Empirical Implications of Incorrect Tax Rate Assumptions

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ABSTRACT

The use of assumed tax rates to adjust various earnings measures is common in empirical accounting research. The objective of this study is to explore the potential empirical consequences of assuming an incorrect tax rate in adjusting earnings-related measures. In so doing, we focus our investigation on special items (e.g., restructuring charges) given their prevalence in the prior literature and the wide variation in tax rate assumptions. Our investigation shows that the tax rate assumed can be critical to the interpretation of results. Importantly, our evidence suggests that extreme tax rate assumptions (zero or the highest statutory rate) can be especially problematic and that firm-specific tax rates, such as effective or marginal tax rates, exhibit less bias in several contexts. By providing empirical evidence on the potential empirical consequences of these varied tax rate assumptions in different contexts, we offer a guide for future researchers on this importance of this critical design choice.
I. INTRODUCTION

The use of assumed tax rates to adjust various earnings measures is common in empirical accounting research (e.g., Dechow et al. 1994; Burgstahler et al. 2002). The objective of this study is to explore the potential empirical consequences of assuming an incorrect tax rate in adjusting earnings-related measures. In so doing, we focus our investigation on special items (e.g., restructuring charges, asset writedowns, employee terminations, etc.) given their prevalence in the prior literature along with the wide variation in tax rate assumptions. By providing empirical evidence on the potential consequences of these varied assumptions in different contexts, we offer a guide for future researchers on this important design choice when including tax-adjusted earnings-related items in archival models.

Several studies investigate 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, Hogan and Jeter 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—which are typically reported on a pre-tax basis—as a key component of a firm’s information environment, these studies vary widely in the methods used to adjust for estimated tax effects. Since prior research suggests the market values after-tax earnings (e.g., Ayers et al. 2002), such adjustments are seemingly critical in achieving proper alignment between key dependent and explanatory variables for a clear interpretation of documented results. This interpretation will suffer to the extent any error in the tax rate assumption biases coefficients or is correlated with the error term.

Our examination of the prior literature suggests there is no discernible pattern to how researchers tax-adjust (or fail to adjust) special items. We identify 63 studies that include a special items measure and an earnings measure in the same analyses. We find that 27 percent of these studies perform the analyses on a pre-tax basis for both earnings and special items, more than half assume the extremes of either a zero

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1 The tax rate adjustments found in the prior literature multiply the reported special item by \((1-t)\) where \(t\) is the assumed tax rate. The assumed tax rates include zero (no adjustment), the top statutory rate, an estimated marginal rate, a calculated effective tax rate, or alternatively utilize the recently added after-tax special items in Compustat.

2 We discuss our method for identifying these studies in greater detail in the literature review section.
tax rate (33 percent) or adjust special items at the highest statutory rate (21 percent), and 14 percent adjust special items using a calculated effective tax rate. Importantly, over two thirds of the studies we identify are published in either the *Journal of Accounting and Economics, Journal of Accounting Research, The Accounting Review, Contemporary Accounting Research,* or *Review of Accounting Studies.* In addition, prior research reports that special item reporting frequency has increased dramatically over the past 30 years (e.g., Johnson et al. 2011). Thus, this line of research is clearly important to academics and, given the number of tax-adjustment methods employed in prior studies, an investigation into the empirical implications of the various methods of tax-adjusting earnings-related items is warranted and relevant.

Our first step is to model the empirical implications for future earnings of over- or under-estimating the “true tax rate” when tax-adjusting special items. We do so utilizing the Burgstahler et al. (2002) (hereafter BJS) inter-period expense transfer framework. This framework provides a relevant setting for the future earnings implications (i.e., persistence) of current special items and earnings that is easy to understand. Importantly, persistence frameworks are often utilized in valuation studies relating earnings to stock prices and returns (e.g., Basu 1997; BJS; Cready et al. 2010). Our model suggests that overestimating (underestimating) the “true tax rate” will downwardly (upwardly) bias the coefficients on negative special items. In the context of the BJS inter-period expense transfer framework, our analysis suggests that if the highest statutory rate (zero rate) is higher (lower) than the true tax rate, the estimate of the income-transfer effect of negative special items is likely overstated (understated).

Next, we utilize the BJS framework to investigate the empirical implications of applying various assumed tax rates for special items by comparing the economic significance of inter-period transfer results across several tax rate assumptions.3 Consistent with our model, we find that the magnitude of the estimated inter-period transfer associated with negative special items varies significantly with the tax rate adjustment. Specifically, our analysis suggests changes in income over the four quarters following negative special items charges range from an average increase of 44 percent of the special item (assuming

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3 The inter-period transfer results of Burgstahler et al. (2002), which assumes the highest statutory rate, suggests that almost 50 percent of the current special items is reflected in increased income over the subsequent four quarters.
the highest statutory rate) to an average decrease of 16 percent of the special item (assuming a zero tax rate). Clearly, the tax rate assumed dramatically effects the magnitude and interpretation of the results.

We then attempt to identify the tax rate assumption that most closely represents the “true tax rate” by comparing coefficients and overall inter-period transfer effects to those from the estimation of a pre-tax model (i.e., where both current special items and future earnings are measured on a pre-tax basis). We assume that a pre-tax analysis will yield quantitatively and qualitatively similar results to an after-tax analysis where the assumed tax rate approximates the “true tax rate.” We make this assumption because the tax rate adjustment, if indeed based on the “true tax rate,” should simply be a scalar effect. Our analyses suggest that firm-specific effective tax rates are a better estimate of the true tax rate than assuming either a zero tax rate or the highest statutory rate.

Finally, we apply different tax rate assumptions to two additional contexts based on prior research—executive compensation and analyst forecast revisions—and show that these assumptions have a significant effect on the results and can even alter the direction of conclusions. In the context of executive cash compensation, we find that, depending on the assumed tax rate, executive compensation is either fully shielded, partially shielded or not shielded at all from the income-decreasing effect of negative special items. Similarly, with respect to analyst forecast revisions, changing the tax rate used to adjust negative special items changes the inferences drawn from tests examining the persistence of negative special items relative to recurring unexpected earnings. Overall, we show that tax rate assumptions utilized in research on special items and earnings are critical to the interpretation of results. Importantly, our evidence suggests that extreme tax rate assumptions (zero or the highest statutory rate) can be

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4 For example, if 50 percent of a negative special item is realized in future earnings we would expect a 0.5 coefficient on negative special items in a regression of pre-tax future earnings on pre-tax special items. Assuming the pre-tax special item is $10 we would expect to see $5 of future earnings. If we rely on after-tax future earnings and adjust special items at a tax rate of 35 percent, assuming the 35 percent is the true tax rate, we would expect to see $3.25 in future after-tax earnings [(10 x 65%) x 0.5] on $6.50 of earnings ($10 x 65%). If 35 percent is the true tax rate, the coefficient on special items will be identical across pre-tax and after-tax models (the scale effect of tax-adjustment). We discuss this in greater detail later in the text.

5 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.
especially problematic and that firm-specific tax rates, such as effective or marginal tax rates, exhibit less bias and better approximate the true tax rate.

The remainder of the paper proceeds as follows. Section II discusses prior literature and Section III models the tax rate assumptions specific to the BJS setting. Section IV details our sample selection and descriptive statistics. Section V presents our research designs and results. Section VI briefly summarizes and concludes.

II. PRIOR LITERATURE

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 63 published research studies since 1980 that include special items in the main analyses.6 Our search began with identifying keywords such as “special items,” “restructure,” and “write-off,” in journals with “accounting” in the title and expanded to include the reference sections for each study identified.7 In Table 1, Panel A, we report the journals in which the identified studies are published. Our analysis suggests that these studies are important to accounting academics, as 68 percent of these studies we identified are published in the premier accounting journals based on top 5 rankings.

[Table 1]

In Panel B, we report the studies by decade (combining the 80s and 90s) and by the different methods utilized to adjust special items: pre-tax for both earnings and special items (PT); zero tax rate (ZERO); top federal statutory rate (TOP); estimated marginal rate (MTR); calculated effective tax rate (ETR), or the tax-adjusted special items provided by Compustat (CSTAT). While we first suspected there might be a progression of tax rate assumptions over time, there is no apparent pattern by decade. Approximately a quarter of the studies use pre-tax special items along with pre-tax earnings. Over half

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6 To avoid citation inflation, all 63 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.
7 This process may have resulted in omissions, but the studies identified are used for descriptive purposes and context.
the studies use the extreme assumptions of the top statutory rate or a zero tax rate. A calculated effective tax rate is used in over 14 percent of the studies. Marginal tax rates provided by Graham (1996a and 1996b) are used in one study and two recent studies use the after-tax special items recently added in Compustat. Other than the recent Compustat reported after-tax special items, there is no apparent trend in adjustments over time.

In Panel C, we report the different dependent variables used in the main analyses of the identified studies. Since many studies include more than one analysis/dependent variable, the total adds up to 89 dependent variables used in the 63 identified studies. A majority of the identified studies (63 percent) have an earnings measure (either current or future earnings) or a market measure such as stock price or returns as the dependent variable. Next are special items (11 percent) and analyst forecasts (9 percent) with a small number of compensation variables (6 percent), accruals (3 percent), and miscellaneous other dependent variables (8 percent total, no more than one each). Finally, in Panel D we report the studies by genre, which is related to dependent variable choice. Again we have 78 identified genres as several studies investigate more than one area. Most of this overlap comes from market studies that include persistence of earnings tests as a pre-cursor to market tests (and these studies comprise 68 percent of the study genres). There is no clear pattern of tax adjustment for special items by time, dependent variable, nor study genre.

III. MODELING THE IMPLICATIONS OF TAX RATE MISSPECIFICATION

We model the implications of tax rate assumptions using the BJS framework because this setting provides a clear context to understand the consequences of these various assumptions vis-à-vis earnings and special items. BJS document that negative special items (NSIs) are followed by “earnings of the opposite sign in subsequent quarters” (p. 587, emphasis theirs). Their empirical evidence suggests that over 50 percent of an NSI is realized as increased earnings in the four quarters subsequent to recognition.

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8 The zero assumption matches after-tax earnings with pre-tax special items which seemingly mismatches special items and earnings but may be the appropriate assumption as we discuss below.
BJS adjust NSIs, which are reported on a pre-tax basis by *Compustat*, for taxes in order to enhance comparability to the after tax income numbers that serve as the foundation of their model.⁹

The BJS income-transfer analysis focuses on the following equation for $k = 1, \ldots, 4$:

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

where:

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

Consistent with prior studies (e.g., Kinney and Trezevant 1997; Bradshaw and Sloan 2002), BJS (p. 596) use the highest federal statutory tax rate applicable for each year of their sample to adjust NSIs. Importantly, the use of after-tax special items by BJS is critical to their analyses since the primary purpose of their study is to assess the market implications of special items relative to earnings before special items.¹⁰

There are compelling reasons to believe the highest statutory rate is an unbiased estimate of the “true tax rate” for NSIs and as such, the appropriate rate to adjust NSIs. NSIs are often recognized for book purposes before they are deductible for tax purposes. Even if the firm faces a marginal tax rate equal to the highest statutory rate, the present value of the tax deduction is something less than the highest statutory rate. However, for financial accounting purposes in calculating net income, the firm recognizes the undiscounted tax benefit of the tax deduction even if the firm faces current period losses and has an effective tax rate well below the highest statutory rate. Provided the firm expects to eventually realize a

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⁹ As the frequency of special items has increased, *Compustat* reporting of these items has consequently become more informative. In 2000, *Compustat* began reporting several components of special items (in addition to gross overall special items) as these components have clearly different valuation implications (e.g., Cready et al. 2012). In addition, *Compustat* began reporting both pre-tax as well as after-tax numbers for the components (though the overall special item, mnemonic SI or SIQ, is still only reported on a pre-tax basis).

¹⁰ In the earnings persistence portion of our BJS replication (which we discuss at length later in the text), we find significant differences in the extent of income transfer depending on the tax rate assumed. However, in a separate analysis, not reported, we replicate the market portion of the BJS study (Table 3 p. 602) and although we find differences in the extent to which special items are impounded into price depending on the tax rate assumed, we also find that the primary BJS conclusion (i.e., more of the special item is impounded into price than recurring earnings) is robust to the tax rate used to adjust special items.
tax deduction for the NSI, it will recognize a tax benefit equal to the highest statutory rate (in the deferred tax expense account) and book a corresponding deferred tax asset. The only time the firm does not recognize the benefit in current income is if a valuation allowance is offset against the deferred tax asset signaling that the firm never expects to realize the tax benefit.

On the other hand, prior literature provides equally compelling reasons to suggest that the highest statutory rate actually over-estimates the “true tax rate” associated with NSIs. For example, Beaver et al. (2007) report evidence which suggests that average effective tax rates for negative special item observations are substantially less than the highest statutory rate. In a sample of restructuring and write-off firms, Christensen et al. (2008) find that while the deferred tax asset account increases in the year of recognition, the deferred tax valuation account simultaneously increases by approximately 90 percent of that amount. Said another way, firm management estimates that only 10 percent of the current period restructuring or write-off will ever be deductible against taxable income, on average. This would imply that the “true tax rate” for these charges is closer to 3.5 percent than the 35 percent top statutory rate.

Similarly, Dechow and Ge (2006) suggest that the true tax rate for NSIs is zero where firms provide for a 100 percent valuation allowance against the deferred tax asset. They examine a random sample of 20 low-accrual firms to assess whether special items affect the tax expense/benefit reported by the firm (see their Appendix A, p. 294). In most cases the special items did not affect reported taxes since most of the firms were reporting losses and concurrently reported a 100 percent deferred tax asset valuation allowance. Accordingly, Dechow and Ge (2006) do not tax-adjust special items, and in fact explicitly state the assumption of a zero tax rate, even though they use after-tax earnings on the left side of their analyses. Relying on a zero tax rate assumption, Dechow and Ge (2006) report evidence (see their Table 2 column 3) which suggests that NSIs are associated with earnings decreases over the subsequent year that equals approximately 16 percent of the charge.

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11 The lower tax rate for negative special items firms documented by Beaver et al. (2007) derives from the fact that these firms are frequently loss firms as well. Beaver et al. (2007) report that in their sample, ETRs for loss firms are 7 percent while ETRs for profit observations are 33.2 percent. They further report that 37 (20) percent of loss (profit) firms report a negative special item.
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 BJS income transfer model. We evaluate the impact of tax rate misspecification on the equation (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:

\[(E_{i,t+k} - E_{i,t+k-4}) = g_{0k} + g_{1k} TSI_{i,t} + g_{2k}(E_{i,t} - TSI_{i,t} - E_{i,t-4}) + e_{it}.\]  (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 (\(\tau\)) as follows:

\[TSI_{i,t} = (1 - \tau) \times RSI_{i,t}.\]  (3)

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

\[TSI_{i,t} = \{(1 - \tau)/(1 - \tau')\} \times SI_{i,t}.\]  (4)

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

\[(E_{i,t+k} - E_{i,t+k-4}) = g_{0k} + [g_{1k} \{(1 - \tau)/(1 - \tau')\} + g_{2k}(1 - \{(1 - \tau)/(1 - \tau')\})] \times SI_{i,t}\
+ g_{2k}(E_{i,t} - SI_{i,t} - E_{i,t-4}) + e_{it}.\]  (5)

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

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

for \(g_{1k}\) as follows:

\[g_{1k} = \{(1 - \tau)/(1 - \tau)\} b_{1k} - g_{2k} \{(1 - \tau)/(1 - \tau)\} - 1.\]  (7)

The role of the second term in equation (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 BJS 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 suggest a general setting in which subsequent interim quarter special items coefficients reported by BJS 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.\(^{12}\) This is particularly important because the \(k=4\) lag, as the seasonal lag, plays a central role in the BJS 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 \((g_{1k})\):

\[
b_{1k} - g_{1k} = \frac{\left(\tau' - \tau\right)}{1 - \tau} \times (b_{1k} - g_{2k}). \tag{8}
\]

The \(\frac{\left(\tau' - \tau\right)}{1 - \tau}\) term in this expression reflects a tax rate scale effect. If \(\tau'\) (the assumed tax rate) exceeds \(\tau\) (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 \(\tau'\) (the assumed tax rate) is lower than \(\tau\) (the true tax rate) then the sign of (8) is also determined by the relative magnitudes of the estimated special items parameter, \(b_{1k}\), 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 BJS 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 BJS 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

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\(^{12}\) These inferences are, of course, reversed when the actual tax rate exceeds the true tax rate. However, it is unlikely that the actual tax rate exceeds the true tax rate since the top statutory rate is used in our analysis and BJS.
the estimated $b_{1k}$ value in BJS for negative special item observations (Table 2 panel B, p. 596) is considerably more negative than the estimated $b_{2k}$ value (i.e., $-1.277$ versus $-0.316$ for negative special items) suggesting that the reported BJS $b_{1k}$ estimate is again downwardly biased relative to its expected true value, $g_{1k}$. This follows from the fact that BJS use the top statutory rate, thus if any bias is present, it must be from an assumed tax rate that is higher than the true tax rate. Given the implications from a simple modeling of the possible effects of misestimating the true tax rate, we next empirically test various tax rate assumptions as compared to pre-tax models.

IV. 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 1998−2013 merged with the marginal tax rate database provided by Graham (1996a, 1996b)\(^{13}\), for a starting sample of 249,588 firm quarters. We then delete all financial firms (SIC codes 6000−6999, 42,113 observations) and those firms missing market value or earnings information for the four quarters before and after the observation date (32,622 observations). We then delete firms where the absolute value of special items or earnings exceeds the market value four quarters prior to the observation date (2,710 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 (9,523 observations) and the absolute value of the after-tax special items are greater than the absolute value of pre-tax special items (1,532 observations). We limit our sample to negative pre-tax special items (123,185 observations lost). Finally, 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 (9,483 observations lost). This leaves a final sample of 28,420 firm quarter observations.

\(^{13}\) 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 to us.
As reported in Panel B of Table 2, the final sample consists of firms with an average of $5.4 billion in assets and $5.3 billion in market value. These firms average nearly $96 million of pre-tax income with just over $22 million in negative special items reported. The average tax rates are interesting to note. Compustat appears to assume the top marginal tax rate in most cases as the median is 35.0 percent, but not in all cases as the mean is 38.7 percent. The estimated marginal tax rates are much lower and reflect the common observation that firms reporting negative special items are often loss firms as the mean is 13.9 percent with a median of only 3.8 percent. The calculated effective tax rate is also lower than the top marginal rate with a mean of 26.8 percent and a median of 29.8 percent.

V. RESEARCH DESIGN AND EMPIRICAL RESULTS

Research Design

In the primary empirical portion of our analysis, we examine the implications of several different assumed tax rates on the estimated negative special items coefficients from BJS. 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 prior literature. Our 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. Our empirical method attempts to identify the tax rate assumption that best represents the true tax rate for NSIs. We do so by identifying the after-tax estimate with the smallest difference to the pre-tax estimate.

To begin, we estimate a pre-tax version of the BJS model for $k = 1, \ldots, 4$:

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

where:

$PTI_{i,t+k}$ = pre-tax income (PIQ) for firm $i$ in quarter $t+k$ (where $k=1,\ldots,4$) divided by the market value of equity ($CSHQ*PRCCQ$) in quarter $t-4$;

$RNSI_{i,t}$ = pre-tax negative special items (SPIQ < 0) for firm $i$ in quarter $t$ divided by the market value of equity ($CSHQ*PRCCQ$) in quarter $t-4$.  

[Table 2]
Next, we estimate several after-tax versions of the BJS model for \( k = 1, \ldots, 4 \) as follows:

\[
\left( E_{i,t+k} - E_{i,t+k-4} \right) = b_{0k} + b_{1k} \text{NSI}_{i,t} + b_{2k} (E_{i,t} - \text{SI}_{i,t} - E_{t-4}) + e_{it}
\]

where:

\begin{align*}
E_{i,t+k} &= \text{income before extraordinary items (IBQ) for firm } i \text{ in quarter } t+k \text{ (where } k=1,\ldots, 4) \text{ divided by the market value of equity (CSHOQ*PRCCQ) in quarter } t-4; \\
\text{NSI}_{i,t} &= \text{RNSI multiplied by one minus the assumed tax rate.}
\end{align*}

We estimate five different after-tax versions of the BJS model. First, we use the simple assumptions of a zero tax rate (ZERO) and the top statutory rate (TOP). We also investigate marginal tax rates (MTR) by using the firm-specific annual marginal tax rate estimates provided by John Graham (Graham 1996a, 1996b). We then use the effective tax rate (ETR), calculated as one minus income before extraordinary items (IBQ) divided by pre-tax income (PIQ), or \( 1 – \text{IBQ}/\text{PIQ} \). Finally, we use the 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.\(^{14}\)

**Empirical Results**

*BJS Analyses*

Our estimates of Equation (9) and the five after-tax versions of Equation (10) are reported in Table 3. We report estimates of \( b_{1k} \), the special item variable of interest, in Panel A and \( b_{2k} \) in Panel B. BJS conjecture that NSIs, on average, represent “inter-period transfers” of future expenses to current period income. Incorporating NSIs adjusted at the highest statutory rate, their analysis suggests that over 50 percent of the original NSI is recovered through increased earnings in the four subsequent quarters with 27 percent of that being in the fourth subsequent quarter.

[Table 3]

Prior research suggests marginal tax rates are considerably lower than the highest statutory rate (Shevlin 1990; Graham 1996b; Graham and Mills 2008), and effective tax rates for firms reporting NSIs

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\(^{14}\) Compustat reports the components of special items (e.g., restructuring charges, goodwill impairments, etc.) on both a pre-tax and after-tax basis, but total special items (SPIQ) are only reported on a pre-tax basis. Thus, we use this method to estimate the tax rate assumed by Compustat on total special items.
are particularly low (Beaver et al. 2007). Therefore, we expect that the negative special item coefficients \( b_{1k} \) in equation (10) for both the interim quarters (i.e., \( k=1, 2, \) or 3) and the crucial fourth quarter (i.e., \( k=4 \)) will increase (become less negative) using marginal tax rates (MTR) or effective tax rates (ETR) rather than the highest statutory rate. The effect of the MTR or ETR adjustment may well be so large that the interim quarter NSI coefficients become positive and the fourth quarter negative special items coefficient increases to a value greater than \(-1\). Such a result would suggest that, on average, there are no net future earnings increases (from either income-transfer or real operational improvements) associated with negative special items.\(^{15}\)

Our results in Table 3 using NSIs adjusted at the highest statutory rate (TOP) are almost identical to BJS. In particular, we find cumulatively that 43.5 percent of the original NSI is recovered through increased earnings over the subsequent four quarters with more than a third (15.2 percent) of this effect occurring in the fourth quarter following NSI recognition. On the other hand, a pre-tax version (PT) of the BJS model tells a very different story. Specifically, we find that the income-transfer aspect of NSIs for the four subsequent quarters is only 8.0 percent of the original charge with none of it coming in the fourth subsequent quarter. When we apply a zero tax rate adjustment (ZERO), our evidence suggests that NSIs are associated with income decreases over the subsequent four quarters of approximately 15.8 percent, 18.1 percent of which occurs in the fourth subsequent quarter. As mentioned before in the modeling of tax rates, this suggests 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.

Given the results of the extremes of the TOP and ZERO tax rate assumptions, it appears that both are problematic in the BJS setting. In particular, the TOP tax rate assumption appears to result in an overstatement of the earnings transfer effect while the ZERO tax rate assumption appears to understate the earnings transfer effect. Thus, it is possible that one of the firm-specific rates (MTR, ETR, or CSTAT) is more representative of the “true” tax rate for NSIs. Accordingly, we test the BJS model using

\(^{15}\) That is, if the effect is entirely realized within the subsequent four quarters. Analyses beyond four quarters similar to Cready et al. (2012) are beyond the scope of this study.
the MTR, ETR, and CSTAT tax adjustments. Using the MTR adjustment, we find that the earnings transfer effect is 1.1 percent of after-tax special items. The CSTAT tax rate adjustment yields results that suggest this assumed tax rate is higher than the true tax rate as the total income transfer effect with this adjustment is 27.6 percent, 4.5 percent occurring in the fourth lag. The ETR tax rate adjustment appears to slightly overstate the income transfer effect as the total using this adjustment is 15.5 percent.

We next report the comparisons of the coefficients from the pre-tax model to the corresponding coefficients from the different tax rate assumption models in Table 4. We report these as differences from the pre-tax model with significance levels. We are particularly interested in the $b_{ik}$ (special items) coefficients in Panel A. Again, the bias from an overstated assumed tax rate would result in significantly negative differences, and an understated assumed tax rate significantly positive differences. Our conclusions for the total income transfer results for the extreme assumptions from Table 3 are confirmed here 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 < 0.01 or better). That is, 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.

[Table 4]

CSTAT also appears to overstate the true tax rate as each difference is negative, and those on the first and fourth lags significantly so (two-tailed p-value < 0.01 and <0.001, respectively). It appears that the MTR tax rate assumption is lower than the true tax rate as the comparisons to the PT estimated coefficients are generally positive although only significantly so (two-tailed p-value < 0.01) at the crucial fourth lag. ETR appears to perform the best of all the tax rate assumptions. While the differences from PT are negative at all lags, only the third lag difference is significant (two-tailed p-value < 0.01) and the critical fourth lag is statistically indistinguishable from the fourth lag PT coefficient. This stands in contrast to each of the other tax rate assumptions (ZERO, TOP, CSTAT and MTR) where we find that the fourth lag estimates are all significantly different from the PT fourth lag estimate (two-tailed p-value < 0.01 or better). In summary, ETR and MTR appear to be the adjustments closest to the true tax rate using
the BJS model, with a slight edge to ETR because the critical fourth lag is not statistically different from the pre-tax model.

Taken together, our evidence in Tables 3 and 4 clearly suggests that the TOP (ZERO) tax rate overstates (understates) the true NSI tax rate. In addition, our evidence suggests that the tax rate applied by Compustat to special items (CSTAT) overstates the true tax rate which follows that the median reported in Table 2 appears to be equal to TOP. On the other hand, the evidence in Table 4 suggests that a firm-specific MTR or ETR is a better proxy of the true NSI tax rate than the other tax rate assumptions applied in our analyses and in prior research. We suggest that the ETR appears to be the better proxy; however, the difference between ETR and MTR is negligible and either represent a major improvement over the other tax rate assumptions applied in prior studies.

**Application to other Areas of Research**

In this section, we examine the empirical implications of altering tax rate assumptions used in prior research on executive compensation and analyst forecast revisions. The analyses that follow are presented to further demonstrate the sensitivity of empirical results to the various tax rate assumptions.

**Executive Compensation**

The prior literature is replete with studies which 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; Joo and Chamberlain 2017). We examine the impact of varying tax rate assumptions on results previously reported. In so doing, we adopt the following model:

$$\Delta \text{LN}_\text{CASH}_it = \beta_0 + \beta_1 \Delta \text{ROA}_it + \beta_2 \text{RTN}_it + \beta_3 \text{NSI}_it + \beta_4 \Delta \text{SIZE}_it + \beta_5 \text{TENURE}_it + \varepsilon_it \quad (11)$$

where

- $\Delta \text{LN}_\text{CASH}$ = the annual change in the natural logarithm of 1 + CEO salary and bonus;
- $\Delta \text{ROA}$ = $\Delta \text{AT}_\text{ROA}$ or $\Delta \text{PT}_\text{ROA}$;
- $\Delta \text{AT}_\text{ROA}$ = the 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 effective tax rate (ETR). ETR is calculated as (1 – (income before extraordinary items (IB) divided by pre-tax income (PI));

\[
\Delta \text{PT\_ROA} = \text{the pre-tax change in return on assets before special items, measured as the change in pre-tax income (PI) and pre-tax special items scaled by lagged total assets;
}
\]

\[
\text{RTN} = \text{raw return calculated as the annual change price (PRCC\_F) scaled by the beginning of the year price;
}
\]

\[
\text{NSI} = \text{AT\_NSI or PT\_NSI;
}
\]

\[
\text{AT\_NSI} = \text{after-tax annual negative special items (SPI < 0) adjusted for taxes assuming a tax rate of zero (ZERO), the highest statutory rate (TOP), or the firm’s effective tax rate (ETR);
}
\]

\[
\text{PT\_NSI} = \text{pre-tax annual negative special items (SPI<0) not adjusted for taxes;
}
\]

\[
\Delta \text{SIZE} = \text{the annual change in the natural logarithm of sales revenue (REVT);
}
\]

\[
\text{TENURE} = \text{number of years the CEO has been the CEO.
}\]

To perform these analyses, we collect CEO compensation data from Execucomp and financial data from Compustat for the years 2003 – 2013. We report the empirical estimations of equation (11) in Table 5. The results for the ZERO tax rate assumption are reported in column 3. Our results with respect to \Delta \text{ROA}, \text{RETURN}, \Delta \text{SIZE} and \text{TENURE} are consistent with the prior research (e.g., Jackson et al. 2008; Darrough et al. 2014). In particular, we find that \Delta \text{ROA}, \text{RETURN}, \Delta \text{SIZE} are positive and significant (two-tailed p-value < 0.01) while the coefficient on \text{TENURE} is negative but insignificant.

Our results further suggest that executive compensation is penalized for negative special items, as the coefficient on \text{NSI} is −0.150 and significant (two-tailed p-value < 0.10).\textsuperscript{16} However, we find that the sum of the coefficients on \Delta \text{ROA} (0.347) and \text{NSI} (−0.150) is positive (0.198) and significant (two-tailed p-value < 0.10), which suggests that executive compensation is partially shielded from the income-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 NSIs less harshly than other unfavorable changes in income when paying executives, as the effect of \Delta \text{ROA} on executive compensation dominates that of NSI.

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 \text{NSI} is −0.043 and insignificantly different from zero. In

\textsuperscript{16} NSIs are entered as positive values in the model.
addition, we find that the sum of the coefficients on ΔROA (0.347) and NSI (−0.043) is positive (0.305) and significant (two-tailed p-value < 0.10). In contrast to our results using an assumed tax rate of zero, our evidence in column 4 suggests that executive compensation is fully shielded from NSIs when negative special items are adjusted at the top statutory rate. That is, assuming the top statutory tax rate on negative special items, our evidence suggests that compensation committees fully protect executives’ earnings-based bonuses from the income-decreasing effect of NSIs.

Finally, in column 5 we report the results for the ETR tax rate assumption. We find that the coefficient on NSI is −0.239 and significant (two-tailed p-value < 0.01), implying a penalty for negative special items similar to that shown in column 3. However, we also find that the sum of the coefficients for ΔROA (0.289) and NSI (−0.239), though positive (0.049), is insignificant at conventional levels. Thus, our evidence in column 5 suggests that executive compensation is not shielded from negative special items when adjusted at the effective tax rate (ETR). With the assumed tax adjustment equal to the firm’s ETR, executive compensation bears the full brunt of the income-decreasing effects of negative special items in equal proportion to other changes in income (i.e., ΔROA). Critically, our results in Table 5 demonstrate that the overall impact of negative special items on executive compensation is sensitive to the tax rate used to adjust special items leading to very different conclusions (i.e., partial shielding for a ZERO tax rate, full shielding for the TOP statutory tax rate, and no shielding for the ETR). Taken together, our evidence suggests the tax rate assumed in executive compensation research is an essential element of the research design.

**Analyst Forecast Revisions**

A number of studies have examined the association between special items and either analyst forecast errors or 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 models:

\[
REV_{it+1} = \alpha_0 + \alpha_1 UE_{it} + \alpha_2 NSI_{it} + \alpha_3 SIZE_{it} + \alpha_4 LOSS_{it} + \epsilon_{it} \quad (12)
\]
and

\[
REV_{it+1} = a_0 + a_{1UE_{it}} + a_{2NSI_{it}} + a_{3SIZE_{it}} + a_{4LOSS_{it}} + a_{4DETR_{it}} + \varepsilon_{it} \tag{13}
\]

where

\[
REV = \text{first analyst forecast of earnings for year } t+1 \text{ subsequent to earnings announcement for year } t \text{ less the last analyst forecast of year } t+1 \text{ earnings prior to the earnings announcement for year } t, \text{ scaled by price at } t;
\]

\[
UE = \text{actual earnings for year } t \text{ less the last analyst forecast of earnings for year } t, \text{ scaled by price at year } t;
\]

\[
NSI = \text{AT\_NSI\_TOP, AT\_NSI\_ZERO or AT\_NSI\_ETR;}
\]

\[
\text{AT\_NSI\_TOP} = \text{after-tax annual per share negative special items (SPI < 0) for year } t \text{ adjusted for taxes assuming the highest statutory federal tax rate (TOP), scaled by price at year } t;
\]

\[
\text{AT\_NSI\_ZERO} = \text{after-tax annual per share negative special items (SPI < 0) for year } t \text{ adjusted for taxes assuming a zero tax rate (ZERO), scaled by price at year } t;
\]

\[
\text{AT\_NSI\_ETR} = \text{after-tax annual per share negative special items (SPI < 0) for year } t \text{ adjusted for taxes assuming the effective tax rate (ETR), scaled by price at year } t;
\]

\[
\text{DETR} = \text{DETR\_TOP or DETR\_ZERO;}
\]

\[
\text{DETR\_TOP} = \text{AT\_NSI\_TOP less AT\_NSI\_ETR;}
\]

\[
\text{DETR\_ZERO} = \text{AT\_NSI\_ZERO less AT\_NSI\_ETR;}
\]

\[
\text{SIZE} = \text{the natural log of total assets (AT);}
\]

\[
\text{LOSS} = 1 \text{ if income before extraordinary items (IB) for year } t \text{ is negative, otherwise 0.}
\]

To perform these analyses, we collect forecasts of current and future annual earnings as well as current actual annual earnings from IBES for the years 2003–2013. 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 effective tax rate (ETR) assumptions; however, we do not include a pre-tax analysis because IBES does not provide pre-tax earnings forecasts. We report the results of estimating equations (12) and (13) in Table 6.

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 ETR tax rate assumptions are \(-0.083\), \(-0.128\) and \(-0.106\), respectively, and each of these coefficients is significant (two-tailed p-value < 0.01). Importantly, our results also suggest that the magnitude of the coefficients is significantly impacted by the tax rate.
assumption. For example, in column 2 (ZERO tax rate assumption), we find that the sum of the coefficients on UE and NSI is 0.068 and significant (two-tailed p-value < 0.01). This result suggests that analysts treat NSIs as less permanent than other unexpected earnings (UE), and a dollar of UE increases future forecast revisions more than a dollar of NSIs 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 UE and NSI is 0.024 and insignificant, suggesting no difference in the extent to which UE increases and NSIs decrease future forecast revisions. In other words, our results for the TOP tax rate assumption suggest that analysts treat NSIs in a manner consistent with other recurring unexpected earnings. When we perform the same test assuming the ETR in column 4, we again find that the sum of UE and NSI is positive (0.047) and significant (two-tailed p-value < 0.01), a result consistent with the conclusion that NSIs are viewed as less permanent than other recurring unexpected earnings.

[Table 6]

In columns 5 and 6, we test whether the coefficients on NSI are different across the three tax rate assumptions by introducing a measure of the difference in NSIs between the ZERO and TOP as compared to the ETR tax rate assumption. We measure DETR_TOP (DETR_ZERO) as the after-tax NSI assuming the highest statutory rate (zero tax rate) less the after-tax NSI adjusted by the ETR. Our evidence suggests that in both cases the sum of the NSI and DETR is significantly different from zero (two-tailed p-value < 0.01). That is, the effects of NSIs adjusted at the top or zero tax rates are different than those of NSIs adjusted by the ETR. Coupled with our BJS and compensation analyses, our evidence in an analyst forecast setting suggests the tax rate assumed in adjusting special items can significantly affect the results of archival tests in major areas of accounting research.

VI. 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. 2012; Curtis et al. 2014). However, despite their prevalence in
prior 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 (or fail to adjust) special items for estimated tax effects.

Utilizing the Burgstahler et al. (2002) (BJS) inter-period expense transfer framework, we first model the empirical implications for future earnings of over- or under-estimating the “true tax rate” when tax-adjusting special items. Our model suggests that overestimating (underestimating) the “true tax rate” will downwardly (upwardly) bias the coefficients on negative special items. Consistent with this notion, we find that the magnitude of the estimated inter-period transfer associated with negative 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 items charges range from an average increase of 44 percent of the special item (highest statutory rate) to an average decrease of 16 percent of the special item (zero tax rate). Moreover, our analyses suggest that firm-specific effective tax rates yield results most consistent with an entirely pre-tax model. This suggests firm-specific rates are a better estimate of the true tax rate than assuming either the extremes of either a zero tax rate or the highest statutory rate.

We apply different tax rate assumptions to two additional contexts based on prior research—executive compensation and analyst forecast revisions—and show that these assumptions have a significant effect on the results and can even alter the direction of conclusions. In the context of executive cash compensation, we find that executive compensation is either fully shielded, partially shielded, or not shielded at all from the income-decreasing effect of negative special items depending on the tax rate assumed. Similarly, with respect to analyst forecast revisions, changing the tax rate used to adjust negative special items changes the inferences drawn from tests examining the perceived persistence of negative special items relative to recurring unexpected earnings.

While it is not our goal or intention to criticize prior research, 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 such widely read and highly regarded
findings. In particular, we prominently feature the BJS model in our analyses given its relative ease of interpretation and utility in modeling the potential consequences of over- or under-estimating tax rate adjustments in an earnings persistence setting (a setting which is often coupled with valuation settings). Similarly, our replication and extension of prior works on executive compensation (e.g., Dechow et al. 1994; Gaver and Gaver 1998; Adut et al. 2003; Darrough et al. 2014; Joo and Chamberlain 2017) and analyst forecast revisions (e.g., Chaney et al. 1999; Alford and Berger 1999; Lopez 2002; Lin and Yang 2006) merely provide examples of the potential impacts varying tax rate adjustments may have in different contexts.

None of the studies we replicate and extend are uniquely affected by the issues we bring to light—rather, we contend that the results of any study relying on a single tax rate assumption may be sensitive to such seemingly innocuous design choices, especially if the extremes are chosen (i.e., a zero or top statutory rate assumption. Overall, we show that tax rate assumptions utilized in research with special items and earnings in the same models are critical to the interpretation of results. Authors should be aware of the potential effects of tax rate assumptions and we encourage them to exercise due caution and give careful consideration to the context at hand when selecting one or more assumed tax rates.
REFERENCES


Table 1: Special Items Studies Descriptive Statistics

Panel A: Journals Included

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Panel B: Tax Method Utilized by Decade and in Total

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Table 1 Continued: Special Items Studies Descriptive Statistics

Panel C: Dependent Variable by Special Item Tax-Rate Adjustment Method for 63 Studies Identified in Table 1

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Panel D: Study Genre by Special Item Tax-Rate Adjustment Method for 63 Studies Identified in Table 1

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<td><strong>7</strong></td>
<td><strong>2</strong></td>
<td><strong>7</strong></td>
<td><strong>5</strong></td>
<td><strong>22</strong></td>
<td><strong>31</strong></td>
<td><strong>4</strong></td>
<td><strong>78</strong></td>
</tr>
</tbody>
</table>

PT = 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 the Effective Tax Rate (1 – income before extraordinary items (IBQ) divided by pre-tax income (PIQ) for firm i in quarter t (1 – (IBQ/PIQ)) used to adjust Special Items;
CSTAT = After-tax Earnings (IB or NI) and after-tax Special Items provided by Compustat (e.g., RCA).
### Table 2: Panel A Sample Selection

<table>
<thead>
<tr>
<th>Data Selection Step</th>
<th>Obs. Lost</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merge Compustat with Graham marginal tax rates, 1998–2013</td>
<td></td>
<td>249,588</td>
</tr>
<tr>
<td>Delete financial firms (SIC 6000–6999)</td>
<td>42,113</td>
<td>207,475</td>
</tr>
<tr>
<td>Delete missing market value or earnings information for time t−4 through t+4</td>
<td>32,622</td>
<td>174,853</td>
</tr>
<tr>
<td>Delete if special items or earnings at time t−4 through t+4 exceed market value at time t−4</td>
<td>2,710</td>
<td>172,143</td>
</tr>
<tr>
<td>Delete where Compustat pre-tax SI components do not equal reported total pre-tax SI</td>
<td>9,523</td>
<td>162,620</td>
</tr>
<tr>
<td>Delete where abs(after-tax SI) &gt; abs (pre-tax SI) in Compustat</td>
<td>1,532</td>
<td>161,088</td>
</tr>
<tr>
<td>Delete missing cash flow information for time t−4 through t+4</td>
<td>3,835</td>
<td>157,253</td>
</tr>
<tr>
<td>Limit sample to negative total pre-tax SI</td>
<td>119,350</td>
<td>37,903</td>
</tr>
<tr>
<td>Limit sample to common (post-SFAS 146) period, 2003–2013</td>
<td>9,483</td>
<td>28,420</td>
</tr>
</tbody>
</table>

### Panel B: Final Sample Descriptive Statistics

<table>
<thead>
<tr>
<th>Category (N=28,420)</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>1st Quartile</th>
<th>Median</th>
<th>3rd Quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Items</td>
<td>−22.097</td>
<td>137.081</td>
<td>−9.381</td>
<td>−2.206</td>
<td>−0.533</td>
</tr>
<tr>
<td>Compustat SI Tax Rate</td>
<td>0.387</td>
<td>0.266</td>
<td>0.338</td>
<td>0.350</td>
<td>0.371</td>
</tr>
<tr>
<td>Marginal Tax Rate</td>
<td>0.139</td>
<td>0.149</td>
<td>0.016</td>
<td>0.038</td>
<td>0.344</td>
</tr>
<tr>
<td>Effective Tax Rate</td>
<td>0.268</td>
<td>0.223</td>
<td>0.027</td>
<td>0.298</td>
<td>0.380</td>
</tr>
<tr>
<td>1-Year Effective Tax Rate</td>
<td>0.260</td>
<td>0.219</td>
<td>0.026</td>
<td>0.289</td>
<td>0.374</td>
</tr>
<tr>
<td>Total Assets</td>
<td>5,402.658</td>
<td>19,217.750</td>
<td>259.247</td>
<td>953.540</td>
<td>3,429.775</td>
</tr>
<tr>
<td>Market Value</td>
<td>5,309.540</td>
<td>18,727.170</td>
<td>258.840</td>
<td>877.517</td>
<td>3,007.122</td>
</tr>
<tr>
<td>Pre-tax Income</td>
<td>95.887</td>
<td>437.071</td>
<td>−1.719</td>
<td>7.751</td>
<td>51.600</td>
</tr>
</tbody>
</table>
Table 3: BJS Regressions Using Alternative Tax Rate Adjustments for Negative Special Items
Based on Equation (1) \((E_{i,t} - E_{i,t+k}-4) = b_0 + b_1SPI_{i,t} + b_2(E_{i,t} - SPI_{i,t} - E_{i,t-4}) + e_{i,t}\)

### Panel A: Estimates of \(b_1\) (N = 28,420)

<table>
<thead>
<tr>
<th>Tax Method</th>
<th>Estimate</th>
<th>Estimate</th>
<th>Estimate</th>
<th>Estimate</th>
<th>Total Earnings Transfer Effect&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT</td>
<td>0.04837</td>
<td>-0.05207***</td>
<td>-0.12271***</td>
<td>-0.95304***</td>
<td>7.95%</td>
</tr>
<tr>
<td>ZERO</td>
<td>0.08257***</td>
<td>-0.01054</td>
<td>-0.09548***</td>
<td>-0.81879***</td>
<td>(15.78%)</td>
</tr>
<tr>
<td>TOP</td>
<td>-0.00714</td>
<td>-0.09686***</td>
<td>-0.17926***</td>
<td>-1.15209***</td>
<td>43.54%</td>
</tr>
<tr>
<td>MTR</td>
<td>0.06318**</td>
<td>-0.03828</td>
<td>-0.12846***</td>
<td>-0.90731***</td>
<td>1.09%</td>
</tr>
<tr>
<td>ETR</td>
<td>0.02997</td>
<td>-0.06087***</td>
<td>-0.15430***</td>
<td>-0.97007***</td>
<td>15.53%</td>
</tr>
<tr>
<td>CSTAT</td>
<td>0.00340</td>
<td>-0.08333***</td>
<td>-0.15108***</td>
<td>-1.04525***</td>
<td>27.63%</td>
</tr>
</tbody>
</table>

<sup>a</sup> Calculated by summing the \(k=1, 2, 3\) and 4 coefficients plus 1 (for the seasonal \(k=4\) lag), multiplying by \(-1\) (since NSIs load as negative numbers), then multiplying by 100.

***, **, * significantly different from zero at the 0.001, 0.01, or 0.05 level, respectively, in a two-tailed test.

### Panel B: Estimates of \(b_2\) (N = 28,420)

<table>
<thead>
<tr>
<th>Tax Method</th>
<th>Estimate</th>
<th>Estimate</th>
<th>Estimate</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT</td>
<td>0.29836***</td>
<td>0.18083***</td>
<td>0.08323***</td>
<td>-0.14559***</td>
</tr>
<tr>
<td>ZERO</td>
<td>0.24916***</td>
<td>0.14977***</td>
<td>0.06012***</td>
<td>-0.19981***</td>
</tr>
<tr>
<td>TOP</td>
<td>0.24916***</td>
<td>0.14977***</td>
<td>0.06012***</td>
<td>-0.19981***</td>
</tr>
<tr>
<td>MTR</td>
<td>0.24921***</td>
<td>0.15070***</td>
<td>0.06162***</td>
<td>-0.19803***</td>
</tr>
<tr>
<td>ETR</td>
<td>0.25159***</td>
<td>0.15208***</td>
<td>0.06330***</td>
<td>-0.19492***</td>
</tr>
<tr>
<td>CSTAT</td>
<td>0.24756***</td>
<td>0.14801***</td>
<td>0.05743***</td>
<td>-0.21017***</td>
</tr>
</tbody>
</table>

\(E_{i,t+k}\) = income before extraordinary items (IBQ) for firm \(i\) in quarter \(t+k\) (where \(k=1,\ldots,4\)) divided by market value of equity in quarter \(t-4\).

\(SPI_{i,t}\) = after-tax special items (SPIQ) for firm \(i\) in quarter \(t\) if special items is less than zero divided by market value of equity in quarter \(t-4\), adjusted for the following tax assumptions:

- **PT** = Pre-tax;
- **ZERO** = 0% tax rate;
- **TOP** = the top statutory tax rate (35% for the sample period);
- **MTR** = Firm-specific marginal tax rate provided by Graham (1996a, 1996b);
- **ETR** = 1 – income before extraordinary items (IBQ) divided by pre-tax income (PIQ) for firm \(i\) in quarter \(t\) (1 – (IBQ/PIQ));
- **CSTAT** = Tax adjustment provided by Compustat.
Table 4: Comparison of Coefficients from BJS Regressions Using Alternative Tax Rate Adjustments for Negative Special Items

Based on Equation (1) \( (E_{i,t} - E_{i,t+k} - 4) = b_0 + b_1 SPI_{i,t} + b_2 (E_{i,t} - SPI_{i,t} - E_{i,t-4}) + e_{i,t} \)

Panel A: Estimates of \( b_1 \) (N = 28,420)

<table>
<thead>
<tr>
<th>Tax Method</th>
<th>vs Pre-tax</th>
<th>vs Pre-tax</th>
<th>vs Pre-tax</th>
<th>vs Pre-tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO</td>
<td>0.03420**</td>
<td>0.04153***</td>
<td>0.02723**</td>
<td>0.13425***</td>
</tr>
<tr>
<td>TOP</td>
<td>−0.05551**</td>
<td>−0.04479**</td>
<td>−0.05655***</td>
<td>−0.19905***</td>
</tr>
<tr>
<td>MTR</td>
<td>0.01481</td>
<td>0.01379</td>
<td>−0.00575</td>
<td>0.04573**</td>
</tr>
<tr>
<td>ETR</td>
<td>−0.01840</td>
<td>−0.00880</td>
<td>−0.03159**</td>
<td>−0.01703</td>
</tr>
<tr>
<td>CSTAT</td>
<td>−0.04497**</td>
<td>−0.03126</td>
<td>−0.02837</td>
<td>−0.09221***</td>
</tr>
</tbody>
</table>

Panel B: Estimates of \( b_2 \) (N = 28,420)

<table>
<thead>
<tr>
<th>Tax Method</th>
<th>vs Pre-tax</th>
<th>vs Pre-tax</th>
<th>vs Pre-tax</th>
<th>vs Pre-tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO</td>
<td>−0.04920***</td>
<td>−0.03106***</td>
<td>−0.02311***</td>
<td>−0.05422***</td>
</tr>
<tr>
<td>TOP</td>
<td>−0.04920***</td>
<td>−0.03106***</td>
<td>−0.02311***</td>
<td>−0.05422***</td>
</tr>
<tr>
<td>MTR</td>
<td>−0.04915***</td>
<td>−0.03013***</td>
<td>−0.02161**</td>
<td>−0.05244***</td>
</tr>
<tr>
<td>ETR</td>
<td>−0.04677***</td>
<td>−0.02875***</td>
<td>−0.01993**</td>
<td>−0.04933***</td>
</tr>
<tr>
<td>CSTAT</td>
<td>−0.05080***</td>
<td>−0.03282***</td>
<td>−0.02580***</td>
<td>−0.06458***</td>
</tr>
</tbody>
</table>

*, **, *** significantly different from zero at the 0.05, 0.01, or 0.001 level, respectively, in a two-tailed test.

\( E_{i,t+k} \) = income before extraordinary items (IBQ) for firm \( i \) in quarter \( t+k \) (where \( k=1,...,or 4 \)) divided by market value of equity in quarter \( t-4 \).

\( SPI_{i,t} \) = after-tax special items (SPIQ) for firm \( i \) in quarter \( t \) if special items is less than zero divided by market value of equity in quarter \( t-4 \), adjusted for the following tax assumptions:

PT = Pre-tax;
ZERO = 0% tax rate;
TOP = the top statutory tax rate (35% for the sample period);
MTR = Firm-specific marginal tax rate provided by Graham (1996a, 1996b);
ETR = 1 – income before extraordinary items (IBQ) divided by pre-tax income (PIQ) for firm \( i \) in quarter \( t \) (1 – (IBQ/PIQ));
CSTAT = Tax adjustment provided by Compustat.
vs Pre-tax = The coefficient for each respective tax rate assumption – the coefficient for PT.
Table 5
Special Items and CEO Cash Compensation* (n=11,122)

Equation (11)  \( \Delta \ln_{CASHt} = \beta_0 + \beta_1 \Delta ROAt + \beta_2 RTNt + \beta_3 NSIt + \beta_4 \Delta SIZEt + \beta_5 TENUREit + \epsilon_{it} \)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Predicted Sign</th>
<th>ZERO Coefficient (t-stat)</th>
<th>TOP Coefficient (t-stat)</th>
<th>ETR Coefficient (t-stat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICEPT</td>
<td>—</td>
<td>-0.0050 ((-0.59))</td>
<td>-0.0050 ((-0.59))</td>
<td>-0.0021 ((-0.26))</td>
</tr>
<tr>
<td>(\Delta ROA)</td>
<td>+</td>
<td>0.3474 ((5.40)***)</td>
<td>0.3474 ((5.40)***)</td>
<td>0.2886 ((5.31)***)</td>
</tr>
<tr>
<td>RTN</td>
<td>+</td>
<td>0.0538 ((5.38)***)</td>
<td>0.0538 ((5.38)***)</td>
<td>0.0545 ((5.39)***)</td>
</tr>
<tr>
<td>NSI</td>
<td>—</td>
<td>-0.1495 ((-1.92)^*)</td>
<td>-0.0429 ((-0.34))</td>
<td>-0.2392 ((-4.05)***)</td>
</tr>
<tr>
<td>(\Delta SIZE)</td>
<td>+</td>
<td>0.0703 ((3.83)***)</td>
<td>0.0703 ((3.83)***)</td>
<td>0.0729 ((3.99)***)</td>
</tr>
<tr>
<td>TENURE</td>
<td>—</td>
<td>-0.0002 ((-0.49))</td>
<td>-0.0002 ((-0.49))</td>
<td>-0.0002 ((-0.61))</td>
</tr>
<tr>
<td>(\Delta ROA + NSI) (t-stat)</td>
<td>—</td>
<td>0.1979 ((1.91)^*)</td>
<td>0.3045 ((1.91)^*)</td>
<td>0.0494 ((0.76))</td>
</tr>
</tbody>
</table>

*two-tailed p-value < 0.01; **two-tailed p-value < 0.05; *two-tailed p-value < 0.10.
Consistent with 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).

\(\Delta L N_{CASH} = \) the annual change in the natural logarithm of 1 + CEO salary and bonus;

\(\Delta ROA = \) \(\Delta AT\_ROA\) or \(\Delta PT\_ROA\);

\(\Delta AT\_ROA = \) the 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 effective tax rate (ETR), where the ETR is calculated as 1 – (income before extraordinary items (IB) divided by pre-tax income (PI));

\(\Delta PT\_ROA = \) the pre-tax change in return on assets before special items, measured as the change in pre-tax income (PI) and pre-tax special items scaled by lagged total assets;

RTN = raw return calculated as the annual change price scaled by the beginning of the year price;

NSI = \(AT\_NSI\) or \(PT\_NSI\);

\(AT\_NSI = \) after-tax annual negative special items (SPI < 0) adjusted for taxes assuming a tax rate of zero (ZERO), highest statutory rate (TOP), or effective tax rate (ETR);

\(PT\_NSI = \) pre-tax annual negative special items (SPI<0) not adjusted for taxes;

\(\Delta SIZE = \) the annual change in the natural logarithm of sales revenue (REVT);

TENURE = number of years the CEO has been the CEO.
Table 6
Special Items and Analyst Forecast Revisions (n=43,435)

<table>
<thead>
<tr>
<th>Variable</th>
<th>EQ (12) ZERO Coefficient (t-stat)</th>
<th>EQ (12) TOP Coefficient (t-stat)</th>
<th>EQ (12) ETR Coefficient (t-stat)</th>
<th>EQ (13) DETR_TOP Coefficient (t-stat)</th>
<th>EQ (13) DETR_ZERO Coefficient (t-stat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICEPT</td>
<td>−0.0110 (−19.81)***</td>
<td>−0.0110 (−19.81)***</td>
<td>−0.0113 (−20.46)***</td>
<td>−0.0110 (−19.81)***</td>
<td>−0.0110 (−19.81)***</td>
</tr>
<tr>
<td>UE</td>
<td>0.1510 (11.92)***</td>
<td>0.1510 (11.92)***</td>
<td>0.1520 (11.99)***</td>
<td>0.1522 (11.94)***</td>
<td>0.1510 (11.92)***</td>
</tr>
<tr>
<td>NSI</td>
<td>−0.0829 (−11.41)***</td>
<td>−0.1276 (−11.41)***</td>
<td>−0.1055 (−8.68)***</td>
<td>−0.1396 (−10.75)***</td>
<td>−0.1083 (−8.91)***</td>
</tr>
<tr>
<td>SIZE</td>
<td>0.0011 (15.89)***</td>
<td>0.0011 (15.89)***</td>
<td>0.0011 (15.74)***</td>
<td>0.0011 (15.74)***</td>
<td>0.0011 (15.74)***</td>
</tr>
<tr>
<td>LOSS</td>
<td>−0.0059 (−9.88)***</td>
<td>−0.0059 (−9.88)***</td>
<td>−0.0057 (−9.43)***</td>
<td>−0.0057 (−9.43)***</td>
<td>−0.0057 (−9.43)***</td>
</tr>
<tr>
<td>DETR</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>0.0502 (3.57)***</td>
<td>0.0502 (3.57)***</td>
</tr>
<tr>
<td>UE + NSI (t-stat)</td>
<td>0.0681 (4.55)***</td>
<td>0.0235 (1.35)</td>
<td>0.0465 (2.61)***</td>
<td>0.0117 (0.63)</td>
<td>0.0429 (2.41)***</td>
</tr>
<tr>
<td>NSI + DETR (t-stat)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−0.894 (7.67)***</td>
<td>−0.581 (7.67)***</td>
</tr>
</tbody>
</table>

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

Consistent with 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.

REVISION = first analyst forecast of earnings for year $t+1$ subsequent to 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 $t$;

UE = actual earnings for year $t$ less the last analyst forecast of earnings for year $t$, scaled by price at $t$;

NSI = AT_NSI_TOP, AT_NSI_ZERO or AT_NSI_ETR;

AT_NSI_TOP = after-tax annual per share negative special items (SPI < 0) for year $t$ adjusted for taxes assuming the highest statutory federal tax rate (TOP), scaled by price at year $t$;

AT_NSI_ZERO = after-tax annual per share negative special items (SPI < 0) for year $t$ adjusted for taxes assuming a zero tax rate (ZERO), scaled by price at year $t$;

AT_NSI_ETR = after-tax annual per share negative special items (SPI < 0) for year $t$ adjusted for taxes assuming the firm’s effective tax rate (ETR), scaled by price at year $t$;

DETR = DETR_TOP or DETR_ZERO;

DETR_TOP = AT_NSI_TOP less AT_NSI_ETR;

DETR_ZERO = AT_NSI_ZERO less AT_NSI_ETR;

SIZE = the natural log of total assets (AT);

LOSS = 1 if income before extraordinary items (IB) for year $t$ is negative, 0 otherwise.