Comparing the Value Relevance, Predictive Value, and Persistence of Other Comprehensive Income and Special Items

Denise A. Jones
Kimberly J. Smith
The College of William & Mary

ABSTRACT: Gains and losses reported as other comprehensive income (OCI) and as special items (SI) are often viewed as similar in nature: transitory items with little ability to predict future cash flows and minimal implications for company value. However, current accounting standards require SI gains and losses to be recognized in net income, while OCI gains and losses are deferred until realized. This study empirically compares OCI and SI gains and losses using a model that jointly estimates value relevance, predictive value, and persistence. Results show that both SI and OCI gains and losses are value-relevant, but SI gains and losses exhibit zero persistence (i.e., are transitory), while OCI gains and losses exhibit negative persistence (i.e., partially reverse over time). Further, we find that SI gains and losses have strong predictive value for forecasting both future net income and future cash flows, while OCI gains and losses have weaker predictive value.

Keywords: other comprehensive income; special items; financial statement presentation; value relevance; persistence; predictive value.

Data Availability: All data are publicly available from sources indicated in the text.

I. INTRODUCTION

For many years, standard-setters have allowed certain gains and losses to be deferred and reported as other comprehensive income (OCI), while requiring income statement recognition of gains and losses referred to as special items (SI). The primary argument offered for deferring OCI gains and losses is that they are often related to volatile fluctuations in

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market conditions and are viewed as transitory, limiting their usefulness for predicting future cash flows and firm values (Linsmeier et al. 1997; Barker 2004; Chambers et al. 2007; Yen et al. 2007; Bamber et al. 2010). However, many types of SI gains and losses are also viewed as transitory (e.g., Elliott and Shaw 1988; Fairfield et al. 1996; Burgstahler et al. 2002), therefore making it difficult to justify the different accounting treatments for SI and OCI gains and losses.

Further differences occur in terms of presentation, as the majority of companies do not choose to report OCI gains and losses in a primary statement of financial performance (Bamber et al. 2010). During deliberations related to the joint Financial Accounting Standards Board (FASB) and International Accounting Standards Board (IASB) project on Financial Statement Presentation, the Boards agreed that financial reporting would be improved by requiring companies to present a single Statement of Comprehensive Income that appends a separate section for OCI gains and losses to the traditional income statement. Yet, some FASB board members stated that they do not endorse the continued separation of OCI gains and losses (from net income) in the proposed single statement, and that the division between OCI and net income must be addressed in future standards.¹

However, a decision to recognize OCI gains and losses as components of net income is not simple in terms of implementation, and includes questions about how much detailed information to present about OCI gains and losses, as well as where to present this information. For example, the Boards have discussed whether an OCI gain or loss (e.g., a derivative gain) should be reported as a separate line item (i.e., similar to an SI gain or loss), or integrated with the component of income to which it relates (e.g., cost of goods sold).² If integrated, should the line item (e.g., cost of goods sold) be presented only as a single total, or should detailed information about the various components be presented? If the latter, what details should be presented, and should they be presented on the face of the Statement of Comprehensive Income (e.g., parenthetically) or in the notes to the financial statements? The Boards have discussed making decisions about presentation issues such as these based on a “disaggregation objective”—that is, in the context of whether items exhibit differences in persistence and/or predictive value.³

We believe that future decision-making related to OCI and SI gains and losses can be informed by investigating whether and how OCI gains and losses differ from SI gains and losses, and how both compare to net income and cash flows. We present the results of a systematic empirical study comparing the value relevance, persistence, and predictive value of OCI and SI gains and losses.⁴ Our dataset for this study consists of a panel of 236 companies that meet certain data requirements for the 1986–2005 time frame.

Our empirical analysis is based on estimating two systems of equations. The first includes equations for company stock returns, net income before special items (NI/C0SI), OCI, and SI. The second further partitions NI/C0SI into cash flows (CF) and accruals (ACC). We use the estimated coefficients from these systems to calculate dynamic responses, which are partial derivatives that represent the value relevance, persistence, and predictive value of shocks to OCI and SI.⁵ We believe our results contribute both to the standard-setting process and to the academic literature.

¹ For example, see the minutes of the June 18, 2008 FASB board meeting at: http://www.fasb.org/board_meeting_minutes/06-18-08_fsp.pdf
² For example, see the discussion on page 4 of Agenda Paper #2 for the September 14, 2007 Financial Statement Presentation Meeting at: http://www.fasb.org/project/09-14-07_jig_fiag.pdf
³ For example, see the minutes of the March 21, 2007 board meeting (http://www.fasb.org/board_meeting_minutes/03-21-07_fsp.pdf) or the preliminary views discussion paper (FASB 2008a, para. S11).
⁴ Similar to Lipe (1986), we use the term persistence to capture the ability of an item to predict future values of itself. We use the term predictive value to capture the ability of an item to predict future earnings or cash flows. This latter concept is sometimes referred to in the literature as the persistence of an item with respect to future earnings (e.g., Sloan 1996; Cready et al. 2010).
⁵ We use the term “response” in the time-series sense, to denote the partial derivatives of current and/or future values of one variable with respect to a current unexpected change (i.e., shock) in another variable. See Boschen and Smith (1995) and Boschen et al. (2003) for other examples using this type of analysis.
We find that OCI gains and losses, SI gains and losses, NI – SI, and CF are all value-relevant. However, the value relevance of OCI gains and losses is significantly smaller than the value relevance of SI gains and losses, NI – SI, and CF. If standard-setters were to decide that all value-relevant gains and losses should be recognized as components of net income (Barth et al. 2001a; Holthausen and Watts 2001), then our results could be viewed as support for recognizing both OCI and SI gains and losses in net income. In addition, if standard-setters were to require disaggregated presentation for gains and losses with differing magnitudes of value relevance, then our results could be viewed as support for presenting disaggregated information about OCI gains and losses (i.e., separately from SI gains and losses and NI – SI).

We find that SI gains and losses exhibit zero persistence (i.e., are transitory). In contrast, we find that OCI gains and losses are not transitory, but exhibit negative persistence (i.e., partially reverse over time). Thus, we conclude that SI and OCI gains and losses are intrinsically different from each other in terms of their persistence. Furthermore, OCI and SI gains and losses are very different from NI – SI and CF, both of which are strongly positively persistent. If standard-setters were to decide that only gains and losses with positive persistence should be recognized as components of net income (Black 1993), then our results could be viewed as support for including neither OCI nor SI gains and losses in net income. In addition, if standard-setters were to decide that disaggregated data should be presented for gains and losses with substantially different levels of persistence, our results could be viewed as support for presenting disaggregated information about both OCI and SI gains and losses (i.e., separately from each other and from NI – SI).

Finally, with respect to predictive value, we find that SI gains and losses are positively and significantly associated with future NI – SI, as well as future CF, for at least five years into the future. OCI gains and losses predict future NI – SI, but only one year ahead. OCI gains and losses also predict future CF, but the responses are much smaller, and their significance varies. If standard-setters were to decide that only gains and losses with predictive value for future cash flows should be recognized as components of net income, then our results could be viewed as support for including SI gains and losses in net income, but the support for including OCI gains and losses would be more questionable. If standard-setters were to prescribe disaggregated presentation for gains and losses with different predictive values, as they propose in their recent discussion paper (FASB 2008a, 10), then our results could be viewed as support for presenting disaggregated information about OCI gains and losses (i.e., separately from SI gains and losses and NI – SI).

Overall, by integrating tests of the value relevance, persistence, and predictive value of SI and OCI gains and losses, this study extends academic research on the usefulness of disaggregating components of net income by comparing SI gains and losses to OCI gains and losses (see, e.g., Lipe 1986; Fairfield et al. 1996; Sloan 1996; Barth et al. 1999; Ohlson 1999; Barth et al. 2001b; Burgstahler et al. 2002; Dechow and Ge 2006; Cready et al. 2010). Further, we extend the academic literature on the value relevance of OCI gains and losses, which has found mixed results. Specifically, we document significant value relevance for OCI gains and losses, albeit smaller in magnitude than that of SI. We also extend this literature by directly examining the persistence and predictive value of OCI gains and losses over the long run. Finally, we document an important finding that the persistence of SI and OCI gains and losses, commonly thought of as similarly transitory, are in fact different.

Section II reviews the accounting guidance for OCI and SI gains and losses, as well as the related academic literature. Section III describes our sample and data. Section IV presents our empirical analysis and related robustness testing. Section V concludes.

6 Note that under current Generally Accepted Accounting Principles, SI gains and losses are components of net income, while OCI gains and losses are not. However, OCI gains and losses are similar to the components of net income in that they are also a component of non-owner changes in equity.
II. BACKGROUND

Agreement has generally existed that realized gains and losses should be recognized in net income immediately. Developing accounting rules for unrealized gains and losses has proven more challenging (SEC 2008). Current accounting guidance requires that some unrealized gains and losses be treated similarly to realized gains and losses (i.e., to be recognized in net income), but allows other unrealized gains and losses to be treated differently (i.e., to be deferred as OCI).

Infrequent or unusual gains and losses that are separately reported in net income (whether realized or unrealized) are coded by Compustat as special items (SI), and include realized gains and losses from the sale of assets and investments, unrealized impairment write-offs, and realized or unrealized restructuring charges, merger costs, settlements, and other accrued items (Elliott and Hanna 1996; Kinney and Trezevant 1997; Bradshaw and Sloan 2002; Cready et al. 2010). Gains and losses that are reported as OCI include four types of gains and losses during our sample period: unrealized changes in the fair value of marketable securities classified as available-for-sale (SFAS No. 12, effective 1975; SFAS No. 115, effective 1994), foreign currency translation adjustments (SFAS No. 52, effective 1983), additional minimum pension liability adjustments (SFAS No. 87, effective 1987 with early adoption), and changes in the fair value of derivative instruments classified as cash flow hedges (SFAS No. 133, effective 2001 with early adoption) (FASB 1975, 1981, 1985, 1993, 1998). These OCI gains and losses are deferred in the balance sheet account “Accumulated Other Comprehensive Income” (AOCI) until realization occurs.

Both SI and OCI gains and losses are viewed by many as transitory (i.e., exhibiting zero persistence), and thus not useful for predicting future cash flows (i.e., exhibiting minimal predictive value) and company value (i.e., exhibiting minimal value relevance). If these views are valid, then our current guidance results in different accounting treatments for similar items. The deferral of gains and losses as OCI has expanded over time due to increased interest in remeasuring certain balance sheet items subsequent to the initial recognition date, specifically those items that standard-setters viewed as being sufficiently important and having sufficiently reliable measurements. The most hotly debated aspect of this guidance has been where to reflect changes in the remeasured balance sheet accounts. OCI treatment was developed because these changes were argued to be too volatile to be a useful component of net income. However, significant concerns have also been raised about the use of OCI to manage earnings.8

As noted earlier, the FASB and IASB have been working to improve financial statement presentation, and the FASB has discussed basing their decisions about financial presentation on a “disaggregation objective”—that is, disaggregating items that exhibit differences in persistence or predictive value. This is consistent with the ideas of Ohlson (1999) that value relevance, persistence (ability to predict future values of itself), and predictive value (forecasting relevance) are important in evaluating earnings components. Below we review the literature on the value relevance, persistence, and predictive value of OCI and SI.

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7 Current international accounting standards allow additional items to receive similar treatment, such as revaluations of certain fixed assets. In addition, subsequent to our sample period, the computation of OCI related to pensions changed dramatically, as did the accounting for changes in the fair value of debt securities that are other than temporarily impaired.

8 For example, in SFAS No. 115, two dissenting members of the Board raised concerns about the use of OCI to manage earnings, and stated that this accounting would “provide the opportunity for the managers of an enterprise to manage its earnings by selectively selling securities and thereby selectively including realized gains in earnings and selectively excluding unrealized losses from earnings” (FASB 1993). More recently Graham et al. (2005) presents a survey of CFOs, 78 percent of whom admit to sacrificing long-term value to smooth earnings, and 20 percent of whom agree or strongly agree that they would sell investments to recognize gains this quarter.
Value Relevance

Prior research has documented that SI gains and losses are value-relevant (i.e., associated with stock returns), although the magnitude of the stock market response is found to be smaller than that for earnings before special items (Elliott and Shaw 1988; Elliott and Hanna 1996; Cready et al. 2010). Studies examining the value relevance of OCI gains and losses, as well as the individual components of OCI, have found mixed results (Barth 1994; Soo and Soo 1994; Ahmed and Takeda 1995; Bartov 1997; Dhaliwal et al. 1999; O’Hanlon and Pope 1999; Seow and Tam 2002; Louis 2003; Ahmed et al. 2006; Chambers et al. 2007; Kanagaretnam et al. 2009). Dhaliwal et al. (1999) construct as if OCI using Compustat data over the 1994 to 1995 time period, and find no clear evidence that comprehensive income (defined as NI + OCI) is more strongly associated with stock returns than is net income. In contrast, using hand-collected as reported OCI data in the post-SFAS No. 130 (FASB 1997) time period (1998 to 2003), Kanagaretnam et al. (2009) find that comprehensive income is more strongly associated with stock returns than is net income, and Chambers et al. (2007) find a dollar-for-dollar association between OCI and stock returns that is consistent with Ohlson’s (1999) expectations for transitory items.

Persistence

Lipe (1986) finds that different components of earnings have different persistence, and that the magnitude of the market reaction to the individual components of earnings is related to the specific persistence of each component. Researchers have generally assumed SI gains and losses to be transitory, that is, to have zero persistence (Fairfield et al. 1996; Bradshaw and Sloan 2002; Burgstahler et al. 2002). For example, Bradshaw and Sloan (2002) find that SI gains and losses are highly correlated with nonrecurring charges excluded from GAAP earnings by analysts.

Researchers have also generally assumed OCI gains and losses to be transitory (Linsmeier et al. 1997; Barker 2004; Chambers et al. 2007; Yen et al. 2007; Bamber et al. 2010), but for different reasons. Although special items are related to changes in economic conditions, a given item (e.g., a specific machine) does not typically produce an SI gain or loss every period. In contrast, assets and liabilities yielding OCI gains and losses are revalued each period, so OCI gains and losses will recur over time for the same asset or liability. As an example, available-for-sale securities are marked to market at the end of each period as securities prices change. However, if capital markets are efficient, then current available-for-sale gains and losses should not predict future available-for-sale gains and losses.

Nevertheless, there is evidence that SI and OCI gains and losses may not necessarily be transitory. Specifically, Elliott and Hanna (1996), Francis et al. (1996), and Cready et al. (2010) find that certain special items recur over time. Cready et al. (2010, 1579) find evidence “consistent with the idea that managers find it attractive to classify ordinary recurring operating expenses as ‘special items.’”9 OCI gains and losses may also not be transitory. Management makes choices related to the selection of investments and the timing of asset sales/repatriations, as well as the funding of pension plans and the duration of derivatives contracts (e.g., Lee et al. 2006). As a result, OCI gains and losses may reflect more than just unpredictable changes in market conditions.

Adding to the complexity, cumulative OCI gains or losses will “recycle” when the asset is sold or the liability settled. For example, if an available-for-sale security is sold for a (cumulative) gain, then this gain will be removed from AOCI on the balance sheet and be reported as a negative

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9 Note that Cready et al. (2010) do not empirically estimate our measure of persistence (i.e., the relation between current and future values of SI). Rather, they use SI frequencies as interaction terms in a regression of future net income on contemporaneous SI and NI – SI. Thus, the recurring SI gains and losses reported by Cready et al. (2010) may or may not exhibit persistence as we define it.
component of OCI, while also being recognized as a positive component of net income, and as a cash inflow.\textsuperscript{10} This artifact of the current accounting treatment for OCI gains and losses could lead to negative persistence if recycling occurs regularly.\textsuperscript{11}

On the other hand, OCI gains and losses may remain on the balance sheet for years before the underlying asset is sold or the liability settled. For example, Moody’s considers the foreign currency translation adjustment to be a permanent component of stockholder equity on the balance sheet (i.e., AOCI); these items are not expected to be realized and thus their gains and losses are not expected to be recycled and recognized as income (Emrick 2006). Thus, a gain in the current period could be associated with a loss in a future period (i.e., negative persistence), another gain in the future (i.e., positive persistence), or neither. We conclude that it is unclear \textit{ex ante} what the persistence of SI and OCI gains and losses will be.

**Predictive Value**

Studies have shown that different components of earnings have different predictive value (Finger 1994; Sloan 1996; Fairfield et al. 1996; Dechow and Ge 2006), and that disaggregating earnings into components enhances the prediction of future performance (Fairfield et al. 1996; Barth et al. 2001b). Studies document a positive relation between special items and future net income, although the coefficient on SI gains and losses is smaller than the coefficients on net income, operating income, and total accruals excluding special items (e.g., Fairfield et al. 1996; Burgstahler et al. 2002; Dechow and Ge 2006; Fairfield et al. 2009). In addition, Cready et al. (2010) find that the ability of negative special items to predict future earnings is higher when the company has reported negative special items in prior quarters.

In contrast, there is no direct evidence about the predictive value of OCI.\textsuperscript{12} Skinner (1999) argues that OCI gains or losses should not have implications for future operating performance or future cash flows, because past changes in the value of OCI gains and losses have no implications for future changes, and so are unlikely to be related to future cash flows. Alternatively, Ohlson (1999, 154) demonstrates analytically how current gains from a forward contract (or other gain or loss) may not predict future gains from the forward contract (i.e., exhibit zero persistence), but may still predict future earnings (see also FASB 2008b, ¶QC4). If an OCI gain or loss substantially reverses before it is realized, it seems reasonable to expect no future cash flow consequences. However, if OCI gains and losses accumulate on the balance sheet for several years and then an

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\textsuperscript{10} Although companies are expected to report ongoing unrealized gains and losses separately from the recycled gains and losses (i.e., the reclassifications), in practice very few companies provide adequate detail to allow the successful partition of unrealized gains and losses versus reclassifications. Therefore, most OCI data available to financial statement users are the net of these two items, and thus it is important to consider the net OCI (i.e., unrealized gains and losses net of reclassifications).

\textsuperscript{11} Consider a simple scenario where an available-for-sale security is purchased for $100, increases in value by $25 during the first year, holds that value for two more years, and then is sold for $125. In the first year, the $25 gain would be recorded as an OCI gain. However, OCI for years two and three would be zero, and so the $25 gain could be viewed as transitory. But, since the $25 is recycled out of AOCI upon sale, and recognized as a gain in net income, the OCI amount for year three is $25. Thus, in this scenario, OCI would have zero persistence in the short run, but 100 percent negative persistence in the long run, i.e., the $25 gain in year one would reverse in year three.

\textsuperscript{12} There is some limited evidence about the predictive value of net income versus comprehensive income. Dhaliwal et al. (1999) find that net income is more strongly associated with one-year-ahead cash flows than is comprehensive income. In contrast, Kanagaratnam et al. (2009) find that comprehensive income is more strongly associated with one-year-ahead cash flows than is net income. In addition, O’Hanlon and Pope (1999) make the point that due to timing differences in the recognition of events by the stock market and their recognition by the accounting system, tests based on annual data have very low power. It could be the case that a relation between OCI and future cash flows takes more than one year to develop.
In summary, OCI and SI gains and losses are similar, in that they both result from management choices about the selection of assets and liabilities, as well as choices about the timing of subsequent sales, settlements, and write-downs. However, we believe that the empirical evidence to date does not unequivocally support the contention that OCI and SI are transitory. Further, although research has shown that SI gains and losses predict future net income, the question of OCI’s predictive value remains open. Finally, while the value relevance of SI has been consistently documented, prior research on the value relevance of OCI has found mixed results. In the following section, we describe our approach to testing the persistence, predictive value, and value relevance of OCI and SI using a common sample and an integrated model.

III. SAMPLE AND DATA

Sample Selection

If detailed data about company assets and liabilities were consistently available, then we could select a sample of companies with assets and liabilities that exhibit the potential to yield SI and OCI gains and losses. Because OCI gains and losses result from recurring remeasurements of underlying assets and liabilities, we assume that companies with regular OCI gains and losses will have the requisite assets. However, we cannot assume the same for SI gains and losses, as they are often the result of nonrecurring valuation adjustments. As a result, we focus our sample selection on companies with OCI gains and losses. Further, although we recognize that it is important to understand the behavior and impact of OCI in a wide cross-section (see Dhaliwal et al. 1999; Biddle and Choi 2006), it is also important to understand these issues in companies where OCI is regularly reported and material in amount, as this latter group is particularly affected by changes in the accounting for OCI.13

We begin our sample selection by identifying all company-years in the Compustat database for the period 1976–2005 (i.e., beginning with the effective date of SFAS No. 12), eliminating company-years without corresponding CRSP data, companies with fiscal year-end changes, foreign filers, and flow-through entities. This process yields a possible sample of 14,435 companies. However, approximately 54 percent of these companies (n = 7,748) report no OCI gains or losses during the entire 1976–2005 time frame. Further, although the remaining 6,637 companies have some evidence of OCI gains or losses, many of these companies report OCI gains or losses only occasionally.14 Because we are testing dynamic relations in the data, it is important to have a complete time-series to give the empirical model its best chance to capture these relations. Alternatively stated, it is critical to minimize the likelihood that any lack of value relevance, predictive value, and/or persistence results from selecting companies with only intermittent occurrences of OCI gains or losses, or with unusually low occurrences of special items.

13 For example, Dhaliwal et al. (1999) analyze all 1994–1995 firm-years with the necessary Compustat and CRSP data (n = 11,425 firm-years) and report that only 22.7 percent of the firm-years reflect gains and losses on available-for-sale securities, 26.4 percent reflect foreign currency adjustments, and 8.2 percent reflect pension gains and losses.

14 There is a very high correlation between the occurrence of the OCI gains and losses and the reporting of accumulated other comprehensive income (AOCI) on the balance sheet. More specifically, for the 6,637 companies with some evidence of OCI gains or losses, 95 percent of the observations have: (1) both AOCI and OCI or (2) neither AOCI nor OCI. In addition, very few companies (less than 0.5 percent of the 6,637 companies) have AOCI in every year and report an OCI flow in less than 50 percent of those years.
Another issue that affects our sample selection process is whether to use proxies for the OCI components based on Compustat data (referred to in the literature as as if data). Dhaliwal et al. (1999, footnote 9) note a high correlation between these Compustat proxies and hand-collected data from annual reports for the gains and losses related to available-for-sale securities (99 percent) and foreign currency translations (97 percent). However, they note a lower correlation for the pension component of OCI (40 percent). Further, Chambers et al. (2007) cite their use of hand-collected annual report data (as reported data) versus as if data as an important factor in their results. We made the decision to hand-collect certain OCI data based on these studies, and also to allow us to obtain direct measures of the OCI gains and losses related to derivatives. This decision is discussed further in the next section.

We obtain a final sample of 236 companies, which is the complete set of companies that report nonzero OCI gains or losses in each year for the 1986–2005 time frame. We settled on 1986 as our starting year because three of the four OCI components were in place as of that year. This sample balances the cost of hand-collecting data with the need for a relatively long time-series for each company. This approach makes our results less generalizable to companies with only infrequent occurrences of OCI. However, we believe that our sample fairly represents an important group of companies that are likely to be most affected by changes in the financial reporting of OCI gains and losses.

Because we are comparing OCI to SI, we are also concerned that our sample companies report special items. Due to the nature of special items, it would be unusual to find companies that report SI gains and losses every year. We find that 42 percent of our company-year observations include nonzero special items, which is in the range of the incidence of special items reported by other studies. Dechow and Schrand (2004) find that 25 percent of all Compustat companies report large special items (greater than 1 percent of total assets) in 2001, and Donelson et al. (2011) find that 50 percent of the 1,000 largest companies report large special items in 2001. Below we discuss our variable measurement, as well as our benchmarking of this sample to those of other studies.

Variable Measurement

Our primary data include company stock returns ($R$), net income ($NI$), cash flows ($CF$), accruals ($ACC$), SI gains and losses ($SI$), and OCI gains and losses ($OCI$). We define company stock returns as the buy-and-hold stock return reported by CRSP and cumulated over the 12-month period ending three months after the company’s fiscal year-end. We select this period to ensure that information on OCI reported in the company’s annual report is available to the market. We define net income as Compustat item #172 (net income after extraordinary items and discontinued operations), cash flows as Compustat item #308 (operating cash flows), accruals as net income less special items less cash flows, and special items as Compustat item #17. Following the predictive value literature, all variables except for stock returns are deflated by average total assets (Sloan 1996; Barth et al. 2001b; Dechow and Dichev 2002; Francis and Smith 2005; Kim and Kross 2005; Richardson et al. 2005; Dechow and Ge 2006). This choice of deflator is addressed later in the “Robustness Testing” section.

For the years 1998–2005, we hand-collected the individual components of OCI and total comprehensive income from 10-K filings; for the years 1986–1997, we use the as if data derived

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15 For years subsequent to 1988, the year that SFAS No. 95 became effective, we define $CF$ as Compustat data item #308. For years prior to 1988, following Francis et al. (2004), we define $CF$ as net income before extraordinary items (data item #18) less total accruals, where total accruals are defined as the change in current assets (data item #4) less the change in current liabilities (data item #5) less the change in cash (data item #1) plus the change in short-term debt (data item #34) less depreciation and amortization expense (data item #14). These two $CF$ measures are very highly correlated, with a correlation coefficient of 0.98 (p < 0.001).
from Compustat. We made this decision based on an analysis of a pilot sample consisting of the 100 largest U.S. companies in terms of market capitalization as of December 31, 2003 (35 percent of which remain in our current sample). In the analysis of this pilot sample, we compared hand-collected OCI data for the 1996–2003 time period with as if data derived from Compustat. We found that the as if data cannot be used to reliably measure the pension component of OCI beginning in 1998. In contrast, the correlations in our sample between our hand-collected data and the as if data for the pension component in 1996 and 1997 are 97 percent and 99 percent, respectively. Further, similar correlations for available-for-sale securities and foreign currency translation adjustments exceed 90 percent in almost all years.

Our OCI gains and losses are defined as follows (note that gains are defined to be positive and losses are defined to be negative):

\[ AFS = \text{change in the balance of unrealized gains and losses on marketable securities categorized as available-for-sale securities (hand-collected for 1998–2005; defined as the change in the Compustat variable “marketable securities adjustment” [item #238] for 1986–1997);} \]

\[ FC = \text{change in foreign currency translation adjustment (hand-collected for 1998–2005; defined as the change in the Compustat variable “retained earnings-cumulative translation adjustment” [item #230] for 1986–1997);} \]

\[ PEN = \text{change in the additional minimum pension liability in excess of unrecognized prior service cost, where increases are negative (hand-collected for 1998–2005; for 1986–1998 if the additional minimum pension liability exceeds the prior service cost, } PEN \text{ is defined as } -0.65 \times (\text{Compustat variable “pension-additional minimum liability” [item #298] less Compustat variable “pension-unrecognized prior service cost” [item #297]} \text{, and } 0 \text{ otherwise);} \]

\[ DER = \text{change in the balance of unrealized gains and losses on derivatives classified as cash flow hedges (hand-collected for 2000–2005); and} \]

\[ OCI = \text{other comprehensive income (} AFS + FC + PEN + DER). \]

**Benchmarking and Descriptive Statistics**

We benchmark and describe our sample in three ways. First, Table 1 compares our sample to different groups of companies not selected. Second, Tables 2 and 3 present descriptive statistics. Finally, since our sample selection differs from other studies in regard to the incidence of OCI data, we discuss (untabulated) results obtained from using our dataset to estimate selected regressions from prior studies of OCI value relevance.

Table 1 compares certain financial data and industry membership data for the 7,798 companies with no evidence of OCI, the 6,637 companies with some evidence of OCI, and our final sample. Panel A compares these groups in terms of size (i.e., market value of equity), profitability (i.e., return on assets and annual stock returns), and the extent to which OCI and SI are material to the company.

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16 Compustat reports data on the minimum pension liability for almost none of our pilot sample companies after 1998 due to a change in the disclosure requirements for pension plans, leading to an average correlation between our hand-collected PEN data and the Compustat-derived data of negative 93 percent in 1998 and less than 1 percent in each of the years 1999–2003. The correlations for 1996 and 1997 were 99 percent and 98 percent, respectively. This may partially explain the Chambers et al. (2007) failure to find value relevance when using as if data for the post-SFAS 130 time period.

17 We calculate OCI materiality using the data that is available in Compustat and following the definitions used by Dhaliwal et al. (1999). OCI materiality is defined as the absolute value of total OCI divided by the absolute value of net income each year. We calculate SI materiality in the same way, also based on Compustat data as described in the variable measurement section.
The average company in our final sample is larger than the other subsets, and has a higher mean and median ROA. However, the average annual stock return of our sample is within the range of the average returns for the other subsets. In addition, as intended, OCI is more material to the mean and median company in our sample than to other subsets of companies (i.e., mean OCI materiality of 0.33 versus 0.24; median OCI materiality of 0.06 versus 0.001). Finally, the mean SI materiality for our sample firms is similar to other subsets of companies with evidence of OCI (0.55 versus 0.58).

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Table 1, Panel A presents descriptive statistics for our final sample of 236 companies. Both the mean and median companies in the sample are profitable, yielding an annual stock return of 16.15 percent and 11.93 percent, respectively. On average, both SI and OCI are negative, as are PEN and DER. Both AFS and FC are positive, on average.

---

**TABLE 1**

Sample to Non-Sample Benchmarking

Panel A: Descriptive Statistics for Companies With and Without Any Evidence of OCI

<table>
<thead>
<tr>
<th></th>
<th>Companies with No Evidence of OCI (n = 7,798)</th>
<th>Companies with Evidence of OCI (n = 6,637)</th>
<th>Final Sample (n = 236)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td>Std. Dev.</td>
</tr>
<tr>
<td>Market Value of Equity</td>
<td>$217</td>
<td>$29</td>
<td>$1,194</td>
</tr>
<tr>
<td>Return on Assets</td>
<td>−7.27%</td>
<td>2.31%</td>
<td>66.05%</td>
</tr>
<tr>
<td>Annual Stock Return</td>
<td>15.65%</td>
<td>3.82%</td>
<td>84.26%</td>
</tr>
<tr>
<td>OCI Materiality</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>SI Materiality</td>
<td>0.34</td>
<td>0</td>
<td>7.59</td>
</tr>
</tbody>
</table>

Panel B: Industry Composition for Companies With and Without Evidence of OCI

<table>
<thead>
<tr>
<th></th>
<th>Companies with No Evidence of OCI (n = 7,798)</th>
<th>Companies with Evidence of OCI (n = 6,637)</th>
<th>Final Sample (n = 236)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># Companies</td>
<td>%</td>
<td># Companies</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3,525</td>
<td>45%</td>
<td>3,146</td>
</tr>
<tr>
<td>Financial Institutions</td>
<td>992</td>
<td>13%</td>
<td>1,379</td>
</tr>
<tr>
<td>Service</td>
<td>3,281</td>
<td>42%</td>
<td>2,112</td>
</tr>
</tbody>
</table>

This table reports descriptive statistics for three comparison groups: companies with no evidence of OCI, companies with evidence of OCI, and companies in the final sample of firms evaluated in this paper. Companies with evidence of OCI are companies for which Compustat reports data on available-for-sale securities, foreign currency translation, or a minimum pension liability in any year. OCI materiality is defined as the absolute value of total OCI divided by the absolute value of net income each year, where OCI is calculated using the data that are available in Compustat, and following the definitions used by Dhaliwal et al. (1999). SI materiality is defined as the absolute value of special items divided by the absolute value of net income each year.
Table 2, Panel B presents the percentage of nonzero observations for each component of OCI over four different time periods. The percentage of nonzero observations for each component has been relatively stable over time, particularly for FC. An exception is PEN, which increased to 70.1 percent of the observations for the 2001–2005 time frame. This increase is not unexpected, as the decline in the stock market caused many companies to record additional minimum pension liabilities during this time period. DER was not a component of OCI until after 2000, when SFAS No. 133 became effective. For the period 2001 to 2005, 56 percent of the observations included DER, confirming the importance of hand-collecting this item.

Table 3 reports the autocorrelations for each of the variables through lag 6. Net income exhibits the most persistent autocorrelation structure. The autocorrelation of net income at lag 1 of 0.728 is consistent with the autocorrelation of 0.71 reported by Dechow and Schrand (2004, 13) for a
sample of 56,940 company years over the period 1987 to 2002. As is expected, the autocorrelations of both SI and OCI are much smaller than those of NI. The OCI autocorrelations are mainly negative, consistent with Chambers et al. (2007) and Bamber et al. (2010).

As discussed below, a substantial portion of our empirical model is formulated in terms of levels. We check for nonstationarity by testing the null hypothesis of a panel unit root using the approach suggested by Maddala and Wu (1999) to combine the p-values from individual augmented Dickey and Fuller (1979) unit root tests. We reject the null for all variables, based on a critical value of 0.05.

Finally, we benchmark our sample to those of previous studies by estimating regression equations commonly used to test for value relevance of OCI. Our sample produces similar coefficients to those obtained by Dhaliwal et al. (1999), who compare regressions of returns on net income with regressions of returns on comprehensive income using a much larger cross-section of companies for the 1994–1995 time frame (n = 11,425 firm-years). More specifically, the coefficient from our regression of returns on comprehensive income for the 1994–2005 time frame is 0.643, which is similar to the Dhaliwal et al. (1999, Table 2, Panel B) coefficient of 0.680. Our sample also produces generally similar results to those of Chambers et al. (2007), who estimate regressions of returns on net income and OCI for the S&P 500 over the 1994–2003 time frame. More specifically, using our data for the 1994–2005 time frame, we estimate a coefficient on OCI of 1.332, which is similar to Chambers et al.’s (2007, Table 2, Panel A) coefficient of 1.29 (the sum of 0.44 and 0.85).

In summary, we believe that focusing our sample selection on companies with a complete time-series of OCI gains and losses over a 20-year period does not have any obvious negative consequences. Strictly speaking, our results can only be generalized to large, mature publicly traded companies that have a long history of OCI-related assets and liabilities, and thus OCI gains and losses. However, to the extent that we are documenting characteristics of specific components of OCI, our results should hold regardless of whether the OCI gains and losses are reported every year.

### TABLE 3

**Autocorrelations for Sample Data**

<table>
<thead>
<tr>
<th>Autocorrelation of Lag</th>
<th>NI</th>
<th>CF</th>
<th>ACC</th>
<th>SI</th>
<th>OCI</th>
<th>AFS</th>
<th>FC</th>
<th>PEN</th>
<th>DER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.728**</td>
<td>0.804**</td>
<td>0.724**</td>
<td>0.005</td>
<td>−0.068**</td>
<td>0.059**</td>
<td>0.215**</td>
<td>−0.225**</td>
<td>0.004</td>
</tr>
<tr>
<td>2</td>
<td>0.571**</td>
<td>0.687**</td>
<td>0.589**</td>
<td>−0.128**</td>
<td>−0.308**</td>
<td>0.012**</td>
<td>−0.305**</td>
<td>−0.299**</td>
<td>−0.212**</td>
</tr>
<tr>
<td>3</td>
<td>0.433**</td>
<td>0.602**</td>
<td>0.516**</td>
<td>0.083**</td>
<td>−0.085**</td>
<td>−0.065**</td>
<td>−0.237**</td>
<td>−0.042**</td>
<td>−0.273**</td>
</tr>
<tr>
<td>4</td>
<td>0.415**</td>
<td>0.564**</td>
<td>0.518**</td>
<td>0.016**</td>
<td>0.077**</td>
<td>−0.132**</td>
<td>0.012**</td>
<td>0.144**</td>
<td>0.093</td>
</tr>
<tr>
<td>5</td>
<td>0.355**</td>
<td>0.486**</td>
<td>0.419**</td>
<td>0.012**</td>
<td>0.023**</td>
<td>0.091**</td>
<td>0.007**</td>
<td>−0.019**</td>
<td>NA</td>
</tr>
</tbody>
</table>

* *, ** Indicates a probability of less than 10 percent and 5 percent, respectively, that the coefficient is equal to zero.

Statistics are calculated over the 1986–2005 time frame, except for DER, which is calculated over the 2001–2005 time frame.

Variable Definitions

NI = annual net income after extraordinary items and discontinued operations;
CF = operating cash flows;
ACC = total accruals;
SI = special items; and
OCI = other comprehensive income, and is measured as the sum of the gains and losses related to the following four items: available-for-sale securities (AFS), foreign currency translations (FC), defined benefit retirement plans (PEN), and derivatives accounted for as cash flow hedges (DER).
IV. ANALYSIS AND RESULTS

Our empirical model is designed to jointly test value relevance, persistence, and predictive value. Accomplishing this goal requires a model in which we can consider a change in (or shock to) one variable (e.g., OCI or SI), and determine its association with company stock returns (to measure its value relevance), with future values of net income and/or cash flows (to measure its predictive value), and with future values of itself (to measure its persistence).

Our resulting empirical model can be described as consisting of a stock returns equation and forecasting equations for certain components of non-owner changes in equity (e.g., OCI, SI, and NI – SI). Similar to Kormendi and Lipe (1987), our stock returns equation is formulated such that company stock returns are a function of the contemporaneous innovations in (or shocks to) the other variables. Following other studies investigating persistence or predictive value (e.g., Fairfield et al. 1996; Sloan 1996), the forecasting equations are constructed in levels and include only past values as independent variables. Following our findings to prior research. We refer to this as the net income model. Because standard-setters and financial statement users are interested in predicting future cash flows, we examine a second model that further partitions NI – SI into CF and ACC. We refer to this second model as the cash flow model.

In order to capture the phenomena of persistence and predictive value, we include three lags of each dependent variable as independent variables in each forecasting equation. Allowing a richer representation of the long run is especially important for OCI gains and losses, which may be adjusted and/or realized over multiple years (O’Hanlon and Pope 1999). This formulation also allows for higher-order time-series processes than a random walk (Lipe and Kormendi 1994; Baginski et al. 1999). In order to capture the interrelations among the components of non-owner changes in equity, we also include three lags of all other components in each forecasting equation. Allowing for these cross-relations is important in situations where, for example, an OCI gain or loss in the current year is recognized as a special item or other net income item in a subsequent year.

Our net income model is presented in (1) below:

\[
\begin{bmatrix}
R_{it} \\
NI_{it} – SI_{it} \\
SI_{it} \\
OCI_{it}
\end{bmatrix}
= \sum_{\ell = 1}^{3}
\begin{bmatrix}
0 & 0 & 0 & 0 \\
\beta_{N_i} & \beta_{S_i} & \beta_{O_i} \\
0 & \theta_{N_i} & \theta_{S_i} & \theta_{O_i} \\
0 & \gamma_{N_i} & \gamma_{S_i} & \gamma_{O_i}
\end{bmatrix}
\begin{bmatrix}
R_{it-\ell} \\
NI_{it-\ell} – SI_{it-\ell} \\
SI_{it-\ell} \\
OCI_{it-\ell}
\end{bmatrix}
+ \begin{bmatrix}
1 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 \\
0 & 0 & 0 & 1
\end{bmatrix}
\begin{bmatrix}
R_{it-NI} \\
NI_{it} – SI_{it} \\
SI_{it} \\
OCI_{it}
\end{bmatrix}
\]

and our cash flow model is presented in (2) below:

\[
\begin{bmatrix}
R_{it} \\
CF_{it} \\
ACC_{it} \\
SI_{it} \\
OCI_{it}
\end{bmatrix}
= \sum_{\ell = 1}^{3}
\begin{bmatrix}
0 & 0 & 0 & 0 & 0 \\
\psi_{C_i} & \psi_{A_i} & \psi_{S_i} & \psi_{O_i} \\
0 & \eta_{C_i} & \eta_{A_i} & \eta_{S_i} & \eta_{O_i} \\
0 & \theta_{C_i} & \theta_{A_i} & \theta_{S_i} & \theta_{O_i} \\
0 & \gamma_{C_i} & \gamma_{A_i} & \gamma_{S_i} & \gamma_{O_i}
\end{bmatrix}
\begin{bmatrix}
R_{it-\ell} \\
CF_{it-\ell} \\
ACC_{it-\ell} \\
SI_{it-\ell} \\
OCI_{it-\ell}
\end{bmatrix}
+ \begin{bmatrix}
1 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 1 & 0
\end{bmatrix}
\begin{bmatrix}
R_{it-NI} \\
NI_{it} – SI_{it} \\
SI_{it} \\
OCI_{it}
\end{bmatrix}
\]

where the variables are as defined in the variable measurement section for company i in period t.  

\[\text{The current aggregate market return is included in the equation for company stock returns as an exogenous variable to control for changes in market conditions, which are likely to be correlated with SI and OCI gains and losses (see Bloomfield et al. 2006). For parsimony, this variable does not appear in the matrix representations (1) and (2). Constant terms for each regression are estimated but are also subsumed in the matrix representations.} \]
The $\beta, \psi, \eta, \theta,$ and $\gamma$ terms are the coefficients at lag $\ell$. The subscript on each coefficient indicates the associated variable, where $N, C, A, S$, and $O$ denote $NI - SI, CF, ACC, SI,$ and $OCI$, respectively. The $\rho_{NI}, \rho_{SI}, \rho_{CF}, \rho_{ACC}, \rho_{SI}$, and $\rho_{OCI}$ terms are shocks to stock returns, $NI - SI, CF, ACC, SI,$ and $OCI$, respectively.

Each of these shocks can be traced through the system to determine its effect on each variable, contemporaneously as well as over the long run. However, due to the extensive lag structure in the model, the response of one variable to a shock in another variable may be a complex combination of the regression coefficients from the models in (1) or (2) and the calculation of the dynamic responses.

We estimate the set of equations in each model jointly in order to increase efficiency by estimating the parameters using the information in the stock returns variable as well as the components of non-owner changes in equity (Kormendi and Lipe 1987). The set of equations for estimating the parameters using the information in the stock returns variable as well as the models in (1) and (2) and the calculation of the dynamic responses.

20 The persistence and predictive value over both the short run and long run (see discussion of vector auto-regressions and impulse responses in Hamilton [1994]). Below we discuss the estimation of the models in (1) and (2) and the calculation of the dynamic responses.

We estimate the set of equations in each model jointly in order to increase efficiency by estimating the parameters using the information in the stock returns variable as well as the components of non-owner changes in equity (Kormendi and Lipe 1987). The set of equations for each model is estimated as a system of seemingly unrelated regressions (SURs) to account for heteroscedasticity and contemporaneous correlation in the errors across equations. The regression expressions for each equation for periods $t$ through $t+5$. Finally, we calculate the sequences of derivatives (i.e., the dynamic responses) that correspond to value relevance, persistence, and predictive value, as discussed below. The complete list of derivatives that we calculate for the net income model is summarized in Appendix C. We also examine long-run cumulative responses, which are the sums of the responses for periods $t$ through $t+5$.

We test value relevance by examining the responses of company stock returns to shocks in $NI - SI, CF, ACC, SI,$ and $OCI$. The derivatives measuring value relevance are straightforward because we model returns as a direct function of the shocks, with no feedback of returns to other variables. Specifically, the contemporaneous responses of stock returns are: $\frac{\partial R_t}{\partial z_{NI}} = \frac{\partial R_t}{\partial z_{SI}} = \frac{\partial R_t}{\partial z_{CF}} = \frac{\partial R_t}{\partial z_{ACC}} = \frac{\partial R_t}{\partial z_{SI}} = \frac{\partial R_t}{\partial z_{OCI}} = \frac{\partial R_t}{\partial z_{OCI}}$. Furthermore, because our model structure assumes market efficiency, the responses of returns in periods $t+1$ and beyond will be zero. Thus, we conclude that an item is value-relevant if the contemporaneous response is positive and significant.

In contrast, the dynamic responses for persistence and predictive value occur for multiple periods and are more complex. We investigate persistence by calculating the future responses of each component of non-owner changes in equity (i.e., in periods $t+1$ through $t+5$) to a shock to itself in period $t$. For example, the persistence of $SI$ is measured as the following series of derivatives: $\frac{\partial S_{I_{t+1}}}{\partial z_{SI}}$, $\frac{\partial S_{I_{t+2}}}{\partial z_{SI}}$, ..., $\frac{\partial S_{I_{t+5}}}{\partial z_{SI}}$. We conclude that an item exhibits positive
persistence if the responses are generally positive and significant, and if the cumulative response is also positive and significant. We conclude that an item exhibits zero persistence (i.e., is transitory) if the responses are not significantly different from zero, or if the cumulative response is not significantly different from zero. Finally, we conclude that an item exhibits negative persistence (i.e., is reversing) if the pattern includes responses that are negative and significant, and the cumulative response is also negative and significant.\textsuperscript{20}

We measure the predictive value of OCI and SI (i.e., their ability to predict $ NI - SI $ and/or $ CF $) by calculating the responses of future $ NI - SI $ and $ CF $ to OCI and SI shocks. For example, the predictive value of SI in the net income model is measured as the series of derivatives: \( \partial(N_{t+1} - S_{t+1})/\partial z_{t}^{SI}, \partial(N_{t+2} - S_{t+2})/\partial z_{t}^{SI}, \ldots, \partial(N_{t+5} - S_{t+5})/\partial z_{t}^{SI} \). We conclude that OCI and/or SI have predictive value for a specified future period if the response is positive and significant for that period. If the cumulative response is also positive and significant, then we conclude that the shock has predictive value over the long run.

To further understand the intuition behind these derivatives, consider again the responses representing the predictive value of SI in the net income model. The response of $ N_{t+1} - S_{t+1} $ to an SI shock in period $ t $ is simply the direct relation, $ \partial(N_{t+1} - S_{t+1})/\partial z_{t}^{SI} = \beta_{S}^{1} $. However, consider the response of $ N_{t+2} - S_{t+2} $ to the same $ z_{t}^{SI} $. This response will still have a direct component, $ \beta_{S}^{2} $, but will also include the indirect effects of the $ z_{t}^{SI} $ on $ N_{t+1} - S_{t+1}, S_{t+1}, $ and $ OCI_{t+1} $, all of which impact $ N_{t+2} - S_{t+2} $ and are, in turn, impacted by $ z_{t}^{SI} $. Specifically: $ \partial(N_{t+2} - S_{t+2})/\partial z_{t}^{SI} = \beta_{S}^{3} + \beta_{N}^{1} \beta_{S}^{1} + \beta_{D}^{1} \beta_{S}^{1} $.

We test the statistical significance of each response (including the cumulative responses) using a Monte Carlo simulation due to the difficulty of obtaining analytical standard errors for the complex nonlinear combinations of the regression coefficients from the models in (1) and (2). This procedure is similar to that used in testing the significance of impulse responses in a vector autoregression analysis (see Hamilton 1994, 337). That is, we use the regression coefficients and variance-covariance matrices estimated for (1) and (2) to simulate an empirical distribution of the dynamic responses.

More specifically, we populate a vector with a random normal shock, and then pre-multiply the Cholesky decomposition of the estimated variance-covariance matrix by this vector to create a multivariate random normal shock. We then add this shock to the vector of estimated regression coefficients and use this new set of coefficients to generate a set of associated dynamic responses (via the partial derivatives). We then repeat the process 1,000 times. We report the means of the resulting distributions as our dynamic responses in Tables 4–6, and we use the standard deviation of each response distribution to determine statistical significance. We truncate the random normal shocks to avoid including simulated responses based on nonstationary sets of coefficients.\textsuperscript{21}

Results

We discuss our results for value relevance, persistence, and predictive value with an emphasis on our findings related to OCI and SI. We compare these findings with the value relevance and persistence of $ NI - SI $ and $ CF $. Results for accruals are included for completeness but are not the focus of our study and thus will not be emphasized in our discussion.

In interpreting our results, it is important to note that we deflate the OCI, SI, and $ NI - SI $ variables by average total assets. Thus, when we describe a response to an OCI, SI, or $ NI - SI $ shocks over our time frame, then we would expect the period $ t+1 $ through $ t+5 $ responses to be negative and to fully offset the one-unit contemporaneous shock (i.e., the sum of the responses would equal $ -1 $). Other approaches to dealing with this issue are discussed by Kilian (1998).

\textsuperscript{20} If OCI fully reverses over our time frame, then we would expect the period $ t+1 $ through $ t+5 $ responses to be negative and to fully offset the one-unit contemporaneous shock (i.e., the sum of the responses would equal $ -1 $).

\textsuperscript{21} Other approaches to dealing with this issue are discussed by Kilian (1998).
shock, the shock is really to OCI, SI, or NI/SI deflated by average total assets. However, for the sake of brevity, in our discussion we describe the shocks in terms of the numerator.

**Value Relevance Responses**

Table 4 presents results for value relevance. Panel A presents the results for the net income model in (1), and Panel B presents the results for the cash flow model in (2). The values can be interpreted as the response of stock returns to a 1 percent shock in each variable.

For the net income model, Table 4, Panel A shows that shocks to NI/SI, SI, and OCI are all positively and significantly associated with company stock returns. For example, a 1 percent increase in NI/SI in period t is associated with a 2.018 percent increase in period t returns, while a 1 percent increase in SI (OCI) in period t is associated with a 1.958 (1.399) percent increase in period t returns. The value relevance of SI and NI/SI are larger and statistically different from that of OCI (p < 0.05).

Panel B of Table 4 presents findings for the cash flow model. Similar to the net income model, shocks to all variables are positively and significantly associated with company stock returns. However, the responses of stock returns to CF and SI are again significantly larger than the other variables.
response to $OCI$ ($p < 0.05$). We conclude from this analysis that $OCI$, $SI$, $NI - SI$, and $CF$ are all value-relevant, but that the impact of $OCI$ is lower than that of the other variables.

**Persistence Responses**

Table 5 presents the dynamic responses for persistence. Panel A presents the responses from the net income model in (1) and Panel B presents the responses from the cash flow model in (2). The values can be interpreted as the response of each variable in periods $t+1$ through $t+5$ to a 1 percent shock in itself in period $t$.

The results in Table 5, Panel A show that $NI - SI$ exhibits strong persistence, $SI$ exhibits close to zero persistence (i.e., is transitory), and $OCI$ exhibits negative persistence. Specifically, a 1 percent increase in $NI - SI$ in period $t$ is associated with a 0.540 percent increase in $NI - SI$ in period $t+1$, followed by a 0.371 percent increase in period $t+2$, a 0.369 percent increase in period $t+3$, and so on. The cumulative response to the 1 percent period $t$ shock in $NI - SI$ is 1.825 percent. Thus $NI - SI$ exhibits strong positive persistence, as found in many prior studies (see, e.g., Kormendi and Lipe 1987; Finger 1994; Fairfield et al. 1996).

In contrast, the responses of future $SI$ to a contemporaneous $SI$ shock exhibit negative responses in the early periods, followed by small positive and significant responses in the later periods. However, the cumulative responses are not significantly different from zero, suggesting that $SI$ is transitory in nature. $OCI$ exhibits yet another pattern. The responses of future $OCI$ to a contemporaneous $OCI$ shock are negative and significant for the first three periods. These results are consistent with the autocorrelations reported in Table 3, and suggest that $OCI$ is not transitory, but instead exhibits negative persistence (i.e., reverses over time). Over the long run, the cumulative response is also negative and significant, but its relatively small magnitude suggests the reversal is only partial. We interpret this finding as evidence that many $OCI$ gains and losses deferred in the balance sheet in AOCI do reverse, but do not reverse quickly or completely. However, our results do not allow us to unequivocally attribute these reversals either to recycling or to mean reversion in market values.

The results for the cash flow model in Table 5, Panel B are consistent with those from Panel A. That is, $CF$ exhibits strong positive persistence, $SI$ appears to be transitory, and $OCI$ exhibits negative persistence. The $ACC$ variable is similar to $CF$, in that it is persistent, but the magnitudes of the responses are significantly smaller than those for $CF$ ($p < 0.05$).

**Predictive Value Responses**

Table 6 presents the dynamic responses for predictive value. Panel A presents the responses from the net income model in (1) and Panel B presents the responses from the cash flow model in (2). The responses can be interpreted as the response of $NI - SI$ or $CF$ in periods $t+1$ through $t+5$ to a 1 percent shock in $OCI$ and $SI$ in period $t$.

The results in Panel A of Table 6 show that $SI$ is positively and significantly associated with future $NI - SI$, both period-by-period and cumulatively. We describe these results in terms of a decrease in $SI$ because many special items are negative. Specifically, a 1 percent decrease in $SI$ in period $t$ is associated with a 0.419 percent decrease in $NI - SI$ in period $t+1$, followed by a 0.308 percent decrease in period $t+2$, a 0.250 percent decrease in period $t+3$, and so on. The cumulative response to the 1 percent period $t$ shock in $NI - SI$ is a decrease of 1.391 percent, and is also significant. These findings indicate that $SI$ has strong predictive value for future $NI - SI$. These results are consistent with Cready et al. (2010), who find a positive relation between negative special items and future earnings.

In contrast, $OCI$ is positively and significantly associated with only one-period-ahead $NI - SI$; although the responses in period $t+2$ and beyond are positive, they are not significantly different
The table presents the dynamic responses calculated from the regression coefficients estimated for the net income model in (1) and the cash flow model in (2) over the 1986–2005 time frame. The dynamic responses for persistence are the series of partial derivatives of each variable in period $t+k$, with respect to a shock in itself in period $t$. The cumulative responses are the sums of the period-by-period responses for each variable.

Statistical significance is determined based on standard errors calculated using a Monte Carlo simulation, as described in the text. The responses reported are the means of these distributions. The OCI data are hand-collected from company 10-K filings for 1998–2005, and calculated from Compustat data for 1986–1997. All variables are deflated by average total assets. $NI$, $SI$, $CF$, and $ACC$ are measured based on Compustat data.

**Variable Definitions**
- $NI$ = net income;
- $SI$ = special items;
- $CF$ = operating cash flows;
- $ACC$ = accruals; and
- $OCI$ = other comprehensive income, and is measured as the sum of the gains and losses related to the following four items: available-for-sale securities ($AFS$), foreign currency translations ($FC$), defined benefit retirement plans ($PEN$), and derivatives accounted for as cash flow hedges ($DER$).
Further, the cumulative response is not significantly different from zero. These findings indicate that OCI may have predictive value for one-step-ahead NI/C0 SI, but not for NI/C0 SI over the long run.

The results for the cash flow model in Table 6, Panel B show that the response of future cash flows to an SI shock is similar to the response of NI – SI. That is, an SI shock is positively and significantly associated with future cash flows, both period-by-period and cumulatively. In contrast, an OCI shock is positively but not significantly related to cash flows in period t+1, but positively
and significantly related to cash flows in periods $t+2$ and $t+3$. The cumulative response of $CF$ to an $OCI$ shock is also positive and significant, although of a smaller magnitude than the cumulative response of $CF$ to an $SI$ shock (0.218 versus 1.333). Thus, we conclude that $OCI$ tends to have positive predictive value for future $NI - SI$ primarily in the short run, but for $CF$ over the longer run.

In summary, our findings support the following three conclusions. Consistent with the earnings literature, $NI - SI$ is persistent, has strong predictive value, and is value-relevant. $SI$ exhibits close to zero persistence (i.e., is transitory), but has predictive value and is value-relevant. This overall pattern for $SI$ is consistent with the various findings of Fairfield et al. (1996), Burgstahler et al. (2002), Dechow and Ge (2006), Fairfield et al. (2009), and Cready et al. (2010). Finally, $OCI$ exhibits negative persistence (i.e., partially reverses over time), and has weaker predictive value for future $NI - SI$ and $CF$, but is value-relevant. This overall pattern for $OCI$ helps to reconcile the findings of Dhaliwal et al. (1999), Chambers et al. (2007), and Kanagaretnam et al. (2009).

Robustness Testing

We test robustness of the models in (1) and (2) related to five areas: model design, subsets of companies with certain characteristics, individual $OCI$ components, choice of deflator, and estimation time frames. First, our model is designed such that the equations for $OCI$, $SI$, $NI - SI$, $ACC$, and $CF$ are functions of only past values, which we deem appropriate for forecasting equations (Fairfield et al. 1996; Sloan 1996). However, prior research has documented a contemporaneous relation between special items and net income (Kinney and Trezevant 1997; Marquardt and Wiedman 2004; McVay 2006; Fan et al. 2010), and has also found evidence that companies engage in “cherry picking” by timing management choices about the sale of $OCI$-related items (Graham et al. 2005; Lee et al. 2006). We re-estimate several models that include contemporaneous relations among the variables, finding results that are very similar to those from our primary model.

Second, studies have found differences in companies with certain characteristics, such as financial versus nonfinancial (Dhaliwal et al. 1999), and high versus low volatility companies (Hodder et al. 2006; Yen et al. 2007; Bamber et al. 2010). We re-estimate the models in (1) and (2) after excluding the 26 financial companies from the sample, and (separately) after excluding 22 high-volatility companies. Results are consistent with those reported previously. In fact, the predictive value of $OCI$ is stronger for both nonfinancial and low-volatility companies.

Third, we separately estimate the models in (1) and (2) for three of the $OCI$ components: $AFS$, $FC$, and $PEN$ (e.g., Dhaliwal et al. 1999; Chambers et al. 2007), after eliminating companies with inadequate time-series data for that component. For all three components, our findings for value relevance are consistent with the results reported previously. However, our persistence results for $AFS$ differ from the main results, in that $AFS$ appears more transitory and its cumulative predictive value for future cash flows is not statistically significant. It is important to note that, although

Note that, although we estimated regressions that included contemporaneous relations, we appropriately did not include the coefficients on the contemporaneous variables in our dynamic response calculations for persistence or predictive value.

To identify companies with significantly higher $OCI$-induced volatility, we compare the volatility of net income to the volatility of comprehensive income for each sample company over the 1986–2005 time frame. Following Barth et al. (1995) and Hodder et al. (2006), we calculate an F-test of the equality of the variances at a 10 percent significance level.

We do not examine the derivatives component because we did not have a long enough time-series to run it separately in this model. Campbell (2010) examines the short-run predictive power of cumulative unrealized cash flow hedge gains and losses, and finds a negative association between unrealized hedging gains and future gross profit.
available-for-sale securities tend to exhibit more recycling than other OCI components, it is difficult to draw definitive conclusions about what these results suggest about recycling. We anticipate that improved disclosures about recycling details resulting from the FASB/IASB project on financial statement presentation may allow more research in this area.

Fourth, many value relevance studies deflate their independent variables by beginning market value of equity, while most persistence and forecasting studies use average total assets. One problem with using the market value of equity as a deflator is that it exhibits more variability over time than total assets, and this variation is likely to be related to future cash flows. Thus, we use average total assets as a deflator in our reported analyses. When we run the model using beginning market value of equity as the deflator, the value relevance and persistence results are consistent. Not surprisingly, the cash flow predictive value results are weaker.

Fifth, we estimate the models in (1) and (2) using three alternative time frames: 1986–2005 (reported), 1994–2005, and 1998–2005, which correspond to the years in which SFAS Nos. 87, 115, and 130, respectively, became effective. The results for the 1994–2005 and 1998–2005 time frames are consistent with those reported previously. This finding further supports the idea that our reported results are not driven by the inclusion of as if OCI data before 1998.

V. DISCUSSION AND CONCLUSIONS

We report the results of a comprehensive study to compare OCI and SI gains and losses in terms of value relevance, persistence, and predictive value. Our study extends the literature on the usefulness of disaggregating components of income by comparing OCI gains and losses with SI gains and losses. We also extend the literature on the value relevance of OCI gains and losses, which has found mixed results. We document three important findings. First, both OCI and SI are value-relevant, but the value relevance of OCI is smaller. Second, OCI and SI differ in terms of persistence: SI exhibits zero persistence (i.e., is transitory), while OCI exhibits negative persistence. Third, OCI and SI also differ in terms of predictive value: SI is consistently positively associated with both future net income and future cash flows. In contrast, OCI predicts future net income and cash flows for some but not all periods, and the magnitude of the relation is smaller than for SI.

We believe that our results have important implications for standard-setting. Specifically, our findings that OCI and SI gains and losses differ in terms of their persistence, predictive value, and value relevance, can be viewed as support for making disaggregated data about these gains and losses available to users. Disaggregated data about OCI gains and losses could be made available while maintaining the current separation between net income and OCI, or via disclosures if OCI gains and losses were to be incorporated into net income line items on the face of the statement of comprehensive income. Regardless, we conclude that presenting disaggregated information related to both SI and OCI gains and losses should remain an important goal for standard-setters.

In addition, the mixed implications of our results regarding whether to recognize OCI and SI gains and losses in net income emphasize the importance of the decision criteria upon which to base this decision. For example, imposing the current emphasis of standard-setters on predictive value would lead us to interpret our results as suggesting that SI gains and losses are better suited for inclusion in net income than are OCI gains and losses. Alternatively, increased emphasis on persistence would require judgments about whether transitory items such as SI gains and losses should be included as part of net income, and about how to treat items with negative persistence, such as OCI gains and losses.

Our results suggest standard setters may want to consider emphasizing both persistence and predictive value. Prior researchers (Kormendi and Lipe 1987; Ohlson 1999) have made the link between the persistence of an item (i.e., association with future values of itself) and valuation. Given that our value relevance tests show a significant positive association between returns and SI
shocks—and that the magnitude of this association is almost as large as that for NI – SI—these prior studies would suggest that SI would exhibit strong persistence (i.e., association with future SI). However, our study does not find that SI is persistent. Rather, our results suggest that SI may be important in valuation due to its association with future net income and/or cash flows (i.e., its predictive value), rather than its association with future values of SI (i.e., its persistence).

A limitation of our study is that OCI may exhibit negative persistence for at least two different reasons. An OCI gain or loss may reverse if market conditions change before the underlying balance sheet item is sold or settled. Alternatively, the negative persistence may be due to the recycling of gains and losses out of AOCI and into net income. Because recycling details are only intermittently available for a small proportion of our sample, it is difficult to distinguish between these two possibilities. Research in this area could be extended by collecting data for a sample of firms that report the recycling details for OCI components.

Another limitation of our study is that we have selected a sample with a long time-series in order to estimate persistence and predictive value. Therefore, our results are most generalizable to larger companies that continuously report OCI. However, the sample selection process is also a strength of the study, in that its focus is on companies with material and regular amounts of OCI. This focus increases confidence that any lack of value relevance, predictive value, or persistence is unlikely to be due to immaterial and/or intermittent amounts of OCI.

REFERENCES


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**APPENDIX A**

### Seemingly Unrelated Regression Results for Net Income Model

#### Panel A: Dependent Variable = $R_{it}$

<table>
<thead>
<tr>
<th>Term</th>
<th>Regression Coefficient</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$(NI_{it} - SI_{it}) - E(NI_{it} - SI_{it})$</td>
<td>2.026**</td>
<td>17.3%</td>
</tr>
<tr>
<td>$SI_{it} - E(SI_{it})$</td>
<td>1.966**</td>
<td></td>
</tr>
<tr>
<td>$OCI_{it} - E(OCI_{it})$</td>
<td>1.417**</td>
<td></td>
</tr>
</tbody>
</table>

#### Panel B: Dependent Variable = $NI_{it} - SI_{it}$

<table>
<thead>
<tr>
<th>Term</th>
<th>Regression Coefficient</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$(NI_{it-1} - SI_{it-1}) - E(NI_{it-3} - SI_{it-3})$</td>
<td>0.541**</td>
<td>36.7%</td>
</tr>
<tr>
<td>$(NI_{it-2} - SI_{it-2}) - E(NI_{it-3} - SI_{it-3})$</td>
<td>0.079**</td>
<td></td>
</tr>
<tr>
<td>$SI_{it-1}$</td>
<td>0.122**</td>
<td></td>
</tr>
<tr>
<td>$SI_{it-2}$</td>
<td>0.419**</td>
<td></td>
</tr>
<tr>
<td>$SI_{it-3}$</td>
<td>0.082**</td>
<td></td>
</tr>
<tr>
<td>$OCI_{it-1}$</td>
<td>0.063**</td>
<td></td>
</tr>
<tr>
<td>$OCI_{it-2}$</td>
<td>0.103**</td>
<td></td>
</tr>
<tr>
<td>$OCI_{it-3}$</td>
<td>-0.028</td>
<td></td>
</tr>
<tr>
<td>$SI_{it}$</td>
<td>0.016</td>
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</table>

#### Panel C: Dependent Variable = $SI_{it}$

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<th>Term</th>
<th>Regression Coefficient</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$(NI_{it-1} - SI_{it-1}) - E(NI_{it-3} - SI_{it-3})$</td>
<td>0.004</td>
<td>0.1%</td>
</tr>
<tr>
<td>$(NI_{it-2} - SI_{it-2}) - E(NI_{it-3} - SI_{it-3})$</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>$SI_{it-1}$</td>
<td>0.007</td>
<td></td>
</tr>
<tr>
<td>$SI_{it-2}$</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>$SI_{it-3}$</td>
<td>-0.024</td>
<td></td>
</tr>
<tr>
<td>$OCI_{it-1}$</td>
<td>0.034*</td>
<td></td>
</tr>
<tr>
<td>$OCI_{it-2}$</td>
<td>0.043</td>
<td></td>
</tr>
<tr>
<td>$OCI_{it-3}$</td>
<td>-0.037</td>
<td></td>
</tr>
<tr>
<td>$SI_{it}$</td>
<td>0.015</td>
<td></td>
</tr>
</tbody>
</table>

#### Panel D: Dependent Variable = $OCI_{it}$

<table>
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<th>Term</th>
<th>Regression Coefficient</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$(NI_{it-1} - SI_{it-1}) - E(NI_{it-3} - SI_{it-3})$</td>
<td>-0.014**</td>
<td>0.6%</td>
</tr>
<tr>
<td>$(NI_{it-2} - SI_{it-2}) - E(NI_{it-3} - SI_{it-3})$</td>
<td>-0.009</td>
<td></td>
</tr>
<tr>
<td>$SI_{it-1}$</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td>$SI_{it-2}$</td>
<td>-0.002</td>
<td></td>
</tr>
<tr>
<td>$SI_{it-3}$</td>
<td>0.016*</td>
<td></td>
</tr>
<tr>
<td>$OCI_{it-1}$</td>
<td>0.015</td>
<td></td>
</tr>
<tr>
<td>$OCI_{it-2}$</td>
<td>-0.032*</td>
<td></td>
</tr>
<tr>
<td>$OCI_{it-3}$</td>
<td>-0.040**</td>
<td></td>
</tr>
<tr>
<td>$OCI_{it}$</td>
<td>-0.025</td>
<td></td>
</tr>
</tbody>
</table>

* and ** Indicates a probability of less than 10 percent and 5 percent, respectively, that the coefficient is equal to zero.
Shown are the regression coefficients from estimating the net income model in (1) as a seemingly unrelated regression over the 1986 to 2005 time frame. This balanced panel includes 236 companies with the required data. All variables except for stock returns are deflated by average total assets. Included in the returns regression but not reported is the contemporaneous annual aggregate market return.

**Variable Definitions**

- $R = \text{buy and hold stock returns cumulated over the period ending three months after the company’s fiscal year-end}$
- $NI - SI = \text{net income less special items}$
- $SI = \text{special items}$; and
- $OCI = \text{total other comprehensive income}$.

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APPENDIX B
Seemingly Unrelated Regression Results for Cash Flow Model

Panel A: Dependent Variable = $R_{it}$

<table>
<thead>
<tr>
<th></th>
<th>$CF_{it} - E(CF_{it})$</th>
<th>$ACC_{it} - E(ACC_{it})$</th>
<th>$SI_{it} - E(SI_{it})$</th>
<th>$OCI_{it} - E(OCI_{it})$</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.203**</td>
<td>1.847**</td>
<td>2.104**</td>
<td>1.513**</td>
<td>17.0%</td>
</tr>
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</table>

Panel B: Dependent Variable = $CF_{it}$

<table>
<thead>
<tr>
<th></th>
<th>$CF_{it-1}$</th>
<th>$CF_{it-2}$</th>
<th>$CF_{it-3}$</th>
<th>$ACC_{it-1}$</th>
<th>$ACC_{it-2}$</th>
<th>$ACC_{it-3}$</th>
<th>$SI_{it-1}$</th>
<th>$SI_{it-2}$</th>
<th>$SI_{it-3}$</th>
<th>$OCI_{it-1}$</th>
<th>$OCI_{it-2}$</th>
<th>$OCI_{it-3}$</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.364**</td>
<td>0.200**</td>
<td>0.171**</td>
<td>0.157**</td>
<td>0.006</td>
<td>0.030</td>
<td>0.302**</td>
<td>0.204**</td>
<td>0.088**</td>
<td>0.025</td>
<td>0.035</td>
<td>0.023</td>
<td>25.8%</td>
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</table>

Panel C: Dependent Variable = $ACC_{it}$

<table>
<thead>
<tr>
<th></th>
<th>$CF_{it-1}$</th>
<th>$CF_{it-2}$</th>
<th>$CF_{it-3}$</th>
<th>$ACC_{it-1}$</th>
<th>$ACC_{it-2}$</th>
<th>$ACC_{it-3}$</th>
<th>$SI_{it-1}$</th>
<th>$SI_{it-2}$</th>
<th>$SI_{it-3}$</th>
<th>$OCI_{it-1}$</th>
<th>$OCI_{it-2}$</th>
<th>$OCI_{it-3}$</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.189**</td>
<td>-0.089**</td>
<td>-0.036*</td>
<td>0.305**</td>
<td>0.022</td>
<td>0.056**</td>
<td>0.137**</td>
<td>-0.090**</td>
<td>-0.010</td>
<td>0.097**</td>
<td>-0.031</td>
<td>0.022</td>
<td>7.9%</td>
</tr>
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</table>

Panel D: Dependent Variable = $SI_{it}$

<table>
<thead>
<tr>
<th></th>
<th>$CF_{it-1}$</th>
<th>$CF_{it-2}$</th>
<th>$CF_{it-3}$</th>
<th>$ACC_{it-1}$</th>
<th>$ACC_{it-2}$</th>
<th>$ACC_{it-3}$</th>
<th>$SI_{it-1}$</th>
<th>$SI_{it-2}$</th>
<th>$SI_{it-3}$</th>
<th>$OCI_{it-1}$</th>
<th>$OCI_{it-2}$</th>
<th>$OCI_{it-3}$</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.003</td>
<td>0.001</td>
<td>0.018</td>
<td>0.015</td>
<td>0.013</td>
<td>-0.0003</td>
<td>-0.005</td>
<td>-0.030</td>
<td>0.043**</td>
<td>0.038</td>
<td>-0.042</td>
<td>0.018</td>
<td>0.1%</td>
</tr>
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</table>

Panel E: Dependent Variable = $OCI_{it}$

<table>
<thead>
<tr>
<th></th>
<th>$CF_{it-1}$</th>
<th>$CF_{it-2}$</th>
<th>$CF_{it-3}$</th>
<th>$ACC_{it-1}$</th>
<th>$ACC_{it-2}$</th>
<th>$ACC_{it-3}$</th>
<th>$SI_{it-1}$</th>
<th>$SI_{it-2}$</th>
<th>$SI_{it-3}$</th>
<th>$OCI_{it-1}$</th>
<th>$OCI_{it-2}$</th>
<th>$OCI_{it-3}$</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.016**</td>
<td>-0.004</td>
<td>0.010</td>
<td>-0.016**</td>
<td>-0.015**</td>
<td>0.007</td>
<td>-0.001</td>
<td>-0.012</td>
<td>0.016*</td>
<td>-0.035**</td>
<td>-0.041**</td>
<td>-0.031*</td>
<td>0.7%</td>
</tr>
</tbody>
</table>

*, ** Indicates a probability of less than 10 percent and 5 percent, respectively, that the coefficient is equal to zero.

Shown are the regression coefficients from estimating the cash flow model in (2) as a seemingly unrelated regression over the 1986 to 2005 time frame. This balanced panel includes 236 companies with the required data. All variables except for stock returns are deflated by average total assets. Included in the returns regression but not reported is the contemporaneous annual aggregate market return.

Variable Definitions

$R$ = buy and hold stock returns cumulated over the period ending three months after the company’s fiscal year-end;

$CF$ = operating cash flows;

$ACC$ = total accruals;

$SI$ = special items; and

$OCI$ = total other comprehensive income.
**APPENDIX C**

Partial Derivatives Representing Value Relevance, Persistence, and Predictive Value for Model in (1)

### Panel A: Partial Derivatives Representing Value Relevance

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<th>(k = 0)</th>
<th>(k = 1)</th>
<th>(k = 2)</th>
<th>(k = 3)</th>
<th>(k = 4)</th>
<th>(k = 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(NI - SI)</td>
<td>(\frac{\partial (R_t)}{\partial z_{NI-SI}})</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>(SI)</td>
<td>(\frac{\partial (R_t)}{\partial z_{SI}})</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>(OCI)</td>
<td>(\frac{\partial (R_t)}{\partial z_{OCI}})</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

### Panel B: Partial Derivatives Representing Persistence

<table>
<thead>
<tr>
<th></th>
<th>(k = 0)</th>
<th>(k = 1)</th>
<th>(k = 2)</th>
<th>(k = 3)</th>
<th>(k = 4)</th>
<th>(k = 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(NI - SI)</td>
<td>(\frac{\partial (NI_{t+1} - SI_{t+1})}{\partial z_{NI-SI}})</td>
<td>(\frac{\partial (NI_{t+2} - SI_{t+2})}{\partial z_{NI-SI}})</td>
<td>(\frac{\partial (NI_{t+3} - SI_{t+3})}{\partial z_{NI-SI}})</td>
<td>(\frac{\partial (NI_{t+4} - SI_{t+4})}{\partial z_{NI-SI}})</td>
<td>(\frac{\partial (NI_{t+5} - SI_{t+5})}{\partial z_{NI-SI}})</td>
<td>NA</td>
</tr>
<tr>
<td>(SI)</td>
<td>(\frac{\partial (SI_{t+1})}{\partial z_{SI}})</td>
<td>(\frac{\partial (SI_{t+2})}{\partial z_{SI}})</td>
<td>(\frac{\partial (SI_{t+3})}{\partial z_{SI}})</td>
<td>(\frac{\partial (SI_{t+4})}{\partial z_{SI}})</td>
<td>(\frac{\partial (SI_{t+5})}{\partial z_{SI}})</td>
<td>NA</td>
</tr>
<tr>
<td>(OCI)</td>
<td>(\frac{\partial (OCI_{t+1})}{\partial z_{OCI}})</td>
<td>(\frac{\partial (OCI_{t+2})}{\partial z_{OCI}})</td>
<td>(\frac{\partial (OCI_{t+3})}{\partial z_{OCI}})</td>
<td>(\frac{\partial (OCI_{t+4})}{\partial z_{OCI}})</td>
<td>(\frac{\partial (OCI_{t+5})}{\partial z_{OCI}})</td>
<td>NA</td>
</tr>
</tbody>
</table>

### Panel C: Partial Derivatives Representing Predictive Value

<table>
<thead>
<tr>
<th></th>
<th>(k = 0)</th>
<th>(k = 1)</th>
<th>(k = 2)</th>
<th>(k = 3)</th>
<th>(k = 4)</th>
<th>(k = 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(SI)</td>
<td>(\frac{\partial (NI_{t+1} - SI_{t+1})}{\partial z_{SI}})</td>
<td>(\frac{\partial (NI_{t+2} - SI_{t+2})}{\partial z_{SI}})</td>
<td>(\frac{\partial (NI_{t+3} - SI_{t+3})}{\partial z_{SI}})</td>
<td>(\frac{\partial (NI_{t+4} - SI_{t+4})}{\partial z_{SI}})</td>
<td>(\frac{\partial (NI_{t+5} - SI_{t+5})}{\partial z_{SI}})</td>
<td>NA</td>
</tr>
<tr>
<td>(OCI)</td>
<td>(\frac{\partial (NI_{t+1} - SI_{t+1})}{\partial z_{OCI}})</td>
<td>(\frac{\partial (NI_{t+2} - SI_{t+2})}{\partial z_{OCI}})</td>
<td>(\frac{\partial (NI_{t+3} - SI_{t+3})}{\partial z_{OCI}})</td>
<td>(\frac{\partial (NI_{t+4} - SI_{t+4})}{\partial z_{OCI}})</td>
<td>(\frac{\partial (NI_{t+5} - SI_{t+5})}{\partial z_{OCI}})</td>
<td>NA</td>
</tr>
</tbody>
</table>