An Alternative Interpretation of the Discontinuity in Earnings Distributions

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September 2005

ABSTRACT: We show that the asymmetric effects of income taxes and special items for profit and loss firms contribute substantially to a discontinuity at zero in the distribution of earnings. Income taxes draw profits towards zero while special items pull loss observations away from zero. These earnings components are thus expected to contribute to a discontinuity even in the absence of discretion. We show our results are not an artifact of deflation, and that other prominent components of earnings do not have similar affects on the earnings distribution around zero.

Keywords: earnings management; earnings distributions; special items; income taxes.

We appreciate the helpful comments and suggestions of Dave Burgstahler, Ted Christensen, Ilia Dichev, Leslie Hodder, Yaniv Konchitchki, and workshop participants at the University of Chicago, Emory University, London Business School, Michigan State University, Ohio State University, Stanford University Summer Accounting Camp, Texas Christian University, the 14th Annual Conference on Financial Economics and Accounting, the American Accounting Association Annual Meeting, and the Third Annual University of Utah Winter Accounting Conference. We gratefully acknowledge the support of the Stanford Graduate School of Business Financial Research Initiative.

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I. INTRODUCTION

Prior research documents a discontinuity at zero in the distribution of earnings, showing an unusually high frequency of firm-year observations with small profits and an unusually low frequency of firm-year observations with small losses (Hayn 1995; Burgstahler and Dichev 1997a, hereafter BD; Degeorge et al. 1999). This discontinuity has been widely interpreted as evidence that managers exercise discretion to avoid losses.[1] Specifically, prior research interprets the discontinuity as evidence that firms that would otherwise report a small loss exercise discretion to move from this region of the distribution to the small profit region. In contrast, this paper shows that a discontinuity in the earnings distribution can arise from nondiscretionary features of earnings components.

We develop a model that predicts a discontinuity in the distribution of earnings without invoking discretionary behavior. In our model, the discontinuity originates from the asymmetric effects of certain earnings components for profit and loss firms. Specifically, because effective tax rates are higher for profit firms, we predict that taxes cause a disproportionate shift of profit observations to the region just above zero. Similarly, because the magnitude and frequency of negative special items are higher for loss firms, we predict that special items cause a disproportionate shift of observations from the region just below zero to larger losses. These effects both contribute to the "unusual" frequency of small profit and loss observations, but neither necessarily imply managing earnings to cross the "red line" for the year.

Based on our model, we predict the asymmetric accounting treatment of taxes and special items for profit and loss firms contributes to the discontinuity in the earnings distribution. Thus, we compare the distribution of bottom line net income to pretax income and to income before taxes and special items. As expected, our results show that taxes and special items contribute substantially to the discontinuity in the earnings distribution.

To provide further evidence consistent with our theory, we analyze the properties of taxes and special items in relation to the distribution of earnings. We find a striking difference in mean and median effective tax rates in the region immediately around zero; firms with a pretax loss have significantly lower effective tax rates, on average, than firms with a pretax profit. The asymmetric tax effect is also apparent in a cross-tabulation of frequencies for the distributions of net income and pretax income. This transition matrix shows that the effect of income taxes is to shift observations with pretax profits to the region just above zero in the net income distribution.

Similar analysis of special items reveals a greater magnitude and frequency of negative special items for firms with negative earnings before special items. A transition matrix comparing the distributions of pretax income and income before special items reveals this asymmetry in special items shifts observations from the region just below zero in the distribution of income before special items to the region in the left tail of the distribution of pretax income.

Because BD present their primary results for net income deflated by beginning of year market value, we initially use the same deflator. However, we contend that the discontinuity arises, at least in part, because of asymmetric components of earnings, and therefore we predict and find that our results are robust across a variety of deflators and in undeflated form. Hence, our findings are not a special feature of deflation in general, or market value deflation in particular. Additional robustness analysis examines how earnings components other than income taxes and special items affect the discontinuity in the earnings distribution. We show that the earnings distribution only begins to display a striking discontinuity at zero after the inclusion of

[1] The term "discontinuity" is shorthand terminology for an unusually low frequency of small loss observations and an unusually high frequency of small profit observations, relative to the frequencies in the adjacent intervals of the

special items and income taxes. Hence, the inclusion of other prominent earnings components, such as depreciation expense, in the calculation of earnings appears to have relatively little affect on the distribution of earnings around zero.

We believe our research offers an alternative explanation for the "unusual" frequency of observations in the region immediately around zero in the distribution of net income. Our findings suggest that the discontinuity is at least partly explained by the asymmetric effects of income taxes and special items for profit and loss firms, and that these effects are expected in the absence of discretionary behavior. We do not claim that the discretionary component of either income taxes or special items is zero, only that the effects we document would not cause otherwise small loss firms to report a small profit. As a result, for our purposes it is not necessary to decompose tax expense or special items into discretionary and nondiscretionary components. We also do not claim that our findings preclude the possibility that firms manage earnings to avoid losses. In fact, Beaver et al. (2003) find evidence that property-casualty insurers (which are excluded from the current study's sample) with small profits significantly understate claim loss reserves relative to insurers with small losses, consistent with managing earnings to avoid a loss.

Clarification of the nature of the discontinuity at zero in the earnings distribution has important implications for the earnings management literature. A number of studies use this discontinuity as a proxy for earnings management. Our findings suggest that researchers should use caution in interpreting a discontinuity in the earnings distribution as evidence of earnings management.

The layout of the paper is as follows. Section II discusses prior literature. Section III provides a model of the implications of special items and income taxes for the distribution of

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earnings distribution. It does not imply that the cumulative distribution function is discontinuous at zero.

earnings. Section IV outlines our research design. Section V describes the sample and data. Section VI presents our empirical findings. Section VII concludes.

II. RELATED LITERATURE

This paper is related to the literature on earnings management and its implications for the distributional properties of earnings as well as to the literature on the characteristics of earnings for profit and loss firms.

Earnings Management and the Distribution of Earnings

Hayn (1995) suggests that a greater than expected frequency of small profit firms relative to small loss firms reflects earnings management. She bases this conclusion on a histogram depicting the distribution of the ratio of earnings-per-share to price for the period 1963-1990. In discussing the implications of the observed earnings distribution, Hayn (1995) notes:

> *Interestingly, there is a point of discontinuity around zero. Specifically, there is a concentration of cases just above zero, while there are fewer than expected cases (assuming the above normal distribution) of small losses (i.e. just below zero). The frequency of observations in both the region just above and that just below zero departs significantly from the expected frequency under the normal distribution at the 1% significance level using the binomial test. These results suggest that firms whose earnings are expected to fall just below the zero earnings point engage in earnings manipulations to help them cross the 'red line' for the year. (p. 132)*

BD draw on this observation to design tests to examine whether firms manage earnings to avoid reporting losses. Specifically, they construct a statistical test whose only assumption is that, under the null hypothesis of no earnings management, the cross-sectional distribution of earnings levels is relatively smooth. They hypothesize that there will be a decreased frequency of observations below the threshold and an increased frequency of observations above the threshold, relative to what would be expected if the underlying distribution were smooth. Similarly, Degeorge et al. (1999) model the implications of earnings management and derive the prediction that there will be a discontinuity in earnings distributions if firms manage earnings, but none if they do not. Their model assumes that managers observe a "random, independent, and identically distributed draw of 'latent' or true earnings," and that any difference between reported earnings and true earnings is due to manipulation (Degeorge et al. 1999, p. 8).

A key assumption in these papers is that the cross-sectional distribution of earnings is smooth at zero if earnings are not managed. This assumption underlies the inference that a difference in frequencies above and below zero is due to discretionary behavior. McNichols (2000) notes that these studies

> *measure discretion over earnings as the behavior of earnings after management, which no doubt includes discretionary and nondiscretionary components. However, it seems implausible that the behavior of the nondiscretionary component of earnings could explain such large differences in the narrow intervals around their hypothesized earnings targets. Stated differently, measurement error in their proxy for discretionary behavior seems unlikely to be correlated with their partitioning variable. (p. 336)*

In contrast to this earlier view, we question the assumption that the distribution of earnings before manipulation is smooth. Instead, we suggest that nondiscretionary features of certain earnings components can induce a discontinuity in the distribution of earnings, and thus explain at least part of the difference in the frequency of small profits and small losses. In other words, we argue that measurement error in the proxy for discretionary behavior, the increased frequency of small profits, is correlated with the partition on profits and losses.[2]

Other studies develop tests to examine earnings management around earnings thresholds. For example, Dechow et al. (2003) examine the discretionary operating accruals of firm-years with earnings just above and just below zero to test whether firms manage earnings to avoid losses. They find that firms with small positive earnings have positive discretionary operating accruals, but that these accruals not significantly greater than the discretionary operating accruals of firms with small negative earnings. As a result, they conclude that their results are

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[2] See McNichols and Wilson (1988) for further discussion of earnings management research designs.

"inconsistent with the joint hypothesis that our discretionary accrual model detects earnings management and that the kink is caused by earnings management" (Dechow et al. 2003, p. 3).

The results of our study which focuses on income taxes and special items as a source of the discontinuity provides one explanation for why Dechow et al. (2003) are unable to document an association between discretionary operating accruals and the kink in earnings distributions. Although other studies find evidence of earnings management to avoid losses (e.g., Beaver et al. 2003), the mixed nature of the evidence leaves open the cause(s) of the discontinuity. Dechow et al. (2003) suggest that exchange listing selection bias and scaling by market value of equity may explain the discontinuity in the distribution of net income.[3] We investigate two alternative explanations, taxes and special items, that jointly account for approximately two-thirds of a measure of the magnitude of the discontinuity in the net income distribution.

The Persistence of Profits and Losses

Our study is also related to a number of studies examining earnings persistence and informativeness which find that the relation between earnings and market value is not homogenous for profit and loss firms. Hayn (1995) documents that the return-earnings relation is much weaker for loss firms than for profit firms. She posits that the market value of the firm's equity reflects the value of an option to abandon the firm for its liquidation value. She examines observations where earnings may be considered to be sufficiently low to make liquidation a nontrivial alternative. Consistent with the notion that conservative accounting implies anticipating losses but not gains, Basu (1997) posits and finds an asymmetric relation between

[3] Prior research, however, finds that the discontinuity exists in samples of non-publicly listed firms (e.g., Beaver et al. 2003), inconsistent with the exchange listing argument, and we find here that the discontinuity is not sensitive to alternative deflators, such as assets, book value of equity, and net sales (e.g., BD), inconsistent with the market value deflator argument.

net income and current and lagged returns, with net income exhibiting greater sensitivity to negative returns because of the increased likelihood of an impairment write-down.

Burgstahler and Dichev (1997b) posit a nonlinear relation between earnings and market value, holding book value constant. They provide dramatic evidence (their figure 3, p. 205) that the relation between earnings and market value is nonlinear, conditional upon book value. While there is in general a positive relation between earnings and market value for profitable firms, the relation is flat (or nonexistent) for loss firms. Hence, there is a demonstrated nonlinearity around zero earnings. Collins et al. (1999) examine the relation that characterizes market value of equity as a linear function of earnings and book value. They find that the earnings-market value relation is nonlinear on either side of zero earnings. In particular, they find that the slope coefficient for profit firms is positive and significant and is significantly greater than for loss firms. They also find that adding book value to the earnings-market value relation changes the slope coefficient on the loss firms from significantly positive to slightly positive but generally insignificant. The interpretation of their findings is that losses contain a greater transitory component and hence are priced with a lower multiple. Barth et al. (1998) offer an abandonment option interpretation for the transitory nature of losses, while Burgstahler and Dichev (1997b) offer an adaptation interpretation. Both are specific examples of sources of transitory components in earnings.

III. A MODEL OF THE DISTRIBUTION OF EARNINGS

We argue that under the null hypothesis of no earnings management, the cross-sectional distribution of earnings will nevertheless exhibit a discontinuity at zero due to the asymmetric effects of certain earnings components for profit and loss firms. We focus our analysis on two earnings components for which we expect asymmetric effects for profit and loss firms. First, we expect an increased frequency and magnitude of negative special items for firms incurring losses relative to firms generating profits. Although for most of our sample period there was little authoritative guidance on assessing impairment, evidence suggests that impairment is associated with poor firm performance. For example, the studies discussed above documenting that losses are less persistent than profits are consistent with a greater frequency of transitory special items for loss firms. In addition, Francis et al. (1996) find that poor firm performance is significant in explaining the magnitude and timing of write-offs. Elliott and Hanna (1996) report that, on average, earnings before special items is positive in quarters without a write-off and negative in quarters with a write-off. For fiscal years beginning after December 15, 1994, Statement of Financial Accounting Standards (SFAS) No. 121 specifically identifies current and past losses as criteria for determining whether an impairment should be recognized.

The second earnings component we examine is income taxes. The tax code requires current payment for taxable income, but provides refunds through carryback and carryforward provisions for taxable losses. However, accounting standards for income taxes restrict the recognition of tax benefits related to tax credits and tax loss carryforwards. For example, SFAS 109, effective for fiscal years beginning after December 15, 1992, requires that the recognition of benefits from carryforwards be subject to the criterion that realization is "more likely than not." SFAS 109 specifically identifies the occurrence of recent losses as a factor for firms to consider in determining whether deferred tax assets should be recognized. Consistent with this provision of the standard, Miller and Skinner (1998) document that the deferred tax asset valuation allowance is inversely related to firm profitability. Prior to SFAS 109, SFAS 96 did not permit the recognition of deferred tax assets no matter how likely the firm was to realize these benefits, and Accounting Principles Board Opinion No. 11 precluded recognition of the tax benefits associated with tax credit carryforwards, but allowed recognition of the tax benefits for operating loss carryforwards when realization was assured "beyond a reasonable doubt." Taken together, these features of the tax environment suggest that a greater proportion of loss firms experience a low or zero effective tax rate, that is, the ratio of tax benefit to pretax loss, relative to the effective tax rate for profit firms.

Although accounting standards and prior academic literature suggest that taxes and special items likely have asymmetric effects for profit and loss firms, the extent of the asymmetry in the region around zero is an open empirical question that we address in our empirical analysis. If one or both of these earnings components are asymmetric around zero, there is a violation of the assumption that the distribution of earnings absent discretion is continuous in this region. In the remainder of this section, we model how the asymmetric effects of taxes and special items contribute to the discontinuity at zero in earnings distributions.

Model

Our model assumes that a given net asset base, A_t, is used to generate profits, and that reported pretax profits, X_t, reflect an unmanaged profitability parameter, ρ, times the asset base, and an identically and independently distributed error term, ε_t, with mean 0 and variance σ_ε^2:

$$X_t = \rho A_t + \varepsilon_t A_t$$

In other words, pretax earnings reflects an expected return on assets or operating income and a random error term due to transitory economic shocks, measurement errors, or transitory components that are recognized in the reporting process.

We further assume that for unprofitable firms, that is, when $\rho A_t + \varepsilon_t A_t$ is negative, pretax earnings reflects an additional transitory component:

$$X_t = \rho A_t + \varepsilon_t A_t + \upsilon_t A_t$$

We motivate this additional transitory component with the argument that asset impairments and restructuring charges are more likely for unprofitable operations. Specifically, the conservative bias of accrual accounting encourages early recognition of losses but delays recognition of gains until related assets or liabilities are sold. The additional error, υ_t, is distributed with mean ν and variance σ_ν^2.[4] We also assume that the two error terms are independent.

Given the above assumptions, we note that the conditional variance of earnings given assets is greater for loss firms than for profitable firms:

$$\sigma^2(X_t|A_t, \rho + \varepsilon_t < 0) > \sigma^2(X_t|A_t, \rho + \varepsilon_t > 0)$$

Note that the above discussion assumes that profits and losses are generated by different processes and therefore that the frequency distribution of earnings combines two underlying distributions rather than a single continuous distribution. We note that even without earnings management, the earnings distribution may appear discontinuous at zero because the greater variance of earnings for a given level of assets results in a smaller density in the interval just below zero than would be observed for a profitable firm with a lower conditional variance. Furthermore, if the mean of υ_t is negative, the distribution of pretax earnings for loss firms is shifted further to the left.

Second, we assume that the effective tax rate for firms generating losses, τ_L, is lower than the effective tax rate for firms generating profits, τ_P. Therefore, reported net income, *NI*, reflects a smaller portion of pretax income, X_t, for firms generating pretax profits than for firms generating pretax losses. Specifically, for loss firms:

$$NI_t = (1-\tau_L)X_t + \varpi_t$$

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[4] We assume that the mean of υ_t is negative, and therefore transitory items affect both the mean and the variance of the distribution of earnings for loss firms.

whereas for profit firms:

$$NI_t = (1-\tau_P)X_t + \varpi_t$$

where $\tau_L < \tau_P$.

We note that a discontinuity in the effective tax rate for profit and loss firms is inconsistent with the assumption that the earnings distribution is continuous in the absence of earnings management. Furthermore, the difference in tax rates for profit and loss firms is likely to increase the difference between the frequency of small loss and small profit firms. This occurs because a higher effective tax rate for profit firms relative to loss firms causes a greater frequency of firms with pretax profits relative to pretax losses to end up in the net income intervals closest to zero. Specifically, for loss firms, the pretax distribution is similar to the net income distribution, while for profit firms the net income distribution is shifted closer to zero.

To illustrate the predictions generated by the model, we conduct a simulation using parameters obtained from our sample data, summarized below in tables 1 and 2. The simulation is based on the following assumptions: (i) income before special items deflated by market value of equity is normally distributed with a mean of 0.029 and a standard deviation of 0.30; (ii) if income before special items is negative there is a 50 percent probability of a special item with a mean of –0.08 and standard deviation of 0.17, whereas if income before special items is positive there is a 31 percent probability of a special item with a mean of –0.025 and standard deviation of 0.09; and (iii) if pretax income is negative the effective tax rate is 7 percent, whereas if pretax income is positive the effective tax rate is 33 percent.

Figure 1 shows the simulated distributions of net income, pretax income, and income before special items. In panel A, the simulated distribution of net income is strikingly similar to the empirical distribution documented in prior research in two respects: first, there is an unusually high frequency of observations in the intervals just above zero, and second, there is an unusually low frequency of observations, or "trough," in the intervals just below zero. Panel A also shows that the discontinuity in the distribution of pretax income is substantially less pronounced, primarily due to a shifting of observations from the intervals further to the right in the pretax distribution to the intervals just above zero in the net income distribution. Panel B shows that the distribution of income before special items is fairly smooth around zero. It is also apparent from this figure that there is a higher frequency of observations just to the left of zero in this distribution relative to the pretax income distribution, primarily due to observations shifting from the intervals just below zero to the intervals further to the left. Thus, without invoking discretionary behavior, the simulation illustrates how special items and income taxes contribute to a discontinuity in the distribution of net income.

Implications for the Relation between Net Income and Market Value of Equity

Several assumptions about the bivariate relation between numerator and denominator are embedded in an analysis of data in ratio form. Specifically, for the relation to be fully reflected in a ratio, the underlying relation between the variables must be linear, must not include additional conditioning variables or an intercept, must have a constant slope coefficient across observations, and a continuous error term with a constant variance. A violation of any of these assumptions could cause a variable in ratio form to be discontinuously distributed. It is clear that the assumption that the distribution of net income deflated by market value of equity, or any other deflator, is continuous is not trivial. For this to hold, a sufficient condition is that

$$NI = \rho MVE + \varepsilon MVE,$$

and therefore

$$NI / MVE = \rho + \varepsilon.$$

If net income contains greater transitory components for loss firms than for profit firms, or if taxes affect profit and loss firms differently, the relation between net income and market value of equity will differ for profit and loss firms. As discussed earlier, the nonlinear, discontinuous earnings-market value relation has been documented in several studies, including Hayn (1995), Burgstahler and Dichev (1997b), and Collins et al. (1999). Each of these studies documents that the relation between net income and market value differs for profit and loss firms. A key point to note in relation to the present study is that these findings are entirely consistent with our argument that the distribution of net income deflated by market value of equity differs for profit and loss firms. Furthermore, the difference in valuation arises because of differences in the characteristics of profits and losses, and therefore the discontinuity is not merely induced by deflation.

IV. RESEARCH DESIGN

The model developed in the preceding section generates several implications consistent with differences in the earnings of profit and loss firms inducing a discontinuity in the distribution of net income. To facilitate comparison with earlier studies focusing on the discontinuity in the net income distribution, our empirical analysis begins with a comparison of the distributions of net income and pretax income. If taxes play a significant role in enhancing the discontinuity in net income, then we expect the discontinuity in the pretax distribution to be substantially smaller. To further analyze the role of taxes, we examine effective tax rates across the pretax distribution, and predict that tax rates are substantially lower for small loss firms compared to small profit firms.

If effective tax rates are lower for loss firms than profit firms, then the multiplier in a regression of net income on pretax income will be higher for loss firms than profit firms. We test this prediction with the following model, where we partition observations according to their position in the pretax distribution:

$$NI_t = \alpha + \beta_L PRETAX_{t,L} + \beta_{SL} PRETAX_{t,SL} + \beta_{SP} PRETAX_{t,SP} + \beta_P PRETAX_{t,P} + \upsilon_t , \qquad (1)$$

where *NI* is net income and *PRETAX* is pretax income. The subscripts on *PRETAX* identify the position of an observation in the pretax distribution, i.e., *L* is the loss region to the left of small losses, *SL* is the small loss region, *SP* is the small profit region, and *P* is the profit region to the right of small profits.[5] Interpreting the coefficients on the *PRETAX* variables as an estimate of $(1-\tau)$ in that region of the distribution, we expect $\beta_{SL} > \beta_{SP}$ and $\beta_L > \beta_P$. In particular, evidence that β_{SL} is significantly greater than β_{SP} indicates that the difference in tax rates occurs in the region immediately around zero. Moreover, if taxes have little to no effect on loss firms, we expect the coefficients on pretax losses, β_{SL} and β_L, to be approximately equal to one.

We provide similar evidence on the role of conservatism by comparing the distributions of pretax income and income before special items. If special items enhance the discontinuity in net income, then we expect the discontinuity in the distribution of income before special items to be substantially smaller than that in pretax income. In addition, we expect special items occur more frequently and are more negative for loss firms than profit firms. We test this prediction with the following model, where we partition observations according to their position in the distribution of income before special items:

$$PRETAX_t = \alpha + \beta_L PRESPC_{t,L} + \beta_{SL} PRESPC_{t,SL} + \beta_{SP} PRESPC_{t,SP} + \beta_P PRESPC_{t,P} + u_t , \qquad (2)$$

where *PRESPC* is income before special items and the subscripts identify the position of an observation in this distribution as described above. If negative special items are more common

[5] An alternative, and econometrically equivalent, specification to the model in equation (1) uses the tax provision as the dependent variable instead of net income. We adopt the given specification because it parallels our other analyses comparing the distributions of net income and pretax income.

for loss firms, then we expect $\beta_{SL} > \beta_{SP}$ and $\beta_L > \beta_P$. In particular, evidence that β_{SL} is significantly greater than β_{SP} indicates that the shift in special items occurs in the region immediately around zero. Moreover, if special items have little to no effect on profit firms, we expect the coefficients on profits, β_{SP} and β_P, to be approximately equal to one.

V. SAMPLE AND DATA

The sample includes all available observations on the annual industrial and research Compustat databases for the years 1976-2001, which encompasses the period investigated by BD (i.e., 1976-1994). None of our inferences is altered when we restrict our tests to the BD sample period. Following BD, we exclude financial institutions (SIC codes 6000-6500) and utilities (SIC codes 4400-5000).

We focus on three measures of earnings, all scaled by beginning-of-the-year market value of common equity (Compustat data item #25 × Compustat data item #199). The first measure is net income (*NI*, Compustat data item #172), which includes taxes and special items and is the earnings measure examined by BD. The second measure is pretax income (*PRETAX*, Compustat data item #170), which includes special items but not taxes. We compare *NI* and *PRETAX* to determine the effect of income taxes on the distribution of earnings. Although the difference between *NI* and *PRETAX* is also affected by discontinued operations, extraordinary items, and minority interest in subsidiary income, these items occur infrequently and are not asymmetrically related to firm profitability.[6] The third measure is income before special items, (*PRESPC*,

[6] Discontinued operations and extraordinary items are reported by 21 percent of the final sample and minority interest by 15 percent. For our final sample, the magnitude of these items, as a percent of beginning-of-the-year market value of equity, is less than 0.01 at both the mean and median. Moreover, there is little variation in these statistics between profit and loss firms. We examine the robustness of our results to alternative earnings measures below.

Compustat data item #170 – Compustat data item #17).[7] We compare *PRETAX* and *PRESPC* to determine the effect of special items on the distribution of earnings.

Because we are interested in comparing the distributions of the earnings measures, we exclude observations without the requisite data for all three measures. Consistent with BD, we also eliminate observations in the upper or lower one percent of each earnings distribution for each year and those with any of the three earnings measures exactly equal to zero.[8] The final sample consists of 114,177 firm-year observations. Table 1 reports descriptive statistics for scaled values of the three earnings measures. The number of observations increases from approximately 3,000 per year in the late 1970's to approximately 6,000 in the late 1990's. As in BD, scaled net income, *NI*, decreases throughout the sample period, with the median always greater than the mean. Mean *NI* is particularly negative in the last three years of the sample period, 1999-2001, consistent with the economic downturn during these years producing more extreme negative scaled earnings observations. *PRETAX* and *PRESPC* reveal a similar trend over the sample period.

Table 1 also reveals that mean and median *NI* is less than mean and median *PRETAX* in all sample years, which is to be expected given that the provision for income taxes is generally income-decreasing. There is little difference between *PRETAX* and *PRESPC* until the mid-1980's when mean *PRETAX*, and to a lesser extent median *PRETAX*, are noticeably less than *PRESPC*. This evidence is consistent with an increase in large negative special items over this period (e.g., Elliott and Hanna 1996; Collins et al. 1997).

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[7] The Compustat manual indicates that data item #17 includes, among other things, significant non-recurring items, write-downs or write-offs of receivables and intangibles, inventory write-downs when reported as a separate line item or called non-recurring, items specifically called "restructuring/reorganization," "special," or "non-recurring," and non-recurring profit or loss on the sale of assets, investments, and securities.

[8] After applying all other sample selection criteria, there were 19 observations with at least one of the earnings measures exactly equal to zero.

Table 2 reports summary statistics for income taxes and special items. Panel A reports the effective tax rate (*ETR*), equal to income tax expense (Compustat data item #16) divided by *PRETAX*, while panel B reports special items (*SPECIAL*), equal to special items (Compustat data item #17) scaled by beginning-of-year-the-year market value of common equity.[9] We winsorize *ETR* and *SPECIAL* at the upper and lower 1% of their respective distributions to mitigate the influence of outliers. To highlight the asymmetric effects of these two components, table 2 partitions the sample into positive and negative *PRETAX* observations in panel A and positive and negative *PRESPC* observations in panel B.

As expected, the findings in table 2, panel A reveal that *ETR* for firms with a *PRETAX* profit is substantially higher than that for firms with a *PRETAX* loss. Specifically, mean (median) *ETR* for profit firms is 33.2 (38.0) percent compared to 7.0 (0.0) percent for loss firms. Moreover, 93 percent of profit firms have a non-zero *ETR*, nearly all due to firms reporting tax expense. In contrast, only 51 percent of loss firms have a non-zero *ETR*, split approximately equally between firms reporting a tax benefit and firms reporting a tax expense. Because of the asymmetric treatment of income taxes, the distribution of *NI* for profit firms has a lower mean and standard deviation than the distribution of *PRETAX*, but there is little difference in the distribution of *NI* and *PRETAX* for loss firms.

Table 2, panel B shows that special items are more negative, on average, for firms with a *PRESPC* loss (–0.041) than for firms with a *PRESPC* profit (–0.008). In addition, 50 percent of loss firms report special items, of which 74 percent are negative, compared to 31 percent of

[9] Although the economic interpretation of *ETR* for loss firms is unclear, we are merely interested in the income statement effect of income taxes, and for this purpose *ETR* is a reasonable measure. However, the results in table 2 are robust to measuring the tax component as income tax expense scaled by beginning-of-the-year market value of common equity. Dhaliwal et al. (2004) examine whether firms manage *ETR*'s to meet consensus analyst earnings forecasts for a sample of firms with positive pretax income. In contrast, the purpose of our study is to examine whether the accounting treatment of income taxes contributes to a discontinuity in the distributions of earnings and earnings changes in the absence of earnings management.

profit firms, of which 64 percent are negative. Examining positive and negative special items separately reveals that positive special items occur in approximately equal proportion in the profit and loss subsamples. Specifically, of the 36,722 loss observations, 4,709 (13 percent) report positive special items, compared to 8,638 (11 percent) of the 77,455 profit observations. In contrast, negative special items occur at a substantially greater rate in the loss subsample; 37 percent of loss firms report negative special items compared to 20 percent of profit firms. Because of the asymmetric treatment of special items, the distribution of *PRETAX* for loss firms has a lower mean and higher standard deviation than the distribution of *PRESPC*, but there is little difference in the distribution of *PRETAX* and *PRESPC* for profit firms. Taken together, the findings in table 2 support the notion that the distribution of *NI* is not smooth around zero due, at least in part, to the asymmetric effects of income taxes and special items for profit and loss firms.

VI. RESULTS

Primary findings

Figure 2 compares the frequency distributions of *NI* and *PRETAX*. Following BD, we partition the sample into interval widths of 0.005. Consistent with prior research, panel A shows a pronounced discontinuity at zero in the distribution of *NI*. Specifically, assuming a smooth probability distribution, earnings slightly greater than zero occur more frequently than expected. To test the significance of the discontinuity, BD construct a test statistic based on the assumption that the expected number of observations in an interval is the average of the two adjacent intervals. The standardized difference in any given interval is the difference between the actual and expected number of observations, divided by the estimated standard deviation of the difference.[10] Under the null hypothesis of a smooth distribution, these standardized differences

[10] BD state in their footnote 6 that the variance of the difference between the observed and expected number of observations for interval i is $Np_i(1 - p_i) + (1/4)N(p_{i-1} + p_{i+1})(1 - p_{i-1} - p_{i+1})$. The correct variance, however, is

are distributed approximately Normal with mean 0 and standard deviation 1. The standardized difference for the interval immediately to the right of zero in the distribution of *NI* is 9.07 (Table 5).

Panel A also reveals that the discontinuity at zero is substantially less pronounced in the *PRETAX* distribution than in the *NI* distribution. The standardized difference is 6.02 (Table 5) for the interval immediately to the right of zero in the *PRETAX* distribution, one-third less than the comparable interval in the *NI* distribution. Further inspection shows that the frequency distributions of *PRETAX* and *NI* map fairly closely in the region below zero. However, in the region above zero, the *NI* distribution reflects a pronounced compression towards zero relative to the *PRETAX* distribution, consistent with the argument that an asymmetric tax effect for profit and loss firms contributes to the discontinuity in the distribution of *NI*.

To provide more direct evidence of an asymmetric tax effect, panel B of figure 2 shows mean and median *ETR* conditional on the distribution of *PRETAX*. The results reveal a striking jump in *ETR* in the region immediately around zero. Median *ETR* is zero for loss firms and mean *ETR* is approximately seven percent. In contrast, mean and median *ETR* in the earnings interval immediately to the right of zero increase to approximately 16 percent, and reach 30 percent within a few more intervals.

The evidence presented in figure 2 suggests that the unexpectedly high frequency of observations in the interval just above zero in the *NI* distribution is largely due to a shifting of observations from further to the right of zero rather than from the region just below zero as would be expected if firms were exercising discretion to avoid losses. To further analyze this

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$Np_i(1 - p_i) + (1/4)N(p_{i-1} + p_{i+1})(2 - p_{i-1} - p_{i+1})$. Because of the difference in the first term in the last parentheses, the estimated standard deviation used in BD and related papers is understated, resulting in an overstatement of the standardized difference test statistic. We report all results using the correct standard deviation, and thus our standardized difference test statistics are somewhat lower than reported in BD.

issue, table 3, panel A presents a cross-tabulation of frequencies for *PRETAX* and *NI*, partitioning observations for each earnings measure into four regions of their respective distributions: (i) to the left of the first portfolio below zero (*LOSS*), (ii) in the portfolio immediately below zero (*SMLOSS*), (iii) in the portfolio immediately above zero (*SMPROFIT*), and (iv) to the right of the first portfolio above zero (*PROFIT*). We highlight the *SMPROFIT* and *SMLOSS* cells that are the focus of earnings distribution analysis.

The evidence reveals a pronounced shifting of observations from the *PROFIT* region of *PRETAX* to the *SMPROFIT* region of *NI*. Specifically, of the 1,687 observations in the *SMPROFIT* region of *NI*, 747 were also in the *SMPROFIT* region of *PRETAX*, but 658 shifted into this region from the *PROFIT* region of *PRETAX*. Although 84 observations move from the *SMLOSS* region of *PRETAX* to the *SMPROFIT* region of *NI*, an approximately equal number of observations (70) shift in the opposite direction. Thus, although it is likely that firms manage tax expense, there is little evidence to suggest that firms use such discretion to avoid reporting losses. Instead, the evidence is most consistent with an asymmetric tax effect for profit and loss firms driving a large portion of the discontinuity in the distribution of *NI*.[11]

Figure 3 compares the frequency distributions of *PRETAX* and *PRESPC*. The findings show that the discontinuity at zero is less pronounced in the *PRESPC* distribution relative to the *PRETAX* distribution. The standardized difference is 3.23 (Table 5) for the interval immediately to the right of zero in the *PRESPC* distribution, approximately one-half less than the comparable

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[11] Note that if firms in the *PROFIT* region of the *PRETAX* distribution opportunistically reduce *ETR*, there would be *less* compression of observations towards zero in the *NI* distribution. Although the potential for discretion under SFAS 109 is greater than under previous income tax accounting standards, as noted previously none of our inferences is altered when we restrict our tests to the BD sample period which roughly corresponds to the pre-SFAS 109 era. Moreover, Miller and Skinner (1998) conclude that firms do not opportunistically manage the deferred tax asset valuation allowance, but rather establish the allowance consistent with the guidance of SFAS 109.

interval in the *PRETAX* distribution (6.02) and two-thirds less than the comparable interval in the *NI* distribution (9.07).[12]

Further inspection of panel A reveals a higher frequency of observations in the *PRESPC* distribution relative to the *PRETAX* distribution in the region just to the left of zero, consistent with the argument that loss firms recognize more negative special items than profit firms, thus shifting the distribution of *PRETAX* to the left and contributing to the discontinuity in the distribution of earnings. However, we also find a greater frequency of observations in the *PRESPC* distribution in the region around 0.10. Although it is possible that this cluster of observations understates negative special items to avoid moving into the loss region, it seems unlikely the understatement is greater than ten percent of market value for these firms.

To provide more direct evidence on the effect of special items, figure 3, panel B shows the mean of positive and negative special items conditional on the distribution of *PRESPC*. The magnitude of positive special items is relatively constant across the earnings distribution as well as in the intervals immediately around zero, i.e., mean *SPECIAL* is 0.035 in the interval just below zero and 0.038 in the interval just above zero. In contrast, the magnitude of negative special items is substantially greater for loss firms than profit firms. Moreover, mean *SPECIAL* is –0.075 in the interval just below zero compared to –0.058 in the interval just above zero, a difference representing almost 2 percent of market value. Further evidence on the frequency of positive and negative special items reported in panel C confirms the asymmetric effects of negative special items around zero. Consistent with panel B, the frequency of positive special

[12] Although the findings are not as visually striking as the comparison of the *PRETAX* and *NI* distributions in figure 2, the results in table 3, panel B (discussed further below) show that there are 1,149 observations in the interval just above zero in the *PRESPC* distribution compared to 852 in the interval just below zero, a difference of 297 observations. In contrast, there are 1,208 observations in the interval just above zero in the *PRETAX* distribution compared to 722 in the interval just below zero, a difference of 486 observations. Thus, the gap between the frequency of small profit and small loss firms is nearly twice as large in the *PRETAX* distribution, primarily due to a decrease in the frequency of small loss observations.

items is relatively constant across the earnings distribution. In contrast, negative special items are considerably more prevalent for loss firms, with a pronounced jump in frequency occurring in the interval immediately below zero. Specifically, 38 percent of firms with a small loss report a negative special item compared to 28 percent of firms with a small profit. Although special items may contain a discretionary component, the greater magnitude and frequency of negative special items for small loss firms is inconsistent with the hypothesis that firms use discretion to cross the 'red line' for the year.

The cross-tabulation of frequencies for *PRESPC* and *PRETAX* in table 3, panel B also shows no systematic pattern consistent with firms using special items to avoid reporting losses. Instead, the evidence reveals a pronounced shifting of observations from the *SMLOSS* region of *PRESPC* to the *LOSS* region of *PRETAX*. Of the 852 observations in the *SMLOSS* region of *PRESPC*, 449 remain in the *SMLOSS* region of *PRETAX*, while 283 shift to the *LOSS* region. In contrast, only 37 observations move from the *SMLOSS* region of *PRESPC* to the *SMPROFIT* region of *PRETAX*. Thus, there is little evidence that firms with small negative *PRESPC* use special items to avoid losses, especially since an equivalent number of observations (37) move from the *SMPROFIT* region of *PRESPC* to the *SMLOSS* region of *PRETAX*.

Regression results reported in table 4 provide additional evidence on the role of income taxes and special items in explaining the relation between the distributions of *NI*, *PRETAX*, and *PRESPC*. Panel A presents summary statistics from a regression of net income on pretax income (equation (1)).[13] As expected, the coefficient estimates for loss and small loss firms, β_{SL} and β_L, are approximately equal to one, indicating that taxes have little effect on loss firms. In contrast,

[13] All results are presented after the deletion of statistical outliers. However, none of our inferences is altered if these outliers are retained. In addition, following BD, the tabulated results are for estimations that define the small profit (loss) region to include six intervals immediately above (below) zero. However, none of our inferences is altered if we define the small profit (loss) region to include only one interval immediately above (below) zero.

the coefficient estimates for small profit and profit firms, β_{SP} and β_P, are approximately equal to the after-tax rate, $(1-\tau)$. Moreover, β_{SL} is significantly greater than β_{SP}, indicating that the asymmetry in taxes occurs in the region immediately around zero.

Table 4, panel B presents summary statistics from a regression of pretax income on income before special items (equation (2)). As expected, the coefficient estimates for small profit and profit firms, β_{SP} and β_P, are approximately equal to one, indicating that special items have little effect on profit firms. In contrast, the coefficient estimates for loss and small loss firms, β_{SL} and β_L, are both about two, indicating that special items have a substantial negative effect on the earnings of loss firms. Moreover, β_{SL} is significantly greater than β_{SP}, indicating that asymmetry in special items occurs in the region immediately around zero.

Additional tests

Deflation

We test the robustness of our results to three alternative deflators suggested by BD, i.e., total assets (*ASSETS*, Compustat data item #6), book value of common equity (*CE*, Compustat data item # 60), and net sales (*SALES*, Compustat data item #12). As shown in table 5, we observe a similar pattern of standardized differences for each of the alternative deflators.[14] Table 5 also presents standardized differences for an undeflated specification, using interval widths of $100,000 as in Dechow et al. (2003). Consistent with that paper, we find the discontinuity in *NI* is similar in the deflated and undeflated specifications. Moreover, consistent with our primary results, there is a substantial reduction in the standardized difference between *NI* and *PRESPC*.

[14] Ceteris paribus, the standardized difference increases approximately linearly with the square root of sample size. Although sample sizes in table 5 vary somewhat due to missing items for some of the alternative deflators, the variation is small enough to permit direct comparison across the various tests.

The tabulated results for the undeflated specification are based on our primary sample which requires lagged market value of common equity. Durtschi and Easton (2005) argue that this criteria biases in favor of finding a discontinuity at zero in the distribution of earnings because it removes a significantly higher proportion of observations from the smallest negative net income interval than from either of the intervals to its immediate left or right. Eliminating this data requirement, they present visual evidence showing the frequency of observations in the interval just below zero is approximately the same as the frequency in the second interval above zero, but do not consider the frequency in the first interval above zero or report statistical tests of the data.[15]

To test the sensitivity of our findings to the sample selection criteria, we examine the distribution of undeflated earnings for all observations on Compustat with the requisite earnings data but without screening on lagged price. The pattern of standardized differences, *NI* (12.60), *PRETAX* (10.46), and *PRESPC* (8.29), is consistent with our primary results. Further analysis, however, also reveals two features of the expanded sample worth noting. First, there are a number of observations with earnings data but without positive sales and assets.[16] These observations are disproportionately clustered in the interval immediately below zero. Specifically, 13% of observations with earnings data but without positive sales and assets are in the one narrow interval immediately below zero; 17% of all observations in that interval immediately below zero do not have positive sales and assets, compared to 11% two intervals below zero, and 5% and 1% in the two intervals immediately above zero. Because these firm-

[15] In other portions of their paper, Durtschi and Easton (2005) report t-tests for differences in frequencies between earnings intervals which assumes the expected number of observations in those intervals is equal, i.e., the distribution is "flat" in the region immediately around zero This contrasts to BD's standardized difference test statistic which assumes the expected number of observations in a given interval is the average of the two immediately adjacent intervals, i.e., the distribution is "smooth" in the region immediately around zero.
[16] An examination of the financial statements for a sample of these observations indicates these firms are typically development stage companies or otherwise had no operations during the years in question.

years do not represent economically meaningful earnings observations, we repeat the undeflated analysis excluding them from the expanded sample. The pattern of standardized differences, *NI* (20.43), *PRETAX* (16.45), and *PRESPC* (13.03), remains consistent with our primary results.

Second, two-thirds of the observations missing lagged price are also missing *current* price, indicating the firms are not publicly-traded entities.[17] Whether this data screen represents a sample selection bias therefore depends on the research focus is on publicly traded or all firms. Excluding observations without current price from the expanded sample, in addition to the above observations without positive sales and assets, does not change our inferences as the pattern of standardized differences for undeflated earnings, *NI* (12.04), *PRETAX* (9.06), and *PRESPC* (6.07), is consistent with our primary findings.

To summarize our analysis of the undeflated earnings distribution, figure 4, panel A shows the distribution for the expanded sample of 171,074 observations. Note that despite a significant standardized difference for the interval immediately above zero, the distribution does not contain a 'dip' in the interval immediately below zero as is evident in most prior studies (e.g., BD), but not all (e.g., Degeorge et al. 1999). However, this feature is not predicted by prior research, nor is it necessary to produce a significant standardized difference. Panel B shows the distribution of undeflated net income for observations with positive current period sales, assets, and price. In addition to a significant standardized difference in the interval immediately above zero, this distribution displays a 'dip' in the interval immediately below zero, and is quite similar to the distribution for our primary sample reported in panel C. Thus, applying reasonable data screens to obtain a sample of public companies with positive sales and assets, the above analysis shows that the asymmetric effects of income taxes and special items substantially increase the

[17] An examination of 10-K filings for a sample of observations missing current price confirms that their common equity was not publicly-traded during the years in question.

discontinuity at zero in the distribution of earnings, whether undeflated or deflated by lagged market value.

Both Dechow et al. (2003) and Durtschi and Easton (2005) note that share deflation considerably mitigates the discontinuity at zero in the distribution of earnings. Durtschi and Easton (2005) argue that share deflation is superior because the number of shares outstanding does not differ systematically between loss and profit observations, and thus will not induce a spurious discontinuity. Conversely, they suggest deflation by any of the variables discussed above will induce a discontinuity because these deflators are systematically lower for loss observations than profit observations. However, they examine the behavior of the deflators across the distribution of earnings *per share*, which likely confounds the results of their analysis as this distribution incorporates the effects of share deflation.

In contrast, we examine the behavior of the deflators across the distribution of undeflated net income, partitioned into interval widths of $100,000 as above. As shown in figure 5, panel A, the number of common shares outstanding (Compustat data item #25) is systematically higher for loss observations, and declines noticeably over the region around zero.[18] Thus, contrary to the conclusions of Durtschi and Easton (2005), the number of shares outstanding is pervasively larger for loss observations than for profit observations, which shifts loss observations towards zero and reduces the discontinuity in the share-deflated distribution of earnings. In contrast, panel B shows that *MVE* is relatively symmetric around zero, suggesting that this deflator will not induce any disproportionate shifting of profit and loss observations.[19]

[18] Inferences are similar for the number of shares used to calculate basic earnings per share (Compustat data item #54). Because of substantial missing data for the number of shares used to calculate diluted earnings per share (Compustat data item #171), we do not examine this variable.
[19] Untabulated results for the other deflators discussed in this section, *ASSETS*, *CE*, and *SALES* are all quite similar to the *MVE* results reported in figure 5, panel B.

As suggested by the discussion in section III above, the choice of deflator involves a number of implicit assumptions about a regression of unscaled earnings on the deflator. The deflator conforming most closely to these assumptions will produce the best specified relation and the highest regression R^2. Thus, we estimate the regression of *NI* on each of the candidate deflators in table 5, as well as two share-related deflators, the number of common shares outstanding and the number of shares used to calculate basic earnings-per-share. The untabulated results of this analysis reveal that lagged market value of equity produces the best specified relation with an adjusted R^2 of 0.26. The adjusted R^2's of the other deflators in table 5 are similar at 0.23–0.24. The share deflators, however, have lower adjusted R^2's of 0.19–0.20.[20] These results provide support for the choice of deflators in BD and this paper, and suggest that share deflation introduces greater noise and thus biases in favor of the null of no discontinuity.

Figure 6 illustrates the effects share and market value deflation have on the distribution of earnings in the region immediately around zero. Based on a common sample of 109,364 observations with the requisite data, the figure shows the frequency distributions of undeflated net income, basic earnings-per-share (EPS), and net income deflated by lagged market value, using the typical interval widths for each of these measures. A comparison of the undeflated distribution to each of the deflated distributions will reveal the extent to which either share or market value deflation affects inferences regarding the discontinuity at zero.

The results clearly demonstrate that the magnitude of the discontinuity at zero is similar in the undeflated and the *MVE* deflated distributions. Both distributions have approximately 950 more observations in the small profit bin than in the small loss bin, resulting in similar standardized differences (11.73 undeflated and 10.44 *MVE* deflated). It is interesting to note that

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[20] To insure comparability, all regressions were estimated using the primary sample of observations. However, the results for the share deflators are unchanged if estimated using all observations with earnings and share data

market value deflation causes a peak in the region to the right of zero that is not evident in the undeflated distribution, but this does not affect inferences regarding a discontinuity at zero. In contrast to these findings, the appearance of the EPS distribution in the region immediately around zero is considerably different from the undeflated distribution. There is neither a 'dip' in the interval just below zero, consistent with share deflation shifting loss observations towards zero, nor a 'peak' in the interval just above zero. Thus, contrary to the assertions in Durtschi and Easton (2005), market value deflation does not induce a spurious discontinuity at zero, but share deflation substantially distorts the frequency distribution of earnings in this region.

Alternative earnings measures

Tests of the earnings distribution in BD and related prior research focus on net income as the object of earnings management. However, net income is not the only earnings measure that is widely reported or discussed by management and analysts. Alternative earnings measures, such as pretax earnings, earnings before special items, earnings before interest and taxes, and operating earnings, are commonly reported using a multiple-step income statement format. Market participants often focus on these measures of firm performance in addition to, or instead of, bottom-line GAAP earnings. Moreover, extant models of discretionary accruals focus on discretion in operating income.

In this section, we examine three additional commonly reported earnings measures, scaled by lagged market value, to gain a more complete view of how earnings components other than income taxes and special items contribute to the discontinuity in the earnings distribution. The first measure, also examined by BD, is income before extraordinary items and discontinued operations (*INCBXO*, Compustat data item #18). We expect the discontinuity in the distribution of *INCBXO* to be similar to that of *NI* because both measures are after income taxes and special

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available on Compustat, i.e., ignoring the other sample selection criteria.

items, and because relatively few firms report discontinued operations and extraordinary items, as discussed above. The other two earnings measures are operating income after depreciation (*OPINCAD*, Compustat data item #178) and operating income before depreciation (*OPINCBD*, Compustat data item #13). Both of these measures include many typical operating accruals, but exclude net interest income and nonoperating income, such as subsidiary income, securities gains and losses. We do not have a specific prediction about the distribution of these measures around zero. Like *PRESPC*, these measures exclude income taxes and special items which, as shown above, contribute greatly to the discontinuity in earnings distributions. Whether there are other discretionary or nondiscretionary items that would contribute to a discontinuity in these alternative operating income measures is not an issue we address.

Table 6 reports standardized differences for the alternative earnings measures. Consistent with expectations and BD, the standardized difference in the first interval above zero for *INCBXO* is similar in magnitude to that of *NI*. Standardized differences for *OPINCAD* and *OPINCB*, although similar, are somewhat smaller than for *PRESPC*. Untabulated analysis reveals that the increased discontinuity in the distribution of *PRESPC* is primarily attributable to the inclusion of nonoperating income rather than net interest income. Figure 7 illustrates that the distributions of *OPINCAD* (panel A) and *OPINCBD* (panel B) are both relatively smooth in the region immediately around zero, suggesting depreciation expense is not a major contributor to the discontinuity in earnings.

Taken together, the results suggest that the earnings distribution is relatively smooth around zero above the level of income before special items. The distribution only begins to display a striking discontinuity after the inclusion of special items and income taxes. In contrast, the inclusion of other prominent earnings components, such as depreciation expense, in the usual computation of earnings has relatively little affect on the shape of the distribution around zero.

VII. CONCLUDING REMARKS

We posit and find that the asymmetric behavior of income taxes and special items for profit and loss firms appears to be a major source of the observed discontinuity in net income, explaining approximately two-thirds of the discontinuity. The asymmetric behavior of these items is expected even in the absence of management discretion in financial reporting. Thus, this paper provides a substantially different interpretation of the source of the discontinuity in earnings than posited in prior research.

The results are robust to alternative deflators, consistent with our argument that the discontinuity is caused by asymmetric components of earnings, holding scale constant.

Based on a comparison of the standardized differences for *NI* and *PRESPC*, the evidence presented suggests that approximately two-thirds of the discontinuity in the distribution of *NI* is due to the asymmetric effects of taxes and special items on the earnings of profit and loss firms. These findings are expected without invoking discretionary behavior. However, we do not suggest that the discretionary component of income taxes and special items is zero. However, our approach offers additional insights into prior research. For example, Dechow et al. (2003) do not find compelling evidence of differential discretionary accruals by small profit and small loss firms. They use four models of discretionary accruals, all based on Jones (1991), that focus on discretion in operating income (e.g., change in receivables and depreciation). Given our evidence that most of the discontinuity arises below the level of income before special items, it is not surprising that the Jones-type models have difficulty explaining the discontinuity. A separate question for future research is to assess the extent to which managers exercise discretion over income taxes and special items to avoid reporting negative net income.[21]

In any event, we do not claim that there is no discretion in income before special items. We find that the discontinuity at zero is significant in the distribution of income before special items, although at a greatly reduced level. It is possible that firms exercise discretion over the components of income before special items, but that this management is difficult to detect without powerful models of discretionary accruals. For example, Beaver et al. (2003) use a relatively reliable measure of discretion for the property-casualty insurance sector and find evidence that firms reporting small profits significantly understate the claim loss reserve accrual relative to firms with small losses. It is also possible that the discontinuity in operating income is due to items that have an asymmetric effect on operating profits and losses that we do not investigate, such as inventory write-downs. Abarbanell and Lehavy (2003) find an association between extreme negative accruals and earnings forecast errors that presumably exclude special items, suggesting that firms may exercise discretion to recognize more operating expenses when they recognize large negative transitory items.

Our findings not only provide an alternative interpretation of the discontinuity in earnings distributions, but also provide insights into recent research, such as Dechow et al. (2003), which is unable to document that the discontinuity is related to Jones model measures of discretionary accruals. Although we do not claim that taxes and special items are free from discretion, we do conclude that it is unnecessary to invoke discretion to explain much of the discontinuity. Nevertheless, we expect discretionary behavior explains some of the discontinuity, as there is evidence of earnings management to avoid losses in other contexts, such as policy loss reserves

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[21] Several recent papers (e.g., Phillips et al. 2003; Frank and Rego (2003); Burgstahler et al. 2002) examine whether firms use discretion in accounting for deferred taxes to meet earnings thresholds. However, none of these papers

in the property-casualty insurance sector (Beaver et al. 2003). To the extent that discretion is involved, it is not surprising that the Jones-type models do not capture it, since they measure discretion with a considerable amount of noise and focus on items that are "higher up the line" than either taxes or special items. A task for future research is to assess what portion, if any, of tax expense and special items are discretionary. However, it is important to note that our results suggest that the general effect of taxes and special items is not to cause firms to move from a small loss position to a small profit position. Hence, to the extent there is discretion in taxes and special items, it does not appear to explain the discontinuity around zero in the distribution of earnings and earnings changes. Moreover, we do not claim that the explanatory power of our model stops at the operating income level. The asymmetric nature of transitory operating revenues and especially operating expenses could also contribute to the one-third portion of discontinuity that remains at the operating income level. This investigation is also left for future research.

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considers the implications of asymmetries in taxes for profit and loss firms.

REFERENCES

Abarbanell, J., and R. Lehavy. 2003. Biased forecasts or biased earnings? The role of reported earnings in explaining apparent bias and over/underreaction in analysts' earnings forecasts. *Journal of Accounting and Economics* 36 (December): 105-46.

Barth, M. E.,W. H. Beaver, and W. R. Landsman. 1998. Relative valuation roles of equity book value and net income as a function of financial health. *Journal of Accounting and Economics* 25 (February): 1-34.

Beaver, W. H., M. F. McNichols, and K. K. Nelson. 2003. Management of the loss reserve accrual and the distribution of earnings in the property-casualty insurance industry. *Journal of Accounting and Economics* 35 (August): 347-376.

Burgstahler, D., and I. Dichev. 1997a. Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics* 24 (December): 99-126.

Burgstahler, D., and I. Dichev. 1997b. Earnings, adaptation, and equity value. *The Accounting Review* 72 (April): 187-215.

Burgstahler, D., and M. Eames. 2003. Earnings management to avoid losses and earnings decreases: Are analysts fooled? *Contemporary Accounting Research* 20 (Summer): 253-294.

Burgstahler, D., W. B. Elliott, and M. Hanlon. 2003. How firms avoid losses: Evidence of use of the net deferred tax asset account. Working paper, University of Washington.

Collins, D. W., E. L. Maydew, and I. S. Weiss. 1997. Changes in the value-relevance of earnings and book values over the past forty years. *Journal of Accounting and Economics* 24 (December): 39-67.

Collins, D. W., M. Pincus, and H. Xie. 1999. Equity valuation and negative earnings: The role of book value of equity. *The Accounting Review* 74 (January): 29-61.

Dechow, P. M., S. A. Richardson, and I. A. Tuna. 2003. Why are earnings kinky? An examination of the earnings management explanation. *Review of Accounting Studies* 8 (June/September): 355-384.

Degeorge, F., J. Patel, and R. Zeckhauser. 1999. Earnings management to exceed thresholds. *Journal of Business* 72 (January): 1-33.

Dhaliwal, D., C. A. Gleason, and L. F. Mills. 2004. Last chance earnings management: using the tax expense to achieve earnings targets. *Contemporary Accounting Research* 21 (Summer): 431-460.

Durtschi, C., and P. Easton. 2005. Earnings management? The shapes of the frequency distributions of earnings metrics are not evidence ipso facto. *Journal of Accounting Research* 43 (September): 557-592.

Elliott, J. A., and J. D. Hanna. 1996. Repeated accounting write-offs and the information content of earnings. *Journal of Accounting Research* 34 (Supplement): 135-155.

Francis, J., J. D. Hanna, J and L. Vincent. 1996. Causes and effects of discretionary asset write-offs. *Journal of Accounting Research* 34 (Supplement): 117-134.

Frank, M. M., and S. O. Rego. 2003. Do managers use the valuation allowance account to manage earnings around certain earnings targets? Working paper, University of Iowa.

Hayn, C. 1995. The information content of losses. *Journal of Accounting and Economics* 20 (September): 125-153.

Jones, J. J. 1991. Earnings management during import relief investigations. *Journal of Accounting Research* 29 (Autumn): 193-228.

McNichols, M. F. 2000. Research design issues in earnings management studies. *Journal of Accounting and Public Policy* 19: 313-345.

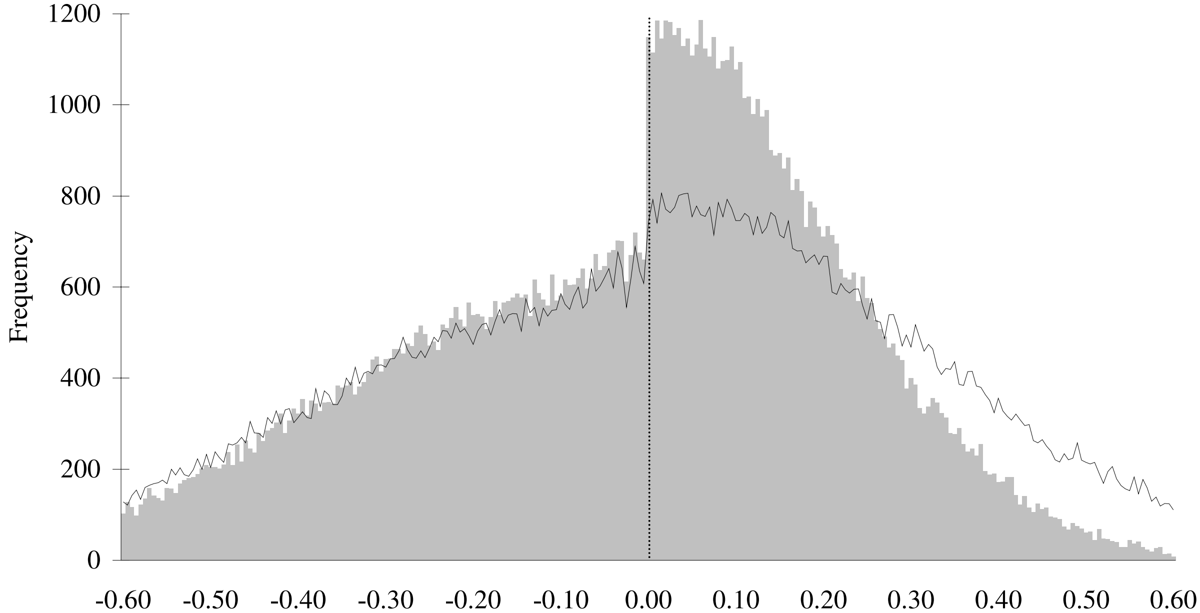
McNichols, M. F., and G. P. Wilson. 1988. Evidence of earnings management from the provision for bad debts. *Journal of Accounting Research* 26 (Supplement): 1-31.

Miller, G. S., and D. J. Skinner. 1998. Determinants of the valuation allowance for deferred tax assets under SFAS N0. 109. *The Accounting Review* 73 (April): 213-233.

Phillips, J., M. Pincus, and S. O. Rego. 2003. Earnings management: New evidence based on deferred tax expense. *The Accounting Review* 78 (April): 491-521.

FIGURE 1
Comparison of the Simulated Distributions of Net Income, Pretax Income, and Income Before Special Items

Panel A: Simulated Distributions of Net Income (Shaded) and Pretax Income (Line)



Panel B: Simulated Distributions of Pretax Income (Shaded) and Income Before Special Items (Line)

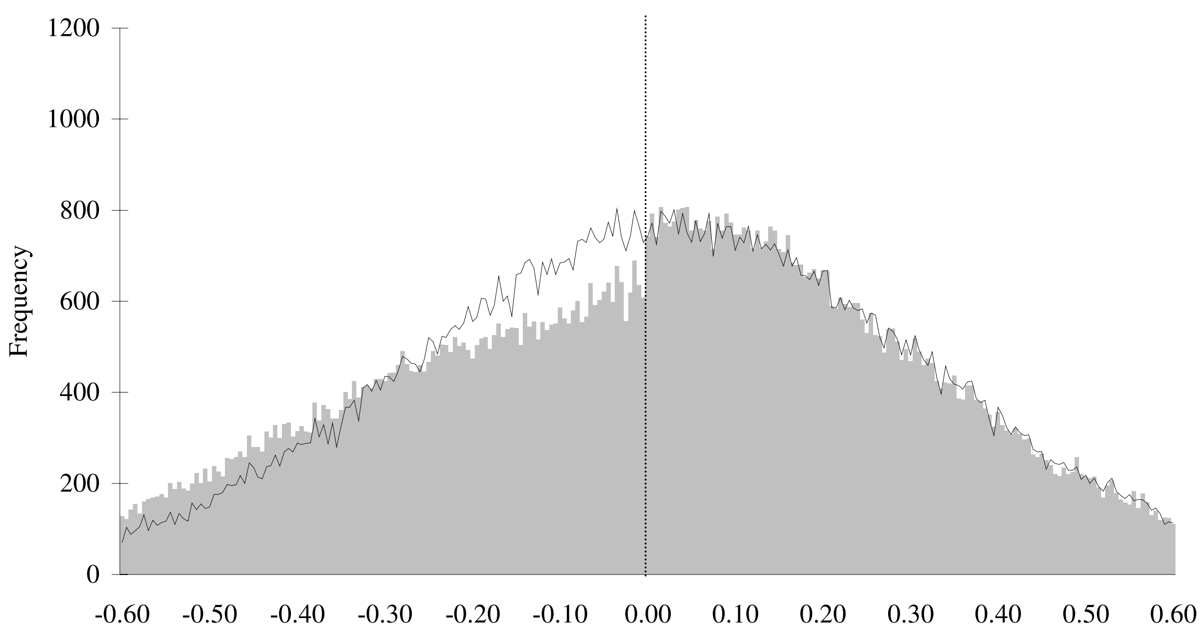


FIGURE 1 (continued)
Comparison of the Simulated Distributions of Net Income, Pretax Income, and Income Before Special Items

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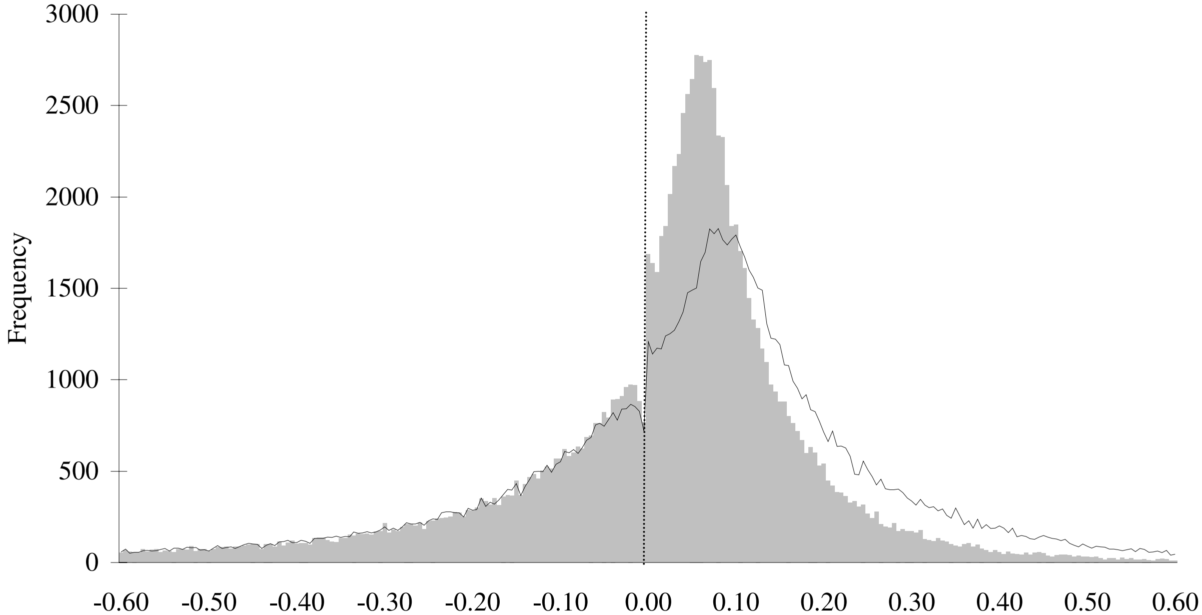
The simulation is based on the following assumptions: (i) income before special items deflated by market value of equity is normally distributed with a mean of 0.029 and a standard deviation of 0.30; (ii) if income before special items is negative there is a 50 percent probability of a special item with a mean of –0.08 and standard deviation of 0.17, whereas if income before special items is positive there is a 31 percent probability of a special item with a mean of –0.025 and standard deviation of 0.09; and (iii) if pretax income is negative the effective tax rate is 7 percent, whereas if pretax income is positive the effective tax rate is 33 percent. In both panels, the distribution interval widths are 0.005 and the location of zero on the horizontal axis is marked by the dashed line.

FIGURE 2
Comparison of the Empirical Distributions of Net Income and Pretax Income

Panel A: Net Income (Shaded) and Pretax Income (Line)



Panel B: Effective Tax Rate Conditional on the Distribution of Pretax Income

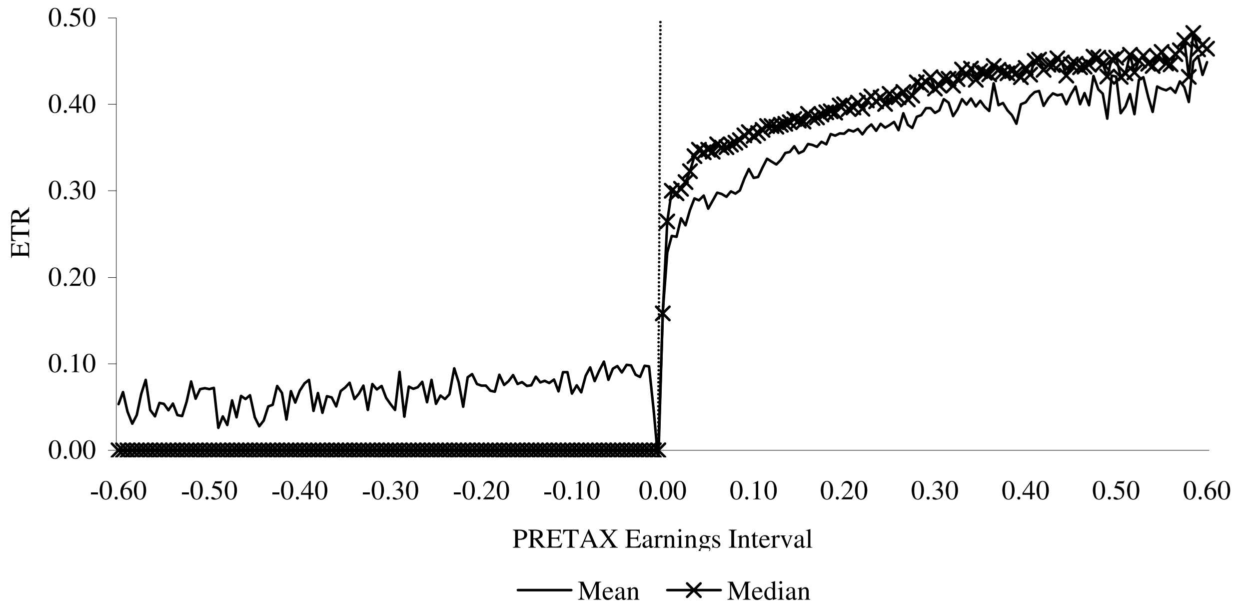


FIGURE 2 (continued)
Comparison of the Empirical Distributions of Net Income and Pretax Income

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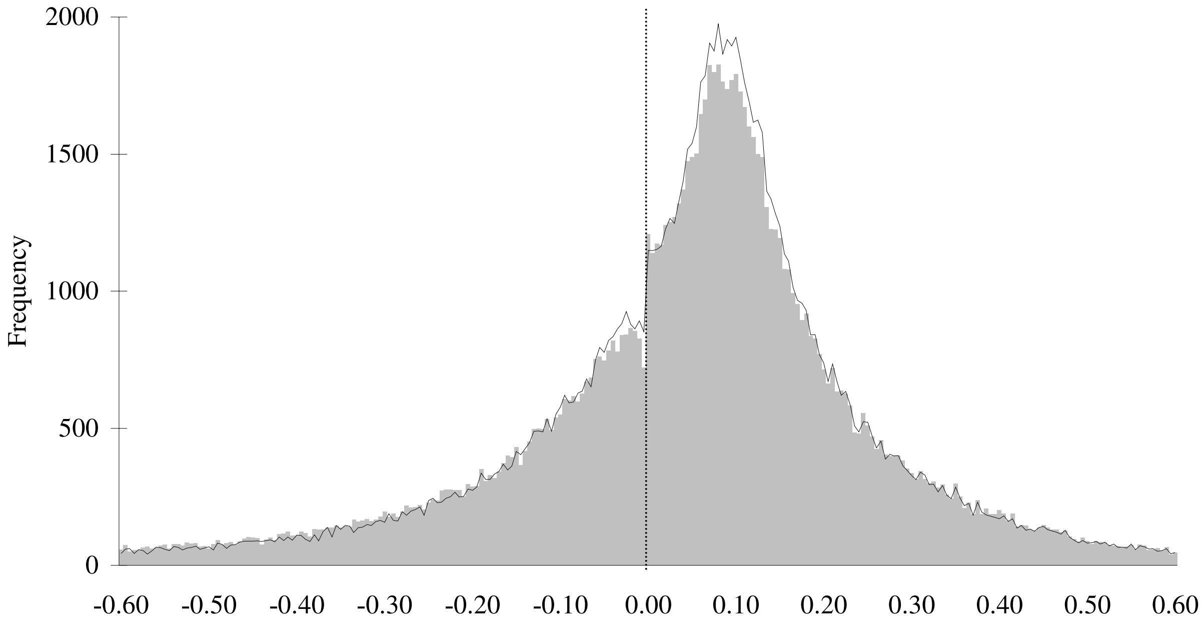
The shaded area in panel A is the distribution of annual net income (Compustat data item #172) scaled by beginning-of-the-year market value of common equity (Compustat data item #25 × Compustat data item #199). The solid line in panel A is the distribution of annual pretax income (Compustat data item #170) scaled by beginning-of-the-year market value of common equity. Panel B is mean and median *ETR* in each interval of the distribution of pretax income. *ETR* is income tax expense (Compustat data item #16) divided by annual pretax income. In both panels, the distribution interval widths are 0.005 and the location of zero on the horizontal axis is marked by the dashed line.

FIGURE 3
Comparison of the Empirical Distributions of Pretax Income and Income Before Special Items

Panel A: Pretax Income (Shaded) and Income Before Special Items (Line)



Panel B: Special Items Conditional on the Distribution of Income Before Special Items

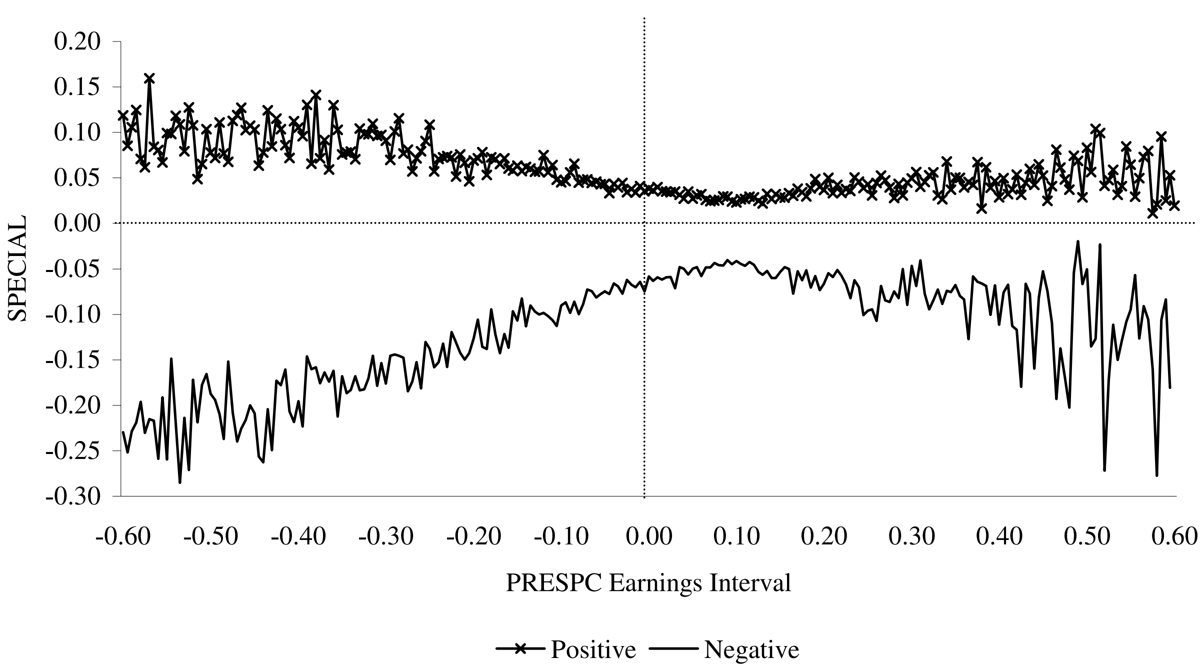
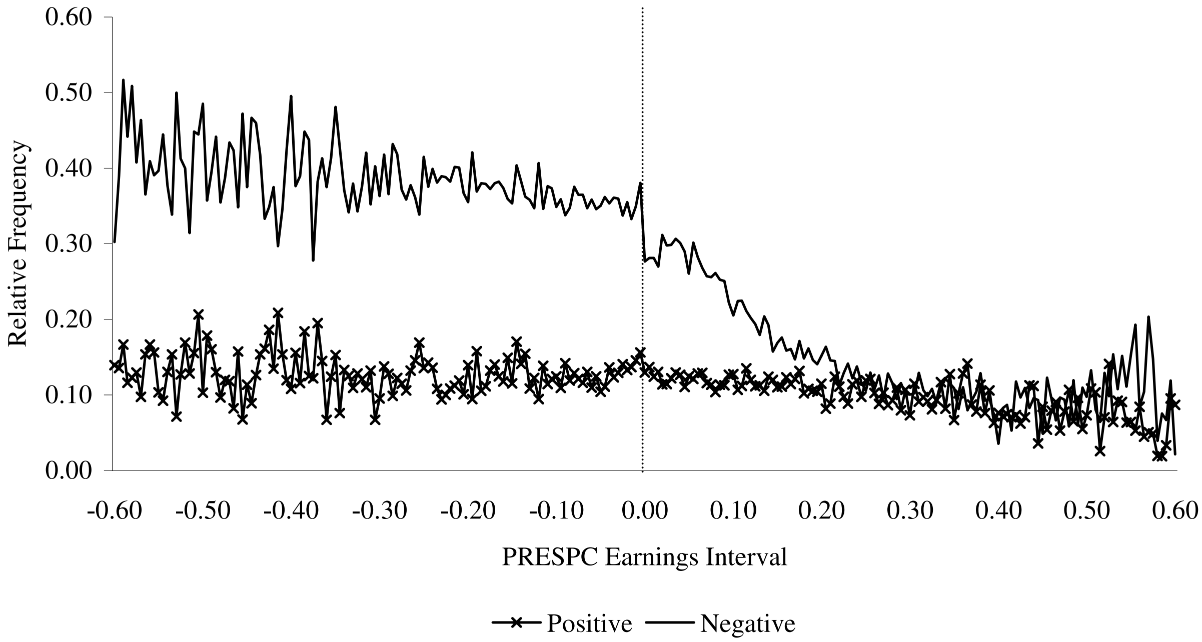


FIGURE 3 (continued)
Comparison of the Empirical Distributions of Pretax Income and Income Before Special Items

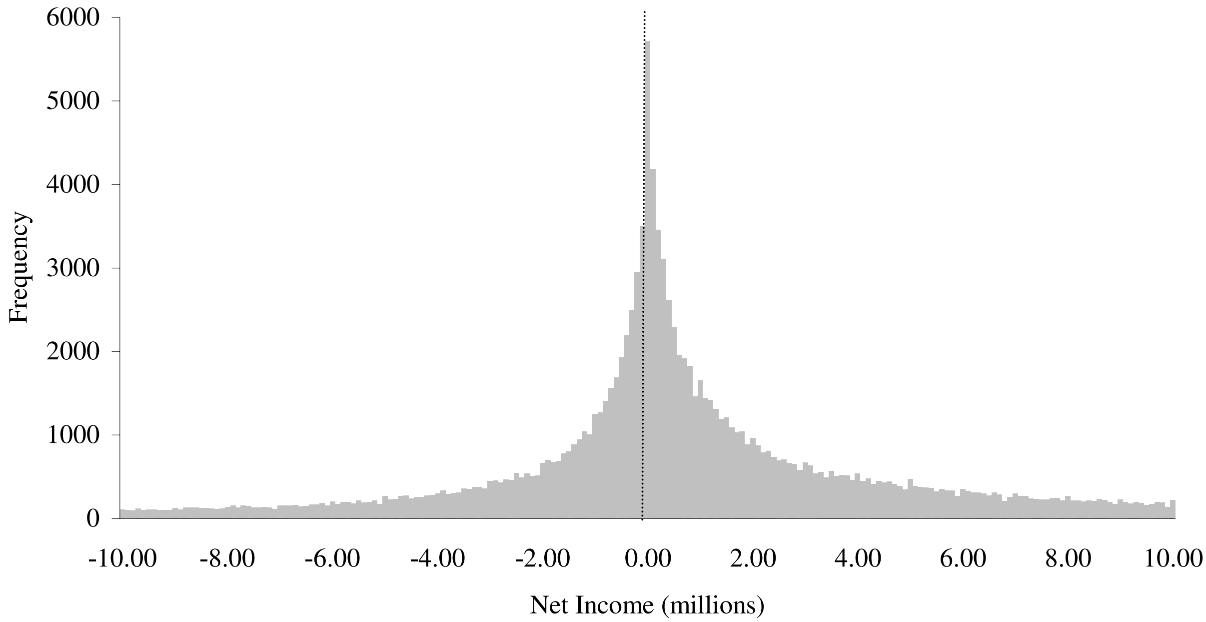
Panel C: Frequency of Special Items Relative to Total Frequency in Interval



The shaded area in panel A is the distribution of annual pretax income (Compustat data item #170) scaled by beginning-of-the-year market value of common equity (Compustat data item #25 × Compustat data item #199). The solid line in panel A is the distribution of annual income before special items (Compustat data item #170 – Compustat data item #17) scaled by beginning-of-the-year market value of common equity. Panel B is mean *SPECIAL* in each interval of the distribution of income before special items. *SPECIAL* is special items (Compustat data item #17), scaled by beginning-of-the-year market value of common equity. Panel C is the frequency of special items in each interval of the distribution of income before special items as a percentage of the total frequency of observations in the interval. In all panels, the distribution interval widths are 0.005 and the location of zero on the horizontal axis is marked by the dashed line.

FIGURE 4
Empirical Distribution of Undeflated Net Income

Panel A: Expanded Sample of All Compustat Observations



Panel B: Compustat Observations with Current Period Sales, Assets, and Price > 0

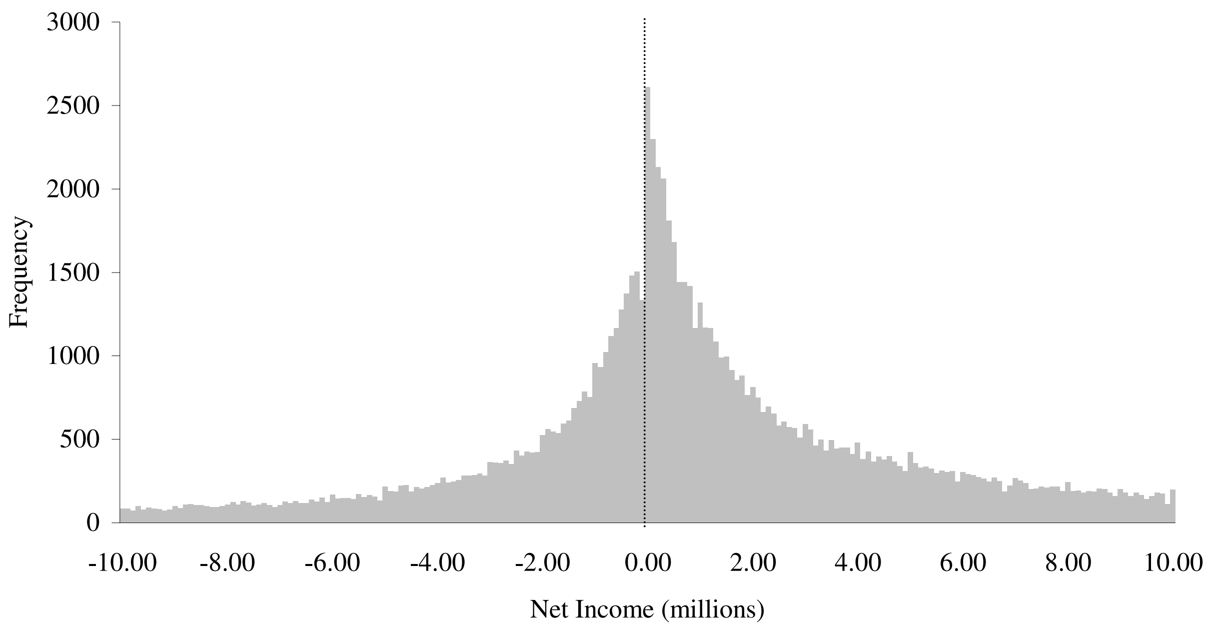
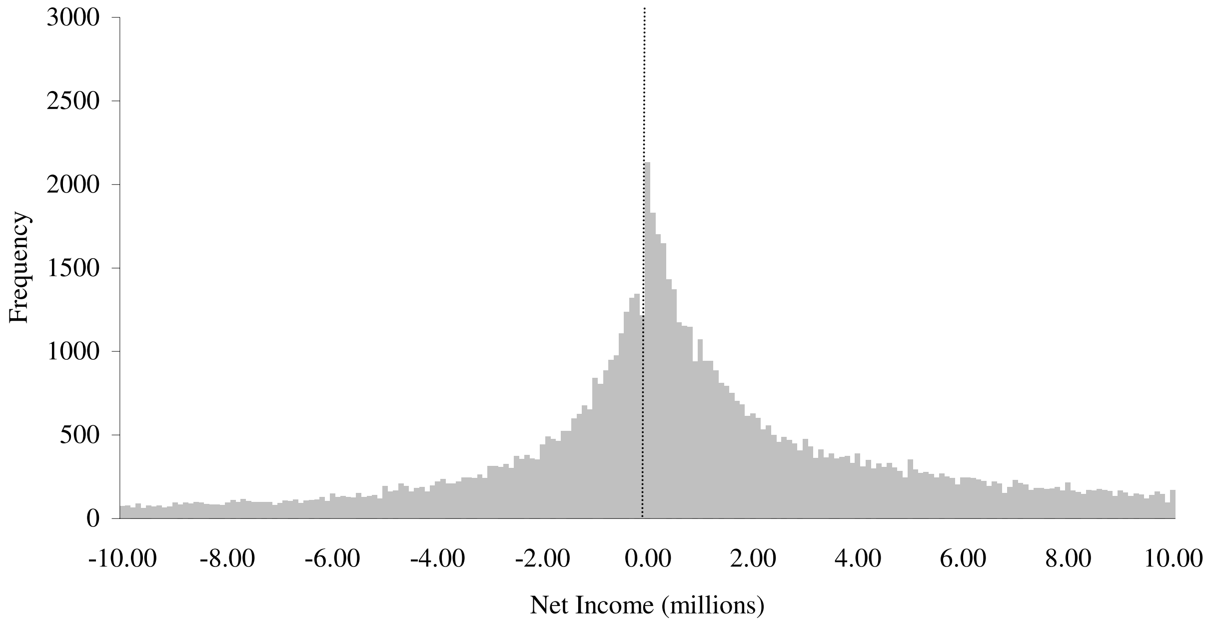


FIGURE 4 (continued)
Empirical Distribution of Undeflated Net Income

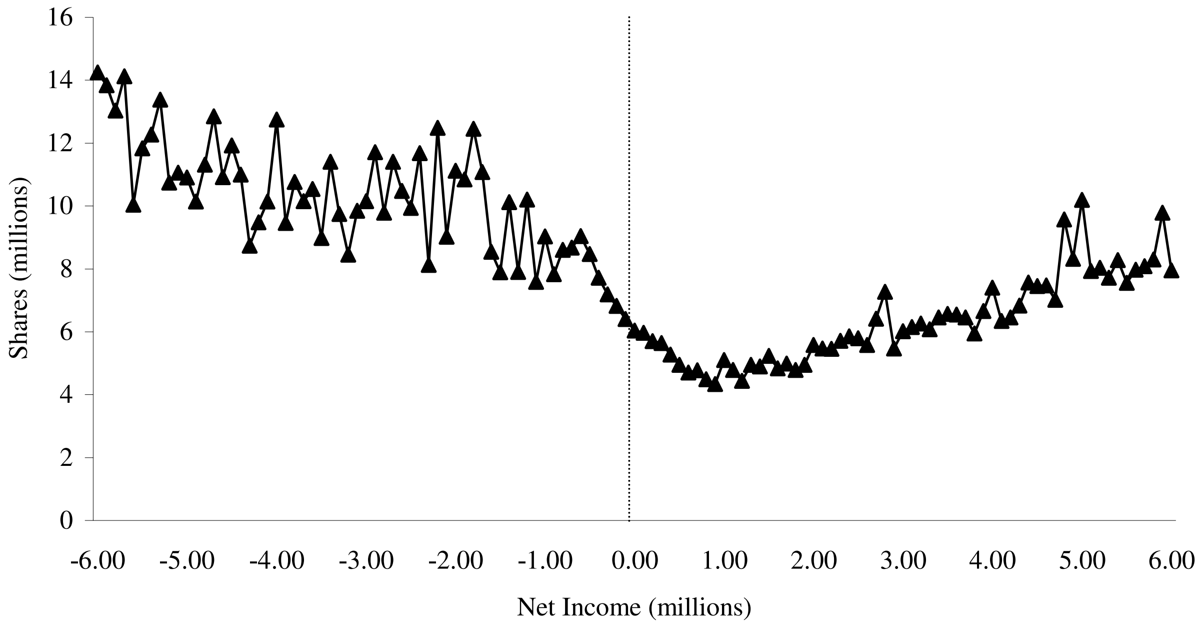
Panel C: Primary Sample



This figure presents the distribution of undeflated net income (Compustat data item #172), partitioned into interval widths of $100,000. There are 171,074 observations in the expanded sample (panel A), 134,667 observations with positive current period sales (Compustat data item #12), assets (Compustat data item #6), and price (Compustat data item #199) (panel B), and 114,177 observations in the primary sample (panel C). The location of zero on the horizontal axis is marked by the dashed line.

FIGURE 5
Comparison of Alternative Deflators Across the Distribution of Net Income

Panel A: Common Shares Outstanding



Panel B: Market Value of Equity

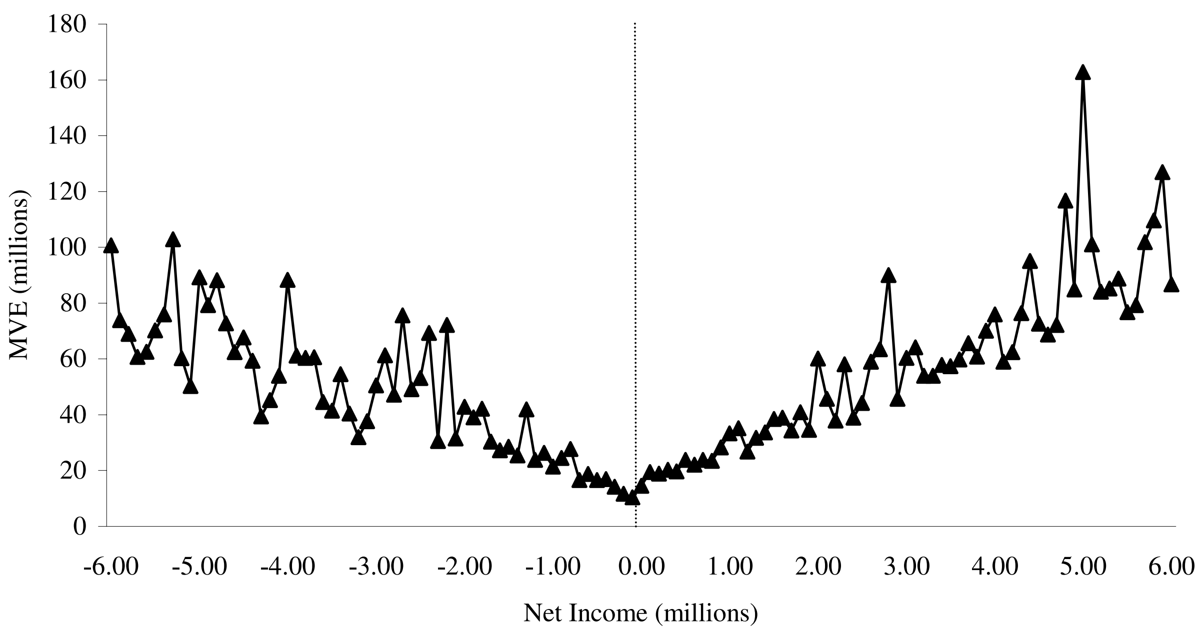


FIGURE 5 (continued)
Comparison of Alternative Deflators Across the Distribution of Net Income

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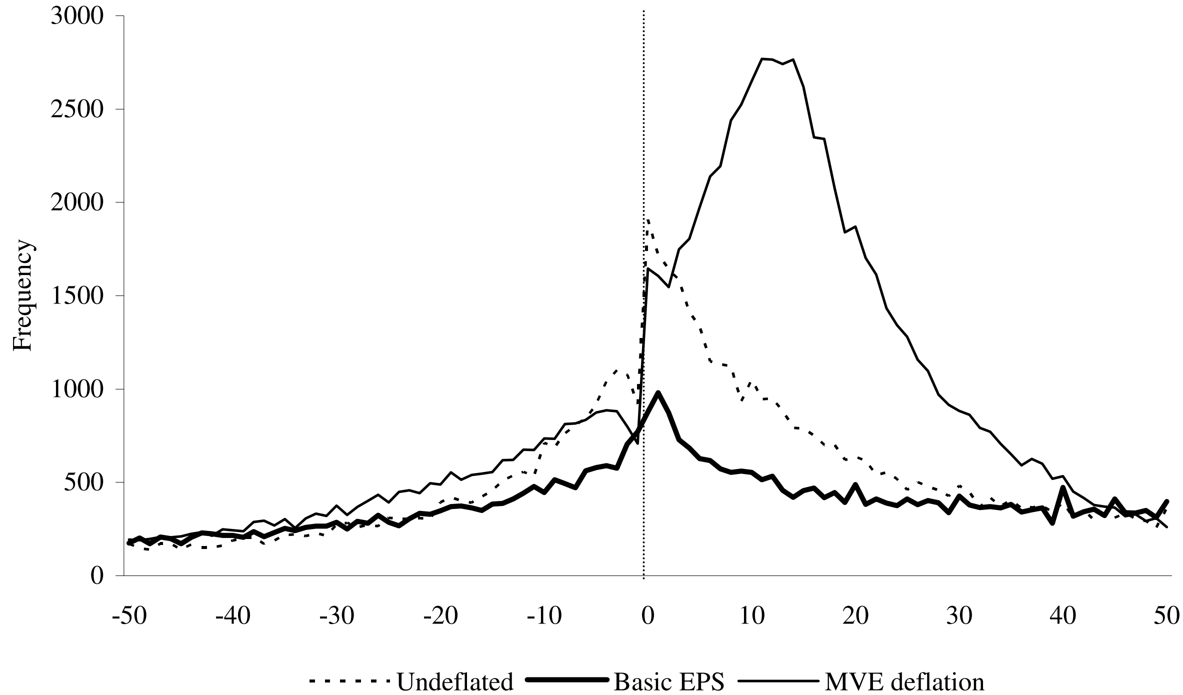
Panel A is mean common shares outstanding (Compustat data item # 25). Panel B is mean market value of common equity (Compustat data item #25 × Compustat data item #199), measured at the beginning of the year. In both panels, the interval width is $100,000, and the sample consists of 109,364 observations with available data.

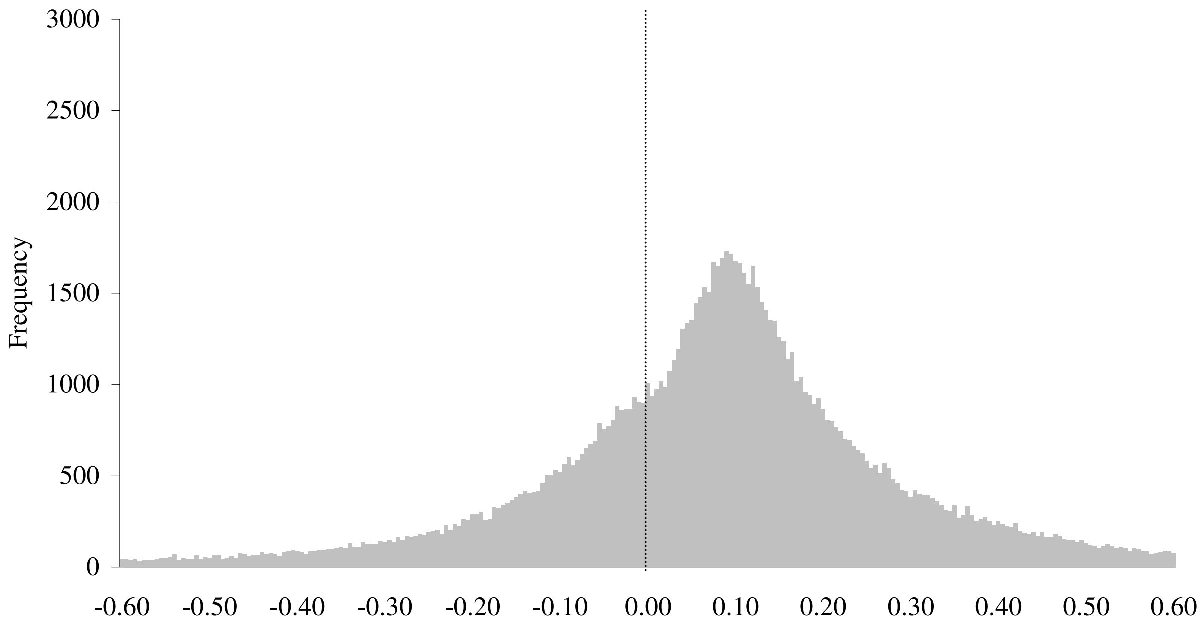
FIGURE 6
Effect of Deflation on the Distribution of Net Income



This figure presents the distribution of undeflated net income (Compustat data item #172), basic earnings-per-share excluding extraordinary items (Compustat data item #58), and net income deflated by beginning-of-the-year market value of common equity (Compustat data item #25 × Compustat data item #199). The interval width is $100,000 for the undeflated specification, $0.01 for the basic earnings-per-share specification, and 0.005 for the market value deflated specification. The sample consists of 109,364 observations with available data. The location of zero on the horizontal axis is marked by the dashed line.

FIGURE 7
Empirical Distributions of Alternative Earnings Measures

Panel A: Operating Income After Depreciation



Panel B: Operating Income Before Depreciation

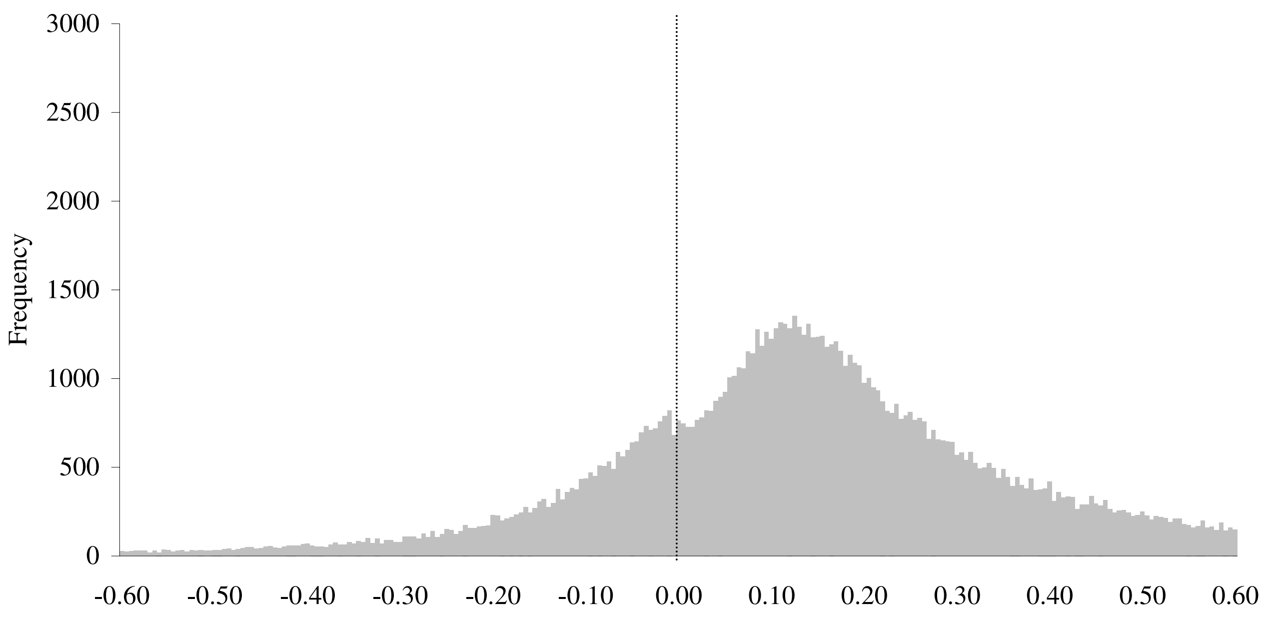


FIGURE 7 (continued)
Empirical Distributions of Alternative Earnings Measures

Panel A is the distribution of operating income after depreciation (Compustat data item #178) and panel B is the distribution of operating income before depreciation (Compustat data item #13), both scaled by beginning-of-the-year market value of common equity (Compustat data item #25 × Compustat data item #199). In both panels, the distribution interval widths are 0.005 and the location of zero on the horizontal axis is marked by the dashed line.

TABLE 1
Scaled Values of Earnings Measures

		NI			PRETAX			PRESPC		
Year	N	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
1976	3,122	0.136	0.160	0.270	0.276	0.283	0.351	0.284	0.284	0.333
1977	3,097	0.124	0.142	0.212	0.245	0.257	0.284	0.253	0.257	0.266
1978	2,988	0.154	0.156	0.176	0.274	0.278	0.259	0.274	0.278	0.253
1979	3,124	0.138	0.153	0.203	0.243	0.255	0.269	0.247	0.255	0.257
1980	3,356	0.097	0.121	0.217	0.182	0.202	0.269	0.178	0.199	0.264
1981	3,480	0.068	0.089	0.203	0.128	0.141	0.260	0.129	0.138	0.253
1982	3,947	0.018	0.066	0.257	0.061	0.097	0.304	0.065	0.095	0.283
1983	3,870	0.004	0.067	0.303	0.048	0.105	0.347	0.057	0.101	0.315
1984	4,077	0.007	0.052	0.204	0.040	0.077	0.227	0.045	0.078	0.208
1985	4,073	–0.041	0.043	0.285	–0.008	0.066	0.301	0.009	0.070	0.268
1986	4,087	–0.062	0.033	0.319	–0.039	0.048	0.349	–0.021	0.051	0.307
1987	4,261	–0.028	0.038	0.241	–0.005	0.055	0.260	0.004	0.055	0.232
1988	4,295	–0.037	0.045	0.296	–0.011	0.061	0.311	0.003	0.063	0.275
1989	4,090	–0.051	0.038	0.296	–0.027	0.053	0.306	–0.009	0.057	0.268
1990	3,996	–0.082	0.029	0.352	–0.061	0.041	0.364	–0.031	0.049	0.296
1991	3,987	–0.143	0.030	0.552	–0.119	0.046	0.573	–0.068	0.056	0.451
1992	4,168	–0.076	0.029	0.384	–0.054	0.047	0.402	–0.023	0.054	0.338
1993	4,483	–0.042	0.035	0.273	–0.018	0.055	0.273	0.006	0.062	0.227
1994	4,799	–0.013	0.043	0.182	0.009	0.060	0.192	0.026	0.065	0.160
1995	5,073	–0.022	0.043	0.211	0.001	0.064	0.221	0.024	0.070	0.186
1996	5,694	–0.028	0.038	0.245	–0.007	0.056	0.257	0.016	0.064	0.217
1997	6,198	–0.048	0.030	0.269	–0.027	0.044	0.278	–0.003	0.056	0.237
1998	6,205	–0.068	0.019	0.279	–0.052	0.030	0.287	–0.029	0.044	0.251
1999	6,078	–0.092	0.025	0.388	–0.073	0.037	0.392	–0.049	0.046	0.342
2000	6,067	–0.093	0.009	0.369	–0.074	0.014	0.381	–0.042	0.022	0.308
2001	5,562	–0.229	–0.023	0.667	–0.209	–0.023	0.662	–0.124	–0.003	0.468
Total	114,177	–0.030	0.046	0.334	0.008	0.069	0.361	0.029	0.073	0.305

NI is net income (Compustat data item #172); *PRETAX* is pretax income (Compustat data item #170); and *PRESPC* is income before special items (Compustat data item #170 – Compustat data item #17). All variables are scaled by market value of common equity (Compustat data item #25 × Compustat data item #199) at the beginning of the year.

TABLE 2
Descriptive Statistics for Income Taxes and Special Items, Conditional on Sign of Earnings Level

Panel A: Effective tax rate, conditional on pretax income

	Negative PRETAX						Positive PRETAX					
Variable	Nobs.	Mean	Median	Std. Dev.	% ≠ 0	% > 0	Nobs.	Mean	Median	Std. Dev.	% ≠ 0	% > 0
NI	38,658	–0.290	–0.139	0.449	100	4	75,519	0.104	0.081	0.115	100	97
ETR	38,496	0.070	0.000	0.260	51	62	75,441	0.332	0.380	0.224	93	97
PRETAX	38,658	–0.302	–0.151	0.443	100	0	75,519	0.167	0.124	0.148	100	100

Panel B: Special items, conditional on income before special items

	Negative PRESPC						Positive PRESPC					
Variable	Nobs.	Mean	Median	Std. Dev.	% ≠ 0	% > 0	Nobs.	Mean	Median	Std. Dev.	% ≠ 0	% > 0
PRETAX	36,722	–0.303	–0.153	0.453	100	3	77,455	0.156	0.120	0.164	100	96
SPECIAL	36,722	–0.041	0.000	0.128	50	26	77,455	–0.008	0.000	0.053	31	36
Positive	4,709	0.067	0.037	0.068	100	100	8,638	0.033	0.014	0.046	100	100
Negative	13,661	–0.134	–0.060	0.167	100	0	15,520	–0.057	–0.022	0.097	100	0
Both	18,370	–0.082	–0.029	0.172	100	26	24,158	–0.025	–0.006	0.093	100	36
PRESPC	36,722	–0.255	–0.132	0.355	100	0	77,455	0.164	0.123	0.145	100	100

See table 1 for definitions of *NI*, *PRETAX*, and *PRESPC*. *ETR* is the effective tax rate, calculated as income tax expense (Compustat data item #16) divided by *PRETAX*. *SPECIAL* is special items (Compustat data item #17), scaled by market value of common equity (Compustat data item #25 × Compustat data item #199) at the beginning of the year, and includes both zero and non-zero observations. *Positive* includes only those observations with positive special items, and *Negative* includes only those observations with negative special items. *Both* includes all observations with non-zero special items.
% > 0 indicates the percentage of non-zero observations that are positive.

TABLE 3
Cross-Tabulation of Frequency Distributions for Alternative Earnings Measures

Panel A: Comparison of pretax income and net income

	Pretax Income (PRETAX)				
Net Income (NI)	LOSS	SMLOSS	SMPROFIT	PROFIT	All Obs.
LOSS	36,450	207	170	1,523	38,350
SMLOSS	208	356	70	133	767
SMPROFIT	198	84	747	658	1,687
PROFIT	1,080	75	221	71,997	73,373
All Obs.	37,936	722	1,208	74,311	114,177

Panel B: Comparison of income before special items and pretax income

Pretax Income	Income Before Special Items (PRESPC)				
(PRETAX)	LOSS	SMLOSS	SMPROFIT	PROFIT	All Obs.
LOSS	34,759	283	241	2,653	37,936
SMLOSS	56	449	37	180	722
SMPROFIT	106	37	743	322	1,208
PROFIT	949	83	128	73,151	74,311
All Obs.	35,870	852	1,149	76,306	114,177

NI, *PRETAX*, and *PRESPC* are as defined in table 1. Based on interval widths of 0.005, *LOSS* includes observations in the portfolio immediately below zero, *SMLOSS* includes observations in the portfolio immediately below zero, *SMPROFIT* includes observations in the first portfolio above zero, and *PROFIT* includes observations to the right of the first portfolio above zero.

TABLE 4
Estimation Results for Earnings Levels Regression Models

Panel A: Regression of net income on pretax income (N = 113,113)

$$NI_t = \alpha + \beta_L PRETAX_{t,L} + \beta_{SL} PRETAX_{t,SL} + \beta_{SP} PRETAX_{t,SP} + \beta_P PRETAX_{t,P} + \upsilon_t$$

Variable	Coefficient Estimate	t-statistic	p-value	Adj. R^2
Intercept	0.07	1.38	0.17	0.99
$PRETAX_L$	0.98	1337.55	< 0.01	
$PRETAX_{SL}$	1.04	149.57	< 0.01	
$PRETAX_{SP}$	0.67	590.86	< 0.01	
$PRETAX_P$	0.62	2927.66	< 0.01	

F-statistic for the hypothesis that $\beta_{SL} = \beta_{SP}$: 2679.10 (p-value < 0.01)
F-statistic for the hypothesis that $\beta_L = \beta_P$: 215474.00 (p-value < 0.01)

Panel B: Regression of pretax income on income before special items (N = 113,356)

$$PRETAX_t = \alpha + \beta_L PRESPC_{t,L} + \beta_{SL} PRESPC_{t,SL} + \beta_{SP} PRESPC_{t,SP} + \beta_P PRESPC_{t,P} + u_t$$

Variable	Coefficient Estimate	t-statistic	p-value	Adj. R^2
Intercept	0.50	5.75	< 0.01	0.99
$PRESPC_L$	2.03	465.58	< 0.01	
$PRESPC_{SL}$	1.94	125.19	< 0.01	
$PRESPC_{SP}$	0.94	393.22	< 0.01	
$PRESPC_P$	0.99	4151.68	< 0.01	

F-statistic for the hypothesis that $\beta_{SL} = \beta_{SP}$: 4125.23 (p-value < 0.01)
F-statistic for the hypothesis that $\beta_L = \beta_P$: 56802.70 (p-value < 0.01)

NI, *PRETAX*, and *PRESPC* are as defined in table 1 except that they are in undeflated form. The subscripts on the explanatory variables in panels A and B identify the position of an observation in the indicated distribution, i.e, *L* is the region to the left of small losses, *SL* is the small loss region, *SP* is the small profit region, and *P* is the region to the right of small profits. Based on interval widths of 0.005 as in figures 2 and 3, the small profit region includes the six intervals to the right of zero and the small loss region includes the six intervals to the left of zero. All reported p-values are two-sided.

TABLE 5
Standardized Differences for Alternative Deflators

Earnings Measure	MVE (N = 114,177)	ASSETS (N = 114,142)	CE (N = 109,410)	SALES (N = 111,798)	Undeflated (N = 114,177)
NI	9.07	11.81	9.03	12.55	10.19
PRETAX	6.02	6.58	5.25	7.25	7.04
PRESPC	3.23	4.74	3.41	5.87	4.19

See table 1 for definitions of *NI*, *PRETAX*, and *PRESPC*. The deflators are market value of common equity (*MVE*, Compustat data item #25 × Compustat data item #199), total assets (*ASSETS*, Compustat data item #6), book value of common equity (*CE*, Compustat data item #60), and net sales (*SALES*, Compustat data item # 12). *MVE*, *ASSETS*, and *CE* are measured at the beginning of the year. *SALES* is measured for the previous year. Standardized differences are for the first interval above zero. The interval width is 0.005 for the four deflated specifications, *MVE*, *ASSETS*, *CE* and *SALES*. The interval width is $100,000 for the undeflated specification.

TABLE 6
Standardized Differences for Alternative Earnings Measures

Earnings Measure	N	Standardized Difference
NI	114,177	9.07
INCBXO	114,162	9.97
PRETAX	114,177	6.02
PRESPC	114,177	3.23
OPINCAD	114,094	2.05
OPINCBD	112,179	1.27

See table 1 for definitions of *NI*, *PRETAX*, and *PRESPC*. The other earnings measures are income before extraordinary items and discontinued operations (*INCBXO*, Compustat data item #18), operating income after depreciation (*OPINCAD*, Compustat data item #178), and operating income before depreciation (*OPINCBD*, Compustat data item #13). All variables are scaled by beginning-of-the-year market value of common equity (Compustat data item #25 × Compustat data item #199). All variables are scaled by market value of common equity (Compustat data item #25 × Compustat data item #199) at the beginning of the year.