterly data item SPIQ), which includes a variety of transactions ranging from one-time gains and losses associated with asset dispositions to expenses associated with restructurings, plant closings, and asset impairments. (See Appendix 1 for more detail on the composition of special items in Compustat.) Special items reporting has dramatically increased over time and, in turn, has become an area of growing interest to accounting researchers (e.g., Johnson et al. 2011). In total, we identified 71 published studies since 1980 that include special items and earnings in the main analyses.¹³

Our search began with identifying keywords such as “special items,” “restructure,” and “write-off,” in journals with “accounting” in the title and expanded by including searches of the reference sections and additional keyword searches.¹⁴ In Table 1, Panel A, we report the journals that published the identified studies. The fact that 66 percent

¹³ To avoid citation inflation, all 71 papers are not included in the reference section but are available from the authors upon request. We only include references for papers directly cited in the manuscript.

¹⁴ A recent study by Cain et al. (2020) in *Management Science* also provided a relatively comprehensive list of special items research. This process may have resulted in omissions, but the studies identified are used for descriptive purposes and context on the relevance of special items and tax adjustments in published research. Furthermore, this list does not include studies similar to the work of Doyle et al. (2003), who define special items other than the Compustat provided variables, or studies that use incidence of special items solely as a partition or indicator.

of the studies we identify are published in premier accounting journals—*The Accounting Review*, *Contemporary Accounting Research*, *Journal of Accounting and Economics*, *Journal of Accounting Research*, or *Review of Accounting Studies*—validates the importance of our investigation.

In Panel B, we report the studies by decade (combining the 80s and 90s and post-2010) and by the different assumed tax rates used to adjust, or not adjust in the case of pre-tax analyses, special items: pre-tax for *both* earnings and special items (PTB), zero tax rate (ZERO),¹⁵ highest federal statutory rate (TOP), estimated marginal tax rate (MTR), calculated effective tax rate (ETR), or the tax-adjusted special items provided by Compustat (CSTAT). We find no obvious pattern by decade with the exception of CSTAT, which all occur after 2000 because the Special Items Breakout, which includes after-tax component data (though total special items does not include an after-tax number), became available beginning in 2001. Over one-quarter of the studies match pre-tax special items with pre-tax earnings, and over half the studies use the extreme assumptions of the highest statutory rate or a zero tax rate. A calculated effective tax rate is used in over one-eighth of the studies, while MTR and CSTAT represent just over one 20th of the sample combined.

In Panel C, we report the different dependent variables used in the main analyses of the identified studies.¹⁶ Nearly two-thirds of the identified dependent variables (64.9 percent) are earnings (current or future earnings) or market measures (stock price or returns). Next are special items (12.0 percent) and analyst forecasts (8.3 percent) with a small number of compensation variables (5.6 percent), accruals (2.8 percent), and miscellaneous other dependent variables (6.5 percent total, no more than one each). Finally, in Panel D, we report the studies by genre, which relates to dependent variable choice. We identified 92 genres, as several studies investigate more than one area. Most of this overlap comes from market studies that include persistence of earnings tests (earnings qualities) as a pre-cursor to market tests (capital markets). These studies comprise the clear majority (71.7 percent) of the genres, underscoring the appropriateness of using the persistence framework in our study. Overall, there is no clear pattern of tax adjustment for special items by time, dependent variable, nor study genre.

3 Implications of tax rate misspecification and the “true tax rate”

3.1 Modeling the implications of tax rate misspecification

We model the implications of tax rate assumptions using the income-transfer model because this setting provides a clear context to understand the consequences of these various assumptions vis-à-vis earnings and special items.¹⁷ Cready et al. (2012) and

¹⁵ To clarify, PTB matches *both* pre-tax earnings to the reported special item (measured pre-tax). The ZERO assumption matches after-tax earnings with pre-tax special items, seemingly mismatching special items and earnings. While some studies explicitly assume a zero tax rate (e.g., Dechow and Ge 2006), others are silent but the inclusion of special items as reported with after-tax earnings implicitly assumes a zero tax rate. That said, this may be the appropriate assumption in certain circumstances, as we discuss and investigate below.

¹⁶ Since many studies include more than one analysis/dependent variable, the total adds up to 108 dependent variables in the 71 identified studies.

¹⁷ The income-transfer model in its simplest form is based on the work of Bernard and Thomas (1990), who demonstrate that the predictable relation between current and future quarterly earnings is not fully impounded in prices.

Table 1 Special Items Studies Descriptive Statistics

Panel A: Journals Included		Total	Percentage
Journal Title			
Accounting & Finance		2	2.8%
Advances in Accounting		2	2.8%
Contemporary Accounting Research		7	9.9%
Journal of Accounting and Economics		7	9.9%
Journal of Accounting and Public Policy		2	2.8%
Journal of Accounting Research		8	11.3%
Journal of Accounting, Auditing & Finance		6	8.5%
Journal of Business Finance & Accounting		3	4.2%
Management Science		1	1.4%
Review of Accounting and Finance		2	2.8%
Review of Accounting Studies		9	12.7%
Review of Quantitative Finance and Accounting		6	8.5%
The Accounting Review		16	22.2%
Total		71	

Panel B: Tax Method Used by Decade and in Total					
Tax Method	'80 s-'90 s	2000s	2010+	Total	Percentage
PTB	5	7	6	18	25.4%
ZERO	6	10	9	25	35.2%
TOP	2	9	4	15	21.1%
MTR	-	1	-	1	1.4%
ETR	2	4	3	9	12.7%
CSTAT	-	-	3	3	4.2%
Total	15	31	25	71	

Table 1 (continued)

Panel C: Dependent Variable by Special Item Tax-Rate Adjustment Method for 71 Studies Identified in Table 1, Panels A and B																
	Earnings	Price & Returns	SIIs	Comp	Analyst Forecasts	Accruals	Other	Total								
PTB	10	27.0%	5	15.2%	3	23.1%	3	50.0%	2	22.2%	-	3	42.9%	26	24.1%	
ZERO	12	32.4%	10	30.3%	6	46.2%	3	50.0%	2	22.2%	2	66.7%	2	28.6%	37	34.3%
TOP	11	29.7%	8	24.2%	-	-	-	-	2	22.2%	1	33.3%	1	14.3%	23	21.3%
MTR	-	-	-	-	1	7.7%	-	-	-	-	-	-	-	-	1	0.9%
ETR	3	8.1%	7	21.2%	2	15.4%	-	-	2	22.2%	-	-	1	14.3%	15	13.9%
CSTAT	1	2.7%	3	9.1%	1	7.7%	-	-	1	11.1%	-	-	-	-	6	5.6%
Total	37	34.3%	33	30.6%	13	12.0%	6	5.6%	9	8.3%	3	2.8%	7	6.5%	108	

Panel D: Study Genre by Special Item Tax-Rate Adjustment Method for 71 Studies Identified in Table 1, Panels A and B																	
	Analysts	Accounting Choices	Comp	Earnings Mgmt	Earnings Qualities	Capital Markets	Regulation	Total									
PTB	1	16.7%	1	100%	3	42.9%	3	50.0%	6	20.7%	5	13.5%	1	16.7%	21	26.9%	
ZERO	2	33.3%	-	-	4	57.1%	3	50.0%	12	41.4%	10	27.0%	1	16.7%	22	28.2%	
TOP	2	33.3%	-	-	-	-	-	-	9	31.0%	11	29.7%	-	-	19	24.4%	
MTR	-	-	-	-	-	-	-	-	-	-	-	-	-	1	16.7%	1	1.3%
ETR	1	16.7%	-	-	-	-	-	-	1	3.4%	8	21.6%	1	16.7%	10	12.8%	
CSTAT	-	-	-	-	-	-	-	-	1	3.4%	3	8.1%	2	33.3%	5	6.4%	
Total	6	6.5%	1	1.1%	7	7.6%	6	6.5%	29	31.5%	37	40.2%	6	6.5%	92		

PTB Pre-tax for both earnings and special items; ZERO After-tax earnings (IB or NI) and 0% tax rate used to adjust special items; TOP After-tax earnings (IB or NI) and top statutory tax rate used to adjust special items; MTR After-tax earnings (IB or NI) and firm-specific marginal tax rate provided by Graham (1996a, 1996b) used to adjust special items; ETR After tax earnings (IB or NI) and effective tax rate used to adjust special items. Effective tax rate usually calculated as total income tax expense (TXT) divided by pre-tax income (PI); CSTAT After-tax earnings (IB or NI) and after-tax special items provided by Compustat (e.g., RCA).

Burgstahler et al. (2002) document that negative special items are followed by earnings of the opposite sign in subsequent quarters. The evidence from these studies suggests that up to 60 percent of a negative special item is realized as increased earnings in the four quarters after recognition (when negative special items are adjusted at the highest statutory rate). The income-transfer analysis from prior research (Cready et al. 2012; Burgstahler et al. 2002) focuses on the following equation for $k = 1, \dots, 4$.

$$(E_{i,t+k} - E_{i,t+k-4}) = b_{0k} + b_{1k}SI_{i,t} + b_{2k}(E_{i,t} - SI_{i,t} - E_{t-4}) + e_{it} \tag{1}$$

where:

- $E_{i,t+k}$ income before extraordinary items (*IBQ*) for firm i in quarter $t+k$ (where $k=1, \dots, 4$) divided by the market value of equity ($CSHOQ * PRCCQ$) in quarter $t-4$; and
- $SI_{i,t}$ special items (*SPIQ*) reported by firm i in quarter t multiplied by one minus the highest statutory tax rate divided by the market value of equity in quarter $t-4$.

Next we analyze the implications of an assumed tax rate that is higher or lower than the true tax rate on the inferences drawn from the income-transfer model. We evaluate the impact of tax rate misspecification on the EQ (1) parameters by replacing *SI* (the special item adjusted at the highest statutory tax rate) with its unobserved *true* value, *TSI* (the special item adjusted at the unobserved true tax rate), so that:

$$(E_{i,t+k} - E_{i,t+k-4}) = g_{0k} + g_{1k}TSI_{i,t} + g_{2k}(E_{i,t} - TSI_{i,t} - E_{i,t-4}) + e_{i,t} \tag{2}$$

Defining $RSI_{i,t}$ as the reported amount of special items by firm i in quarter t , we then relate it to the unobserved *TSI* (i.e., the true after-tax special item) through the unobserved true special items tax rate (τ) as follows:

$$TSI_{i,t} = (1-\tau) * RSI_{i,t} \tag{3}$$

Since *SI* in EQ (1) is adjusted by an assumed special items tax rate, τ' , expressing *TSI* in EQ (3) in terms of *SI* rather than *RSI* implies:

$$TSI_{i,t} = \left\{ \frac{(1-\tau)}{(1-\tau')} \right\} * SI_{i,t} \tag{4}$$

Substituting (4) into (2) and collecting terms yields:

$$(E_{i,t+k} - E_{i,t+k-4}) = g_{0k} + \left[g_{1k} \left\{ \frac{(1-\tau)}{(1-\tau')} \right\} + g_{2k} \left(1 - \left\{ \frac{(1-\tau)}{(1-\tau')} \right\} \right) \right] * SI_{i,t} + g_{2k}(E_{i,t} - SI_{i,t} - E_{t-4}) + e_{it} \tag{5}$$

The b_{1k} term in EQ (1) corresponds to the bracketed SI coefficient in EQ (5), while b_{2k} corresponds to g_{2k} . The relationship between b_{1k} and the true SI coefficient, g_{1k} , is seen by solving

$$b_{1k} = g_{1k}(1-\tau)/(1-\tau') + g_{2k}(1-\{(1-\tau)/(1-\tau')\}) \quad (6)$$

for g_{1k} as follows:

$$g_{1k} = \{(1-\tau')/(1-\tau)\}b_{1k} - g_{2k}(\{(1-\tau')/(1-\tau)\} - 1) \quad (7)$$

The role of the second term in EQ (7) is more complicated, as its effect is in the form of a shift that depends both on the difference between the assumed and true tax rate and the sign of g_{2k} . When the assumed tax rate exceeds the true tax rate and $g_{2k} > 0$, the overall effect on g_{1k} is positive. In other words, a downward bias is present in the estimated special items parameter b_{1k} . In the context of the income-transfer analysis, a reasonable supposition is that $g_{2k} > 0$ in quarters 1 through 3 and $g_{2k} < 0$ in quarter 4. Hence the second term suggests an upward adjustment in the estimated special items coefficient for $k = 1, 2,$ and 3 but a downward adjustment for $k = 4$. This effect, taken together with the first term's scale effect, suggests a general setting in which subsequent interim quarter special items coefficients reported by Cready et al. (2012) and Burgstahler et al. (2002) are underestimated, while the effect on the subsequent fourth quarter coefficient depends on the relative magnitudes of the scale and shift effects since these two effects work in opposite directions.¹⁸ This is particularly important because the $k = 4$ lag, as the seasonal lag, plays a central role in the income-transfer analysis and conclusions due to its reversal properties as well as its magnitude.

Rearranging terms yields the following expression reflecting the difference between the estimated SI coefficient (b_{1k}) and the true SI coefficient (g_{1k}):

$$b_{1k} - g_{1k} = \{(\tau' - \tau)/(1 - \tau)\} * (b_{1k} - g_{2k}). \quad (8)$$

The $\{(\tau' - \tau)/(1 - \tau)\}$ term in this expression reflects a tax rate scale effect. If τ' (the assumed tax rate) exceeds τ (the true tax rate), then the sign of (8) is determined by the relative magnitudes of the estimated special items parameter, b_{1k} , and the true income change parameter, g_{2k} . Hence b_{1k} is a downwardly biased estimate of the true value, g_{1k} , if and only if $b_{1k} < g_{2k}$. That is, the absolute value of a positive (negative) coefficient will be smaller (greater) than that from the estimated true tax rate. Similarly, if τ' (the assumed tax rate) is lower than τ (the true tax rate) then the sign of (8) is also determined by the relative magnitudes of the estimated special items parameter, b_{1k} ,

¹⁸ These inferences are of course reversed when the actual tax rate exceeds the true tax rate. This is unlikely when the top statutory rate is used but possible when a zero rate is assumed.

and the true income change parameter, g_{2k} . In that case, b_{1k} would be an upwardly biased estimate of the true value, g_{1k} , if and only if $b_{1k} < g_{2k}$. That is, the absolute value of a positive (negative) coefficient will be greater (smaller) than that from the estimated true tax rate.

In the case of the income-transfer model for the interim earnings changes (i.e., $k = 1, 2$, or 3), the expected g_{2k} (and estimated b_{2k}) values are positive while the estimated special items parameters (b_{1k}) are negative. Thus b_{1k} is less than g_{2k} , which suggests that the reported Cready et al. (2012, Table 2, p. 1177) and Burgstahler et al. (2002, Table 2, p. 596) estimates of b_{1k} for these quarters are less than their expected true value, g_{1k} . In the case of fourth quarter earnings changes, the expected g_{2k} (and estimated b_{2k}) value is negative. However, the b_{1k} value estimated by Cready et al. (2012) and Burgstahler et al. (2002) for negative special item observations are considerably more negative than the estimated b_{2k} value (i.e., -1.342 versus -0.213 and -1.277 versus -0.316 , respectively), suggesting that the reported b_{1k} estimates are again downwardly biased, relative to the expected true value, g_{1k} . This follows from the fact that these estimates are based on assuming the highest statutory rate, and thus, if any bias is present, it must be from an assumed tax rate that exceeds the true tax rate. Given the implications from a simple modeling of the possible effects of misestimating the true tax rate, we next discuss the “true tax rate” from a theoretical perspective. We then empirically test various tax rate assumptions, as compared to pre-tax models, under the assumption that the coefficients from the pre-tax models represent the true coefficients and therefore the coefficients from tax-adjusted models that most closely align to the pre-tax models represent the best approximation of the true tax rate.

3.2 What is the true tax rate?

In this section, we discuss whether each of the TOP, ZERO, MTR, or ETR tax rate assumptions is theoretically correct. We do not discuss the implied Compustat tax rate (CSTAT) because we cannot determine the algorithm Compustat uses to calculate its tax rate.¹⁹ We begin with ETR because a simple example demonstrates that ETR is not the theoretically correct rate under any circumstance. The following example, which assumes both TOP and MTR are equal at 35 percent, municipal bond interest income is a permanent book-tax difference, and the negative special item is fully deductible, makes obvious the ETR is not the theoretically correct tax rate.

¹⁹ Our observations suggest Compustat generally assumes the highest statutory rate (TOP) with exactly 35% assumed for over 70 percent of our sample of special item observations. The zero tax rate (ZERO) is assumed for approximately 10 percent of our sample of special items. For those in between, there is no clear calculation (e.g., ETR) for the rate as far as we can tell. We cannot ascertain how this choice is made and the Compustat manuals provide no clarification.

Sales Revenue	\$100
COGS	<u>30</u>
Gross Profit	70
Other Expenses	(40)
Negative Special Item	(10)
Municipal Bond Interest	<u>10</u>
Income before taxes	30
Provision for income tax	(7)
Net Income	\$23

In this example, the ETR is 23.33 percent ($7/30$); however, it would be incorrect to calculate an after-tax negative special item using the ETR. To illustrate, we calculate after-tax income before the negative special items in two ways. First, if we simply add back the negative special item and adjust it for taxes using the ETR, we obtain Net Income Before Negative Special Items = $23 + 10 \cdot (1 - 0.2333) = 23 + 7.66 = \30.66 . Alternatively, we note that pre-tax income before the negative special item = 40. If both TOP and MTR equal 35 percent, tax expense for earnings before negative special items equals $(40 - 10 \text{ tax-exempt municipal bond interest}) = 30 \cdot \text{TOP} = \10.50 . Thus the after-tax earnings excluding negative special items in this case is $40 - 10.50 = \$29.50$, not $\$30.66$, as in the example using the ETR to adjust the negative special item.²⁰

The MTR is defined as the present value of the corporate tax on an additional dollar of income or expense (Scholes et al. 2014). Theory suggests that the MTR is the appropriate rate to use in evaluating incremental corporate decisions because it is the rate paid or saved on an incremental dollar of income or expense (Graham et al. 2017). Consistent with that notion, Graham (1996a) states that “financial theory is clear that the marginal tax rate is relevant when analyzing incremental financing [investing] choices,” and this would apply in disinvesting decisions (such as restructurings) as well. The future deductibility or taxability of a special item is an important factor in determining the best estimate of the true tax rate. Market models of stock prices as well as the tests of persistence of earnings are forward-looking, underlying the importance of the tax assumption on the marginal items of income. When a special item is currently taxable or gives rise to a temporary difference, the firm’s MTR is the theoretically correct rate.

On the other hand, if the item is a permanent difference (i.e., negative special items where book expenses never produce a tax deduction) or if there will never be positive income, the theoretically correct rate is ZERO. The only special item subtype we identified where the entire component category (see Appendix 1) might be a permanent book-tax difference by GAAP standards is goodwill impairments

²⁰ We assume a statutory tax rate of 35 percent in this example because our sample period predates the establishment of a 21 percent flat corporate tax rate under the Tax Cuts and Jobs Act. However, substituting a 21 percent tax rate in our example leads to the same conclusion that the ETR is a flawed estimate of the true tax rate. Tax expense at 21 percent would equal $30 \cdot \text{TOP} = \$6.30$, resulting in after-tax earnings before NSIs of $40 - \$6.30 = \33.70 .

(see 26 USC §197a and b). But even in the case of goodwill impairments, some goodwill is amortized for tax purposes, which would create temporary differences, depending on timing of amortization and impairment.²¹ ZERO may also be the correct tax rate where there is a deferred tax valuation allowance of 100 percent, suggesting the firm does not expect future taxable income and the difference would become permanent. There is evidence in the literature consistent with the notion that negative special items are associated with 100-percent deferred tax valuation allowances (Dechow and Ge 2006; Christensen et al. 2008). To examine whether this notion holds for our sample of special item firms, we examine the tax footnote disclosures for a random sample of 100 negative special item firms where the absolute value of the negative special item is greater than one percent of total assets. We report the results of this examination in Appendix 2. Our analyses suggest that, on average, the deferred tax valuation allowance is 42.1 percent of the deferred tax asset. We found 21 (25) percent of the random sample had a complete (substantially complete) write-off of deferred tax assets as measured by a 100-percent (greater than 95 percent) deferred tax valuation allowance. The remaining 79 (75) percent of the sample has a mean valuation allowance of 26.8 (23.0) percent of deferred tax assets. We also find that 11 percent of the random sample observations have no valuation allowance. Last, 36 (64) percent of the firms report positive (negative) pre-tax income.²²

Taken together, we do not believe that, on average, ZERO is the theoretically correct tax rate for a general sample of special item reporting firms, especially as a cross-sectional constant. Moreover, the MTR calculation contemplates the likelihood of future taxable income (e.g., Graham 1996a, 1996b), implicitly inferring a valuation allowance on the deferred tax asset if necessary. Thus, even in cases of a 100-percent valuation allowance, an unbiased estimate of the MTR would be zero and the theoretically correct tax rate. Similarly, for special items that are currently taxable or represent temporary book-tax differences there are compelling reasons to believe the TOP rate is an unbiased estimate of the true tax rate. However, while the TOP statutory rate may be the correct rate, the circumstances that give rise to the TOP rate being correct would also lead to an MTR equal to the top statutory rate.

Our examination of special items categories (see Appendix 1) suggests these items are generally either currently deductible for tax purposes or represent a book-tax timing

²¹ Goodwill deductibility is a complex situation depending on the structure of the acquisition. Generally, stock-for-stock (cash for asset) acquisitions result in nondeductible (deductible and amortized over 15 years) goodwill, though there are exceptions and also mixed consideration transactions (e.g., Henning and Shaw 2000; Ayers et al. 2000; 2004; Martin 1996; Erickson 1998; Oler 2008). Khalil et al. (2021, Appendix B) explain the timing issues for taxable acquisitions, and their study examines a strategy for deducting impairments of goodwill.

²² We perform the same analyses for a smaller sample of 25 positive special items observations (reported in Appendix 2, Panel B) and find that the mean (median) valuation allowance is 42.8 (18.0) percent of the deferred tax asset. We also find that 28 percent have a valuation allowance greater than 95 percent and 8 percent have no allowance. Of these firms, 23 of 25 report positive pre-tax income.

difference.²³ The only subtype we identify as a permanent difference is goodwill impairments, and, as noted above, that is only true when goodwill is acquired in a stock-for-stock transaction. In summary, our analysis above suggests that cross-sectional constant tax rate assumptions, on average, likely overstate (TOP) or understate (ZERO) the true tax rate, though either may be correct for individual firms. In those cases, an unbiased estimate of the MTR should be equal to the TOP or ZERO rate, which would only pose a problem if the special item to be adjusted creates a permanent book-tax difference, in which case ZERO is the theoretically correct rate. Accordingly, we believe that, on average, the MTR is the theoretically correct tax rate for all special items with the sole exception being nondeductible goodwill impairments.

4 Sample selection and descriptive statistics

We report the results of our sample selection process in Table 2, Panel A. Our sample consists of quarterly earnings data from Compustat for the years 2000 – 2017 merged with the marginal tax rate database provided by Graham (1996a, 1996b), for a starting sample of 194,187 firm quarters.²⁴ We then delete all financial firms (SIC codes 6000 – 6999; 45,310 observations) and those firms missing market value or earnings information for the four quarters before and after the observation date (30,699 observations). Next we delete firms where the absolute value of special items or earnings exceeds the market value four quarters prior to the observation date (1,905 observations). We also delete observations where the sum of the pre-tax components of special items is not equal to the pre-tax special item (3,613 observations) and the absolute value of the after-tax special items are equal to or greater than the absolute value of pre-tax special items (9,979 observations).²⁵ Because SFAS No. 142 (enacted June 2001), SFAS No. 144 (enacted August 2001), and SFAS No. 146 (enacted June 2002) significantly and directly affected the accounting for goodwill, asset impairments, and restructuring charges, we limit our sample to years after 2002 (22,023 observations lost). Finally, we limit our sample to nonzero special item observations (49,115 observations lost). This leaves a final sample of 31,543 firm quarter observations. Of these observations, we have 25,461 with negative special items and 6,082 with positive special items.

²³ Our review of the Compustat manuals as well as company disclosures suggests that, with the exception of nondeductible goodwill impairments, every component of special items is currently taxable or a temporary timing difference. That said, there may be limited circumstances where a portion of an item gives rise to a permanent book-tax difference. We note the following examples: 1) debt repurchases that are governed by restrictions under IRC §249, 2) gains from debt forgiveness where the firm is allowed to exclude the cancellation of debt income due to bankruptcy or insolvency, 3) fines and penalties on settlements, 4) interest or fines on tax settlements, 5) nontaxable insurance settlements. We believe instances of these items occurring in the data are limited.

²⁴ The marginal tax rates provided by Professor Graham account for many important features of the tax code, including uncertainty about taxable income, deferred taxes, the progressivity of the statutory tax schedule, net operating loss carryforwards and carrybacks, certain tax credits, and the alternative minimum tax. The data are available at his website: <http://faculty.fuqua.duke.edu/~jgraham/taxform.html>. We thank him for making this data available.

²⁵ We do so to calculate the implied Compustat tax rate on total special items. Compustat provides after-tax values for the individual special item components (e.g., restructuring charges) but not for total special items.

The descriptive statistics for the negative special item observations in our sample are reported in Panel B of Table 2. All variables are as defined in Appendix 3. The negative special item sample consists of firms with an average of \$7.1 billion in assets and \$7.4 billion in market value. These firms average \$118 million of pre-tax income with just under \$36 million in pre-tax negative special items reported. The average tax rates are interesting. Compustat appears to

Table 2 Sample Selection and Descriptive Statistics

Panel A: Sample Selection					
Data Selection Step		Obs. Lost		Total N	
Merge Compustat with Graham marginal tax rates, 2000–2017				194,187	
Delete financial firms (SIC 6000–6999)		45,310		148,877	
Delete missing market value or earnings information for time t–4 through t+4		30,699		118,178	
Delete if special items or earnings at time t–4 through t+4 exceed market value at time t–4		1,905		116,273	
Delete where Compustat pre-tax SI components do not equal reported total pre-tax SI		3,613		112,660	
Delete where abs(after-tax SI)>abs (pre-tax SI) or implied Compustat tax rate on special items exceeds 100%		9,979		102,681	
Delete remaining observations with missing model data, limit sample to common (post-SFAS 146) period, 2003–2017		22,023		80,658	
Limit sample to nonzero total pre-tax SI		49,115		31,543	
Negative total pre-tax SI observations		N/A		25,461	
Positive total pre-tax SI observations		N/A		6,082	
Panel B: Final Sample Descriptive Statistics, NSI Observations (n=25,461)					
Category (N=25,461)	Mean	Std. Dev	1st Quartile	Median	3rd Quartile
Special Items ^a (\$ million)	–35.885	216.671	–14.437	–3.363	–0.802
Compustat SI Tax Rate	0.304	0.134	0.321	0.350	0.350
Marginal Tax Rate	0.132	0.147	0.016	0.035	0.340
Effective Tax Rate	0.266	0.223	0.055	0.285	0.371
Total Assets (\$ million)	7,072.691	22,560.941	363.377	1,325.672	4,538.700
Market Value (\$ million)	7,362.613	23,603.885	352.115	1,241.859	4,343.075
Pre-tax Income (\$ million)	118.164	526.393	–1.389	12.494	71.529
Panel C: Final Sample Descriptive Statistics, PSI Observations (n=6,082)					
Category (N=6,082)	Mean	Std. Dev	1st Quartile	Median	3rd Quartile
Special Items ^a (\$ million)	28.168	208.148	0.418	1.750	7.800
Compustat SI Tax Rate	0.291	0.153	0.316	0.350	0.350
Marginal Tax Rate	0.145	0.150	0.018	0.042	0.346
Effective Tax Rate	0.260	0.201	0.059	0.297	0.370
Total Assets (\$ million)	6,139.274	20,855.758	240.498	865.170	3,385.084
Market Value (\$ million)	6,072.886	20,478.790	235.846	812.495	3,180.958
Pre-tax Income (\$ million)	156.954	668.195	1.880	16.746	78.900

^a Reported on a pre-tax basis

assume the top statutory tax rate in most cases. The overall mean is 30.4 percent, the first quartile is 32.1 percent, the median is 35.0 percent, and the third quartile is 35.0 percent (the top federal statutory rate during the entire sample period). The estimated marginal tax rates are much lower and reflect the common observation that firms reporting negative special items are often loss firms with substantial deferred tax valuation allowances (Beaver et al. 2007, 532; Dechow and Ge 2006, 272). The mean MTR is 13.2 percent with a median of only 3.5 percent. The mean effective tax rate (ETR) is 26.6 percent with a median of 28.5 percent. We find that the calculated ETR is lower than the top statutory rate but substantially higher than the MTR.

Finally, the descriptive statistics for the positive special item observations are reported in Panel C of Table 2. The positive special item sample consists of firms with an average of \$6.1 billion in assets and \$6.1 billion in market value. These firms average \$157 million of pre-tax income with \$28 million in pre-tax positive special items reported. The MTR for these observations compared to the negative special item group suggests that MTRs for positive special item firms are higher than for negative special item firms. We find that the mean MTR for positive special item firms is 14.5 percent and the median is 4.2 percent. Effective tax rates and the Compustat implied tax rates are nearly identical between negative special item and positive special item firms, and again the Compustat implied tax rates appear to highly favor the top statutory rate as all quartiles are above 30 percent and the median and third quartile are 35 percent.

5 Research design and empirical results

5.1 Research design

5.1.1 Negative and positive special item analyses

In the initial portion of our analyses, we examine the implications of five different assumed tax rates on the estimated negative and positive special items coefficients from the income-transfer model. We do so by estimating a pre-tax version of the model and then comparing the results from the pre-tax version to after-tax versions applying various assumed tax rates identified in the literature. Our model and discussion above suggests that tax adjustments represent a scaling of income for taxes. Thus an after-tax model with special items adjusted for the true tax rate should yield quantitatively and qualitatively identical results to a pre-tax version of the model.

To perform our analyses, we estimate pre- and after-tax versions of the income-transfer model for $k = 1, \dots, 4$ as follows.

$$(PTI_{i,t+k} - PTI_{i,t+k-4}) = b_{0k} + b_{1k}PTSI_{i,t} + b_{2k}(PTI_{i,t} - PTSI_{i,t} - PTI_{i,t-4}) + e_{i,t} \quad (9)$$

$$(E_{i,t+k} - E_{i,t+k-4}) = b_{0k} + b_{1k}ATSI_{i,t} + b_{2k}(E_{i,t} - ATSI_{i,t} - E_{i,t-4}) + e_{i,t} \quad (10)$$

PTI is quarterly pre-tax income and PTSI is quarterly pre-tax special items. E is quarterly after-tax income, and ATSI is after-tax special items adjusted at each assumed tax rate. All model variables are formally defined in Appendix 3, Panel A.

We estimate five different after-tax versions of the income-transfer model. First, we use the simple and cross-sectional constant assumptions of a zero tax rate (ZERO) and the highest statutory rate (TOP). We also investigate firm-specific marginal tax rates (MTR) provided by Graham (Graham 1996a, 1996b) and effective tax rates (ETR), calculated as total income tax expense (*TXTQ*) divided by pre-tax income (*PIQ*). Finally, we use the firm-specific average tax rate implied by Compustat (CSTAT), calculated as one minus the sum of after-tax special items components divided by total pre-tax special items [$1 - (\text{Sum after-tax SI components/total pre-tax SIs})$].²⁶

5.1.2 Restructuring charge and goodwill impairment analyses

As discussed earlier, restructuring-charge and goodwill-impairment subsamples may have differing tax consequences. Accordingly, we estimate modified versions of the income-transfer model. The sample for these tests is limited to observations that have a restructuring charge or goodwill impairment included in the negative special item. To perform our analyses, we first estimate pre- and after-tax versions of the modified income-transfer model for $k = 1, \dots, 4$ as follows.

$$(PTI_{i,t+k} - PTI_{i,t+k-4}) = b_{0k} + b_{1k}PTC_{i,t} + b_1 b_k PTOSI_{i,t} + b_{2k}(PTI_{i,t} - PTSI_{i,t} - PTI_{i,t-4}) + e_{i,t} \quad (11)$$

$$(E_{i,t+k} - E_{i,t+k-4}) = b_{0k} + b_{1k}ATC_{i,t} + b_1 b_k ATOSI_{i,t} + b_{2k}(E_{i,t} - ATSI_{i,t} - E_{i,t-4}) + e_{i,t} \quad (12)$$

PTC is pre-tax restructuring charges or pre-tax goodwill impairments. PTOSI are other pre-tax special items. ATC is after-tax restructuring charges or goodwill impairments. ATOSI is after tax other special items. All other variables are as previously defined and formally defined in Appendix 3, Panel A. As with our full sample analyses, we estimate the five different after-tax versions of the modified income-transfer model.

5.2 Empirical results

5.2.1 Negative special items analyses

Our estimates of EQ (9) and the five after-tax versions of EQ (10) are reported in Tables 3 and 4 for NSIs and PSIs, respectively. We report estimates of b_{1k} , the negative special item variable of interest, in Panel A of Table 3 as well as the total income transfer stemming from the differences in the lags for $k = 1, 2,$ and 3 from zero, and the $k = 4$ lag

²⁶ Compustat reports each of the components of special items (e.g., restructuring charges, goodwill impairments, etc.) on both a pre- and after-tax basis, but total special items (SPIQ) are only reported on a pre-tax basis. Thus this method is effectively the weighted-average tax rate assumed by Compustat on total special items.

from -1.0. (See Burgstahler et al. 2002, p. 599, for a thorough discussion of the fourth lag.) In Panel B, we report differences in the $k = 1$ through $k = 4$ coefficients as well as the total income transfer for the five tax-adjusted models, compared to the pre-tax model. Our results on the b_{Jk} (special items) coefficients in Table 3, Panel A, using negative special items adjusted at the highest statutory rate (TOP) are almost identical to Cready et al. (2012) and Burgstahler et al. (2002). In particular, we find cumulatively that 44.2 percent of the original negative special item is recovered through increased earnings over the subsequent four quarters with more than half (22.1 percent) of this effect occurring in the fourth quarter following negative special item recognition.

On the other hand, consistent with the pre-tax analysis of Cready et al. (2012, p. 1179), the pre-tax version (PTB) of the income-transfer model tells a very different story. Specifically, we find that the income-transfer aspect of negative special items for

Table 3 Income-Transfer Model Regressions Using Alternative Tax Rate Adjustments for Negative Special Items and Coefficient Comparisons across Assumed Tax Rates

Panel A: Estimates of b_{1k} (n=25,461)					
	k=1	k=2	k=3	k=4	Total Effect on k=1 to 4 Earnings ^a
Tax Method	Estimate	Estimate	Estimate	Estimate	
PTB	0.04367*	-0.02181	-0.06370**	-0.96713**	0.90%
ZERO	0.06538**	-0.00523	-0.04560**	-0.85754**	-15.70%
TOP	-0.02807	-0.08580**	-0.10773**	-1.22078**	44.24%
MTR	0.04008*	-0.03335*	-0.06855**	-0.95050**	1.23%
ETR	0.03117	-0.04452**	-0.07215**	-0.98429**	6.98%
CSTAT	0.00373	-0.05919**	-0.07573**	-1.08716**	21.84%

Panel B: Comparison of PTB b_{1k} Coefficients and Income Transfer to Assumed Tax Estimates					
	k=1	k=2	k=3	k=4	Total Effect on k=1 to 4 Earnings ^a vs. PTB
Tax Method	Estimate vs. PTB	Estimate vs. PTB	Estimate vs. PTB	Estimate vs. PTB	
ZERO	0.02171*	0.01658*	0.01810*	0.10959**	-16.60%**
TOP	-0.07174**	-0.06399**	-0.04403**	-0.25365**	43.34%**
MTR	-0.00359	-0.01154	-0.00485	0.01663	0.33%
ETR	-0.01250	-0.02271*	-0.00845	-0.01716	6.08%*
CSTAT	-0.03994**	-0.03738**	-0.01203	-0.12003**	20.94%**

Pre-tax EQ (9) $(PTI_{i,t+k} - PTI_{i,t+k-4}) = b_{0k} + b_{1k} PTSI_{i,t} + b_{2k} (PTI_{i,t} - PTSI_{i,t} - PTI_{i,t-4}) + e_{i,t}$

After-tax EQ (10) $(E_{i,t+k} - E_{i,t+k-4}) = b_{0k} + b_{1k} ATSI_{i,t} + b_{2k} (E_{i,t} - ATSI_{i,t} - E_{i,t-4}) + e_{i,t}$

^a For $k = 1$ through 3, positive (negative) coefficients imply a decrease (increase) in future earnings because special items are recorded as negative values for the sample. For $k = 4$, the future earnings effect is calculated as 1 plus the coefficient. To determine the total effect on future earnings, we add 1 to the sum of the $k = 1$ to 4 coefficients and multiply the result by -1.

*, ** significant at the 0.05 or 0.01 level, respectively, in a two-tailed test.

All variables are defined in Appendix 3, Panel A.

the four subsequent quarters is only 1 percent of the original charge with none of it coming in the fourth subsequent quarter.²⁷ When we apply a zero tax rate adjustment (ZERO), consistent with the evidence of Dechow and Ge (2006), our results suggest that NSIs are associated with income *decreases* over the subsequent four quarters of approximately 15 percent, 14 percent of which occurs in the fourth subsequent quarter. As discussed previously in the tax rate misspecification model, these results suggest that a ZERO (TOP) tax rate assumption is lower (higher) than the average true tax rate, since the income transfer appears to be biased downward (upward) when compared to the pre-tax model, and these biases are statistically significant (see Panel B, sixth column) and economically meaningful.

Given our results from the extreme TOP and ZERO tax rate assumptions, it appears that both are problematic in the income-transfer model setting with respect to negative special items. In particular, assuming the PTB results yield the best estimate of true income transfer, the TOP tax rate assumption results in an overstatement of the income-transfer effect, while the ZERO tax rate assumption understates the income-transfer effect. Our analysis in the prior sections concluded that tax rate estimates inside these extreme boundaries will exhibit less bias and that the heterogeneity of the sample suggests that one of the firm-specific rates will be more representative of the true tax rate for negative special items. Accordingly, we test the income-transfer model using the MTR, ETR, and CSTAT tax adjustments. Using the MTR adjustment, we find that the income-transfer effect is 1 percent of after-tax negative special items. The ETR adjustment yields an income transfer of 7 percent. The CSTAT tax rate adjustment results suggest this assumed tax rate is higher than the true tax rate as the total income-transfer effect with this adjustment is almost 22 percent.

In Panel B of Table 3, we report the comparisons for each lag of the negative special item coefficients from the pre-tax model to the corresponding coefficients from the five tax-adjusted models along with differences in the aggregate income transfer. The bias from an overstated (understated) assumed tax rate will result in significantly negative (positive) coefficient differences and the total income transfer difference will be positive (negative). Our conclusion that extreme assumptions are clearly biased is confirmed in the differences for each lag. The difference between every after-tax coefficient and the corresponding pre-tax coefficient is positive (negative) for ZERO (TOP) and significant (two-tailed p-value < 0.05 or better). Thus our evidence suggests that the ZERO tax rate assumption significantly understates the true tax rate while the TOP tax rate assumption significantly overstates the true tax rate. CSTAT also appears to overstate the true tax rate as the coefficient differences on every lag are negative, though not significant at the third lag. This result is expected given that more than half the after-tax observations in Compustat are adjusted at the top statutory rate.

Our previous discussion suggests that, on average, the MTR is the theoretically correct tax rate for negative special item observations. Our results in Panel B support this expectation. None of the estimated coefficient differences between the PTB estimates and estimates that rely on MTR-adjusted negative special items is significant. Further, the difference between the estimated income transfer for the PTB and MTR models is less than 1 percent and insignificant. Each of the other tax rate assumptions (TOP, ZERO, ETR, and CSTAT) yield significantly different aggregate income

²⁷ Cready et al. (2012, Table 3, p. 1179) report income transfer for the pre-tax model of 7.8 percent.

transfers (two-tailed p -value < 0.05 or better) when compared to the PTB estimate (see sixth column). Taken together, our evidence in Table 3 clearly suggests that, on average, the TOP, ETR, and CSTAT (ZERO) tax rate overstates (understates) the true negative special item tax rate. Further, consistent with expectations, the TOP assumption creates the greatest bias in estimating income transfer. Finally, our empirical evidence suggests the theoretically correct tax rate, the MTR, is also the best empirical estimate of the true tax rate for negative special items.

5.2.2 Positive special items analyses

Our results for the estimation of EQ (9) and (10) for positive special items (PSIs) are reported in Table 4. With respect to positive special items, a tax rate assumption that overstates (understates) the true tax rate will result in estimated income transfer that is lower (higher) than from a model that tax-adjusts positive special items at the true tax rate. Our results on the b_{ik} coefficients in Table 4 using positive special items are reported in Panel A. We find that the PTB version of the income-transfer model yields an income transfer of 28 percent of the positive special item. As expected, the assumption that yields the lowest income transfer, 3 percent, is TOP, and the assumption that yields the highest income transfer, 41 percent, is ZERO. The income transfer associated with MTR, ETR, and CSTAT rates are 37, 22, and 18 percent, respectively. As mentioned previously the signs for positive special items are reversed, and thus our results suggest that a ZERO (TOP) tax rate assumption is lower (higher) than the average true tax rate, since the coefficients appear, in general, to be biased upward (downward) when compared to the pre-tax model. In addition, the income transfer for the ZERO (TOP) tax rate assumptions yield a significantly (two-tailed p -value < 0.05 or better) higher (lower) income-transfer effect compared to the PTB version (see sixth column Panel B).

Again, with the extreme and cross-sectional constant assumptions of ZERO and TOP showing significant bias, we move to the firm-specific measures. Unsurprisingly, these measures inside the boundaries are less biased than the extreme assumptions, and all three are somewhat reasonable approximations of the true tax rate for the positive special item subsample. ETR and CSTAT both underestimate the total transfer and have generally negative individual coefficients, suggesting these rates are greater than the true tax rate, though none of these differences are statistically significant at the 0.05 level. Our analysis concludes that MTR is the theoretically correct assumption for positive special items, and the overall income transfer results suggest this is a reasonable approximation of the true tax rate, though may be slightly lower than the true tax rate, on average. The overall income transfer difference of 9 percent is not statistically different from the PTB income transfer, and three lags have positive coefficients, only the fourth lag significantly so.²⁸

Taken together, our evidence in Table 4 clearly suggests that, on average, the TOP and (ZERO) assumptions overstate (understate) the true positive special item tax rate. Further, consistent with expectations, the TOP rate creates the greatest bias in total income transfer. While CSTAT, ETR, and MTR are all reasonable estimates of the true tax rate for positive special items, the lack of information on the CSTAT adjustment

²⁸ Evaluating positive special items is particularly difficult because, as Appendix 1 makes clear, many PSIs are merely the reversal of a prior NSI that must have been overestimated when originally reported.

Table 4 Income-Transfer Model Regressions Using Alternative Tax Rate Adjustments for Positive Special Items and Coefficient Comparisons across Assumed Tax Rates

Panel A: Estimates of b_{1k} (n=6,082)					
	k=1	k=2	k=3	k=4	Total Effect on k=1 to 4 Earnings^a
Tax Method	Estimate	Estimate	Estimate	Estimate	
PTB	0.05708	0.09920	0.04775	-0.92113**	28.29%
ZERO	0.07801*	0.08271	0.05238	-0.79826**	41.48%
TOP	0.00266	0.04999	0.06009	-1.08727**	2.55%
MTR	0.06372	0.08594	0.05506	-0.83256**	37.22%
ETR	0.06395	0.05500	0.03843	-0.94040*	21.70%
CSTAT	0.02999	0.03778	0.08345	-0.97377**	17.74%

Panel B: Comparison of PTB b_{1k} Coefficients and Income Transfer to Assumed Tax Estimates					
	k=1	k=2	k=3	k=4	Total Effect on k=1 to 4 Earnings^a vs. PTB
Tax Method	Estimate vs. PTB	Estimate vs. PTB	Estimate vs. PTB	Estimate vs. PTB	
ZERO	0.02093	-0.01649	0.00463	0.12287**	13.19%*
TOP	-0.05442*	-0.04921	0.01234	-0.16614**	-25.74%**
MTR	0.00664	-0.01326	0.00731	0.08857*	8.93%
ETR	0.00687	-0.04420	-0.00932	-0.01927	-6.59%
CSTAT	-0.02709	-0.06142	0.03570	-0.05264	-10.55%

Pre-tax based on EQ (9) $(PTI_{i,t+k} - PTI_{i,t+k-d}) = b_{0k} + b_{1k} PTSI_{i,t} + b_{2k} (PTI_{i,t} - PTSI_{i,t} - PTI_{i,t-d}) + e_{i,t}$

After-tax based on EQ (10) $(E_{i,t+k} - E_{i,t+k-d}) = b_{0k} + b_{1k} ATSI_{i,t} + b_{2k} (E_{i,t} - ATSI_{i,t} - E_{i,t-d}) + e_{i,t}$

^a For $k = 1$ through 3, positive (negative) coefficients imply a decrease (increase) in future earnings because special items are recorded as negative values for the sample. For $k = 4$, the future earnings effect is calculated as 1 plus the coefficient. To determine the total effect on future earnings, we add 1 to the sum of the $k = 1$ to 4 coefficients

*, ** significant at the 0.05 or 0.01 level, respectively, in a two-tailed test

All variables are defined in Appendix 3, Panel A

and the economic difference in total income transfer make it an unsettling choice for adjusting positive special items. Thus our evidence suggests in the context of positive special items both the ETR and MTR are high-quality estimates of the true tax rate with ETR (MTR) slightly overstating (understating) the true tax rate. That said, we still assert that the theoretically correct tax rate for positive special items is the MTR.

5.2.3 Restructuring charges and goodwill impairments analyses

Next we perform empirical tests of restructuring charges and goodwill impairments (limited to any firm that reports negative values in the pre-tax components RCP and GDWLIP, respectively) by estimating EQ (11) and the five after-tax versions of EQ (12). We report the restructuring charge (goodwill impairment) versions of these models in

Table 5 (6). In summary, our conclusion with respect to restructuring charges is that the theoretically correct tax rate assumption is the MTR, though this subsample may approach zero, as noted above. On the other hand, nondeductible goodwill impairments are permanent book-tax differences (i.e., goodwill acquired in a stock for stock transaction), suggesting ZERO may be the theoretically correct tax rate for these charges. However, the evaluation of goodwill impairments is complicated by the fact that some goodwill is deductible (i.e., goodwill acquired in cash for asset acquisitions).

In Table 5, Panel A, we find that the PTB version of the restructuring model yields an income transfer of 64 percent of the restructuring charge, much greater than that for the overall NSI sample and consistent with the real-improvements results from Cready et al. (2012, Table 6, p. 1185). TOP once again yields the highest income transfer at 157 percent, and this appears to be a significantly upwardly biased estimate of the true

Table 5 Income-Transfer Model Regressions Using Alternative Tax Rate Adjustments for Restructuring Charges and Coefficient Comparisons across Assumed Tax Rates

Panel A: Estimates of b_{1k} (n=12,721)

	k=1	k=2	k=3	k=4	Total Effect on k=1 to 4 Earnings ^a
Tax Method	Estimate	Estimate	Estimate	Estimate	
PTB	0.10105	-0.21723	-0.46549**	-1.05352**	63.52%
ZERO	0.03704	-0.22456*	-0.44950**	-0.94057**	57.76%
TOP	-0.07292	-0.42278*	-0.73026**	-1.34375**	156.97%
MTR	0.00419	-0.28044*	-0.53710**	-1.04637**	85.97%
ETR	-0.11656	-0.40105**	-0.66338**	-1.20083**	138.18%
CSTAT	-0.07292	-0.42196*	-0.67595**	-1.29002**	146.09%

Panel B: Comparison of PTB b_{1k} Coefficients and Income Transfer to Assumed Tax Estimates

	k=1	k=2	k=3	k=4	Total Effect on k=1 to 4 Earnings ^a vs. PTB
Tax Method	Estimate vs. PTB	Estimate vs. PTB	Estimate vs. PTB	Estimate vs. PTB	
ZERO	-0.06401	-0.00733	0.01599	0.11295*	-5.76%
TOP	-0.17397*	-0.20555*	-0.26477**	-0.29023**	93.45%**
MTR	-0.09686	-0.06321	-0.07161	0.00715	22.45%*
ETR	-0.21761*	-0.18382*	-0.19789*	-0.14731*	74.66%**
CSTAT	-0.17397*	-0.20473*	-0.21046**	-0.23650**	82.57%**

Pre-tax EQ (11) $(PTI_{i,t+k} - PTI_{i,t+k-4}) = b_{0k} + b_{1k} PTC_{i,t} + b_{1bk} PTO_{i,t} + b_{2k} (PTI_{i,t} - PTSI_{i,t} - PTI_{i,t-4}) + e_{i,t}$

After-tax EQ (12) $(E_{i,t+k} - E_{i,t+k-4}) = b_{0k} + b_{1k} ATC_{i,t} + b_{1bk} ATOS_{i,t} + b_{2k} (E_{i,t} - ATSI_{i,t} - E_{i,t-4}) + e_{i,t}$

^a For $k = 1$ through 3, positive (negative) coefficients imply a decrease (increase) in future earnings because special items are recorded as negative values for the sample. For $k = 4$, the future earnings effect is calculated as 1 plus the coefficient. To determine the total effect on future earnings, we add 1 to the sum of the $k = 1$ to 4 coefficients and multiply the result by -1

*, ** significant at the 0.05 or 0.01 level, respectively, in a two-tailed test

All variables are defined in Appendix 3, Panel A

tax rate as each lag coefficient difference (Panel B) is significantly negative. Furthermore, in Panel B, the difference in overall transfer, compared to the PTB estimate, is 93 percent and significantly different both statistically (0.01 level) and economically, as the total overstatement is nearly 1.5 times the PTB income transfer total. On the other hand, the ZERO assumption appears to reasonably approximate the true tax rate in total, with some offsetting differences at the coefficient-level for each lag. The total income transfer difference compared to the PTB estimate, is -6 percent, suggesting ZERO is less than the true tax rate, though this difference is statistically insignificant. For the lag coefficient differences reported in Panel B, the first and second are negative, the third and fourth are positive, and the critical fourth lag is significantly different (two-tailed p-value < 0.05) by over 11 percent. The positive difference on the fourth lag again points to ZERO understating the true tax rate.

Table 6 Income-Transfer Model Regressions Using Alternative Tax Rate Adjustments for Goodwill Impairments and Coefficient Comparisons across Assumed Tax Rates

Panel A: Estimates of b_{1k} (n=1,488)

	k=1	k=2	k=3	k=4	Total Effect on k=1 to 4 Earnings ^a
Tax Method	Estimate	Estimate	Estimate	Estimate	
PTB	0.02118	0.04103	-0.02096	-0.96923**	-7.20%
ZERO	0.04479**	0.01719	-0.01694	-0.88120**	-16.38%
TOP	-0.01386	-0.02559	-0.05111	-1.26427**	35.48%
MTR	0.03063	-0.00258	-0.03434	-0.97200**	-2.17%
ETR	0.02822	0.00308	-0.03238	-0.97841**	-2.05%
CSTAT	0.00433	-0.00679	-0.02869	-1.08302**	11.42%

Panel B: Comparison of PTB b_{1k} Coefficients and Income Transfer to Assumed Tax Estimates

	k=1	k=2	k=3	k=4	Total Effect on k=1 to 4 Earnings ^a vs. PTB
Tax Method	Estimate vs PTB	Estimate vs. PTB	Estimate vs. PTB	Estimate vs. PTB	
ZERO	0.02361	-0.02384	0.00402	0.08803**	-9.18%*
TOP	-0.03504	-0.06662*	-0.03015	-0.29504**	42.69%**
MTR	0.00945	-0.04361	-0.01338	-0.00277	5.03%
ETR	0.00704	-0.03795	-0.01142	-0.00918	5.15%
CSTAT	-0.01685	-0.04782*	-0.00773	-0.11379**	18.62%**

Pre-tax EQ (11) $(PTI_{i,t+k} - PTI_{i,t+k-4}) = b_{0k} + b_{1k} PTC_{i,t} + b_{1bk} PTO_{i,t} + b_{2k} (PTI_{i,t} - PTSI_{i,t} - PTI_{i,t-4}) + e_{i,t}$

After-tax EQ (12) $(E_{i,t+k} - E_{i,t+k-4}) = b_{0k} + b_{1k} ATC_{i,t} + b_{1bk} ATO_{i,t} + b_{2k} (E_{i,t} - ATSI_{i,t} - E_{i,t-4}) + e_{i,t}$

^a For $k = 1$ through 3, positive (negative) coefficients imply a decrease (increase) in future earnings because special items are recorded as negative values for the sample. For $k = 4$, the future earnings effect is calculated as 1 plus the coefficient. To determine the total effect on future earnings, we add 1 to the sum of the $k = 1$ to 4 coefficients and multiply the result by -1

*, ** significant at the 0.05 or 0.01 level, respectively, in a two-tailed test

All variables are defined in Appendix 3, Panel A

Moving to the firm-specific measures of CSTAT and ETR, the results in Panel B show that these tax rate assumptions significantly (two-tailed p -value < 0.01) overestimate the true tax rate for restructuring firms. In fact, the income transfer results for CSTAT and ETR (83 and 75 percent, respectively) look markedly similar to the 93 percent for the TOP assumption. The total income transfer for both assumptions is more than double that on the pre-tax model, and every lag coefficient difference is negative and significant. Our prior analysis suggests that MTR is the theoretically correct assumption for restructuring firms, and our empirical test of this yields mixed results. For income transfer, the MTR assumption overstates the total effect by 22 percent. This difference is significant at the 0.05 level. However, at the coefficient level, the differences in each of the lags are statistically insignificant, and the critical fourth lag coefficients for the PTB and MTR estimates are nearly identical (-1.053 versus -1.046).

Taken together, our evidence in Table 5 suggests that, on average, the TOP, ETR and, CSTAT assumptions overstate the true tax rate for a restructuring subsample, and TOP is again the worst offender. The evidence is mixed between the ZERO cross-sectional constant assumption and the MTR firm-specific assumption. ZERO as the lower bound appears to understate the true tax rate, significantly so for the fourth lag (but not at other lags or in total), and MTR appears to overstate the true tax rate, significantly so for the overall income transfer (but not at any lag, especially the fourth). One potential explanation for our MTR results is that prior research (e.g., Clement et al. 2007) reports that restructuring firms are undergoing massive changes and are very different from the overall population of firms. Further, restructurings usually last multiple periods (i.e., plant closings and employee terminations are carried out over multiple years). Thus contemporaneous MTRs may not fully capture the impact of downsizings on future taxable income, resulting in MTRs that are upwardly biased.

Our results for the goodwill impairment subsample are reported in Table 6. In Panel A, we find that the PTB version yields an overall income transfer of -7 percent of the goodwill impairment. The TOP rate once again yields the highest income transfer at 35 percent and appears to overestimate the true tax rate. In Panel B, all of the lag coefficient differences for the TOP rate are negative and significantly so for the second and fourth lags. In addition, the overall estimated income transfer for the TOP rate is about six times in absolute value that of the PTB estimate. Again the ZERO tax rate assumption produces the lowest income transfer at -16 percent and appears to underestimate the true tax rate. The interim lag coefficients differences for the ZERO rate reported in Panel B are insignificant, but the fourth lag difference is significantly positive and the overall income transfer difference is significantly negative and understates the PTB estimated transfer total by more than 100 percent. In summary, it appears that extreme assumptions and cross-sectional constants exhibit significant bias from the true tax rate for the goodwill impairment subsample as well.

The income transfer associated with the CSTAT assumption is 11 percent and clearly overestimates the true tax rate. All of the lag coefficient differences are negative with the second and fourth significantly so (two-tailed p -value < 0.05 or better). The total income transfer difference of 19 percent is also significant (two-tailed p -value < 0.01) and over 2.5 times total income transfer from the PTB model. The MTR and ETR tax rate assumptions produce income transfer most similar the PTB version. In Panel B, we find that the coefficient estimate differences and the total income transfer differences for MTR and ETR are both insignificant and nearly identical. Taken together, our evidence in Table 6 suggests that, on average, the TOP and CSTAT assumptions overstate the true tax

rate on goodwill impairments, while the ZERO assumption understates the true tax rate. Consistent with our previous discussion of goodwill impairments being a “special case” mixing permanent and temporary differences, depending on the deductibility of goodwill, the MTR appears to be the best estimate of the true tax rate for goodwill impairments.²⁹

5.2.4 Other negative special items analyses

In Table 7, we report empirical tests for the subsample of other NSI firms, where we exclude observations whose NSI balance is comprised entirely of restructuring charges or goodwill impairments. As a result, this subsample includes many different components reported and often more than one component per observation. However, despite the variation in components, our expectation for these charges is that the theoretically correct tax rate, on average, is the MTR because it primarily captures transactions that are either currently deductible or generate temporary book-tax differences. In Panel A, we find that the PTB version of the income-transfer model yields an income transfer of near 0 percent of the NSI. Once again, the TOP assumption yields the highest income transfer at 37 percent, while the ZERO assumption yields the lowest income transfer at -17 percent. The results in Panel B suggest that both the TOP and ZERO tax rates are clearly biased with significantly (two-tailed p -value < 0.05 or better) different coefficients compared to PTB estimates at every lag and significant differences (two-tailed p -value < 0.01) in total income transfer. Our results suggest that a ZERO (TOP) tax rate assumption is lower (higher) than the true tax rate since the coefficients appear to be biased upward (downward) when compared to the pre-tax model.

Moving to the firm-specific rate assumptions, we see that the CSTAT assumption nearly mirrors that of TOP, which is not surprising since most of these adjustments are equivalent to TOP. All of the lag differences are negative and all but the third significantly so (two-tailed p -value < 0.05 or better), and the total income transfer difference is significantly positive (two-tailed p -value < 0.01). Our previous discussion suggests the MTR is the theoretically correct tax rate for this subsample, and the results in Panel B support that expectation. The differences in the estimated income transfer for the PTB and MTR models is -3 percent and insignificant. The ETR model performs similarly as total income transfer difference of 3 percent is insignificant. Taken together, our evidence in Table 7 clearly suggests that, on average, the TOP and CSTAT (ZERO) tax rate overstates (understates) the true tax rate for the other special items subsample. Further, consistent with expectations, the TOP rate creates the greatest bias in the amount of income transfer. Finally, our evidence suggests that the theoretically correct tax rate, the MTR, is also the best estimate of the true tax rate for this subsample.

5.3 Application to other areas of research

In this section, we examine the empirical implications of altering tax rate assumptions used in prior research to supplement the model and results from the income transfer framework. The analyses that follow are presented to further demonstrate the sensitivity of empirical results within common research contexts to the various tax rate assumptions. In so doing, we do not fixate on any particular study, rather we investigate the

²⁹ This assumes an examination of aggregate goodwill impairments (i.e., both deductible and nondeductible) as in the current study.

Table 7 Income-Transfer Model Regressions Using Alternative Tax Rate Adjustments for Negative Special Items other than Restructuring Charges and Goodwill Impairments and Coefficient Comparisons across Assumed Tax Rates

Panel A: Estimates of b_{1k} (n=19,157)					
	k=1	k=2	k=3	k=4	Total Effect on k=1 to 4 Earnings^a
Tax Method	Estimate	Estimate	Estimate	Estimate	
PTB	0.05191**	-0.02545	-0.06488**	-0.96281**	0.12%
ZERO	0.07179**	-0.00870	-0.04534*	-0.84993**	-16.78%
TOP	0.01540	-0.07661**	-0.09894**	-1.19350**	36.75%
MTR	0.05532**	-0.03210*	-0.06419**	-0.93443**	-2.46%
ETR	0.04847**	-0.04252**	-0.06666**	-0.96974**	3.05%
CSTAT	0.02609	-0.05424**	-0.07054**	-1.07601**	17.47%

Panel B: Comparison of PTB b_{1k} Coefficients and Income Transfer to Assumed Tax Estimates					
	k=1	k=2	k=3	k=4	Total Effect on k=1 to 4 Earnings^a vs. PTB
Tax Method	Estimate vs. PTB	Estimate vs. PTB	Estimate vs. PTB	Estimate vs. PTB	
ZERO	0.01988*	0.01675*	0.01954*	0.11288**	-16.91%**
TOP	-0.05037**	-0.05116**	-0.03406**	-0.23069**	36.63%**
MTR	0.00341	-0.00665	0.00069	0.02838*	-2.58%
ETR	-0.00344	-0.01707	-0.0178	-0.00693	2.92%
CSTAT	-0.02582*	-0.02879*	-0.00566	-0.1132**	17.35%**

Pre-tax based on EQ (9) $(PTI_{i,t+k} - PTI_{i,t+k-4}) = b_{0k} + b_{1k} PTSI_{i,t} + b_{2k} (PTI_{i,t} - PTSI_{i,t} - PTI_{i,t-4}) + e_{i,t}$

After-tax based on EQ (10) $(E_{i,t+k} - E_{i,t+k-4}) = b_{0k} + b_{1k} ATSI_{i,t} + b_{2k} (E_{i,t} - ATSI_{i,t} - E_{i,t-4}) + e_{i,t}$

^a For $k = 1$ through 3, positive (negative) coefficients imply a decrease (increase) in future earnings because special items are recorded as negative values for the sample. For $k = 4$, the future earnings effect is calculated as 1 plus the coefficient. To determine the total effect on future earnings, we add 1 to the sum of the $k = 1$ to 4 coefficients and multiply the result by -1

*, ** significant at the 0.05 or 0.01 level, respectively, in a two-tailed test

All variables are defined in Appendix 3, Panel A

potential implications of altering special item tax rate assumptions beyond our primary analyses of the income transfer framework. In particular, we explore altering tax rate assumptions in models of executive compensation, analyst forecast revisions, and market returns. By adding these three analyses to the tabulated results of the income transfer framework, our empirical investigation of the consequences of an incorrect tax rate assumption in special item-related research will cover the vast majority (86 percent) of the genres examined in the literature (see Table 1, Panel D).³⁰

³⁰ We do not replicate all 71 studies but include examples of the main genres of research to note the possible empirical implications of assumed tax rates in various contexts. Sample selection and descriptive statistics for the following tests are not tabulated but were compared with the studies in each area to confirm proper replication was achieved. Sample selection and descriptive results are available from the authors upon request.

In these analyses, we assume tax rates of TOP, ZERO, or MTR. We do so to test differences in results that manifest from extreme tax rate assumptions (ZERO and TOP) from results derived from our best estimate of the true tax rate (as well as the theoretically correct rate), the MTR. Note that in the following analyses we have no method for determining the correctness of the tax rate assumption, as we do in the income transfer framework, as none of these additional areas has a logical pre-tax model to serve as a benchmark because this would require a corresponding pre-tax income relationship. We note empirical differences in the results when assumed tax rates are altered.

5.3.1 Executive compensation

The literature is replete with studies that examine the extent to which executives' earnings-based bonuses are shielded from the income-decreasing effects of negative special items (e.g., Dechow et al. 1994; Gaver and Gaver 1998; Adut et al. 2003; Darrough et al. 2014). Shielding is the degree to which compensation committees add the negative special item back to income before setting earnings-based bonuses. Full shielding implies 100 percent of the charge is added back to income, while no shielding implies none of the charge is added back. Partial shielding implies part of the negative special item is added back to income before setting earnings-based bonuses. We examine the impact of varying tax rate assumptions on the degree of shielding. In so doing, we adopt the following model.

$$\begin{aligned} \Delta \text{LNCASH}_{it} = & \beta_0 + \beta_1 \Delta \text{ROA}_{it} + \beta_2 \text{RTN}_{it} + \beta_3 \text{NSI}_{it} + \beta_4 \Delta \text{SIZE}_{it} \\ & + \beta_5 \text{TENURE}_{it} + \varepsilon_{it} \end{aligned} \quad (13)$$

All variables are as defined in Appendix 3, Panel B. An insignificant coefficient on NSI (negative special items) is consistent with full shielding. A negative and significant coefficient on NSI and the sum of ΔROA and NSI coefficients being significantly greater than zero is consistent with partial shielding. A negative and significant coefficient on NSI and the sum of the ΔROA and NSI coefficients being insignificantly different from zero is consistent with no shielding.

To perform these analyses, we collect CEO compensation data from Execucomp, financial data from Compustat, and marginal tax rates from the database provided by Professor Graham. We report the empirical estimations of EQ (13) in Table 8. The results for the ZERO tax rate assumption are reported in column 3. Our results with respect to ΔROA , RTN, ΔSIZE , and TENURE are consistent with the prior research (e.g., Jackson et al. 2008; Darrough et al. 2014). In particular, we find that ΔROA , RETURN, and ΔSIZE are positive and significant (0.01 level), while the coefficient on TENURE is negative and significant (0.10 level).

Our results further suggest that executive compensation is not penalized for negative special items, as the coefficient on NSI is -0.093 but insignificant.³¹ We also find that the sum of the coefficients on ΔROA (0.296) and NSI (-0.093) is positive and significant (0.05 level), which suggests that executive compensation is fully shielded from the income-

³¹ NSIs are entered as positive values in the model.

Table 8 Special Items and CEO Cash Compensation^a (n = 15,477)

Variable	Predicted Sign	ZERO Coefficient (t-stat)	TOP Coefficient (t-stat)	MTR Coefficient (t-stat)
ICEPT	?	0.0043 (0.65)	0.0071 (1.09)	-0.0056 (-0.87)
Δ ROA	+	0.2957 (4.57) ^{***}	0.2252 (4.30) ^{***}	0.2605 (4.09) ^{***}
RTN	+	0.0590 (7.50) ^{**}	0.0599 (7.79) ^{***}	0.0613 (7.71) ^{***}
NSI	?	-0.0929 (-1.00)	-0.1572 (-2.44) ^{**}	-0.0915 (-0.87)
Δ SIZE	+	0.0931 (4.75) ^{***}	0.0947 (4.85) ^{***}	0.0941 (4.73) ^{***}
TENURE	?	-0.0006 (-1.80) [*]	-0.0006 (-1.89) [*]	-0.0006 (-1.81) [*]
Δ ROA+NSI (t-stat)		0.2028 (2.28) ^{**}	0.0680 (0.50)	0.1690 (1.68) [*]

$$\text{EQ (13)} \quad \Delta \text{LN_CASH}_{it} = \beta_0 + \beta_1 \Delta \text{ROA}_{it} + \beta_2 \text{RTN}_{it} + \beta_3 \text{NSI}_{it} + \beta_4 \Delta \text{SIZE}_{it} + \beta_5 \text{TENURE}_{it} + \varepsilon_{it}$$

^{***} two-tailed p-value < 0.01; ^{**} two-tailed p-value < 0.05; ^{*} two-tailed p-value < 0.10

Like Petersen (2009), we cluster standard errors by firm and time to correct for two-dimensional cross-sectional and serial correlation. All models include year and industry fixed effects

^a Based in part on Darrough et al. (2014)

All variables are defined in Appendix 3, Panel B

decreasing effects of negative special items when assuming a zero tax rate. That is, assuming a zero tax rate on negative special items, our evidence suggests that compensation committees judge the income-decreasing effect of negative special items less harshly than other unfavorable changes in income when paying executives, as the effect of changes in return on assets on executive compensation dominates that of negative special items.

Next we report the results for the TOP tax rate assumption in column 4. Unlike our results in column 3, we find that the coefficient on NSI is -0.157 and significantly different from zero (0.05 level). We also find that the sum of the coefficients on Δ ROA (0.225) and NSI (-0.157) is positive but insignificant, which suggests that executive compensation is not shielded from the income-decreasing effects of negative special items when assuming the top tax rate. In contrast to our results using an assumed tax rate of zero, our evidence in column 4 suggests that executive bonuses are not protected from the income-decreasing effect of NSIs when negative special items are adjusted at the top statutory rate.

Finally, in column 5, we report the results for the MTR tax rate assumption. We find that the coefficient on NSI is -0.092 and insignificant, implying no penalty for negative special items similar to that shown in column 3. In addition, consistent with the evidence in column 3 (ZERO tax rate), we find that the sum of the coefficients for Δ ROA (0.261) and NSI (-0.092) is positive and significant (0.10 level). Thus our evidence in column 5 suggests that executive compensation is fully shielded from negative special items when adjusted at the marginal tax rate

(MTR). With the assumed tax adjustment equal to the firm's MTR, executive compensation is fully protected from the income-decreasing effects of negative special items. Critically, our results in Table 8 demonstrate that the overall impact of negative special items on executive compensation is quite sensitive to the tax rate assumption for special items and leads to very different conclusions (i.e., full shielding for ZERO and MTR, no shielding for TOP). Taken together, our evidence suggests the tax rate assumed on special items in executive compensation research is an essential element of the research design.

5.3.2 Analyst forecast revisions

A number of studies examine the association between special items and analyst forecast revisions (e.g., Chaney et al. 1999; Alford and Berger 1999; Lopez 2002; Lin and Yang 2006). We examine the impact of varying tax rate assumptions on the association between negative special items and analyst forecast revisions. In so doing, we adopt the following model based on the literature (Chaney et al. 1999; Alford and Berger 1999).

$$REV_{i,t+1} = \alpha_0 + \alpha_1 UE_{i,t} + \alpha_2 NSI_{i,t} + \alpha_3 TA_{i,t} + \alpha_4 LOSS_{i,t} + \varepsilon_{i,t} \quad (14)$$

All variables are as defined in Appendix 3 Panel C. To perform these analyses, we collect forecasts of current and future annual earnings as well as current actual annual earnings from IBES. In addition, we collect stock prices, special items, total assets, and income before extraordinary items from Compustat. We perform our analyses using the zero (ZERO), highest statutory rate (TOP), and marginal tax rate (MTR) assumptions. We report the results of estimating EQ (14) in Table 9.

Our results suggest that negative special items are negatively associated with analyst forecast revisions, regardless of the tax rate assumption. Consistent with that conclusion, we find that the coefficients on NSI for the ZERO, TOP, and MTR tax rate assumptions are -0.079 , -0.121 , and -0.093 , respectively and that each of these coefficients is significant (0.01 level). In column 2 (ZERO tax rate assumption), we find that the sum of the coefficients on UE and NSI is 0.062 and significant (0.01 level). This result suggests that analysts treat negative special items as less permanent than other unexpected earnings, and a dollar of unexpected earnings increases future forecast revisions more than a dollar of negative special items decrease future forecast revisions. On the other hand, for the TOP tax rate assumption in column 3, we find that the sum of the coefficients on unexpected earnings and NSI is 0.020 and insignificant, suggesting analysts treat unexpected earnings and negative special items as equally permanent with respect to future forecast revisions as the positive and negative results offset. In other words, our results for the TOP tax rate assumption suggest that analysts treat negative special items in a manner consistent with other recurring unexpected earnings. When we perform the same test assuming the MTR in column 4, we again find that the sum of the coefficients on unexpected earnings and NSI is positive (0.048) and significant (0.01 level), a result consistent with the conclusion that negative special items are viewed as less permanent than other recurring unexpected earnings. Taken together, our evidence suggests the tax rate assumed on special items in empirical models of forecast revisions is a significant element of the research design.

Table 9 Special Items and Analyst Forecast Revisions (n = 27,634)

Variable	ZERO Coefficient (t-stat)	TOP Coefficient (t-stat)	MTR Coefficient (t-stat)
ICEPT	-0.0092 (-15.68)***	-0.0092 (-15.68)***	-0.0092 (-15.22)***
UE	0.1411 (9.39)***	0.1411 (9.39)***	0.1418 (9.27)***
NSI	-0.0788 (10.11)***	-0.1213 (11.41)***	-0.0934 (-9.50)***
SIZE	0.0009 (12.20)***	0.0009 (12.20)***	0.0009 (11.65)***
LOSS	-0.0043 (-7.25)***	-0.0043 (-7.25)***	-0.0041 (-6.88)***
UE+NSI (t-stat)	0.0622 (3.62)***	0.0198 (1.01)	0.0481 (2.61)***

$$\text{EQ (14)} \text{ } REV_{i,t+1} = \alpha_0 + \alpha_1 UE_{i,t} + \alpha_2 NSI_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 LOSS_{i,t} + \varepsilon_{i,t}$$

*** two-tailed p-value < 0.01; ** two-tailed p-value < 0.05; * two-tailed p-value < 0.10

Like Petersen (2009), we cluster standard errors by firm and time to correct for two-dimensional cross-sectional and serial correlation. All models include year and industry fixed effects

All variables are defined in Appendix 3, Panel C

5.3.3 Market pricing of special items

We next test the value relevance response to after-tax negative special items by examining the market response to shocks in net income and special items based on the work of Elliott and Hanna (1996) and Cready et al. (2010).

$$CAR_{iq} = \alpha_0 + \alpha_1 \Delta AINC_{iq} + \alpha_2 SI_{iq} + \alpha_3 SIZE_{iq-1} + \alpha_4 RTN_{iq-1} + \varepsilon_{iq} \quad (15)$$

All variables are formally defined in Appendix 3, Panel D. Consistent with Cready et al. (2010), we use a quarterly abnormal return (CAR) to perform the analyses.³² We tax-adjust negative special items at the ZERO, TOP, and MTR tax rates and present the value-relevance results from three versions of EQ (15) in columns 2, 3 and 4, respectively.

In Table 10, column 2 (ZERO tax rate), we find that the coefficient on NSI (negative special items) is insignificant. That is, negative special items adjusted at the ZERO tax rate are not associated with quarterly abnormal returns. In addition, we find that the sum of coefficients on $\Delta AINC$ and NSI is positive (0.257) and significant (0.01 level). In column 3 (TOP tax rate), we find that the coefficient on NSI is negative (-0.328) and significant (0.01 level). In addition, inconsistent with the evidence in column 2, we find that the sum of the coefficients on $\Delta AINC$ and NSI is insignificant. That is, the weight the market attaches to negative special items when adjusted at the TOP rate is indistinguishable from the weight applied to the seasonal change in income. In column

³² Elliott and Hanna (1996) implicitly assume a zero tax rate on special items. Cready et al. (2010), in their analyses, adjust special items at the firm's quarterly effective tax rate.

4 (MTR tax rate), we find that the coefficient on NSI is negative (−0.151) and significant (0.05 level). We also find that the sum of ΔAINC and NSI is positive (0.198) and significant (0.01).

In untabulated results, we find that the coefficient on NSI adjusted at the TOP tax rate is significantly different (0.10 level or better) from the coefficients on NSI adjusted at the ZERO and MTR tax rates. We find no difference in the coefficients on NSI adjusted at the ZERO and MTR tax rates. Further, assuming a ZERO tax rate, our evidence suggests no association between negative special items and market returns. However, assuming the TOP or MTR tax rates, our evidence suggests a significantly negative association. Taken together, the evidence in Table 10 demonstrates that negative special item market results are susceptible to different interpretations based solely on the tax rate assumed to adjust the negative special item.

6 Conclusion

Several studies investigate the impact of special items on a wide range of firm-level outcomes including subsequent earnings, market returns, analyst forecast revisions, and executive compensation (e.g., Chaney et al. 1999; Burgstahler et al. 2002; Riedl 2004; Dechow and Ge 2006; Riedl and Srinivasan 2010; Bens et al. 2011; Johnson et al. 2011; Curtis et al. 2014). However, despite their prevalence in the literature and their general acceptance as a key component of a firm’s information environment, we find no discernible pattern in the methods researchers have used to adjust special items for

Table 10 Market Pricing of Negative Special Items (n = 115,784)

Variable	ZERO Coefficient (t-stat)	TOP Coefficient (t-stat)	MTR Coefficient (t-stat)
ICEPT	−0.0079 (−3.69)***	−0.0080 (−3.69)***	−0.0080 (−3.76)***
ΔAINC	0.3484 (16.66)***	0.3484 (16.66)***	0.3487 (16.66)***
NSI	−0.0915 (−1.57)	−0.3284 (−3.67)***	−0.1508 (−2.54)**
SIZE	0.0005 (1.69)*	0.0005 (1.69)*	0.005 (1.79)*
RTN	−0.1638 (−48.31)***	−0.1638 (−48.31)***	−0.1638 (−48.31)***
ΔAINC+ NSI	0.2569 (4.01)***	0.0202 (0.22)	0.1979 (2.76)***

EQ (15): $CAR_{i,q} = \alpha_0 + \alpha_1 \Delta AINC_{i,q} + \alpha_2 SI_{i,q} + \alpha_3 SIZE_{i,q-1} + \alpha_4 RTN_{i,q-1} + \varepsilon_{i,q}$

*** two-tailed p-value < 0.01; ** two-tailed p-value < 0.05; * two-tailed p-value < 0.10

Like Petersen (2009), we cluster standard errors by firm and time to correct for two-dimensional cross-sectional and serial correlation. All models include year and industry fixed effects

All variables are defined in Appendix 3, Panel D

estimated tax effects. This fact is puzzling, given the potential bias inherent in adopting different tax rate assumptions.

Using the income-transfer framework from the literature (Bernard and Thomas 1990; Burgstahler et al. 2002; Cready et al. 2012; among many others, including 25 of the 71 studies noted above), we first model the empirical implications for future earnings of over- or underestimating the true tax rate when tax-adjusting special items. Our model suggests assuming a tax rate that overestimates (underestimates) the true tax rate for negative special items will upwardly (downwardly) bias the income transfer from negative special items. On the other hand, assuming a tax rate that overestimates (underestimates) the true tax rate for positive special items will downwardly (upwardly) bias the income transfer from positive special items.³³

Consistent with this notion, we find that the magnitude of the estimated income transfer associated with negative and positive special items varies significantly with the tax rate adjustment. Specifically, depending on the tax rate assumed, our analysis suggests changes in income over the four quarters following negative special item charges range from an average increase of 44 percent of the negative special item (highest statutory rate) to an average *decrease* of 16 percent of the negative special item (zero tax rate). Similarly, our analysis suggests changes in income over the four quarters following a positive special item ranges from an average increase of 41 percent of the positive special item (zero rate) to an average increase of 3 percent (highest statutory rate). Moreover, our analyses suggest that, on average, firm-specific estimated marginal tax rates yield results most consistent with an entirely pre-tax model. Our results confirm that marginal tax rates are generally a better estimate of the true tax rate than assuming the extremes of either a zero tax rate or the highest statutory rate. In short, cross-sectional constants are incorrect theoretically and problematic empirically because tax rates vary by firm. Effective tax rates are shown to be theoretically incorrect, and though they perform reasonably well empirically in some settings, this is likely because they lie between the extremes and have high correlation with marginal tax rates (Graham 1996b).

Our results are subject to limitations. First, our firm-specific tax rates (MTR, ETR, and CSTAT) are likely measured with error. To the extent the measurement error is correlated with income transfer, this may lead to spurious results. Second, the theoretically correct tax rate, in part, depends on the jurisdiction in which the transactions underlying the special items occur. Graham et al. (2017) note this in describing the complexity and uncertainty in computing MTR estimates for foreign operations. To the extent our measures fail to control for any jurisdictional effects, this could add to the measurement error of these estimates. Finally, special items as identified by Compustat are not homogenous items, even within the components identified by Compustat. For example, restructuring charges include costs associated with plant closings, employee terminations, lease terminations, and other exit-related costs. Thus our results and conclusions speak to average effects and are unlikely to apply in every potential circumstance.

We feel it is important to reiterate that marginal tax rates are the theoretically correct tax rate for everything other than a “pure” permanent book-tax difference (e.g., fines and penalties) whose overall effects on the financial statements go completely unrecognized for tax purposes. Our review of the special item components reported by

³³ Interestingly, in untabulated sensitivity analyses, these findings are unrelated to pre-tax income versus losses as the results hold nearly identically in subsamples split on this dimension. We thank an anonymous reviewer for suggesting this sensitivity test.

Compustat reveals none fit the description of a pure permanent book-tax difference (see our discussion of goodwill above). While there may very well be individual transactions embedded in the various special item components that yield pure permanent book-tax differences (a perfect example being nondeductible goodwill), our review of the item descriptions provided by Compustat suggests that these component items generally capture transactions that are either currently taxable or produce temporary book-tax differences. Thus our results and analyses suggest that one size may not fit all. However, if one size is required by the research question or design (e.g., an examination of all special items), then our results clearly suggest the MTR is the best estimate of the true tax rate. We feel this study contributes to the literature by drawing attention to the current lack of consensus in tax adjustments for special items and highlighting the impact various tax rate assumptions may have on empirical results.

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Appendix 1. Compustat Special Items

The Compustat User's Guide states that "special items" represent "unusual or nonrecurring items presented above taxes by the company." Special items (when reported above taxes) includes:

1. Adjustments applicable to prior years (except recurring prior year income tax adjustments)
2. After-tax adjustments to net income for the purchase portion of net income of partly pooled companies when the adjustment is carried over to retained earnings
3. Any significant nonrecurring items
4. The current year's results of discontinued operations and operations to be discontinued
5. Flood, fire, and other natural disaster losses
6. Impairment of goodwill/unamortized intangibles
7. Interest on tax settlements (when reported separately from other interest expense)
8. Inventory write-downs when reported separately or called "nonrecurring"
9. Nonrecurring profit or loss on the sale of assets, investments, securities, among others
10. Profit or loss on the repurchase of debentures
11. Purchased research and development
12. Relocation and moving expense
13. Reserve for litigation
14. Restructuring charges (includes closing and exit costs)

15. Severance pay when reported separately on the income statement
16. Special allowances for facilities under construction
17. Transfers from reserves provided for in prior years
18. Write-down of assets
19. Write-downs or write-offs of receivables, intangibles, among others
20. Write-offs of capitalized computer software costs
21. Year 2000 expenses

The Compustat Data Guide notes the following items are specifically excluded from special items:

1. Any special item listed above as “include” that appears every year for the last three years, unless it has specifically been called restructuring, special, or nonrecurring. (Additionally, this does not apply to Year 2000 expenses, impairment of goodwill, extinguishment of debt, settlements, in-process R&D, or purchased R&D.)
2. Foreign exchange (currency) adjustments (included in *Nonoperating Income [Expense]*)
3. Gain/loss on sale of marketable securities for companies that have adopted SFAS #115
4. Idle plant expense (included in *Nonoperating Income [Expense]*)
5. Interest on tax settlements, when included by the company with other interest expense (included in interest expense)
6. Milestone payments or one-time contract reimbursements for R&D companies
7. Nonrecurring items that are included in equity in earnings
8. Profit or loss on sale of properties (except for securities, etc.) for the companies in the oil, coal, transportation, and other industries where these transactions are considered a normal part of doing business (included in *Nonoperating Income [Expense]*)
9. Shipping firms’ operating differential subsidies and estimated profit adjustments for preceding years. Prior years’ operating differential subsidies are included in *Nonoperating Income (Expense)*. Current year operating differential subsidy is included in sales. Adjustments by shipping companies to estimated profits reported by this method are ignored.

Beginning in 2001, the following special items breakout categories are provided by Compustat, with options for: pretax, after-tax, basic EPS, and diluted EPS effect (though data may be missing for many of these items).

Data Field	Included Items per Compustat	Interpretation of Negative Special Items	Interpretation of Positive Special Items
Acquisitions & mergers (AQ)	Costs of failed acquisitions	Deductible in year deemed paid	Indicates reversal of a prior-period GAAP adjustment
Extinguishment of debt (DTE)	Gain on repurchase or retirement of debt	N/A	Cancellation of debt income is generally taxable, but exceptions are made for bankrupt or insolvent companies
	Loss from prepayment of debt	Deductible in year deemed paid	N/A
	Adjustments related to SFAS 145	GAAP adjustment	GAAP adjustment
Impairment of goodwill (GDWLI)	Write-off of goodwill, impairment of unamortized intangibles	GAAP impairment charge is a permanent difference, but Sec. 197 intangibles (e.g., Goodwill) amortized over 15 years for tax purposes; unrecovered basis recognized as loss for tax purposes upon abandonment or disposal	Indicates reversal of a prior-period GAAP adjustment
Gain/loss (GL)	Gain/loss items, including amounts from restructuring, not related to impairments or dilution	Loss recognized for tax purposes upon disposal	Gain recognized for tax purposes upon disposal
Restructuring costs (RC)	Severance, closing costs, exit costs, reductions in workforce, rationalizations, realignment, relocation charges, repositioning, early retirement, Chapter 11 reorganization costs, Chapter 11 expenses	Generally deductible, either as incurred or subject to capitalization and amortization	Indicates reversal of a prior-period GAAP adjustment
In-process research & development (RDIP)	Portion of R&D considered to be "purchased" and written off immediately upon acquisition if the R&D items are deemed not to have an alternative use	Generally deductible when the project is finally abandoned and deemed worthless	Indicates reversal of a prior-period GAAP adjustment
Litigation & insurance settlements (SET)	Provisions to adjust reserves for litigation and settlements, Insurance recovery proceeds	Deductible in year deemed paid	Indicates reversal of a previous GAAP adjustment or receipt of insurance proceeds (generally tax-exempt) offsetting prior-period loss

Data Field	Included Items per Compustat	Interpretation of Negative Special Items	Interpretation of Positive Special Items
Write-downs (WD)	Impairment or write-down of assets other than goodwill and unamortized intangibles	GAAP impairment charge is a permanent difference, but Sec. 167 intangibles (e.g., noncompete agreements) amortized over useful life; unrecovered basis recognized as loss for tax purposes upon abandonment or disposal	Indicates reversal of a prior-period GAAP adjustment
Other special items (SPIO)	Gain/loss attributable to pension, post retirement curtailment, settlement, termination Dilution gains/losses	Deductible in year deemed paid GAAP adjustment	Gain recognized for tax purposes upon disposal, GAAP adjustment not taxable GAAP adjustment

Appendix 2

Panel A: Detailed examination of random sample of 100 firms where $|NSI| \div \text{Assets} > 1.0\%$

#	Company Name	FYear	Qtr	NSI	Assets	NSI%	PTI	DTA	VA	%VA	ETR	MTR
1	Restoration Hardware Holdings, Inc	2016	4	-23.773	2,192,520	-1.08%	15.156	28.466	0.76	2.67%	37.7%	4.3%
2	Krispy Kreme Doughnuts, Inc	2007	2	-10.600	255.936	-4.14%	-26.831	176.964	176.964	100.00%	0.0%	1.3%
3	Silgan Holdings, Inc	2003	4	-19.513	1,621.084	-1.20%	-4.029	142.342	18.713	13.15%	39.6%	7.6%
4	Juniper Networks, Inc	2009	4	-184.543	7,590.263	-2.43%	3.948	531.2	112.8	21.23%	0.0%	2.2%
5	Sourcecorp, Inc	2004	3	-10.165	457.902	-2.22%	-2.198	11.589	0	0.00%	81.7%	4.2%
6	Weyerhaeuser Company	2017	3	-209.000	18,402.000	-1.14%	103.000	620	63	10.16%	0.0%	2.6%
7	NewMarket Corporation	2006	4	-7.477	744.793	-1.00%	3.711	59.189	0	0.00%	9.9%	30.5%
8	Zale Corporation	2003	2	-136.300	1,449.503	-9.40%	6.683	44.627	0	0.00%	100.0%	4.4%
9	Zimmer Biomet Holdings, Inc	2015	3	-316.600	26,689.100	-1.19%	31.800	895.6	72.7	8.12%	30.2%	35.0%
10	MTS Systems Corporation	2010	3	-6.148	359.188	-1.71%	-1.563	21.167	0.986	4.66%	100.0%	3.0%
11	Tuesday Morning Corporation	2003	4	-3.854	253.394	-1.52%	56.667	7040	0	0.00%	38.4%	35.0%
12	InterMune, Inc	2006	2	-30.000	224.967	-13.34%	-44.018	252	252	100.00%	0.0%	0.7%
13	Abercrombie & Fitch Co	2013	3	-46.298	2,852.396	-1.62%	-37.025	176.076	0.202	0.11%	57.7%	35.4%
14	Electronic Arts, Inc	2007	4	-156.000	6,059.000	-2.57%	-136.000	424	22	5.19%	31.6%	4.6%
15	Model N, Inc	2017	2	-3.563	175.622	-2.03%	-16.600	92.493	78.003	84.33%	24.8%	1.7%
16	J. C. Penney Company, Inc	2011	3	-265.000	12,751.000	-2.08%	-226.000	708	0	0.00%	36.7%	32.6%
17	The Scotts Miracle-Gro Company	2011	4	-31.200	2,052.200	-1.52%	-110.200	208.2	44.3	21.28%	34.9%	1.0%
18	LCA-Vision, Inc	2012	4	-1.700	48.968	-3.47%	-5.832	26,377	26,377	100.00%	3.6%	1.6%
19	Ablest, Inc	2005	3	-0.290	26.532	-1.09%	0.590	2110	0	0.00%	37.8%	0.3%

#	Company Name	FYyear	Qtr	NSI	Assets	NSI%	PTI	DTA	VA	%VA	ETR	MTR
20	DGSE Companies, Inc	2012	3	-1.407	24.489	-5.75%	-0.403	8.73	8.73	100.00%	0.0%	2.9%
21	TTM Technologies, Inc	2016	4	-48.908	2,500.076	-1.96%	15.606	298.849	221.951	74.27%	100.0%	4.1%
22	Omnicare, Inc	2013	3	-209.900	6,915.526	-3.04%	-95.701	288.611	24.159	8.37%	27.5%	2.6%
23	PLX Technology, Inc	2013	2	-0.903	73.422	-1.23%	1.734	67.173	67.173	100.00%	3.5%	3.2%
24	LSI Industries, Inc	2009	2	-13.450	157.626	-8.53%	-14.006	10.222	1.94	18.98%	4.5%	2.8%
25	Fossil Group, Inc	2017	1	-26.284	2,101.718	-1.25%	-48.009	127.25	78.314	61.54%	0.0%	4.4%
26	Castlight Health, Inc	2017	1	-3.409	147.401	-2.31%	-14.374	112.968	112.968	100.00%	0.0%	2.5%
27	Regis Corporation	2005	3	-38.319	1,701.128	-2.25%	-5.214	17.229	0	0.00%	0.0%	35.0%
28	Dycom Industries, Inc	2008	4	-9.295	789.036	-1.18%	6.253	37.395	0.33	0.88%	26.6%	4.8%
29	Intelligent Systems Corporation	2008	4	-0.369	8.706	-4.24%	0.179	11.606	11.606	100.00%	0.0%	1.2%
30	PolyOne Corporation	2014	2	-39.300	2,846.700	-1.38%	33.300	205.4	23.6	11.49%	7.8%	4.0%
31	LifeVantage Corporation	2017	1	-1.011	49.796	-2.03%	1.678	5.24	0.312	5.95%	29.7%	2.8%
32	O'Charley's Inc	2008	3	-47.987	588.494	-8.15%	-53.008	67.806	65.791	97.03%	0.0%	0.6%
33	Kirkland's, Inc	2003	4	-1.053	103.129	-1.02%	23.587	3.326	0	0.00%	39.1%	35.0%
34	Mines Management, Inc	2007	4	-1.000	42.157	-2.37%	-3.184	3.77	3.77	100.00%	0.0%	0.1%
35	Pinnacle Data Systems, Inc	2006	2	-0.633	26.241	-2.41%	0.086	1.507	0	0.00%	39.5%	34.0%
36	International Flavors & Fragrances Inc	2011	4	-43.299	2,965.581	-1.46%	40.530	478.322	290.879	60.81%	39.8%	1.0%
37	EnPro Industries, Inc	2009	2	-113.900	1,169.200	-9.74%	-102.400	286.4	0	0.00%	0.0%	35.1%
38	Antares Pharma, Inc	2006	4	-0.139	11.534	-1.21%	-1.414	22.588	22.588	100.00%	0.0%	0.1%
39	Revlon, Inc	2012	3	-26.300	1,183.600	-2.22%	-3.500	373.2	70.6	18.92%	0.0%	2.1%
40	Lowe's Companies, Inc	2016	3	-432.000	35,370.000	-1.22%	776.000	1229	578	47.03%	51.2%	1.0%
41	Elizabeth Arden, Inc	2008	4	-27.926	970.734	-2.88%	-19.440	42.02	0.823	1.96%	46.3%	1.6%
42	OSI Pharmaceuticals, Inc	2004	4	-64.799	388.029	-16.70%	-123.189	415.355	415.355	100.00%	0.0%	0.0%
43	inTEST Corporation	2017	4	-7.580	62.493	-12.13%	-4.511	1.185	0.37	31.22%	0.0%	37.7%
44	Belden, Inc	2012	3	-77.318	2,175.599	-3.55%	-77.573	151.572	7.498	4.95%	28.2%	2.4%
45	Maytag Corporation	2003	4	-31.273	3,024.140	-1.03%	30.320	421.774	38.171	9.05%	37.5%	30.3%
46	Align Technology, Inc	2009	3	-71.579	330.784	-21.64%	-60.465	76.724	6.182	8.06%	17.4%	1.8%
47	Gibraltar Industries, Inc	2014	4	-108.302	814.160	-13.30%	-107.332	28.814	0.4	1.39%	10.8%	33.3%
48	Myrexis, Inc	2012	4	-1.834	91.651	-2.00%	-4.420	47.917	47.917	100.00%	0.0%	1.6%
49	Callaway Golf Company	2011	3	-12.624	765.750	-1.65%	-47.733	119.197	110.844	92.99%	0.0%	1.0%
50	Meritor, Inc	2012	4	-27.000	2,501.000	-1.08%	12.000	1324	1204	90.94%	58.3%	24.6%
51	Herman Miller, Inc	2009	4	-9.600	770.600	-1.25%	-0.200	94.9	11	11.59%	100.0%	26.0%
52	lululemon athletica, inc	2017	3	-22.185	1,720.449	-1.29%	86.640	64.395	1.843	2.86%	32.0%	1.0%
53	USG Corporation	2014	3	-78.000	4,064.000	-1.92%	-9.000	1023	1023	100.00%	0.0%	1.6%
54	Cascade Corporation	2009	4	-13.376	341.931	-3.91%	-13.454	51.186	22.011	43.00%	0.0%	1.4%
55	Volcano Corporation	2008	2	-12.232	254.340	-4.81%	-13.230	37.27	37.27	100.00%	0.0%	1.3%
56	Valmont Industries, Inc	2014	3	-31.905	2,862.721	-1.11%	39.511	248.909	104.487	41.98%	36.0%	35.2%
57	Wolverine World Wide, Inc	2016	4	-50.300	2,431.700	-2.07%	-7.900	128.5	11.5	8.95%	75.9%	1.0%
58	Carrizo Oil & Gas, Inc	2005	3	-3.721	365.700	-1.02%	-11.052	2.793	0.274	9.81%	28.4%	5.1%
59	NutriSystem, Inc	2008	4	-6.483	159.471	-4.07%	0.981	9.689	3.749	38.69%	100.0%	35.1%
60	Adept Technology, Inc	2009	3	-0.392	30.965	-1.27%	-3.555	39.721	39.721	100.00%	1.4%	0.7%
61	Advanced Micro Devices, Inc	2014	4	-301.000	3,767.000	-7.99%	-367.000	3570	3495	97.90%	0.8%	2.1%

#	Company Name	FYyear	Qtr	NSI	Assets	NSI%	PTI	DTA	VA	%VA	ETR	MTR
62	Numerex Corp	2010	4	-2.412	57.146	-4.22%	-1.610	11.97	11.97	100.00%	13.5%	3.0%
63	Alaska Communications Systems Group, Inc	2011	2	-12.045	615.631	-1.96%	-6.823	109.468	5.5	5.02%	46.4%	1.5%
64	Quidel Corporation	2003	3	-1.376	86.866	-1.58%	-0.789	17.1	1.9	11.11%	39.0%	2.8%
65	Ribbon Communications, Inc	2017	2	-5.180	292.353	-1.77%	-11.874	115.51	89.6	77.57%	0.0%	2.2%
66	AGCO Corporation	2006	4	-171.400	4,114.500	-4.17%	-103.200	472.5	291.4	61.67%	0.0%	3.7%
67	Spectrum Brands Holdings, Inc	2015	3	-98.200	7,472.200	-1.31%	21.100	587.9	268.7	45.71%	0.0%	2.8%
68	AdStar, Inc.,	2004	4	-1.423	7.412	-19.20%	-2.206	5.72	5.72	100.00%	0.4%	1.1%
69	Symbol Technologies, Inc	2003	2	-16.295	1,526.611	-1.07%	8.770	532.069	43.936	8.26%	24.6%	5.6%
70	Convergys Corporation	2012	2	-94.600	2,111.600	-4.48%	-64.200	147.2	19.7	13.38%	16.4%	4.4%
71	Salix Pharmaceuticals, Ltd	2011	4	-27.000	1,312.969	-2.06%	16.626	126.17	7.711	6.11%	0.0%	1.0%
72	SeaChange International, Inc	2015	4	-20.024	177.669	-11.27%	-22.306	47.877	47.368	98.94%	0.1%	1.4%
73	AK Steel Holding Corporation	2005	4	-78.500	5,487.900	-1.43%	-67.600	1666.8	35.2	2.11%	40.8%	26.6%
74	CRA International, Inc	2015	4	-4.453	313.717	-1.42%	-2.553	33.866	4003	11.82%	0.0%	2.6%
75	Abeona Therapeutics, Inc	2016	4	-1.200	111.058	-1.08%	-7.002	88.021	88.021	100.00%	0.0%	1.8%
76	AbbVie, Inc	2014	3	-737.000	28,454.000	-2.59%	687.000	2152	172	7.99%	26.3%	0.9%
77	The E. W. Scripps Company	2015	2	-31.053	1,698.720	-1.83%	-19.494	134.204	2.334	1.74%	33.5%	1.9%
78	The Spectranetics Corporation	2009	2	-1.152	105.611	-1.09%	-2.342	19.22	12.735	66.26%	1.7%	1.6%
79	Energy Focus, Inc	2016	4	-0.857	34.978	-2.45%	-7.800	12.537	12.537	100.00%	0.0%	1.0%
80	Starwood Hotels & Resorts Worldwide, Inc	2009	4	-376.000	8,761.000	-4.29%	-332.000	1350	482	35.70%	44.0%	3.3%
81	Visteon Corporation	2016	4	-35.000	2,373.000	-1.47%	34.000	1860	1532	82.37%	8.8%	2.5%
82	H.B. Fuller Company	2014	4	-26.637	1,869.006	-1.43%	21.726	104.360	16,364	15.68%	50.3%	2.3%
83	Lantronix, Inc	2016	2	-0.286	27.091	-1.06%	-0.922	35.85	35.85	100.00%	0.0%	3.3%
84	Chemed Corporation	2007	2	-13.715	779.532	-1.76%	15.398	52.814	0	0.00%	38.7%	1.7%
85	Sykes Enterprises, Inc	2010	3	-9.634	816.447	-1.18%	16.567	114.128	60.091	52.65%	0.0%	1.6%
86	Giga-tronics, Inc	2012	3	-0.099	9.309	-1.06%	-0.865	16.403	16.403	100.00%	0.0%	1.4%
87	MSA Safety, Inc	2017	2	-32.219	1,362.036	-2.37%	11.712	60.709	4.559	7.51%	0.0%	0.9%
88	Eli Lilly and Company	2004	4	-524.000	24,867.000	-2.11%	520.000	2714.4	508.4	18.73%	100.0%	35.2%
89	LoJack Corporation	2009	3	-18.250	149.673	-12.19%	-19.681	25.828	8.137	31.50%	31.7%	1.7%
90	Lumber Liquidators Holdings, Inc	2017	1	-18.000	478.996	-3.76%	-25.927	36.198	26.318	72.71%	0.0%	2.7%
91	Lawson Products, Inc	2013	4	-2.401	159.945	-1.50%	-3.312	36.536	35.834	98.08%	0.0%	1.9%
92	Quixote Corporation	2006	4	-15.618	125.203	-12.47%	-13.985	24.16	0.445	1.84%	34.8%	38.1%
93	Maxtor Corporation	2004	3	-31.393	2,327.219	-1.35%	-96.446	479.873	181.295	37.78%	1.3%	3.1%
94	Rayonier Advanced Materials Inc	2015	2	-26.660	1,260.984	-2.11%	-0.665	159.915	19.702	12.32%	52.9%	35.6%
95	Kendle International, Inc	2006	4	-9.277	455.072	-2.04%	-6.961	27.689	7.67	27.70%	33.1%	1.6%
96	Telkonet, Inc	2007	4	-2.472	38.741	-6.38%	-7.254	32.292	32.292	100.00%	0.0%	0.2%
97	Mattel, Inc	2017	3	-74.242	6,199.684	-1.20%	61.263	767.418	579.245	75.48%	100.0%	1.2%
98	Cytec Industries, Inc	2005	2	-62.700	4,099.200	-1.53%	-3.600	338.2	23.2	6.86%	100.0%	33.3%
99	Limited Brands, Inc	2012	4	-120.082	6,019.000	-2.00%	710.410	370	171	46.22%	42.1%	35.1%
100	United Continental Holdings, Inc	2016	2	-425.000	40,476.000	-1.05%	931.000	6010	68	1.13%	36.8%	1.0%
	Mean			-66.082	3,275.102	-3.56%	16.926	2,104.591	606.593	42.13%	25.3%	9.1%
	Median			-21.105	784.284	-2.00%	-3.248	114.819	23.400	21.26%	16.9%	2.5%
	Mean where VA%<100% (79 obs)									26.75%		

#	Company Name	FYear	Qtr	NSI	Assets	NSI%	PTI	DTA	VA	%VA	ETR	MTR
	Mean where VA%<95% (75 obs)										22.95%	
	1 st Qtr Obs		4									
	2 nd Qtr Obs		22									
	3 rd Qtr Obs		29									
	4 th Qtr Obs		45									

FYear Fiscal year from Compustat, *Qtr* Fiscal quarter from Compustat, *NSI* Total negative special items (SPIQ < 0) from Compustat, *Assets* Total assets (ATQ) from Compustat, *NSI%* NSI / assets, *PTI* Pre-tax income (PIQ) from Compustat, *DTA* Total deferred tax assets from the income taxes footnote in the 10-K (subsequent 10-K if interim quarter observation), *VA* The valuation allowance on the deferred tax assets from the income taxes footnote in the 10-K (subsequent 10-K if interim quarter observation), *%VA* VA / DTA, *ETR* total income tax expense (TXTQ) divided by pre-tax income (PIQ), *MTR* Firm-specific marginal tax rate provided by Graham (1996a, 1996b)

Panel B: Detailed examination of random sample of 25 firms where $PSI \div Assets > 1.0\%$

#	Company Name	FYear	Qtr	PSI	Assets	PSI%	PTI	DTA	VA	%VA	ETR	MTR
1	Imperva, Inc	2017	1	34.279	446.726	7.67%	24.041	48.424	46.125	95.25%	4.0%	4.0%
2	Alico, Inc	2009	2	7.000	218.105	3.21%	4.034	9.926	0.651	6.56%	49.0%	2.5%
3	SMTC Corporation	2004	3	2.490	94.823	2.63%	2.983	68.410	68.410	100.00%	3.3%	1.1%
4	EnPro Industries, Inc	2010	2	45.000	1082.100	4.16%	70.200	96.500	6.900	7.15%	36.6%	1.5%
5	SigmaTel, Inc	2006	3	45.673	284.279	16.07%	29.017	9.436	1.270	13.46%	60.3%	0.8%
6	Maxygen, Inc	2010	4	20.000	146.986	13.61%	70.435	51.284	51.284	100.00%	1.3%	0.9%
7	Tiffany & Co	2007	3	95.051	3133.098	3.03%	151.479	272.825	21.035	7.71%	33.9%	0.9%
8	Landauer, Inc	2016	3	4.131	194.670	2.12%	10.804	30.745	0.456	1.48%	31.3%	4.4%
9	Harris Corporation	2007	3	118.100	3940.800	3.00%	272.100	200.400	167.900	83.78%	23.4%	1.2%
10	Best Buy Co., Inc	2013	2	225.000	13,284.000	1.69%	406.000	879.000	158.000	17.97%	41.2%	3.4%
11	Sento Corporation	2005	2	0.182	15.415	1.18%	0.316	4.630	4.619	99.76%	2.2%	14.5%
12	Louisiana-Pacific Corporation	2013	2	35.900	2571.900	1.40%	114.500	205.000	23.500	11.46%	20.5%	27.2%
13	Pixelworks, Inc	2008	3	7.992	92.887	8.60%	8.533	98.260	96.767	98.48%	3.7%	1.9%
14	AMREP Corporation	2017	1	1.318	105.808	1.25%	2.214	12.483	3.873	31.03%	34.6%	2.0%
15	Ballantyne Strong, Inc	2017	4	0.946	59.014	1.60%	-0.324	12.924	12.317	95.30%	0.0%	0.9%
16	Con-way, Inc	2006	4	41.041	2301.889	1.78%	106.313	246.953	21.164	8.57%	21.4%	3.7%
17	Temple-Inland, Inc	2009	2	66.000	5802.000	1.14%	101.000	585.000	23.000	3.93%	34.7%	2.8%
18	TransAct Technologies Incorporated	2013	4	0.640	40.408	1.58%	1.405	3.038	0.242	7.97%	21.1%	33.2%
19	Sypris Solutions, Inc	2007	3	4.835	435.037	1.11%	3.236	25.886	0.000	0.00%	18.5%	6.1%
20	Allegheny Energy, Inc	2004	4	93.126	9045.140	1.03%	140.917	661.700	4.300	0.65%	38.7%	8.8%

#	Company Name	FYear	Qtr	PSI	Assets	PSI%	PTI	DTA	VA	%VA	ETR	MTR
21	I-trax, Inc	2003	3	0.500	13.887	3.60%	-1.610	10.442	9.548	91.44%	0.0%	0.9%
22	Mercer International, Inc	2014	3	31.851	1547.916	2.06%	62.620	187.087	87.862	46.96%	0.0%	2.8%
23	IntriCon Corporation	2012	3	0.822	40.915	2.01%	0.281	8.753	8.746	99.92%	13.1%	16.0%
24	Globecomm Systems, Inc	2012	4	4.129	310.067	1.33%	9.126	11.214	2.850	25.41%	22.4%	3.1%
25	Tetra Tech, Inc	2014	4	23.816	1776.404	1.34%	22.646	50.879	7.576	14.89%	0.3%	6.6%
	Mean			36.393	1,879.371	3.5%	64.491	151.648	33.136	42.8%	20.6%	6.1%
	Median			20.000	310.067	2.0%	22.646	50.879	9.548	18.0%	21.1%	2.8%
	Mean where VA% < 95% (18 obs)									22.14%		
	1st Qtr Obs		2									
	2nd Qtr Obs		6									
	3rd Qtr Obs		10									
	4th Qtr Obs		7									

PSI Total positive special items (SPIQ > 0) from Compustat, *PSI%* PSI / Assets

**Panel C: Detailed examination of random sample of 25 firms
where $|RC| \div \text{Assets} > 1.0\%$**

#	Company Name	FYear	Qtr	RC	Assets	RC%	PTI	DTA	VA	%VA	ETR	MTR
1	Lionbridge Technologies, Inc	2010	4	-1.881	156.976	-1.2%	-2.468	109.480	107.957	98.61%	0.0%	35.2%
2	ParkerVision, Inc	2015	2	-0.313	13.334	-2.3%	-4.842	122.152	122.152	100.00%	0.0%	0.5%
3	Vermillion, Inc	2017	4	-0.286	7.497	-3.8%	-2.955	23.320	23.320	100.00%	0.0%	3.1%
4	NPS Pharmaceuticals, Inc	2006	2	-6.012	248.092	-2.4%	-39.275	385.473	385.473	100.00%	0.0%	1.9%
5	Perry Ellis International, Inc	2016	2	-5.897	559.345	-1.1%	-4.428	51.744	48.052	92.86%	19.5%	2.1%
6	Libbey Inc	2005	2	-6.411	625.850	-1.0%	-1.293	52.459	3.033	5.78%	32.6%	7.6%
7	Tollgrade Communications, Inc	2006	3	-5.808	161.142	-3.6%	-5.009	6.267	2.733	43.61%	35.1%	27.2%
8	Phoenix Technologies Ltd	2007	4	-1.036	94.480	-1.1%	-0.668	43.779	43.549	99.47%	100.0%	1.0%
9	PowerSecure International, Inc	2007	2	-14.139	81.516	-17.3%	-14.217	13.630	8.290	60.82%	0.0%	1.2%
10	MicroStrategy Incorporated	2014	3	-11.578	559.733	-2.1%	-2.013	37.852	0.077	0.20%	58.0%	3.2%
11	Fair Isaac Corporation	2015	4	-15.986	1230.163	-1.3%	20.467	70.276	13.882	19.75%	3.2%	1.7%
12	SIFCO Industries, Inc	2017	3	-4.430	116.442	-3.8%	-5.634	17.215	9.597	55.75%	0.0%	1.3%
13	Lexmark International, Inc	2009	4	-45.900	3354.200	-1.4%	82.200	213.800	0.200	0.09%	27.4%	4.9%
14	Endwave Corporation	2009	4	-1.196	77.116	-1.6%	-3.515	74.554	74.554	100.00%	2.1%	2.5%
15	Network Equipment Technologies, Inc	2006	4	-10.187	134.019	-7.6%	-9.490	81.421	81.421	100.00%	5.1%	1.4%
16	ARI Network Services, Inc	2010	4	-0.361	19.777	-1.8%	-0.909	10.332	5.657	54.75%	100.0%	34.1%
17	CTS Corporation	2015	4	-9.522	484.133	-2.0%	-0.679	96.797	10.266	10.61%	0.0%	34.1%
18	Tutogen Medical, Inc	2005	3	-1.600	29.719	-5.4%	-1.344	8.420	5.865	69.66%	0.0%	2.0%

#	Company Name	FYear	Qtr	RC	Assets	RC%	PTI	DTA	VA	%VA	ETR	MTR
19	Actuant Corporation	2017	4	-118.774	1516.955	-7.8%	-108.415	90.845	22.671	24.96%	8.9%	3.6%
20	Gateway, Inc	2004	3	-63.061	1825.875	-3.5%	-58.250	589.778	517.348	87.72%	3.0%	0.9%
21	PMC-Sierra, Inc	2005	2	-7.606	455.174	-1.7%	2.655	377.735	377.735	100.00%	80.1%	3.0%
22	Zafgen, Inc	2016	3	-1.536	142.712	-1.1%	-14.675	97.720	97.720	100.00%	0.0%	0.8%
23	Pemstar, Inc	2005	2	-7.893	371.345	-2.1%	-13.207	68.193	62.992	92.37%	0.0%	2.8%
24	Sevcon, Inc	2013	2	-0.605	21.880	-2.8%	-0.576	4.412	0.159	3.60%	100.0%	2.3%
25	Intrusion, Inc	2004	4	-0.139	5.316	-2.6%	-0.788	31.508	31.508	100.00%	0.0%	0.0%
	Mean			-13.686	491.712	-3.3%	-7.573	107.166	82.248	64.8%	23.0%	7.1%
	Median			-5.897	156.976	-2.1%	-2.955	68.193	23.320	87.7%	3.0%	2.3%
	Mean where VA% < 95%									41.50%		
	(15 obs)											
	1st Qtr Obs			0								
	2nd Qtr Obs			8								
	3rd Qtr Obs			6								
	4th Qtr Obs			11								

RC Total Restructuring Charges (RCPQ) from Compustat, $RC\% = RC/Assets$

Appendix 3

Variable Definitions

Variable Name	Definition	Database
Panel A: Primary Test Model Variables – Eqs. 9–12, Tables 2–7		
$PTI_{i,t+k}$	pre-tax income (PIQ) for firm i in quarter $t+k$ (where $k=1, \dots, 4$) divided by the market value of equity ($CSHOQ*PRCCQ$) in quarter $t-4$	Compustat
$PTSI_{i,t}$	pre-tax special items ($SPIQ$) for firm i in quarter t divided by the market value of equity ($CSHOQ*PRCCQ$) in quarter $t-4$	Compustat
$E_{i,t+k}$	income before extraordinary items (IBQ) for firm i in quarter $t+k$ (where $k=1, \dots, 4$) divided by the market value of equity ($CSHOQ*PRCCQ$) in quarter $t-4$	Compustat
$ATSI_{i,t}$	PTSI multiplied by (one minus the assumed tax rate), ZERO, TOP, ETR, MTR or CSTAT	Compustat
PTB	pre-tax for both earnings and special items	
ZERO	zero tax rate	
TOP	highest federal statutory income rate in year t	IRS
ETR	total income tax expense ($TXTQ$) divided by pre-tax income (PIQ)	Compustat
MTR	the firm-specific annual marginal tax rate estimates provided by Graham (1996a, 1996b)	John Graham
CSTAT	firm-specific average tax rate implied by Compustat, calculated as one minus the sum of after-tax special items components divided by total	Compustat

Variable Name	Definition	Database
	pre-tax special items $[1 - (\text{Sum after-tax SI components}/\text{Total pre-tax SIs})]$	
$PTC_{i,t}$	pre-tax restructuring charge ($RCPQ$) or pre-tax goodwill impairment ($GDWLIPQ$) for firm i in quarter $t+k$ (where $k=1, \dots, \text{or } 4$) divided by the market value of equity ($CSHOQ*PRCCQ$) in quarter $t-4$	Compustat
$PTOSI_{i,t}$	PTSI ($SPIQ$) for observations where the pre-tax restructuring charge ($RCPQ$) or the pre-tax goodwill impairment charge ($GDWLIPQ$) is less than zero, minus the pre-tax restructuring charge ($RCPQ$) or the pre-tax goodwill impairment charge ($GDWLIPQ$) for firm i in quarter t divided by the market value of equity ($CSHOQ*PRCCQ$) in quarter $t-4$	
$ATC_{i,t}$	$PTC_{i,t}$ times 1 minus the assumed tax rate	Compustat
$ATOSI_{i,t}$	$PTOSI_{i,t}$ times 1 minus the assumed tax rate	Compustat
Panel B: Compensation Model Variables – Eq. 13, Table 8		
ΔLN_CASH	the annual change in the natural logarithm of 1+CEO salary and bonus	Execucomp
ΔROA	the annual after-tax change in return on assets before special items, measured as the change in income before extraordinary items (IB) and special items (SPI) scaled by lagged total assets. Special items are adjusted for taxes assuming a tax rate of zero (ZERO), the highest statutory rate (TOP), or the firm's marginal tax rate (MTR)	Compustat
RTN	raw return calculated as the annual change price ($PRCC_F$) scaled by the beginning of the year price	Compustat
NSI	after-tax annual negative special items ($SPI<0$) times -1 adjusted for taxes assuming a tax rate of zero (ZERO), the highest statutory rate (TOP), or the firm's marginal tax rate (MTR);	Compustat
$\Delta SIZE$	the annual change in the natural logarithm of sales revenue (REVT)	Compustat
TENURE	number of years the CEO has been the CEO	Execucomp
Panel C: Forecast Revisions – Eq. 14, Table 9		
REV	first analyst forecast of earnings for year $t+1$ after earnings announcement for year t less the last analyst forecast of year $t+1$ earnings prior to the earnings announcement for year t , scaled by price at t	I/B/E/S Compustat
UE	actual earnings for year t less the last consensus analyst forecast of earnings for year t , scaled by price at year t	I/B/E/S and Compustat
NSI	pre-tax annual per share negative special items ($SPI<0$) for year t times -1 adjusted for taxes assuming the highest statutory federal tax rate (TOP), zero tax rate (ZERO) or the marginal tax rate (MTR) scaled by price at year t	Compustat
SIZE	the natural log of total assets (AT)	Compustat
LOSS	1 if income before extraordinary items (IB) for year t is negative, otherwise 0	Compustat
Panel D: Value Relevance of Special Items – Eq. 15, Table 10		
$\Delta AINC$	Seasonal change in quarterly income (ibq) less the tax adjusted negative special item ($spiq<0$)	Compustat
SI	Tax adjusted negative special item ($spiq<0$) times -1 divided by market value at quarter $q-4$. Adjusted at the ZERO, TOP, or MTR	Compustat
SIZE	Natural log of lagged total assets (atq)	Compustat

Variable Name	Definition	Database
RTN	12 month buy-and-hold stock returns cumulated over the period ending three months after the company's fiscal year-end;	CRSP
CAR	Quarterly market-adjusted stock return for firm <i>i</i> , adjusted for value-weighted index. Accumulated over the period from one trading day after the earnings announcement date for the prior quarter through one day after the earnings announcement date for the current quarter	CRSP

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Affiliations

William M. Cready¹ · **Thomas J. Lopez**² · **Craig A. Sisneros**³ · **Shane R. Stinson**²

✉ William M. Cready
cready@utdallas.edu

Thomas J. Lopez
tjlopez@cba.ua.edu

Craig A. Sisneros
craig.sisneros@okstate.edu

Shane R. Stinson
srstinson@cba.ua.edu

¹ Accounting and Information Management, School of Management (SM 41), University of Texas at Dallas, Richardson, TX, USA

² Culverhouse College Business, Culverhouse School of Accountancy, University of Alabama, Tuscaloosa, AL, USA

³ School of Accounting, Spears School of Business, Oklahoma State University, Stillwater, OK, USA