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The pricing of conservative accounting and the measurement of conservatism at the firm-year level

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Abstract This paper analyzes the relation between equity prices and conditional conservatism and introduces a new measure of conservatism at the firm-year level. We show that the asymmetric properties of conservative accounting, the existence of non-accounting sources of information, and the properties of GAAP related to special items combine to generate a nonlinear relation between unexpected equity returns and earnings news (the shock to expected current and future earnings). Based on this model, we construct a conservatism ratio (CR) defined as the ratio of the current earnings shock to earnings news. CR measures the proportion of the total shock to expected current and future earnings recognized in current year earnings. Ranking firms according to CR, we show empirically that higher CR firms have more leverage, increased volatility of returns, more incidence of losses, more negative accruals, and increased volatility of earnings and accruals, consistent with the literature on conservative accounting.

Keywords Conservatism special items · Linearity · Return decomposition · Conservatism ratio

JEL Classification M41 · G14

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1 Introduction

This paper analyzes the relation between equity prices and conditional conservatism and introduces a new measure of conservatism at the firm-year level. Specifically, we contribute to the conservatism literature in two main ways. First, using the return decomposition model of Vuolteenaho (2002), we contend that the asymmetric properties of conservative accounting, together with the existence of alternative non-accounting sources of information, generate nonlinear relations between revisions to equity returns and earnings news and between revisions to equity returns and special items. Revisions to equity returns are defined as unexpected current period equity returns. Earnings news is the conceptually correct measure of an earnings surprise and is defined as the shock to the discounted sum of expected current and future earnings over the lifetime of the firm.[1]

Underlying these nonlinear pricing relations is the reasonable assumption that equity markets learn about (and therefore react to) both positive and negative shocks to firm cash flows from non-accounting as well as accounting sources of information. In contrast, under conservative accounting, only negative shocks are recorded immediately, generally through special items, whereas GAAP does not generally allow for the recognition of positive shocks until realized. This asymmetry between the accounting system's treatment of positive and negative shocks and the market's reaction to positive shocks generates nonlinear and discontinuous relations between revisions to equity returns and special items (earnings news).

Second, based on the Vuolteenaho (2002) model, we construct a conservatism ratio (CR) at the firm-year level that can be used to measure the asymmetry between gain and loss recognition timeliness. CR measures the proportion of the total shock to the firm's expected current and future cash flows recognized in current year earnings. By this criterion, firm A is more conservative than firm B, if for a given negative (positive) shock to current and future expected cash flows, firm A recognizes more (less) of the shock in current year earnings than does firm B.[2]

Although our approach is in the spirit of Basu (1997), the structure of the Vuolteenaho (2002) model necessitates a different analysis along a number of dimensions. First, good and bad news in the model are defined in terms of *shocks* (revisions) to returns and not return levels.[3] This definition accords with intuition. Suppose that the firm's cost of capital is 15% so that future returns are expected to be 15% and, because of an information shock, returns expectations are revised downwards to 5%. This is surely bad news despite the fact that returns are positive.[4] Second, the model shows that shocks to returns are not merely a function of the

[1] In other words, earnings news is the conventional current earnings surprise plus the surprise to future earnings (appropriately discounted).

[2] Hence, CR is a meaningful measure of conservatism only if conditioned on the sign of the shock.

[3] We use the terms "unexpected," "revision to," and "shock to" interchangeably in this paper.

[4] Positive (negative) raw returns are neither necessary nor sufficient conditions for good (bad) news. Basu (1997), in a sensitivity analysis, subtracts total market returns from firm returns. However, this measure of unexpected returns is potentially misspecified because it fails to account for systematic risk.

conventionally measured earnings surprise but rather a function of earnings news.[5] Specifically, unless shocks to current earnings are completely transitory, they affect expectations of future earnings as well current earnings. Therefore, the impact of good and bad news shocks on current earnings (the conventional earnings surprise) is an insufficient metric of conservative accounting.[6] Third, the Vuolteenaho model also explicitly controls for shocks to time-varying expected discount rates (discount rate news). This issue is potentially important because, as shown by Campbell et al. (1997, p. 265), among others, small changes in expected discount rates can have a large impact on equity returns, especially when expected returns are persistent.

The empirical results are consistent with our conceptual analysis. In particular, we confirm the hypothesized nonlinear relation between the revision to equity returns and earnings news; the association between negative earnings news and unexpected returns is significant and larger than the association between positive earnings news and unexpected returns. We further show that the GAAP treatment of special items generates a similar, albeit weaker, nonlinear relation between revisions to equity returns and special items. Further, our empirical results indicate that the impact of conservatism on the recognition of bad news relative to good news (differential timeliness) is far smaller than what Basu (1997) reports.

Finally, we establish the properties of the new conservatism ratio (CR) for which the Vuolteenaho model provides the requisite inputs. We show empirically that CR incorporates bad news faster than good news at the firm-year level; when there is a negative shock to current and future expected cash flows, a greater proportion of the total shock is incorporated into current period earnings than when there is a positive shock. This finding is consistent with the asymmetric timeliness of conservative accounting. We find that, on average, more than 58% of bad news is recognized in current earnings as opposed to less than 45% of good news.

In what follows, Sect. 2 briefly reviews the literature on conservatism and special items. Section 3 and the Appendix present the conceptual analysis. Section 4 describes the return decomposition model, the measures of earnings and discount rate news, and the conservatism ratio. Section 5 describes the data, and Sect. 6 provides the empirical results. Section 7 concludes.

2 Brief review of literature on conservatism and special items

Basu (1997) interprets conservatism as capturing accountants' tendency to require a higher degree of verification for recognizing good news than bad news in

[5] The conventional view of the earnings-return paradigm is that the current level of earnings provides information about expected future cash flows and, this in turn (partially) determines the current level of security returns. We do not contest this. However, the standard Basu-type analysis of conservative accounting focuses correctly on the asymmetry between "good" news and "bad" news events on equity valuation. Good news and bad news refer to revisions or equivalently to shocks, not levels. Thus, it is more useful to analyze conservative accounting with a revisions approach rather than a levels approach. Specifically, the perspective of this study is that revisions to current earnings provide information about revisions to expected future cash flows which, in turn, (partially) determines revisions to equity returns.

[6] Focusing on the conventional earnings surprise instead of earnings news, results in a potential correlated omitted variables problem.

financial statements. Under this interpretation, earnings reflect bad news such as unrealized losses more quickly than good news such as unrealized gains. Based on this interpretation, Basu (1997) predicts and finds strong evidence that reported earnings are timely in reflecting publicly available bad news compared with good news.[7] The subsequent literature refers to the Basu measure of conservatism as "differential timeliness."[8] The literature following Basu has established that the differential timeliness attribute of the financial statements increases the effectiveness of corporate governance, compensation systems, and debt agreements in motivating and monitoring managers. (See Ryan 2006 for a comprehensive literature review.)

Notwithstanding the large number of studies employing differential timeliness as their measure of conservatism, recently researchers have argued that the use of this measure should be more selective and qualified. Givoly et al. (2007) show that the measure fails to detect conservatism in instances where it is most likely to exist. In addition, although one might expect the degree of conservatism to be a relatively long-term characteristic of the firm's reporting system, they document that differential timeliness is highly volatile over time. They attribute the results to the use of aggregated measures of earnings and returns as well as the nature of events occurring during the period and firms' disclosure policies. They conclude that differential timeliness suffers from serious measurement errors and that care should be taken when employing the measure in empirical studies.

Dietrich et al. (2007) argue that the empirical results in the conservatism literature based on the Basu measure are attributable to the estimation procedure rather than to conservatism. Specifically, they argue that, if price is a function of earnings and other information, then reversing the regression leaving out the other information yields a biased earnings coefficient, even if earnings and other information are uncorrelated. They further argue that the standard Basu nonlinear regression equation is really comprised of two equations conditioned on whether returns, an endogenous variable, are greater than zero or less than zero. Since OLS abstracts from the endogeneity and the conditioning of returns, the Basu regression yields biased coefficients.[9]

We argue and show that special items are one of the tools through which accounting conservatism is facilitated. According to GAAP, special (or unusual) items are material items that are considered unusual in nature or occur infrequently. They can have a very large impact on earnings and book value of assets and equity. For example, in their review of empirical studies of asset writedowns, Alciatore et al. (1998) identify a mean writedown ranging from 4% to more than 19% of total assets, with maximum writedowns reaching 90%. In addition, Riedl and Srinivasan

[7] Specifically, Basu (1997) uses a reverse regression of price-deflated earnings (EARN) on an indicator variable for negative stock returns (D), stock returns (R), and stock returns interacted with the indicator variable (subscripts omitted): $\mathrm{EARN} = a_0 + a_1 D + a_2 R + a_3 R * D$. He finds the coefficient a_3 to be significantly positive.

[8] Some studies refer to differential timeliness as "earnings conservatism" or "conditional conservatism" as compared with "balance sheet conservatism" or "unconditional conservatism" (as reflected in the market-to-book ratio) (e.g., Beaver and Ryan 2005; Pae et al. 2005).

[9] We perform tests that address these issues in Sect. 6.3.

(2007) document a large increase in both the frequency and magnitude of reported special items throughout the period 1993 through 2002. Although gains also occur, such as gains from sales of assets, the majority of special items are losses. The preponderance of special or unusual losses reflects the conservative bias of accrual accounting which requires early recognition of declines in asset values but tends to delay recognition of most gains until realized. In addition, the magnitude of special items suggests that they represent an economically significant proxy for how conservatism is achieved by firms.

Frankel and Roychowdhury (2008) find that the timeliness of IBES earnings is less asymmetric than that of GAAP earnings. Since IBES earnings are purged of many special items, this finding can be interpreted as special items being an important means of implementing accounting conservatism. Consistent with this notion, Shroff et al. (2004) find that negative special items have a stronger relation with concurrent stock returns than positive special items.[10]

3 The conceptual analysis

This section provides a conceptual analysis of the relations among earnings news, special items, and revisions to returns. In particular, we claim that earnings news is nonlinearly related to revisions to equity returns provided that (1) the accounting system is conservative *and* (2) equity markets learn about shocks to the firm's expected cash flows from non-accounting as well as accounting sources. We also maintain that special items are nonlinearly related to revisions to equity returns under GAAP, although the relation is weaker than for earnings news. For simplicity, absent specific information such as special items to indicate otherwise, shocks to earnings are assumed to be completely transitory and discount rates (expected returns) are assumed to be intertemporally constant.[11]

We illustrate the nonlinear relations between earnings news, special items, and revisions to returns using a relatively simple but nevertheless rich example. This section focuses on the underlying logic. To help explicate these ideas, the Appendix provides a related numerical example.

Suppose that management or the auditor or both suddenly anticipate a negative shock to the firm's expected future cash flows, for example, in the form of a reduction in the market value of a long-lived asset. In an ideal conservative accounting system, the negative shock will be accrued in earnings in a timely fashion relative to actual cash flow realizations, in the form of a special Item (asset writedown). Provided that the asset is carried on the books at its market value before the shock, meaning that accumulated book depreciation equals accumulated economic depreciation, and provided the firm has a 100% dividend-payout ratio policy, the asset writedown will exactly equal the shock to current and future expected cash flows (earnings news). Furthermore, investors should correctly

[10] In contrast, Riedl and Srinivasan (2007) do not find a significant difference in response coefficients across positive and negative special items.

[11] In the empirical analysis below, we specifically control for discount rate news.

interpret the special item as conveying new information of an impending negative shock to current and future expected cash flows, driving down equity returns by the amount of the asset writedown in a timely fashion. Thus, earnings news, special items, and the revision to equity returns are all negative and equal to each other.

Now consider the symmetrically opposite case in which management anticipates a positive shock to expected future cash flows, that is, positive earnings news. In an ideal conservative accounting system there are no special items to reflect the positive shock, and positive earnings news will not be recorded in the accounts until the future cash flows are realized. Furthermore, if accounting is the only source of news about shocks to future cash flows, then the revision to returns is zero.

Thus, when the accounting reports are the only source of information, the relations among the three variables are linear with the only difference being that, with negative shocks these variables (earnings news, the special item and the change to market value) are negative, and with positive shocks they are zero. In addition, linearity obtains whether the accounting system is conservative or not, although the size of the shock recognized in earnings and, hence, in equity returns depends upon the extent of conservatism.[12]

Suppose instead that investors learn about positive shocks to future cash flows from non-accounting sources. When the shock to cash flows is negative, earnings news, special items, and revisions to returns are negative and equal to each other as before since all the information is disclosed in the financial reports. However, when the shocks to future cash flows are positive, earnings news and special items are equal and zero because of conservatism, but equity returns will adjust to reflect the positive shock. In other words, when investors learn about positive shocks to future firm cash flows from non-accounting sources, the ideal conservative accounting system generates a nonlinear relation between earnings news and revisions to returns and between special items and revisions to returns. Hence, the existence of information sources other than the accounting system is a necessary condition for the nonlinear relation between revisions in returns and earnings news (special items).[13]

The above analysis suggests that in an ideal conservative accounting system, the nonlinear relation between earnings news and revisions to returns is identical to the nonlinear relation between special items and revisions to returns. However, the conservative accounting system defined by GAAP is far from ideal. In particular, GAAP and firm financing/investment policies create a wedge between earnings news and special items. There are three main reasons why special items are a less than perfect measure of negative earnings news and, hence, a less than perfect measure of the revision to equity returns. First, book depreciation rarely equals economic depreciation. If accumulated book depreciation is greater than accumulated economic depreciation, then the asset writedown to bring the asset's book

[12] Scenarios 1 and 2 of the example in the Appendix and the related Fig. 1 illustrate this linearity result.

[13] Scenarios 1 and 3 of the example in the Appendix and the related Fig. 2 illustrate this nonlinearity result.

value to market value will be less than earnings news. Conversely, if accumulated book depreciation is less than accumulated economic depreciation then the asset writedown to bring book value to market value will necessarily be greater than earnings news. Second, under GAAP, if the sum of the future undiscounted cash flows from the asset is greater than the carrying value of the asset, no special item is recognized even though there is a negative shock to the asset's future cash flows. Third, if the firm's policy is to reinvest free cash flows from the asset, the reduction in free cash flows arising from the negative shock to the asset's future cash flows will also drive a wedge between special items that do not recognize this opportunity cost and revision to returns (or negative earnings news). Thus, under GAAP, when earnings news is negative, special items and revision to returns (earnings news) will be positively correlated but they will not be equal to each other.

Similarly, under GAAP, special items that provide timely information about positive earnings shocks are sometimes recognized, albeit fairly infrequently (for example, if the firm recognizes a gain on sale of an asset or reverses a portion of a restructuring charge expected to be larger). Thus, under GAAP, special items can be positive and positively correlated with (although unlikely to be equal to) positive earnings news. Therefore, under GAAP, the relation between special items and revision to returns will be nonlinear but generally weaker than the nonlinear relation between earnings news and the revision to returns.[14]

In short, the asymmetry inherent in conservative accounting under GAAP, coupled with alternative sources of value-relevant information, lead to an asymmetric response by investors to positive earnings news (special items) relative to negative earnings news (special items). As a result, revisions to equity returns are more highly correlated with negative earnings news (special items) than with positive earnings news (special items). Furthermore, under GAAP, special items, positive or negative, provide an imperfect measure of the impact of new information on equity returns relative to earnings news, yielding a weaker nonlinear relation between special items and revision to returns by comparison to the nonlinear relation between earnings news and revision to returns.

Together with the Vuolteenaho (2002) model (see next section), the above conceptual analysis and the numerical example of the Appendix provide the framework for our empirical investigation. First, we examine the association between earnings news and special items, and, in particular, we contrast the association between negative earnings news and special items and positive earnings news and special items. Second, we analyze the nonlinear relations between revisions to equity returns and earnings news and between revisions to equity returns and special items. Third, for the sake of completeness, we investigate the potential nonlinear relations between the conventional earnings surprise, the earnings level revisions, and revisions to equity returns. Finally, we empirically analyze the conservatism ratio.

[14] Scenarios 1 and 3 of the example in the Appendix and the related Fig. 3 illustrate this nonlinearity result.

4 The Vuolteenaho (2002) return decomposition model and the conservatism ratio

In this section, we explain the Vuolteenaho (2002) model, describe how we estimate the model, and introduce and describe the conservatism ratio CR.

4.1 The Vuolteenaho return decomposition model

The Vuolteenaho (2002) return decomposition model is essentially an identity so the intuition behind the model is fairly straightforward.[15] If equity prices are the present value of expected future dividends, then shocks to prices or, equivalently, to returns can only come from two sources, namely, shocks to current and expected future dividends (cash flows) or shocks to current and expected future discount rates (or both) over the firm's lifetime. Replacing dividends with earnings via the clean surplus relation implies that shocks to returns are necessarily attributable to shocks to current and expected future earnings (earnings news) or shocks to current and expected future discount rates (discount rate news) over the firm's lifetime or both.

Formally, extending prior work by Campbell (1991), Campbell and Ammer (1993), Vuolteenaho (2002) employs the clean surplus relation to show that revisions to stock returns can be expressed as follows:

$$r_t - E_{t-1}(r_t) = \Delta Et \sum_{j=0}^{\infty} \rho^j (roe_{t+j} - i_{t+j}) - \Delta Et \sum_{j=1}^{\infty} \rho^j r_{t+j} \tag{1}$$

where Δ denotes the first differencing operator; E_t is the expectations operator and $\Delta E_t = E_t(\cdot) - E_{t-1}(\cdot)$; r_t = log equity return (cum dividend) in excess of the risk free rate in period t; ρ is a constant discount rate term; i_t = log of one plus the risk free rate in period t; roe_t = log of one plus return on equity (that is, earnings divided by beginning of period book value of equity) in period t.

Defining the unexpected stock return components as expected-return news (Nr) and earnings news (Ne), Eq. 1 can be expressed more simply as:[16]

$$r_t - E_{t-1}(r_t) = Ne - Nr \tag{2}$$

where

$$Ne = \Delta Et \sum_{j=0}^{\infty} \rho^j (roe_{t+j} - i_{t+j}) = \text{earnings news} \tag{3}$$

[15] The return decomposition (Eq. 2) is derived from the *definition* of the market to book ratio and the clean surplus relation; hence, it is an identity. See Callen (2009) for a formal proof that emphasizes the tautological nature of the Vuolteenaho (2002) return decomposition model.

[16] As a sensitivity analysis we estimate earnings news as the sum of accruals news and cash flow news (see Callen and Segal 2004). The idea behind this alternative estimation is that the breakdown of earnings into cash flows and accruals may provide a better prediction of future cash flows than earnings alone. No inferences are affected if we use this alternative approach. However, breaking down earnings to accruals and cash flows precludes us from computing our conservatism ratio so we do not pursue this approach.

$$Nr = \Delta Et \sum_{j=1}^{\infty} \rho^j r_{t+j} = \text{discount rate news} \tag{4}$$

Equation 2 shows that the unexpected revision to current equity returns increases with earnings news and decreases with discount rate news. An unanticipated increase in the firm's earnings conveys positive information about the firm's prospects and translates into higher returns. Conversely, an unexpected increase in future expected returns (discount rates) due to higher risk, for example, translates into negative unexpected current returns, similar to the effect of an increase in the yield rate on bond prices.

It is worth emphasizing that the standard Vuolteenaho return decomposition model (Eq. 2) is linear in earnings news and discount rate news because it fails to consider the conservative nature of the accounting system. In particular, Vuolteenaho (2002) implicitly assumes that market expectations are conditioned solely on accounting information, and other information sources are irrelevant. However, by restricting accounting recognition rules to specific (and primarily) negative shocks, conservative accounting and GAAP drive a wedge between the market's expectations, which are conditioned upon the immediate recognition of both positive and negative expected cash flow shocks from all information sources, and expectations based solely on conservative accounting numbers for which some negative shocks and almost all positive shocks remain unrecognized in earnings until realized. This wedge drives the nonlinear relation between unexpected returns and earnings news (less discount rate news), as emphasized in the analysis above and in the numerical example of the Appendix. This intuition is related to that of Gonedes (1978) and Antle et al. (1994) who show, that except under very restrictive conditions, the relation between revisions to returns and revisions to earnings need not be linear (or even monotone) if the accounting system uses a more restrictive information set than does the market.

In order to empirically examine the associations between earnings news, special items, and unexpected returns, and to construct the conservatism ratio, we need estimates of earnings news and discount rate news. The return decomposition (Eq. 2) provides the basis. However, to implement the return decomposition, estimates of expected future returns and expected future earnings are required. Following prior studies we implement the return decomposition using a log-linear vector autoregressive (VAR) model. We next describe the estimation procedure in detail.

4.2 Estimation of the Vuolteenaho model

The VAR estimation is facilitated by assuming that the dynamics of the data are well described by a (stationary) time-series model. Specifically, define $z_{i,t}$ to be a vector of firm-specific state variables that follows the vector autoregressive process:

$$z_{i,t} = Az_{i,t-1} + \eta_{i,t} \tag{5}$$

Consistent with prior studies, the VAR coefficient matrix **A** is assumed to be constant over time and over firms. The error term vectors $\eta_{i,t}$ are vectors of shocks and are assumed to have a variance-covariance matrix Ω and to be independent of all variables known at $t - 1$.

We estimate a parsimonious VAR with three state variables consisting of log stock returns (r_t), log of one plus ROE (earnings scaled by book value of equity), and the log book-to-market ratio (bm_t).[17] The VAR model can then be described as a system of (mean-adjusted) equations:

$$r_t = \alpha_1 r_{t-1} + \alpha_2 roe_{t-1} + \alpha_3 bm_{t-1} + \eta_{1,t} \tag{6a}$$

$$roe_t = \beta_1 r_{t-1} + \beta_2 roe_{t-1} + \beta_3 bm_{t-1} + \eta_{2,t} \tag{6b}$$

$$bm_t = \delta_1 r_{t-1} + \delta_2 roe_{t-1} + \delta_3 bm_{t-1} + \eta_{3,t} \tag{6c}$$

We estimate the regressions separately by industry (as per the Fama and French (1997) classifications) using weighted least squares with one pooled regression per state variable.[18] Each annual cross-section is weighted equally by deflating the data for each firm-year by the number of firms in that year.[19]

As shown by Campbell (1991), the variance decomposition of these valuation models can be implemented empirically by combining the residuals from the VAR estimation with the unexpected current return equation (Eq. 1). Formally, let $e_i = (0,\ldots, 1,\ldots, 0)$, where the 1 is in the ith position. The revision to returns is then computed as:

$$r_t - E_{t-1}(r_t) = e_1 \eta_{1,t} \tag{7}$$

Equation 5 implies that forecasts of the state vector $z_{i,t}$ can be computed as:

$$E_t\left[z_{i,t+1+j}\right] = A^{j+1} z_{i,t} \tag{8}$$

Substituting Eq. 8 into Eq. 4 yields discount rate news computed as:[20]

$$\begin{aligned} Nr_t &= \Delta Et \sum_{j=1}^{\infty} \rho^j r_{t+j} = Et \sum_{j=1}^{\infty} \rho^j r_{t+j} - Et - 1 \sum_{j=1}^{\infty} \rho^j r_{t+j} \\ &= e1' \rho A (I - \rho A)^{-1} \eta_{i,t} \end{aligned} \tag{9}$$

Similarly, earnings news is computed as:[21]

[17] The book-to-market ratio is included in the parsimonious VAR because the decomposition model is generated from this ratio. Vuolteenaho (2002) similarly includes the book-to-market ratio in his VAR specifications. It also helps to control for the firm's growth prospects and the firm's unconditional conservatism.

[18] Industry subscripts are suppressed in the above equations.

[19] Using OLS gives similar results.

[20] Note that $(I - \rho A)^{-1}$ is a present value operator.

[21] Following Vuolteenaho (2002), Callen and Segal (2004), Callen et al. (2005), and Callen et al. (2006), we assume that $\rho = 0.967$. The results are not sensitive to this assumption.

$$Ne_t = \Delta Et \sum_{j=0}^{\infty} \rho^j (roe_{t+j} - i_t) = Et \sum_{j=0}^{\infty} \rho^j (roe_{t+j} - i_t) - Et - 1 \sum_{j=0}^{\infty} \rho^j (roe_{t+j} - i_t)$$
$$= e2'(I - \rho A)^{-1} \eta_{i,t} \tag{10}$$

To facilitate the analysis, we generate firm-year estimates of earnings and discount rate news by estimating the firm-year variance-covariance matrix from the residuals of the VAR regression (Eqs. 6a–6c) and by assuming that within-industry observations have the same VAR coefficient matrix. For example, earnings news can be estimated at the firm-year level using the estimated VAR coefficient matrix and the vector of residuals $\varepsilon_{it} = [e_{1it}, e_{2it}, e_{3it}]$, where e_{jit} is the estimated residual from equation j and i(t) is the firm (time) index. The variance-covariance matrix Ω_{it} is computed as $[\varepsilon_{it}'\varepsilon_{it}]$.

4.3 The conservatism ratio (CR)

The conservatism ratio is defined as ratio of unexpected current earnings to total earnings news. The ratio measures how much of the total earnings shock is incorporated into current period unexpected earnings. Thus, for a given negative shock, the greater the conservatism ratio the more conservative is the firm because more of the total negative shock to current and future cash flows is recognized in the current financial statements. Formally, we measure CR as:

$$\mathrm{CR_t} = \eta_{2,\mathrm{t}}/\mathrm{Ne_t} \tag{11}$$

where $\eta_{2,\mathrm{t}}$ is the earnings surprise from the VAR system (see Eq. 6b).

The conservatism ratio can best be understood by reference to the time series properties of the earnings news measure (Eq. 3). Perhaps the simplest example is to assume that the firm's earnings, as measured by $\mathrm{roe_t}$, follow a stationary AR(1) process with drift and that the firm's expected rate of return (cost of capital) is intertemporally constant so that:

$$roe_t = \alpha + \beta roe_{t-1} + \varepsilon_t \tag{12}$$

where β is the persistence parameter assumed to lie between 0 and 1, and $\varepsilon_t \sim (0, \sigma^2)$ is a zero-mean error term. It is fairly straightforward to show that in this case $\mathrm{CR_t} \approx 1 - \beta$.[22] In other words, the conservatism ratio (approximately) equals one minus the persistence of roe_t so that the more persistent are earnings, the less of the total earnings shock recognized in current earnings relative to future earnings. This accords with intuition since an earnings shock to an AR(1) firm will persist over the lifetime of the firm, with the impact of the shock on earnings increasing directly with the firm's earnings persistence. As a result, the more persistent are earnings, the smaller is proportion of the total shock that will be recognized in any given period's earnings.

[22] Substituting the AR(1) dynamic of Eq. 12 into the definition of earnings news (Eq. 3) and noting that $\Delta E_t(\mathrm{roe_{t+j}}) = (\rho\beta)^j \varepsilon_t$ for $j \geq 0$ yields $\mathrm{Ne_t} = \varepsilon_t/(1 - \rho\beta)$. By definition $\mathrm{CR_t} = \varepsilon_t/\mathrm{Ne_t} = (1 - \rho\beta)$. Since ρ is very close to 1 (0.967), the result follows.

In the simple AR(1) example, CR varies by firm but is intertemporally constant. The empirical analysis below allows for far more complex and realistic time-series patterns in earnings and discount rates by assuming a VAR system. In the case of a VAR, the CR varies generally both by firm and over time. To see this, consider the simple stationary VAR example with only two variables r_t and roe_t:

$$r_t = \alpha_1 r_{t-1} + \alpha_2 roe_{t-1} + \eta_{1t} \tag{13}$$

$$roe_t = \beta_1 r_{t-1} + \beta_2 roe_{t-1} + \eta_{2t} \tag{14}$$

It can be shown that the conservatism ratio in this case is[23]

$$CR_t \approx \frac{(1-\alpha_1)(1-\beta_2) - \alpha_2 * \beta_1}{\beta_1 \left(\frac{\eta_{1t}}{\eta_{2t}}\right) + (1-\alpha_1)} \tag{15}$$

Clearly, in the case of a VAR system, the conservatism ratio is generally dependent upon all of the parameters of the dynamics. Also, unless (1) the shocks to earnings and returns are always equal or (2) the shocks to returns are always zero or (3) $\beta_1 = 0$, the conservatism ratio will depend upon the relative shocks (η_{1t}/η_{2t}). In particular, the greater the shock of earnings relative to the shock to expected returns in absolute value, the greater the conservatism ratio. Since the shocks are time dependent, so is CR. Straightforward observation shows that the conservatism ratio is a decreasing function of the earnings persistence parameter β_2 and the earnings parameter α_2. The relation between the other parameters and the conservatism ratio is ambiguous.

5 Sample and descriptive statistics

The data are obtained from annual COMPUSTAT and monthly CRSP files for the years 1962 through 2006. Return on equity is computed as income before extraordinary items (DATA18) scaled by the beginning of the period stockholders' equity (DATA60). The risk-free rate is the annualized 3-month Treasury bill rate. Annual stock returns are computed from monthly CRSP data adjusted for dividends. Returns are computed over a period starting 9 months before and ending 3 months after the fiscal year-end.

We impose the following restrictions on the data. First, we remove firms in the financial industry (SIC 6000-6999). Second, we require non-missing values of contemporaneous and one lag each of ROE, annual returns, and the book-to-market ratio. In addition, we require non-missing values of special items (DATA 17). These restrictions yield a sample size of 124,217 firm-years. Eliminating firms with market value of equity less than $10 million reduces the sample size to 104,471. Finally, to mitigate data errors and scaling problems, we delete the top and bottom one percent of all the variables included in the VAR system. These restrictions reduce the sample to 95,653 (10,292) firm-years (firms).

[23] Note that if past returns have no impact on roe_t so that $\beta_1 = 0$ then roe_t is AR(1) as before and the conservatism ratio equals one minus the persistence of earnings $(1 - \beta_2)$ as before.

Table 1 Descriptive statistics

	Mean	SD	Q1	Median	Q3
MV	1,475	8,664	39	138	615
ROE	0.100	0.174	0.042	0.121	0.188
BM	0.848	1.081	0.377	0.624	0.991
RET	0.186	0.515	−0.141	0.103	0.397
SI	−0.013	0.082	0.000	0.000	0.000
CR	0.510	0.521	0.267	0.391	0.556

The table shows the sample distribution for selected variables where SD is the standard deviation, and Qi denotes the ith quartile. *MV* is market value of equity in millions of dollars, *ROE* is the book return on equity computed as earnings before extraordinary items (DATA 18) divided by beginning of period book value of equity (DATA 60), *BM* is the book-to-market ratio, *RET* is the annual cum dividend return computed from monthly returns, *SI* is special items (DATA 17) scaled by lagged book value of equity, *CR* is the conservatism ratio measure computed as the earnings surprise divided by earnings news. The number of firm-year observations is 95,653 (CR is based on 77,285 observations)

Table 1 shows the distribution of the major variables of interest. The sample firms exhibit large variation in market capitalization; the mean and median market values of equity are $1.475 billion and $138 million, respectively. Median cum dividend equity market returns and accounting returns on book value of equity are 10 and 12%, respectively. The median book-to-market ratio is 0.62. To be consistent with the computation of earnings news, we compute special items (SI) as DATA 17 scaled by beginning of the period book value of equity.[24] Since SI is nonzero for only 34,416 firm-years, the 25th percentile, median, and 75th percentile of SI are zero.[25] Finally, the mean (median) CR is 0.51 (0.39), indicating that on average the current period shock to earnings equals approximately 50% of the total economic shock to current and future cash flows.

6 Empirical results

6.1 VAR estimation

We estimate the VAR equations by industry using the Fama and French (1997) industry classification. Table 2, Panel A, shows the mean estimated parameters across industries and their standard errors.[26] The standard errors are computed using the Fama and MacBeth (1973) method. The significant parameter estimates imply that returns are positively associated with past earnings and the past book-to-market ratio. Earnings are positively associated with past returns and past earnings and

[24] As sensitivity tests, we repeat the analysis scaling special items by beginning of the period total assets and market value of equity. The results are similar to those reported.

[25] Untabulated results show that if we restrict the sample to observations with non-zero SI, then the mean and median SI are −0.037 and −0.014, respectively.

[26] Reported results are based on a parsimonious VAR with only one lag per variable. Untabulated results show that our inferences are robust to including two lags per variable in the VAR estimation.

Table 2 VAR estimation and news summary statistics

Panel A: VAR coefficient matrix

	RET_{t-1}	ROE_{t-1}	BM_{t-1}
RET_t	−0.008	0.106***	0.095***
	(0.009)	(0.018)	(0.006)
ROE_t	0.067***	0.495***	−0.018***
	(0.003)	(0.020)	(0.002)
BM_t	0.105***	0.200***	0.844***
	(0.001)	(0.020)	(0.008)

Panel B: Descriptive statistics of news items

	Mean	SD	Q1	Median	Q3
Nr	0.003	0.159	−0.088	0.006	0.099
Ne	0.012	0.262	−0.085	0.036	0.149
$r_t - E_{t-1}(r_t)$	0.002	0.370	−0.224	0.010	0.234

Panel C: Sample correlations

	Ne	Nr	$r_t - E_{t-1}(r_t)$
Ne	1	−0.242***	0.672***
Nr	−0.041***	1	−0.735***
$r_t - E_{t-1}(r_t)$	0.590***	−0.701***	1

Table 2 continued

Panel D: Means of discount rate news and revision to returns ranked by earnings news quintile portfolios

Quintile	Ne	Nr	$r_t - E_{t-1}(r_t)$
1	−0.365	0.029	−0.349
2	−0.057	0.058	−0.152
3	0.036	0.010	0.008
4	0.124	−0.030	0.153
5	0.321	−0.050	0.352

Panel A lists the parameter estimates of the parsimonious VAR. We estimate the VAR equations by industry (Fama–French 1997) industry classification). Panel A shows the mean estimated parameters across industries and their standard errors in parentheses. The standard errors are computed using the Fama and MacBeth (1973) method. The model variables include the mean-adjusted cum dividend annual excess log return, r_t (the first element of the state vector z); the mean-adjusted log of earnings normalized by prior period book values, roe_t (the second element); and the mean-adjusted log book-to-market value ratio, bm_t (the third element). The sample size for the VAR estimation is 95,653 firm-year observations

The parameters in the table correspond to the following system $z_{i,t} = \Gamma z_{i,t-1} + \eta_{i,t}, \Omega = E\left(\eta_{i,t}, \eta'_{i,t}\right)$

Panel B lists summary statistics of the news items as defined in Sect. 4.2

$Nr = \text{Discount Rate News} = e1'\rho\Gamma(I - \rho\Gamma)^{-1}\eta_{i,t} = \lambda_1{}'\eta_{i,t}$

$Ne = \text{Earnings News} = e2'(I - \rho\Gamma)^{-1}\eta_{i,t} = \lambda_2{}'\eta_{i,t}$

$ei' = (0,\ldots, 1,\ldots, 0)$, where the 1 is in the ith position. We eliminate the top and bottom one percentile of the news items and the revisions to returns, $r_t - E_{t-1}(r_t)$. Thus, the panel and all subsequent tables are based on 91,009 firm-year observations

Panel C shows the correlations between Ne, Nr, and $r_t - E_{t-1}(r_t)$. The revision to returns is defined in Sect. 4.2 as $r_t - E_{t-1}(r_t) = e1'\eta_{1t.}$ Pearson (Spearman) correlations are reported below (above) the diagonal

Panel D lists the means of Ne, Nr, and $r_t - E_{t-1}(r_t)$, all ranked by Ne portfolio quintiles

*** Indicate significance level of 1% (two-tailed)

negatively associated with the past book-to-market ratio. The book-to-market ratio is positively related to past returns, past earnings, and the past book-to-market.

Table 2, Panel B, provides descriptive statistics of expected-return news (Nr), earnings news (Ne), and revisions to returns ($r_t - E_{t-1}(r_t)$).[27] To eliminate potential outliers, we delete the top and bottom 1% of the news items and the revisions to returns, resulting in a sample of 91,009 observations. The mean and median of Ne (0.012 and 0.036, respectively) are significantly positive, indicating that on average the earnings news is good. The mean and median Nr are also significantly positive (0.003 and 0.006, respectively) and, consistent with prior literature, significantly smaller than Ne, indicating that earnings news is the main driver of revisions to returns at the firm level. The mean and median revisions to returns (0.002 and 0.010, respectively) are also positive, consistent with the positive mean and median earnings news.

Table 2, Panel C, shows the Pearson and Spearman correlations among the variables of Eq. 2. Ne (Nr) is positively (negatively) and significantly correlated with unexpected returns ($r_t - E_{t-1}(r_t)$), and Ne and Nr are negatively and significantly correlated with each other. These correlations are consistent with the predictions of the model (Eq. 2). Specifically, the model predicts that the association of the revision to returns with Ne (Nr) is positive (negative).

Table 2, Panel D, presents the means for earnings news (Ne), expected-return news (Nr), and revisions to returns ranked by earnings news quintile portfolios. Quintile 1 is the most negative, and quintile 5 is the most positive. This panel shows that revisions to returns increase monotonically with the Ne quintiles. Specifically, revisions to returns increase from −35%, in the lowest quintile, to 35% in the highest quintile. The Nr column shows that, excluding the first quintile, the mean of Nr decreases monotonically with Ne. This result indicates that earnings news is inversely related to discount rate news, suggesting that positive earnings news is associated with risk reduction and a concomitant decrease in the discount rate.[28]

6.2 Earnings news and special items

Table 3 analyzes the relation between earnings news (Ne) and special items (SI). Panel A lists mean Ne and mean SI ranked by Ne quintile portfolios. Quintile 1 is the most negative, and quintile 5 is the most positive. The results in this panel are generally consistent with our expectations. Specifically, when earnings news is negative (quintiles 1 and 2), so are special items. In addition, special items are positive only for the highest quintile of earnings news. This panel also shows that the means of SI increase monotonically from quintile 1 to quintile 5. For example, the mean of SI in quintile 1 is −0.049, and it increases monotonically to 0.005 in quintile 5.[29] Overall,

[27] The revision to returns is computed as the residual from the VAR return equation. See Eq. 6a.

[28] We are not making a causality statement here but rather documenting an association.

[29] As a sensitivity analysis, we examine the frequencies of positive and negative special items by earnings news portfolio quintiles. Going from the most negative earnings news (quintile 1) to the most positive earnings news (quintile 5), the proportion of firms with negative (positive) special items decreases (increases) monotonically with earnings news.

Table 3 The relation between earnings news and special items

Panel A: Means of special items and earnings news (Ne) by earnings news quintiles

Quintile	N	Ne	SI
1	18,202	−0.365	−0.050
2	18,202	−0.057	−0.008
3	18,202	0.036	−0.003
4	18,202	0.124	−0.001
5	18,201	0.321	0.005

Panel B: Regression results of special items on positive and negative earnings news

Intercept	−0.009***
	(0.001)
D	0.005***
	(0.001)
Ne	0.045***
	(0.002)
D_Ne	0.115***
	(0.003)
F-value	398***
Adj. R^2	0.15

Panel A lists mean earnings news (Ne) and special items (SI) ranked by earnings news quintiles. Quintile 1 is the most negative Ne quintile, and quintile 5 is the most positive Ne quintile

Panel B presents the coefficient estimates (standard errors) of the regression of SI on Ne, D and D_Ne. D is equal to 1 when Ne is negative and zero otherwise. D_Ne is the interaction of D with Ne. Ne is defined in the notes to Table 2. The regression is estimated using firm and year fixed effects (not shown)

*** Indicates significance level of 1% (two-tailed)

these results indicate that there is a positive relation between earnings news and special items.

Table 3, Panel B, shows the results of regressing special items on earnings news, a dummy variable (D) equal to one if earnings news is negative and zero otherwise, and an interaction variable between earnings news and the dummy variable (D_Ne). We estimate the regression using panel data with firm and year fixed effects. The regression results show that the coefficient of earnings news is positive and significant. In addition, the interaction variable is positive and significant, indicating that the association between special items and negative earnings news is stronger than the association between special items and positive earnings news. These results are consistent with special items being an account through which conservatism is manifested. Specifically, when special items are negative (for example, a write-off of a capital asset), it is an indication of a negative shock to future cash flows (earnings news). When special items are non-negative, the association with future cash flows is positive but weaker, consistent with the notion that good news generally is not recognized until the cash flows are realized.

6.3 Earnings news, special items, and revisions to returns

We estimate Vuolteenaho's (2002) equation in reverse regression form in the spirit of Basu (1997).[30] More formally, based on Eq. 2, we regress earnings news on revisions to returns and expected-return news:

$$Ne_t = \alpha_0 + \alpha_1(r_t - E_{t-1}(r_t)) + \alpha_2 Nr_t + \varepsilon_t \tag{16}$$

where the α_j are parameters, and ε_t is a white noise innovation term. Consistent with the model, we expect $\alpha_1 > 0$ and $\alpha_2 > 0$.[31]

Given that earnings news equals the sum of the current period earnings shock and future earnings shocks (Ne = CES + FNe), one can decompose Ne into its components and regress the current period earnings shock (CES) on the independent variables in Eq. 5 as well as the shock to future expected earnings (FNe). We also estimate a variant of the model using the level of earnings. Specifically, the current period earnings shock equals current period ROE (that is, earnings scaled by beginning of period book value of equity) minus the expected ROE (see Eq. 10). Thus, we include the predicted ROE (PROE) as an explanatory variable in the levels regression.[32]

Furthermore, we argued above that special items are an imperfect substitute for earnings news so that special items should be non-negatively associated with revisions in equity returns. To examine this conjecture, we re-estimate the regression with special items as the dependent variable.

We estimate the regressions using panel data with firm and year fixed effects.[33] The regression results are presented in Table 4, Panel A. The results of the earnings news regression are presented in the Ne column in Panel A.[34] The signs of the estimated coefficients are as conjectured—positive and highly significant at the 1% level. Similar to the earnings news regression, the signs of the estimated coefficients in the special items regression (SI column) are positive and significant at the 1% level, indicating a positive relation between special items and unexpected returns.[35]

In a further analysis, we regress the current period earnings shock (CES) and the earnings level (ROE) on the revision to returns, discount rate news, and other control variables as dictated by the Vuolteenaho model. The shock to future earnings (FNe) and the predicted (expected) next period ROE (PROE) are the

[30] In Eq. 2, the revisions in returns are tautologically determined by Ne and Nr so that there are no parameters to estimate. However, we test Eq. 2 using ex post revisions in returns so that the relation has an error structure.

[31] Note that $\alpha_2 > 0$ because Nr is on the other side of the equation in a reverse regression.

[32] Formally, Ne = CES + FNe = ROE – PROE + FNe.

[33] We obtain similar results when estimating the regressions using the Fama–MacBeth (1973) methodology.

[34] Although Nr_t and $(r_t - E_{t-1}(r_t))$ are highly correlated (see Table 2, Panel C), the maximum variance inflation factor of 2.18 and condition index of 2.56 are not indicative of serious multicollinearity.

[35] We also test whether the coefficients across the Ne and SI regressions are equal by estimating both equations as a system. The coefficient on the revisions to returns in the SI regression is significantly smaller (at less than the 1% level) than the coefficient on the revisions to returns in the Ne regression (α_1) consistent with special items being a noisy measure of earnings news.

Table 4 The relation between revisions to returns and earnings news, special items, current period earnings shock, and earnings

	Ne	SI	CES	ROE
Panel A: Linear specification				
Intercept	0.013***	−0.013***	−0.001	0.006***
	(0.002)	(0.001)	(0.001)	(0.001)
$r_t - E_{t-1}(r_t)$	0.763***	0.075***	0.044***	0.046***
	(0.002)	(0.001)	(0.001)	(0.001)
Nr	1.137***	0.192***	0.343***	0.343***
	(0.005)	(0.002)	(0.002)	(0.002)
FNe			0.550***	0.540***
			(0.002)	(0.002)
PROE				0.932***
				(0.002)
Adj. R^2	0.63	0.11	0.74	0.80
Panel B: Nonlinear specification				
Intercept	0.018***	−0.011***	0.001	0.008***
	(0.002)	(0.001)	(0.001)	(0.001)
D	−0.004***	−0.001	−0.001	−0.001**
	(0.002)	(0.001)	(0.001)	(0.001)
$r_t - E_{t-1}(r_t)$	0.744***	0.067***	0.038***	0.040***
	(0.004)	(0.002)	(0.002)	(0.002)
$D * (r_t - E_{t-1}(r_t))$	0.028***	0.013***	0.010***	0.009***
	(0.005)	(0.002)	(0.002)	(0.002)
Nr	1.136***	0.191***	0.343***	0.342***
	(0.005)	(0.002)	(0.002)	(0.002)
FNe			0.549***	0.540***
			(0.002)	(0.002)
PROE				0.932***
				(0.002)
Adj. R^2	0.63	0.11	0.74	0.80

	Regime 1 $r_t - E_{t-1}(r_t) \geq 0$	Regime 2 $r_t - E_{t-1}(r_t) < 0$	Difference
Panel C: Switching regression analysis			
Intercept	0.162***	0.178***	0.015***
	(0.001)	(0.001)	(0.002)
Ne–Nr	1.456***	0.569***	0.887***
	(0.005)	(0.002)	(0.006)

Panel A shows the coefficient estimates (standard errors) of the earnings news (Ne), special items (SI), current period earning shock (CES), and earnings scaled by beginning of period book value of equity (ROE) regressions. FNe is the shock to future earnings (i.e., FNe = Ne–CES). PROE is the predicted ROE from Eq. 6b. Ne, $r_t - E_{t-1}(r_t)$, and Nr are defined in the notes to Table 2. SI is defined in the notes to Table 1

Table 4 continued

Panel B repeats the analysis allowing for a nonlinear relation between the dependent variables and revisions to returns. D equals 1 when revision to returns ($r_t - E_{t-1}(r_t)$) are negative and zero otherwise. The regressions are estimated using firm and year fixed effects (not shown)

Panel C presents the results of the switching regression analysis. The dependent variable is $r_t - E_{t-1}(r_t)$, and the independent variable is Ne–Nr. Regime 1 (Regime 2) shows the estimation results for positive (negative) unexpected returns. The Difference column shows the difference in the coefficients across the two regimes (Regime 1 minus Regime 2)

*** Indicates significance level of 1% (two-tailed)

relevant controls.[36] Consistent with the findings above, the coefficients on revisions to returns and discount rate news in the current period earnings shock and the earnings level regressions (CES and ROE columns, respectively) are positive and significant. The coefficients on the shock to future earnings (FNe) in both regressions are positive and significant, and the coefficient on the predicted ROE in the ROE regression is also positive and significant.

These latter regressions abstract from the potential nonlinearity induced by conservative accounting as discussed in the conceptual analysis. To test for nonlinearity, we estimate the following equation:

$$\mathrm{Ne}_t = \beta_0 + \beta_1 \mathrm{D} + \beta_1 (\mathrm{r}_t - \mathrm{E}_{t-1}(\mathrm{r}_t)) + \beta_2 \mathrm{D} * (\mathrm{r}_t - \mathrm{E}_{t-1}(\mathrm{r}_t)) + \beta_3 \mathrm{Nr}_t + \varepsilon_t \quad (17)$$

where the indicator variable (D) takes on a value of one if revisions to returns are negative and zero otherwise.[37]

Panel B shows the regression results.[38] In all regressions, the coefficient estimates of the revisions to returns, the interaction term, and discount rate news are positive and significant at the 1% significance level. The positive coefficient on the interaction variable suggests differential timeliness in the incorporation of negative news relative to positive news.

Following Basu (1997), we compute the ratio of the coefficient on the interaction variable to the sum of the coefficients on the interaction variable and revisions to returns to gauge the extent to which earnings news, special items, current period earnings shock, and earnings levels capture differential timeliness. These ratios are 1.04, 1.19, 1.26, and 1.23, respectively, vs. 4.66 reported by Basu (1997).[39]

[36] These variables obtain by decomposing Ne in Eq. 2 as per footnote 33 so that CES and ROE are the variables on the left-hand of the equation, respectively.

[37] Equation 17 generalizes the Basu (1997) nonlinear relation. In particular, assuming inter-temporally constant discount rates so that $\mathrm{Nr}_t = 0$ and assuming that shocks to expected future earnings (FNe) are identically 0 yields the Basu relation: $\mathrm{ROE}_t = \beta_0 + \beta_1 \mathrm{D} + \beta_1 (\mathrm{r}_t - \mathrm{E}_{t-1}(\mathrm{r}_t)) + \beta_2 \mathrm{D} * (\mathrm{r}_t - \mathrm{E}_{t-1}(\mathrm{r}_t))$.

[38] The variance inflation factors for all four regressions are less than 10, indicating that multicollinearity is not a concern.

[39] The difference between the ratios is likely attributable to the inclusion of discount rate news, the shock to future earnings, and the predicted ROE in our regression, as required by the Vuolteenaho model.

It is worth noting that the first Dietrich et al. (2007) critique of the reverse regression procedure of Basu (1997) does not apply with equal force to Eq. 17 above. The dependent variable in the Basu analysis is earnings while the dependent variable in Eq. 17 is earnings news. The relations among earnings news, discount rate news, and revisions to returns in Eq. 17 are derived from a return decomposition identity and identities do not suffer from (correlated) omitted variables. Nevertheless, their second critique does apply since even in the absence of correlated omitted variables, the OLS coefficients may be biased given that revisions to returns are endogenous, and the regression is conditioned on the sign of an endogenous variable. Specifically, conditioning on an endogenous variable results in a non-random sample and, hence, in a sample selectivity bias, unless one accounts for sample selectivity in the estimation procedure.

To mitigate these concerns, we perform two additional tests. First, in the absence of correlated omitted variables, Dietrich et al.'s equation (1.9) shows that the probability limit of the coefficient on earnings news conditioned on whether revisions to returns are positive (negative) is the product of the true unconditional coefficient times the ratio of the variance of earnings news to the variance of revision to returns conditioned on whether revisions to returns are positive (negative). Since the ratio of these variances is significantly greater when conditioned on negative revisions to returns as opposed to positive revisions to returns (untabulated), it indicates that the probability limit of earnings news is significantly greater when revisions to returns are negative than when revisions to returns are positive, consistent with nonlinearity and the differential timeliness of earnings news.[40]

Second, and more importantly, we decompose Eq. 17 into a two equations system, depending upon whether the dummy variable D is 1 or 0, yielding the switching regression format (with known sample separation):[41]

$$r_t - E_{t-1}(r_t) = \alpha_0 + \alpha_1(Ne_t - Nr_t) + \varepsilon_t \quad r_t - E_{t-1}(r_t) \geq 0 \tag{18a}$$

$$r_t - E_{t-1}(r_t) = \beta_0 + \beta_1(Ne_t - Nr_t) + \phi_t \quad r_t - E_{t-1}(r_t) < 0 \tag{18b}$$

The conservative nature of the accounting system implies that the coefficient on earnings news in the negative unexpected return regime, β_1, should be smaller than the coefficient on earnings news in the positive unexpected return regime, α_1. We control for the sample selectivity by estimating these switching regressions simultaneously by maximum likelihood. Moreover, since these switching

[40] To account for discount rate news, we subtract discount rate news from earnings news, effectively forcing the coefficient on discount rate news to take on its theoretically correct value of one. Therefore, everywhere that earnings news appears in this statement, one should read earnings news less discount rate news.

[41] The switching regressions (Eqs. 18a and b) are of the exogenous known sample separation type first analyzed by Goldfeld and Quandt (1973). A potentially better approach is to estimate the degree of conservatism endogenously. Unfortunately, since the firm's degree of conservatism is unobservable to the researcher, the switching regression would be of the unknown sample separation type. The latter raises difficult technical estimations issues and is the subject of ongoing research. For surveys of switching regression models, see especially Maddala (1983, 1986).

regressions are estimated directly (that is, not in reverse regression form), Dietrich et al.'s first criticism is also mitigated by the switching regression methodology.

Table 4, Panel C, presents the results of the switching regression analysis. As predicted, the coefficient on earnings news for positive unexpected returns (1.456) is significantly greater than the coefficient on earnings news for negative unexpected returns (0.569).

6.4 Conservatism ratio

We measure the conservatism ratio CR (at the firm year level) as the current period earnings shock (CES) divided by earnings news (Ne). The current period earnings shock is measured by the residual from the earnings equation (Eq. 6b), and earnings news is calculated from Eq. 10. Therefore, CR shows the proportion of the total shock to current and expected future earnings recognized in current year earnings. By this criterion, firm X is more conservative than firm Y at time t if given some bad (good) news shock at time t, firm X recognizes more (less) of the bad (good) news shock in current earnings than does firm Y. Thus, one has to control for economic news when gauging the degree of conservatism.

We investigate the empirical properties of CR by examining its association with good and bad news using both univariate and multivariate analyses. Consistent with the conservative nature of accounting, we expect CR to be negatively associated with unexpected returns (a proxy for news) and to be more highly negatively associated with bad news events than with good news events. In a conservative environment, more of the earnings shock should be recognized in current period earnings for bad news than for good news (for a given level of economic shock).

Since a negative CR raises interpretation issues (see below), we delete the negative CR observations (12,147) from the analysis. In addition, we eliminate the top and bottom one percentile of CR (1,577 observations), resulting in a sample of 77,285 observations.

Table 5, Panel A, presents a univariate analysis of the mean and median CR conditioned on the sign of unexpected returns. The mean (median) of CR for positive unexpected returns is 0.447 (0.371) as compared with 0.583 (0.426) for negative unexpected returns. The differences in the means and medians are significant at less than the 1% level. Hence, the univariate analysis indicates that CR is higher for bad news in comparison to good news, consistent with differential timeliness.

Panel B presents the multivariate analysis. In column (1), CR is regressed on unexpected returns, a dummy variable (D) equal to one if unexpected returns are negative and zero otherwise, and the interaction of D and unexpected returns. As expected the coefficient on the revisions to returns is negative and significant, and the coefficient on the interaction variable is positive and significant. Specifically, the coefficient on the revisions to returns is −0.372, and the coefficient on the interaction variable is 0.863. Hence, the coefficient on negative news equals 0.491. This indicates that CR is positively (negatively) associated with bad (good) news, consistent with the conservative nature of financial accounting. In addition, similar to the findings in the univariate analysis, the coefficient for bad news is significantly

Table 5 The relation between the conservatism ratio (CR) and revisions to returns

Panel A: Mean (median) conservatism ratio for positive and negative unexpected returns

	N	CR	$r_t - E_{t-1}(r_t)$
$r_t - E_{t-1}(r_t) > 0$	41,811	0.447	0.281
		(0.371)	(0.224)
$r_t - E_{t-1}(r_t) < 0$	35,474	0.583	−0.282
		(0.426)	(−0.212)
Difference		0.136***	
		(0.055)***	

Panel B: Regressions of conservatism ratio (CR) on proxies for positive and negative news

	Predicted sign	(1)	(2)
Intercept	?	0.551***	0.641***
		(0.004)	(0.013)
D	?	0.172***	0.171***
		(0.006)	(0.006)
$r_t - E_{t-1}(r_t)$	−	−0.372***	−0.379***
		(0.012)	(0.012)
$D * (r_t - E_{t-1}(r_t))$	+	0.863***	0.876***
		(0.018)	(0.018)
ROE	?		0.183***
			(0.021)
Size	?		−0.022***
			(0.002)
Loss	+		0.042***
			(0.008)
SI	−		−0.087***
			(0.030)
Adj. R^2		0.05	0.06

Panel B shows the coefficient estimates (standard errors) of the regressions of CR on good and bad news (and control variables). CR is defined as the ratio of the current period earnings shock to total earnings news. SIZE is the log of market value of equity. LOSS is an indicator variable equal to one if earnings are negative and zero otherwise. All other variables are defined in previous tables. The regressions are estimated using firm and year fixed effects (not shown)

*** Indicates significance level of 1% level (two-sided)

greater (at the 1% level) than the absolute value of the coefficient on good news, consistent with differential timeliness.

Column (2) replicates the regression in column (1) after controlling for the following variables: ROE, SIZE (log market value of equity), LOSS (a dummy variable equal to one if earnings are negative and zero otherwise), and SI. We expect positive coefficient on LOSS and negative coefficient on SI.[42] We do not

[42] Note that SI is negative for write-offs.

have predictions for the signs of the coefficients on ROE and SIZE. The coefficients on revisions to returns and the interaction variable are identical to those reported above. As expected the coefficient on LOSS is positive and significant indicating that CR is generally higher when firms report losses. The coefficient on SI is negative and significant consistent with higher CR when firms report negative special items (for example, writeoffs).

A negative CR raises interpretation issues. Specifically, the cases where earnings news is negative and the current period earnings shock (CES) is positive may represent overly aggressive financial reporting because the firm has a positive CES even though it will experience an overall negative shock to expected current and future cash flows. Similarly, cases where earnings news is positive and CES is negative may represent overly conservative financial reporting. The data are consistent with this conjecture. The correlation between CES and revisions to returns for negative CR observations is −0.68, in contrast to a correlation of 0.35 for observations where CES and earnings news are of the same sign (untabulated).[43] We leave it for future research to investigate the negative CR cases more thoroughly.

Table 6 partially validates CR as a measure of conditional conservatism. Since conservatism is likely to be manifested when news is bad, we restrict the sample to observations with negative unexpected returns. Next, we control for the magnitude of the shock when determining the rank of the degree of conservatism. Specifically, we rank the observations (again only those with negative unexpected returns) to quintiles according to the size of the shock. Next, within each quintile of negative shocks, we rank the observations to quintiles based on the CR.

Table 6, Panel A, examines the univariate association between the CR rank and firm leverage, volatility of returns, frequency of losses, total accruals, the market-to-book (MB) ratio, and size. Watts (2003) argues that conditional conservatism should be positively correlated with asymmetric information in debt and equity contracts—which we proxy by firm leverage and return volatility, respectively. Specifically, leverage is a proxy for the agency conflict between shareholders and bondholders. The higher the degree of leverage, the greater is the demand for conservatism by bondholders to constrain diversion of resources from the firm to shareholders. The standard deviation of returns is a proxy for operational uncertainty. The greater the operational uncertainty the greater the demand for conservatism by shareholders primarily because managerial performance is harder to verify and less certain. In addition, firms with greater operational uncertainty are exposed to a greater litigation risk because of higher risk of shareholder losses. Conditional conservatism should also be positively correlated with the incidence of losses and negatively correlated with accruals. Firms that have high incidence of losses are likely to be more conservative. Since conservatism is manifested primarily in negative accruals (see Givoly et al. 2007; Ball and Shivakumar 2006) we also expect that firms with high degree of conservatism to report more negative accruals. Many of the studies on conservatism document a negative relation between Basu's asymmetric

[43] Earnings news is a weighted average of the CES and revisions to returns. Hence, CES and earnings news may be of opposite sign if CES and revisions to returns are also of opposite sign.

Table 6 Validation of the estimated degree of conservatism (CR)

Panel A: Correlation between the rank of CR and conservatism determinants

Variable	Correlation
Leverage	0.064***
	(0.000)
MB	−0.0031
	(0.578)
TACC	−0.048***
	(0.000)
Loss	0.078***
	(0.000)
STD_RET	0.062***
	(0.000)
MV	−0.018***
	(0.001)

Panel B: Means of variables by rank of CR

RANKCR	Leverage	TACC	STD_TACC	Loss	STD_ROE	STD_RET
1	0.256	−0.021	0.065	0.101	0.108	0.117
2	0.264	−0.028	0.069	0.187	0.123	0.123
3	0.287	−0.035	0.073	0.346	0.149	0.129
4	0.299	−0.044	0.077	0.396	0.195	0.134
5	0.288	−0.031	0.073	0.179	0.186	0.127

Panel C: Stability of CR at the firm level

Period t	Period t + 1		
	High	Medium	Low
High	0.43	0.31	0.25
Medium	0.27	0.40	0.34
Low	0.22	0.30	0.48

Ranks the conservatism ratio (CR) by quintiles with the lowest (highest) quintile exhibiting the lowest (highest) degree of conservatism. The sample is restricted to firms with negative unexpected returns (33,956 observations)

Panel A presents the correlation of the rank of CR with selected variables. STD_RET is standard deviation of monthly stock returns in the previous 3 years. DLOSS is an indicator variable with one if the firm reports negative income before extraordinary items and zero otherwise. TACC is total accruals. MB is the market-to-book ratio

Panel B shows the means of selected variables by the rank of CR. STD_TACC (STD_ROE) is the standard deviation of total accruals (ROE) within each quintile of CR

Panel C shows the frequency table of the rank of CR. CR is ranked by terciles of high, medium, and low conservatism for period t and period t + 1. The table entries show the proportions frequencies. For example, the upper left cell (High conservatism in period t and high conservatism in period t + 1) indicates that 43% of the companies that were classified as high conservatism firms in period t are classified as high conservatism firms in period t + 1

*** Indicate significance level of 1%

timeliness measure and the market to book ratio (MB), a measure of overall conservatism (Ryan 2006). This result suggests that unconditional and conditional conservatism are substitutes for each other. In contrast, Roychowdhury and Watts (2007) provide evidence that asymmetric timeliness better captures overall conservatism when it is measured over multiple years and the relation is positive. Thus, we have no prediction regarding the correlation between CR and MB. The relation between size and degree of conservatism is also ambiguous ex ante. On one hand, larger firms face lower operational uncertainty and therefore lower demand for conservatism. On the other hand, larger firms are likely to have more resources and are subject to greater litigation risk, which increases the demand for conservatism.

With the exception of the MB ratio, the univariate correlations in Panel A are all highly statistically significant and consistent with the above predictions. The degree of conservatism is positively correlated with leverage, the incidence of losses, and the standard deviation of returns, and negatively correlated with the total accruals and firm size. The latter correlation suggest that smaller firms are more conservative consistent with greater operational uncertainty. The correlation with the market-to-book ratio is close to zero and not statistically significant.

Panel B shows the means of the variables in Panel A for each quintile of the rank of CR. The results tend to confirm the findings of Panel A. Specifically, except for quintile 5, leverage, the volatility of returns, and the incidence of losses (total accruals) are almost monotonically increasing (decreasing) with the rank of CR. In addition, this panel shows that the volatility of accruals and the volatility of ROE increase almost monotonically with the rank of CR, consistent with Givoly et al. (2007) who argue that conservatism is manifested partly in greater volatility of accruals and profitability.

Givoly et al. (2007) also argue that since conservatism is a policy variable, it should be reasonably stable over time at the firm level. Panel C provides evidence on the stability of the rank of CR. CR is ranked by terciles of high, medium, and low degrees of conservatism for period t and period t + 1. The diagonal shows that CR is fairly stable. For example, high, medium, and low CR's in period t have a probability of 43, 40, and 48%, respectively, of remaining in the same tercile in period t + 1.[44] These results are highly significant ($\chi^2 = 523$, $p = 0.00$).

7 Conclusion

This paper analyzes the nonlinear pricing of conservatism using the return decomposition model of Vuolteenaho (2002) and investigates the pricing implications of special items, one of the major accrual items through which conservatism is facilitated. Consistent with implications of accounting conservatism for revisions in security returns, we show empirically that there is a significant nonlinear relation

[44] Although the degree conservatism is expected to be stable over time, it should not be too stable if only because CR is a function of the relative shock of earnings to unexpected returns (see Eq. 15), which varies substantially over time even at the firm level.

between revisions to equity returns and revisions to expected current and future cash flows (earnings news). In particular, revisions to equity returns are more highly associated with negative earnings news than with positive earnings news. Our analysis of conservative accounting also implies that revisions to equity returns are a nonlinear function of special items such that revisions to equity returns are either more highly positively correlated with negative special items than with positive special items or revisions to equity returns are uncorrelated with special items. The empirical results confirm this conjecture as well. Our results imply that special items are an imperfect and noisy measure of revisions to expected future cash flows by comparison to earnings news, consistent with our conceptual analysis.

Future research should try to control for a number of potential measurement issues that may be affecting these results. First, reporting special items as a separate line item, especially before the mid-1990s, may have involved extensive self-selection by managers. Riedl (2004) reports on a survey by the Financial Executives Institute from 1991, which shows that 52% of write-offs were not included as special items (see also Riedl and Srinivasan 2007). This suggests that firms self select into reporting special items (within GAAP enforcement constraints). Hence, we expect and observe that most special items will be negative to encourage investors to view them as one-time or non-recurring items. This self-selection process suggests that it may prove interesting and fruitful to examine extreme discretionary accruals in place of special items as an alternative measure of conditional conservatism. Of course, discretionary accruals, like special items, can also be used as an earnings management tool. Second, the literature reveals that not all special items are homogeneous and that, subject to data limitations, it may be useful to split special items into their component parts.

This paper also develops a new direct metric of conservatism at the firm-year level based on the Vuolteenaho (2002) model. This conservatism ratio (CR) is computed as the ratio of the current earnings shock to earnings news. Hence, CR shows how much of the total shock to expected current and future earnings (cash flows) over the lifetime of the firm is recognized in current year earnings. Focusing on positive CR's, we find that a greater proportion of the shock to earnings is recognized in the current period when the shock is negative than when the shock is positive, consistent with conservative accounting. In addition, we show that the degree of conservatism, formed on the basis of CR, is positively related to leverage and the volatility of returns, consistent with conservatism being determined by the asymmetric information in debt and equity contracts. The degree of conservatism is also negatively related to total accruals and size, and positively related to the volatility of accruals and the volatility of ROE. CR is also fairly stable over time as would be expected for a conservatism measure.

The conservatism ratio has potential for future research. One can use this measure of conservatism both for cross-sectional and time-series analyses. For instance, researchers can examine how cross-sectional differences in conservatism relate to factors that affect the reporting choices of the firm such as governance, auditor independence, or compensation. Another avenue for research is to investigate how the time-series properties of the degree of conservatism change

with external factors such as new regulation (for example, new accounting standards, Sarbanes-Oxley, etc.).

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Appendix: A numerical example to illustrate the conceptual analysis in Sect. 3

The following numerical example is used to illustrate the conceptual analysis.

	Benchmark		Scenario 1		Scenario 2		Scenario 3	
	t = 0	t = 1	t = 2	t = 3	t = 2	t = 3	t = 2	t = 3
CF	−30,000	13,139	11,825	9,854	14,453	16,424	14,453	16,424
NI	–	3,139	2,365	5,326	6,424	10,859	6,424	10,859
MS	–	13,139	26,936	40,830	29,563	50,422	29,563	50,422
PPE-BV	30,000	20,000	8,569	0	10,000	0	10,000	0
PPE-MV	30,000	21,361	8,569	0	14,282	0	14,282	0
BV	30,000	33,139	35,505	40,830	39,563	50,422	39,563	50,422
MV	30,000	34,500	35,505	40,830	43,845	50,422	43,845	50,422
$Ne = \Delta E(ROE) * BV_{t-1}$	–	0	−4,266	0	1,314	3,285	1,314	3,285
DEL(MV)	–	0	−4,170	0	1,314	3,285	4,170	0
SI	–	0	−1,431	0	0	0	0	0
COC (%)	–	15	15	15	15	15	15	15
RET (%)	–	15	3	15	19	23	27	15
$r_t - E_{t-1}(r_t)$ (%)	–	0	−12	0	4	8	12	0

Consider a new all-equity firm that invests \$30,000 in a depreciable plant at t = 0. The firm's cost of capital (COC) is an intertemporally constant 15%. The plant earns expected cash returns of \$13,139 (end of year) for each of three periods and then costlessly liquidates. Cash returns from plant activity are invested in marketable securities that earn the firm's cost of capital.[45] The firm depreciates the asset using the straight-line method. There are no taxes. Given these data, the present value of the plant and its market value at t = 0 is \$30,000. An investor would earn an internal rate of return of 15% on the investment. Each period the financial report shows a straight-line depreciation expense accrual of \$10,000. The

[45] The assumption that free cash flows remain invested in the firm and are not paid out as dividends adds additional illustrative complexity to the analysis.

stock price rises by 15% a year. See the Benchmark scenario in the table above for details regarding period 0 and period 1.[46]

Scenario 1 is similar to the benchmark scenario with one major difference. Just before publication of the financial report at $t = 2$, management discovers that cash flows for the period are 10% lower than expected, \$11,825 instead of \$13,139, and consequently revises downwards its estimates of expected future plant cash flows from \$13,139 to \$9,854 at $t = 3$, a reduction of 25% from the benchmark scenario. The carrying value of PPE at $t = 2$ before the change in estimate is \$10,000 whereas the (revised) undiscounted future cash flows from the asset are \$9,854. Since the carrying value of PPE is less than the undiscounted future cash flows, an impairment is recognized under current GAAP and a special accrual of $-1{,}431 = (9{,}854/(1.15) - 10{,}000)$ is recorded to bring PPE down to its market value of \$8,569. In contrast, earnings news (Ne), the reduction in the value of the firm over its remaining lifetime due to the revision of expected future cash flows, is −\$4,266, closely corresponding to the unexpected change in market value (DEL(MV)) of −\$4,170 (=35,505–39,675).[47] The reduction in market value translates into a revision in expected returns ($r_t - E_{t-1}(r_t)$) of −12% relative to the benchmark scenario. Note that the change in the market value of the firm is comprised of a reduction in the market value of PPE of −\$2,856 (=8,569–11,425) and of a reduction in the end of year balance of marketable securities of −\$1,314 (=26,396–28,250). Of course, whether this negative earnings shock is fully reflected in equity returns in the current period depends upon whether shareholders learn of the downward revision of expected cash flows. Absent non-accounting sources of information, the primary source of information to the equity market regarding the downward revision in future cash flows is the recorded special item.

Scenario 1 raises a measurement issue. The recorded special item is only −\$1,431 while the reduction in equity value is the earnings news of −\$4,170, a difference of −\$2,739. This difference has two sources: (1) the difference between the carrying value of the asset and its market value of $-\$1{,}425 = (10{,}000–11{,}425)$, caused by a (straight-line) depreciation policy that differs from economic depreciation, and (2) the reduction in the investment in marketable securities due to the reduced operational cash flows of −\$1,314, caused by the less than 100% dividend payout ratio and the fact that the GAAP definition of special items does not include this opportunity cost.

[46] Net income (NI) equals cash flow (CF) minus depreciation expense plus investment income, computed as beginning-of-period balance of marketable securities (MS) multiplied by the cost of capital (COC). PPE-MV is computed as the present value of future cash flows. Finally, market value (MV) is computed as the sum of PPE-MV and MS.

[47] The small difference in the two numbers is due to the fact that earnings news is computed here somewhat inexactly but more simply as the sum of the changes in ROE multiplied by the beginning of period book value of equity over the life of the firm. Earnings news is defined more exactly in Sect. 4. Note that earnings news in Scenario 1 is computed based upon the period 2 report. This computation does not presuppose knowledge of the period 3 shock beyond the period 2 special items. In particular, given the asset writedown (special items) in period 2, plant cash flows in the next period equal the product of the asset value and COC. Moreover, the period 3 return on marketable securities (the beginning of the period balance of MS times COC) and depreciation expense are also known. Ultimately, special items are what link the period 3 shock to the period 2 report.

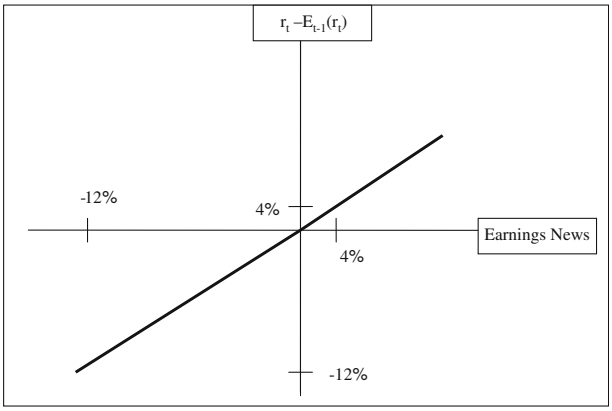

Fig. 1 The relation between revisions to equity returns and earnings news information solely from accounting sources. The figure shows the linear relation between revisions to equity returns and earnings news when accounting reports are the sole source of news for equity market participants. The numbers in the figure are obtained from Scenarios 1 and 2. Note that dollar earnings news numbers in the Scenarios table of the Appendix are converted to percentages in this and subsequent figures by dividing the dollar earnings news by beginning of period book value of equity. Hence, the earnings news in the figure equals the sum of the unexpected changes in ROE as per footnote 51

The comparison of Scenario 1 with the benchmark scenario is illustrative. First, the conventional earnings surprise is an incomplete measure of the news event, because the change in market value is determined both by revisions to current cash flows (the conventional earnings surprise) in period 2 *and* revision to expected future cash flows in period 3. Indeed, the conventional earnings surprise of −$2,745 (=2,365–5,110) understates the overall shock to future cash flows, while earnings news captures the total shock to future cash flows. Second, bad news is defined by the revision to period 2 returns of −12% (=3−15%) and not by the period 2 return of 3%. Therefore, an analysis using raw returns is potentially misspecified. Third, the special items accrual significantly understates earnings news and the revision to equity returns.[48] This scenario indicates that while earnings news and the revision in equity returns are perfectly positively correlated, special items are less than perfectly positively correlated with either earnings news or the revision in equity returns, despite the fact that special items signal and provide information about the shock to future cash flows to shareholders. Further, the accounting recognition of special items is subject to GAAP, which may allow recognition only if specific criteria are met. As such, special items are not a perfect proxy either for earnings news or the revision to equity returns.

Scenario 2 illustrates a positive earnings news event. Again, it is assumed that accounting reports are the only source of information about shocks to future cash flows. Instead of expecting cash flows to decrease, management expects cash flows

[48] Of course, if the firm adopts a depreciation policy such that book depreciation is less than economic depreciation, the special item could potentially overstate earnings news and the revision in equity values, although this is unlikely. It is even more unlikely if free cash flows are not paid out as dividends. More often than not, the historical cost basis of asset value understates market value, so that special items are likely to understate earnings news and the revision to equity values.

to increase 10% relative to the benchmark at t = 2, from \$13,139 to \$14,453, and 25% relative to the benchmark at t = 3, from \$13,139 to \$16,424. Thus, Scenario 2 is completely symmetric to Scenario 1 but with positive shocks to future cash flows. Absent accrual information on the gains because of conservatism and absent external sources of information about the shock, shareholders do not learn about the new situation until the cash flows are realized (that is, no positive special items are recognized). In this scenario, earnings news (unexpected change in market value) is \$1,314 (\$1,314) in period 2 and \$3,229 (\$3,285) in period 3, resulting in unexpected returns of 4 and 8%, respectively. Thus, under this scenario, there is no association between special items and earnings news and between special items and the revision in equity returns. The revision in equity returns is (perfectly) positively associated with earnings news.[49]

Figure 1 illustrates the relation between the revision to returns and earnings news for Scenarios 1 and 2 assuming unrealistically that accounting reports are the only source of information for equity markets. Since accounting reports are the only source of news, the revision in returns are necessarily *linearly* related to earnings news, although because of conservatism negative news has a greater impact on returns than positive news (−12 vs. 4%).[50]

Once we allow for alternative sources of information for positive shocks, the relation between the revision to returns and earnings news become nonlinear.[51] The case of negative earnings shocks (Scenario 1) remains unchanged since in that case all the relevant information is available to the equity markets from the accounts anyway. What does change is the case of positive earnings shocks (Scenario 2). Scenario 3 shows what happens when accounting reports are not the only source of information for the capital markets in the case of positive earnings shocks. Because of the information from non-accounting sources, shareholders learn at t = 2 of management's expectations of future cash flow increases. Consequently, *returns* adjust fully at t = 2 to the positive news. Period 2 returns increase from 15 to 28% to reflect expected cash flow changes in both periods 2 and 3 (\$4,170). In contrast, under conservative accounting, the accounts are unaffected by the change in expectations about future cash flow increases so that earnings news and special items are unchanged from Scenario 2. A comparison of Scenarios 1 and 3 shows that alternative non-accounting sources of information about positive firm shocks and

[49] Scenario 2 assumes that no positive special items are recorded. However, as noted above, under GAAP, positive special items are sometimes recognized when earnings news is positive so that empirically one should expect a weak correlation between special items and positive earnings news and special items and the revision in returns.

[50] We convert dollar earnings news to a percentage by dividing the dollar earnings news by beginning of the period book value of equity. For example, in Scenario 2 the percentage earnings news equals 4% (=1,314/33,139). The percentage earnings news equals (by construction) unexpected ROE. The expected ROE is 15.4% (=5,110/33,139, see Benchmark Scenario), and the actual ROE is 19.4% (=6,424/33,139).

[51] The nonlinearity result is robust to allowing non-accounting information to also inform about negative shocks. But, in that case, accounting might be irrelevant (or dominated) to the extent that external sources provide similar information about negative shocks and better information about positive shocks. More realistically, the more conservative the accounting system, the more likely is management to provide more timely information about negative shocks and the non-accounting system to provide better information about positive shocks. In that case, nonlinearity obtains and accounting matters.

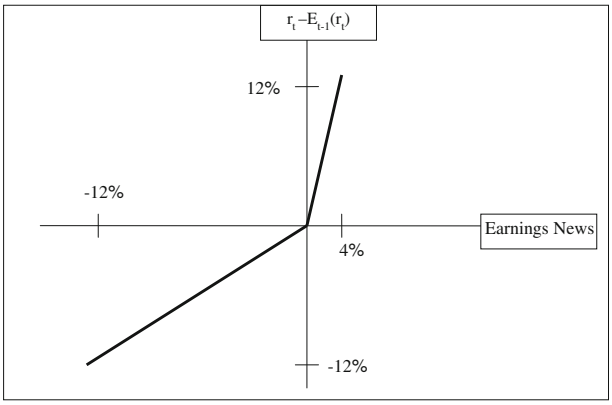

Fig. 2 The relation between revisions to equity returns and earnings news information from accounting and non-accounting sources. The figure shows the nonlinear convex relation between revisions to equity returns and earnings news when equity market participants are privy to firm news from non-accounting sources as well as accounting reports. The numbers in the figure are obtained from Scenarios 1 and 3

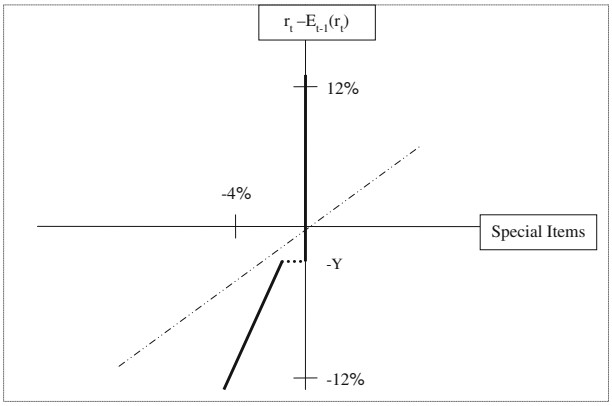

Fig. 3 The relation between revisions to equity returns and special items. The figure shows the nonlinear quasi-convex relation between revisions to equity returns and special items. The numbers in the figure are obtained from Scenarios 1 and 3. Note that we convert the dollar special Item numbers in the Scenarios Table to percentages by scaling special items by beginning of period book value of equity. By assumption, the book value of the asset is less than undiscounted future cash flows from −Y to the origin on the vertical axis, so that special items are zero (the asset is recoverable) as illustrated by Scenario 3. The 45° (dashed) line going through the origin facilitates comparison with Fig. 1

conservative accounting in tandem create a nonlinear convex relation between revisions in returns and earnings news (see Fig. 2).[52]

The relation between revisions in returns and special items (see Fig. 3) is discontinuous and quasi-convex irrespective of external sources of information.[53]

[52] Regarding an analytical proof, see footnote 17.

[53] The numbers in Fig. 3 are based on Scenarios 1 and 3. Scenarios 1 and 2 yield the same qualitative result except that unexpected returns will be a bit more than 4% instead of 12% in the positive quadrant.

This is because special items in our scenarios are uniformly zero for positive shocks. Even under GAAP, special items typically understate the revision in returns for positive news shocks, yielding a nonlinear relation whether or not securities adjust fully to positive news.

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