Are all Individual Investors Created Equal? Evidence from Individual Investor Trading Around Securities Litigation Events

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Abstract

This study examines the trading behavior of a large sample of individual (retail) investors around securities litigation events. We hypothesize and find that the response of these investors around the end of the litigation class period (at the time of a corrective disclosure) and the start of the class period (at the time of disclosure of allegedly false positive information) differs on the basis of the informedness of the investors. These results contribute to the literature by documenting differences in individual investor trading around the start and end of an alleged financial fraud. These events can be relatively difficult to interpret and, so, it is not unreasonable that we should observe differences on the basis of informedness. We also examine individual investor trading within the class period and find that trading intensity is higher earlier in the class period, and higher overall relative to a control period. This is inconsistent with the proportional trading model for damages calculations, which assumes all shares trade with equal probability.

JEL Classification: G14; G15; K22; K41

KEY WORDS: Individual Investor Behavior; Accounting Fraud; Securities Litigation Damages; Class Period Trading; Investor Informedness.

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1. Introduction

This study examines the trading activity of individual investors around securities class action litigation events, in particular, the purchase and sale of stocks by individual (retail) investors around the start and end of the class period.[1] We also examine patterns of individual investor trading between these events, such as the distribution of shares sold that are purchased within the class period. By analyzing how different classes of individual investors trade when allegedly false information is introduced into the market and, later, corrected as a curative disclosure, we are able to offer insights into how information influences individual trading, in particular whether some investors (e.g., more informed) might spot or process false information better than others (e.g., less informed).

These findings build upon a developing literature that, thus far, has focused mostly on the responses of professionals such as securities analysts, short traders, and corporate insiders to litigation and other similar events. One result is that some groups (e.g., short traders, certain institutional investors) are more astute than others (e.g., financial analysts) in detecting accounting conditions that might lead to a restatement or allegation of fraud. (Section 2 reviews the literature.) Differences in incentives, which should have less influence within an individual investor sample than across different professional groups, however, may evince this result.

Our results also pertain to the behavioral notion that some investors realize their losses reluctantly (the disposition effect) (Odean 1998, Dhar and Zhu 2002). The response of individual investors to the correction of heretofore allegedly false positive information, which typically causes claims of substantial out-of-pocket damages by investors who suffered losses (e.g., In re Cendant, 2000), may offer further clues about this behavioral effect.

Based on the class action companies in same data set as used by Barber and Odean (2000, 2001), Dhar and Zhu (2002), and others[2], we document that not only do less informed investors (based on income and occupation) tend to hold their positions through the end of the class period, consistent with delay in the recognition of losses but, also, they tend to buy early in the class period at which time allegedly false positive information is disclosed to the market. Conversely, more informed investors tend to sell later in the class period, thereby cutting their losses and/or possibly profiting from an earlier price run up, which may be, in part, an earlier response to the false information.[3]

The individual investor data set also affords a unique opportunity to observe stock trading behavior within the class period for a broad sample of companies and traders and, thus, to review the appropriateness of certain assumptions used to compute securities class action damages. A common method to determine the number of damaged shares is the proportional trading model (PTM). This model calculates the shares purchased on a particular day in the class period and sold later in the class period as a function of the ratio of trading volume to the total tradable shares (float). Each tradable share under this calculation has an equal probability of trading, so that a given percentage of the float accounts for the same percentage of the trading volume.

However, it may be more realistic to adopt an accelerated trading model (ATM), which assumes that shares that have already traded in the class period are more likely to trade again before the end of the class period than shares that have not yet entered the class (and are still in the float). If class period trading is accelerated, then a higher proportion of purchases in the class period will be sold earlier under the ATM than under the PTM, and if most of the price drop from corrective information is at the end of the class period, the ATM results in lower damages. A third approach specifies a multi-trader model (MTM), which recognizes that some investors trade actively in the class period, whereas other (passive) investors trade less actively in the class period and, thus, more of their shares stay in the float. Under the MTM, the extent of accelerated trading and the percentage of shares in the float

can differ for active and passive traders. For example, active investors, as a group, may hold a small percentage of the float but account for a large percentage of the trading.[4]

To justify the appropriateness of their trading assumptions, proponents of the different approaches typically offer anecdotal evidence and/or base their calculations on the trading or claims records of one or a small number of companies for which data is available.[5] However, to the extent that such evidence misrepresents trading in class action companies more generally, damages calculations may be incorrect and, worse, speculative and, thus, subject to court challenge (e.g., in a settlement proceeding) as lacking in foundation.[6] This study provides additional descriptive evidence on these assumptions based on investors' actual trading in a large sample of companies at a major brokerage house. We study all companies in the data set subject to a federal class action lawsuit.

Because the class periods are of unequal length, we first partition each class period into equal calendar length quartiles and then calculate a transition matrix of the number of buys and sells within and across each quartile. We also derive transition matrices for investor subgroups such as more informed versus less informed investors and more active versus less active investors. Comparisons of these transition matrices support the view that class period trading reflects more than one class of investor. We observe, also, that these class period investors, particularly more active investors, trade at a higher intensity in the class period than at other times, which is consistent with accelerated trading.[7]

The remainder of the study is organized as follows. Section 2 summarizes the literature relating to investor behavior around securities class actions, and develops and states the principal hypotheses. Section 3 describes the data and sample used to test the hypotheses. The findings are discussed in section 4. Section 5 summarizes the results and presents the major conclusions.

2. Related Literature and Hypotheses

The first strand of literature studies how investors behave around securities class action events, and includes analyses of the response of market-adjusted stock prices and trading volume to securities litigation events and how professionals react to and/or anticipate such events. Studies of the stock market response to litigation events include Kellogg (1984), Francis et al. (1994), Beck and Bhagat (1998), Bhagat et al. (1998), and Griffin et al. (2004). These studies document a significant stock price decrease at the time of the corrective disclosure that defines the end of the class period (ECP). They also report that stock prices increase following the start of the class period (SCP) and, generally, continue to rise until the alleged fraud is revealed, typically as an end-of-class-period corrective disclosure.

In addition to the results in prior research, we calculate the mean price and trading volume response for the class action companies in our sample, and show these as figure 1. Figures 1a and 1b report the cumulative excess (market adjusted) return and adjusted trading volume (actual trading volume as a percentage of common shares outstanding) from 20 days prior to and 20 days after the SCP and ECP dates, respectively. Both figures show unusual price and volume activity around both the SCP and ECP dates, consistent with prior work. Indeed, one is almost a mirror image of the other.

A second strand of the literature examines variation in the responses of professionals around securities class action event and similar dates. Not all professionals respond alike, apparently, when it comes to litigation and related disclosures. For example, Griffin (2003) documents that securities analysts tend to revise their earnings forecasts down after a corrective disclosure, whereas short sellers and management insiders tend to sell ahead of a corrective disclosure, thus, acting as if they exploit some aspects of the forthcoming adverse news. Dechow et al. (1996), Ke and Petroni (2003), Efendi et al. (2004), Hribar (2004), Hirshleifer et al. (2005) also suggest that some professional investors obtain information about earnings management prior to public disclosure, as part of an SEC

investigation, restatement, or other announcement. For instance, Ke and Petroni (2003) document significant institutional selling at least one quarter before a break in a series of positive earnings announcements, and Efendi et al. (2004) report that firms with accounting restatements have high and increasing short interest prior to a restatement announcement. Richardson (2003), on the other hand, reports that short sellers do not appear to exploit the information contained in accounting accruals, but this result is challenged by Hirshleifer et al. (2005) who show the opposite results, especially for NASDAQ companies. Other studies, for example, Allen and Ramanan (1990) and Barron et al. (2005), document the release of nonpublic information around earnings announcement dates, also presumed to come from professionals such as insiders and analysts.

In short, these studies reveal that not all professional investors respond alike. The results in these studies, however, could be due, primarily, to differences in incentives, rather than sophistication or information differences, which are two other factors that might explain investors' responses. For instance, while financial analysts are reasonably sophisticated and informed regarding litigation disclosures, conflicts of interest (e.g., need to access management for information) reduce their ability to exploit such bad news, for example, by not acting ahead of a corrective disclosure that might lead to securities class action litigation. Information and sophistication differences, not incentive differences, in our view, should be more influential in a study of individual investors, especially when those investors have accounts at the same brokerage firm, which is the target group in this study.[8] We are not aware of research on the potential inequality of response across individual investors to complex (and adverse) information, which is a primary motivation for this study.[9]

We first hypothesize that individual investors' net selling (net buying) should increase around the ECP (SCP) date, consistent with the implications of the information for stock market prices observed in the aggregate (H1). Some individual investors, however, may be more sophisticated and/or better informed than others and, like some professional investors, may trade ahead of an adverse corrective

disclosure or restatement. Based on certain attributes of the investors in our data set, we form two groups, namely, more informed investors and less informed investors and hypothesize that more informed investors as a group will sell relatively more near the end of the class period than the less informed investors (H2). We also hypothesize that more informed investors will purchase relatively fewer shares early in the class period, since at that time they should be more likely aware that the company disclosed allegedly false positive information to the market (H3). Our results support the rejection of each of these hypotheses.

A third strand of literature helps us identify an appropriate metric of individual investor behavior. This is the buy-sell imbalance (BSI) index, which we calculate in terms of the dollar value of buys by j investors and sells by k investors in period t in each stock i, that is, $BSI_{it} = (\Sigma_{jt}Buy_{it} - \Sigma_{kt}Sell_{it}) / (\Sigma_{jt}Buy_{it} + \Sigma_{kt}Sell_{it})$. This metric has the property that it is bounded by one and minus one. We align BSI_{it} in event time and then average it over the number of class action stocks i in the sample to study individual investor behavior around a class action event date. We also compute BSI for certain investor groups (e.g., more informed investors, less informed investors) around the event dates. Our approach follows Kumar and Lee (2004), who find that the BSI's of different groups of investors contain a common directional component (retail sentiment), which helps explain overall stock return. A similar metric is used by Dhar et al. (2004), who find that individual investors' mean BSI in split stocks tends to increase after a split announcement in contrast to institutional money managers' mean BSI, which tends to decrease following a split announcement. They attribute this result to investor sophistication, in that the individual investor group contains more traders with lower incomes and non-professional occupations.[10]

3. Data and Sample

The initial data set comprises the trading by some 78,000 retail investors at a large discount brokerage firm over 1991-1996. The data set also includes the monthly holdings of the investors and,

in more than one-half of the sample, personal information about each investor (e.g., age, income, occupation). This sample has been shown by Dhar et al. (2004) to be representative of individual investors in general. We merge this sample with a data set maintained by Institutional Shareholder Services (ISS). The ISS data set comprises essentially all federal securities class action filings since the mid-1980s. In each case, ISS identifies the company defendant, the class period event dates, plaintiffs' law firm, settlements amounts (if known), circuit where complaint filed, filing date, a summary of the allegations, and other pertinent information.

Table 1 summarizes the distribution of companies in the class action sample by industry and compares this to the Compustat population and the discount brokerage sample. We rank companies in the class action sample by two-digit SIC industry code from largest to smallest. Relative to the brokerage sample, the class action sample includes more stocks in category 73 (business services), which includes computer software and other technology services, but fewer in category 35 (industrial machinery and equipment). Relative to Compustat, the class action sample also contains more computer and technology stocks (SIC categories 73 and 36). Banks and investment companies (SIC categories 60, 61, and 67), on the other hand, are under-represented in the class action and brokerage samples. In short, the class action and brokerage samples are weighted in favor of technology companies. This derives mostly from two factors. First, technology companies tend to be sued more often and, second, many brokerage company investors have addresses in the western United States, particularly in California (20% of the investor addresses), which is home to a large segment of the technology sector.

Table 2 compares the sample characteristics of the discount brokerage sample (panel A) and the class action sample (panel B) by year. The number of companies in a given year is less than the total class action companies in table 1 because some companies in the class action sample are not traded in every year of the brokerage sample. The differences are small, however, in that brokerage sample

investors trade about 90 percent of the 710 companies listed in table 1 each year. Table 2, for example, reports that brokerage sample investors traded 658 of the 710 class action companies in 1996.[11]

Table 2 also reveals the following. For both samples, the number of buy trades exceeds the number of sell trades, and the number of buy and sell trades generally increases over the sample period, especially in 1995 and 1996. On the other hand, the samples differ in that, for the class action sample, the ratio of stocks traded to investors is higher, as is the average sell size relative to the average buy size, which is also more pronounced in the later years. Brokerage house investors during the sample period, apparently, were relatively more interested in buying class action stocks than stocks in general. For example, in 1996, 658 class action stocks generated 50,394 buys (a multiple of 77), whereas the full sample of 7,096 stocks generated 179,417 buys (a multiple of 25).

These trading data also allow us to match each class action company with trading in the same company over a period of the same length as the class period (hereafter, control period). We assume that this control period ends 250 trading days prior to the actual the SCP.[12] The data in tables 2 and 3, however, do not reflect trading around the class period dates, as such dates are distributed across the calendar years. Unreported analysis indicates that these dates are skewed to the 1994-1996 period, which includes roughly 65 percent of the class period dates versus 35 percent for the 1991-1993 period.

4. Results

4.1. Individual investor trading around the start and end of the class period

We use buy-sell imbalance, BSI_{it} (defined in section 2), aligned in event time as the primary measure to examine individual investor trading around the class action events. We also calculate buy-sell imbalance for a control period (prior period of same length as class period) and denote this as BSI_{it}^{C}. We then average the BSI_{it} and BSI difference (BSI_{it}- BSI_{it}^{C}) over the i class action companies and

denote this as BSI_t or (BSI_t- BSI_t^C). Finally, we cumulate BSI_t or (BSI_t- BSI_t^C) over t = -20 to 20 and t = -5 to 5 days relative to the class action event dates to measure the overall or cumulative impact of individual investor trading over the 41 and 11 day periods. Table 3 summarizes cumulative mean BSI and cumulative mean BSI difference around the start (SCP) and end (ECP) of the class period. Table 3 also includes market capitalization and excess return for descriptive purposes.

Table 3, panel A, shows that the mean market value of a class action company decreases over the class period, from $7.5 million to $6.4 million. The mean market value of the companies with settlement data (about one-half the sample) is larger, however, or about $16.1 million. Panels B and C allow a comparison of mean excess stock return and the mean BSI cumulated over -20 to 20 days and -5 to 5 days. Both measures are negative around the ECP and positive around the SCP. For example, mean BSI (-20,20) = 0.27 (significant at 4%) around the SCP. The mean BSI (-20,20) around the ECP, however, although negative (-0.26) is not significantly negative. In other words, table 3 shows that individual investors, on average, are net buyers around the start of the class period when prices increase due, in part, to false positive news. Their selling, however, is not significantly negative around the end of the class period (based on a window from day -20 to 20) when stock prices decrease. Some individual investors apparently sell in response to, and possibly in anticipation of, the corrective disclosure, whereas others buy, perhaps, in the belief that prices have overreacted to the bad news. Stock price (and market volume) measures, not individual investor trades, are far more reflective of a swift reaction to a corrective disclosure (figure 1b).

These panels focus on trading close to the event date and, hence, do not capture less immediate pre-event and post event investor trading. Panel D broadens the window and reports mean (BSI - BSI^C) for four subperiods (-51,-26), (-25,-5), (5,25), and (26,51).[13] We exclude trading immediately around the event dates (-5,5) to focus on trading less affected by the announcement effects around public disclosure. We note the following from panel D. First, the BSI differences around the ECP are

consistently negative for all subperiods, and significantly so for days -25 to -5 (BSI difference for days -25 to -5 = -0.55, significant at 2%), which is before the corrective disclosure at the ECP. Some individual investors, apparently, sell in the few weeks prior to public disclosure of the negative news.

Conversely, some individual investors buy in the period immediately following the start of the class period (BSI difference for days 5 to 25 = 0.12, significant at 3%). This buying does not persist beyond this initial period, however. Figure 2 illustrates these trends in net selling and buying. Figure 2a shows a general decline in the cumulative BSI around the ECP, which is also consistent with the overall shift in stock prices. Figure 2b shows a general increase in the cumulative BSI around the SCP, also consistent with the direction of stock prices. However, some of this BSI increase occurs before the SCP date and, hence, may not be caused by the allegedly false information disclosed on the SCP date, although it could be due to the anticipation of such information.

Overall, these results support H1–that net individual investor buying (selling) increases around the start (end) of the class period. As such, they support the view that individual investor trading around class actions events, like stock prices more generally, is driven, in part, by allegedly false information that is later corrected at the end of the class period.

4.2. Individual investor trading by more informed versus less informed investors

The results in the preceding section do not distinguish between different types of investors. This section tests the hypothesis that such observed trading differs on the basis of the relative informedness of individual investors, specifically, the ability of investors to process complex litigation-related information for stock trading purposes. We select two proxies for relative informedness–investor income and occupation–and assign each investor/trade to one of two groups based on these proxies. Income and occupation data are available for 61.9 and 33.5 percent, respectively, of the trades in the sample. These measures have been used in prior research.[14]

High income refers to investors whose reported annual income (unadjusted for inflation) is higher than $100,000 and low income refers to those whose reported income is lower than $50,000. We delete the middle-income group to reduce measurement error. Professional investors comprise those in the database who describe their job as "Managerial-Technical" or "Administrative-Managerial". Non-professional investors are those whose job is in any other category. We deem higher income and investors in professional occupations as more informed and lower income and investors in non-professional occupations as less informed. Of course, neither proxy measures informedness without error, but as long as they are not perfect substitutes for each other, consistency in results across the two proxies should strengthen our overall findings.[15]

We calculate the BSI for an investor type as the mean across those class action companies whose trades on a given day are by more informed or less informed investors. We also calculate the BSI difference between more informed and less informed investors as the difference in the mean BSI for each class action company whose trades on a given day are by more informed or less informed investors.

We present the results in two stages, first, for mean BSI and, second, for the difference in mean BSI. Table 4 reports the results for mean BSI based on income as the proxy for informedness. We derived quantitatively similar unreported results for mean BSI based on occupation. Panels A and B of table 4 document that the BSI for more informed investors differs from the BSI for less informed investors around the ECP. In particular, the more informed BSI is significantly negative during days -25 to 5. This is not the case for the less informed group in panel B, whose BSI is non-negative in periods -51 to -26, -25 to -5, and 5 to 25. Similarly, panels C and D document that the BSI differs across investor type around the SCP, in that the less informed BSI is non-negative in all periods, whereas the more informed BSI is negative in days -25 to -5, 5 to 25 and 26 to 51, and significantly negative in days 5 to 25 (BSI = -0.098, significant at 2,75%), shortly after the beginning of the alleged fraud. These

results support our second (H2) and third (H3) hypotheses that the trading behavior of more informed and less informed investors differs within the class period. A more inclusive approach, however, examines the BSI *difference* between investor types around the start and end of the class period.

Table 5 presents the results for the BSI difference for both proxies of investor informedness. Panels A shows the results around the end of the class period (ECP). For each proxy, for days -25 to -5 relative to the ECP, the BSI difference is significantly negative. For panel A1, the BSI difference is -0.085, significant at 7 percent; and for panel A2, the BSI difference is -0.122, significant at 0.2 percent. These BSI differences are also the most negative of the four event periods, and the BSI differences for other event periods are mostly insignificant. In other words, more informed investors are significantly more likely than less informed investors to engage in net selling close to the end of the class period. The results in panel A also indicate that neither investor type is a net buyer following the end of the class period after the corrective disclosure is made. The BSI differences for days 5 to 25 and 26 to 51 are either insignificant or vary in sign across the proxies.

Panel B of table 5 reports the results around the start of the class period (SCP). The BSI difference is significantly negative for days 5 to 25 for each of the proxies, whereas the BSI difference is insignificant or inconsistent in sign across the proxies for the other event periods. For panel B1, the BSI difference for days 5 to 25 is -0.126, significant at 0.2 percent; and for panel B2, the BSI difference is -0.091, significant at 2.8 percent.

We also compared the more informed and less informed groups on the basis of certain financial indicators. It is conceivable, for example, that the results we observe around the litigation dates stem from systematic differences in mispricing due to general factors such as differences in market capitalization, accounting return on common equity, price-to-earnings and book-to-market ratios, and other related "glamour" stock factors. Unreported analysis indicates that the more and less informed

groups (based on both proxies) do not differ significantly on these factors at either the start or the end of the class period. As such, the results we observe are unlikely to be explained by these factors.

In short, relative to less informed investors, more informed investors appear to be net sellers in the few weeks prior to the ECP (supports H2) (table 5, panel A), and less informed investors tend to be net buyers in the few weeks after the SCP (supports H3) (table 5, panel B). We also graph these differences between more informed and less informed traders in figure 3 (based on the income proxy). Figure 3a shows the BSI differences relative to the ECP, and figure 3b shows the BSI differences relative to SCP.

Overall, these results support the view that the stock trading by individual investors prior to a corrective disclosure at the end of the class period and in the first few weeks after the start of the class period may be explained, in part, by a proxy for investor informedness. These results are also broadly consistent with the view (the disposition effect) that some investors, most likely the less informed, sell stocks later than the more informed, perhaps reluctantly, after experiencing a substantial loss by retaining the stock through the end of the class period.

4.3. Individual investor trading around extreme earnings announcements

The preceding results, however, may be explained not by the particular aspects of a litigation disclosure, which some investors may understand better than others, but rather by a more general response to extreme news unrelated to any consequences for securities litigation. We, therefore, conduct a similar analysis of individual investor trading (as outlined in section 4.2) where the event date is the quarterly earnings announcement date and the news is either extreme good news or bad news. We calculate earnings surprise for each firm-quarter as the change in quarterly earnings per share before extraordinary items (split adjusted) relative to the same quarter in a previous year (a seasonal random walk model) scaled by price per share (split adjusted) at the end of the quarter prior to earnings announcement. We designate the top and bottom 20 percent of the earnings surprises as

extreme good news and extreme bad news, respectively. We then calculate the mean BSI difference (more informed minus less informed) for the same intervals in table 5 for each earnings surprise group.

Unreported results indicate that the BSI differences are not significantly different from zero for both news types (based on a t-test and a binomial test). In other words, the trading differences for more and less informed investors that we report in table 5 around the start of a litigation class period (when the market receives allegedly false positive information) and around the end of a class period (when a corrective disclosure is made) do not occur when the market receives extreme positive or negative information about earnings purportedly unrelated to securities litigation.[16] We conclude, therefore, that the results we observe are more likely driven by news related to securities litigation (which could, of course, involve allegations about faulty earnings) than earnings in general. This result is robust to both proxies of investor informedness and for unscaled earnings surprise.[17]

4.4. Individual investor trading within the class period

Our data set also allows us to analyze the timing of purchases and sales within the class period. To normalize the data for class periods of different lengths, we first allocate the investor trades into four calendar day quartiles within the class period (including the first and last day) and form two more groups based, first, on the number of trades during days -50 to -1 relative to the SCP and, second, on the number of trades from days 1 to 50 relative to the ECP. Thus, we have six trading portfolios, including four within the class period.[18] We then form a transition matrix C_{bs} of the percentage of sells in each subperiod "s" conditional on the purchase of those shares in subperiod "b" (b less than or equal to s). For example, table 6, panel A, documents that 26 percent of all shares purchased in quartile one of the class period are sold in quartile two. Panel A also reports that 54.3 percent of all shares purchased in quartile one remain unsold at the end of the class period. In addition, we form a

transition matrix for all investors in the control period (based on the same control period dates as stated previously).

We also form transition matrices for different types of investors, namely, more informed investors, C_{bs}^{I}, and less informed investors, C_{bs}^{L}, and more active investors, C_{bs}^{A}, and less active investors, C_{bs}^{P}. For C_{bs}^{I} and C_{bs}^{L}, we use the same definitions of informedness as in the preceding section. We classify an investor as more or less active based on the upper and lower terciles of the distribution of non-class period trading activity (buys or sells). Based on this distribution, a more active trader makes 20 or more trades outside of the class period, and a less active trader makes 10 or fewer trades outside of the class period.

Our primary objective is to assess the timing of the sale of shares purchased by investors in the class period. These are the potentially damaged shares, as investors purchase these when the price is artificially high due to the allegedly false information. The timing of the sale of class period purchases should add to our understanding of the trading assumptions used by legal analysts to calculate securities class action damages. Such persons often refer to shares purchased after the SCP and sold prior to the ECP as "in and out" shares, and those shares purchased after the SCP but held through the ECP as "retained" shares. If most of the stock price decline to occurs at the ECP date (which is typically the case), and the price inflation occurs early in the class period, then models that calculate higher retained shares will result in higher damages than models that calculate lower retained shares.[19]

Table 6 presents the initial results for all investors in the class period (panel A) and all investors in the control period (panel B). The results indicate that panels A and B differ in that $C_{bs}^{\text{CLASS ACTION}}$ is greater than C_{bs}^{CNTRL} for $s > b+k$, where k lies between 0 and 3. Based on a binomial test that the probability that $C_{bs}^{\text{CLASS ACTION}} > C_{bs}^{\text{CNTRL}}$ is 50 percent, the percentage of shares sold in any one of the remaining quartiles in the class period is significantly greater than for the same companies in the

control period (significant at 0.4%). Individual investors on average are, thus, more active traders in a litigation class period than at other times, ostensibly because of the greater flow of information–both allegedly false and corrective–during this time. For example, table 6 reports that of the purchases made in the first quartile of the class period, investors sell 45.7 percent prior to the end of the class period versus 29.6 percent for the control period.

We also examine whether the transition percentages might differ on the basis of investor type. More informed and/or more active investors, for instance, might sell more shares in the class period quartiles than less informed and/or less active investors who might sell less in those quartiles and more after the end of the class period. Table 7 reports the results based on the two proxies for informedness. The results are consistent across the proxies. The transition percentages for income and occupation do not differ statistically based on a binomial test (as described in the preceding paragraph). In other words, more informed investors on average do not appear to sell more of their class period purchases prior to the end of the class period than less informed investors. However, if we focus more closely on differences in the transition percentages for buying in the first and selling in the last quartile of the class period (quartile one buys and quartile four sells, respectively), we observe that the results are not inconsistent with table 5, which is based on specific event days rather than equal calendar day transition quartiles. The less informed tend to buy more early and sell less late, whereas the more informed tend to buy less early and sell more late. The differences are not statistically significant, however.

We also split the class action sample by more active and less active investors. Table 8 reports the transition matrices and is particularly revealing in that the more active investors, clearly, sell a much larger fraction of their class period purchases prior to the ECP. For example, the more active group sells 56.5 percent of its quartile one purchases before the ECP, whereas the less active group sells

only 16.1 percent. Based on a binomial test similar to the above, the percentages for more active investors statistically exceed (significant at less than 0.1%) the percentages for less active investors.

These results offer insights into the assumptions used in models to calculate securities class action damages.[20] The proportional trading model (PTM) assumes that the shares sold the next period (within the class period) are equally likely to come from the float or prior class period trading volume. Shares assumed sold under the PTM also depend on market trading volume (after dealer trading and other adjustments, e.g., Gould and Kleidon 1994), so that when volume increases more shares are assumed sold than when volume decreases. Unreported analysis indicates that market trading volume for the litigation sample generally increased over the class period. However, the results in tables 6, 7, and 8 differ substantially from this view, in that the highest percentage of selling always occurs in the first adjacent quartile and then tapers off in the other quartiles. Our results are, therefore, inconsistent with the PTM (which would reflect increasing trading volume) relative to the other trading models.[21]

The higher percentages in the next adjacent quarter, for example, could arise from a higher intensity of trading by one class of investors. This would be consistent with a multi-trader approach. The data in table 8 support this view in that the ratio of the percentage of shares sold in the next quartile purchased earlier in the class period by more active investors to the percentage for less active investors ranges from a ratio of 3.5 to 4. This ratio is broadly consistent with Froot et al. (1991), who report relative trading intensities for some different groups of investors (relative to trading in passive pension funds). For retail investors, Froot et al. (1991) derive a trading intensity ratio of 1.5. However, our ratio of 3.5 to 4.0 may not be directly comparable with their study, as it is relative to passive pension fund investors and not to two types of individual investors, as we study here.

A third approach, the accelerated trading model, assumes that investors (in general) trade shares purchased in the class period more intensively than new shares from the float. Our results in this

respect are less clear. If we use shares purchased in days -50 to -1 prior to the start of the class period as a proxy for shares from the float, the data in table 6 are not supportive of accelerated trading in the class period. For example, table 6, panel A reports that 24.5 percent of shares purchased during days -51 to -1 relative to the SCP are sold in the next adjacent quartile versus 26.0 percent of shares purchased in the first class period quartile. On the other hand, if we compare the class action sample transition percentages with the control period percentages, which relate to trading well outside the class period, the class action transition percentages are statistically much higher. Fewer shares remain unsold at the end of the class period in table 6, panel A (class action sample) than in panel B (control period). For example, panel B reports that investors sold 19.9 percent of shares purchased in quartile one of the control period in quartile two versus 26.0 percent sold in quartile two by class period traders. This is consistent with accelerated trading in the class period.

5. Summary and Conclusions

In contrast to an extensive literature that has evolved in the past several decades on the response of the stock market and professional investors to financial news events (e.g., earnings announcements, dividends, restatements), comparatively little has been published on trading by individual investors in response to these and similar events. The unavailability of appropriate data is one factor that might have hampered these efforts. We use a unique data set of the trades in 1991-1996 by some 78,000 investors at a major discount brokerage company to study the buying and selling behavior of individual (retail) investors around events associated with securities class action litigation.

Litigation events are an appropriate focus in that while they typically have swift and dramatic impacts on market prices and trading volume, they are also complex events that can signal diverse expectations about company cash flow, so that some investors may understand them better than others. Knowledge of individual investor trading around litigation events is also relevant to models to calculate securities class action damages. These models typically rely on assumptions about the timing of the sale of shares purchased in the class period based on limited or anecdotal evidence.

This study examines the buys and sells of individual investors at the start, the end, and during the securities litigation class period. Our merged data set allows us to examine trading for a substantial fraction of all federal securities class actions filed during 1991-1996. Given the complexity of the litigation disclosures, we test the primary notion that individual investor trading in the class period differs on the basis of proxies of investor informedness. Our results support this notion in that we find that more informed investors (relative to less informed investors) tend to be net sellers close to the end of the class period. Conversely, less informed investors (relative to more informed investors) tend to be net buyers following the start of the class period, at which time the company first conveys allegedly false positive information to the market. These results are robust to two proxies of informedness, namely, investor income and occupation. They are also unaffected by possible trading in response to extreme good news or bad news earnings announcements.

In addition, our analysis of individual investor trading offers insights into the timing of investor sales conditional on a purchase within the class period, important for the calculation of damages in shareholder lawsuits. A share purchased in the class period predicated on false information exposes an investor to shareholder damages; but those damages depend on when that share is actually sold. If the sale occurs prior to the end of the class period, and the fraud is revealed at the end of the class period, then that share has not been damaged. However, if that share is held through the end of the class period, then the investor suffers a loss. Securities class action damage analyses and court settlements are often based on limited evidence regarding the timing of class action buying and selling. We offer three results in this regard. First, of the shares purchased in the class period, on average, investors sell at least twice as many shares in the next calendar quartile of the class period (20 percent) as in the later quartiles (10 percent or less). Second, for class action stocks, investors hold 54 percent of purchases in the first quartile of the class period through the end of the class period versus 70 percent of purchases for a control period. Third, for more active and less active investors in the class period, the equivalent percentages are 43.5 percent and 83.9 percent, respectively.

These results support the notion that trading intensity differs across traders in the class period, which is more consistent with a multi-trader than a single trader approach to class action damages. The results are persuasive, also, regarding the idea that trading intensity is higher in the class period than at other times, consistent with accelerated trading. Finally, while we intend these results to capture the average trading of a large sample of securities class action companies with different class period lengths, they are not a substitute for a detailed analysis of the trading records of a single company for purposes of a securities damages calculation. Yet such analyses can be costly. Our results should, at least, be useful for analysts in developing defensible preliminary damages calculations and, further perhaps, in assisting courts in buttressing arguments as to the reasonableness of calculations used in class action settlements.

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Table 1
Industry Categories for Securities Class Action, Compustat, and Discount Brokerage Samples

SIC 2-Digit Category	SIC Description	No. of Class Action Coys.	% of Class Action Coys.	Cum % of Class Action Coys.	% of Compust at Coys.[1]	% of Compustat Coys.	No. of Discount Brokerage Coys.[2]	% of Discount Brokerage Coys.
73	Business services	102	14.4%	14.4%	2,132	9.6%	132,579	8.2%
36	Electrical and electronic equipment	74	10.4%	24.8%	1,273	5.7%	192,763	11.9%
35	Industrial machinery and equipment	54	7.6%	32.4%	1,260	5.7%	227,976	14.0%
28	Chemicals and allied products	45	6.3%	38.7%	1,022	4.6%	161,008	9.9%
38	Instruments and related products	31	4.4%	43.1%	1,076	4.9%	67,093	4.1%
80	Health services	29	4.1%	47.2%	406	1.8%	27,571	1.7%
67	Holding and other investment offices	24	3.4%	50.6%	1,394	6.3%	73,914	4.5%
49	Electric, gas, and sanitary services	24	3.4%	53.9%	477	2.2%	49,296	3.0%
48	Communications	23	3.2%	57.2%	755	3.4%	52,478	3.2%
63	Insurance carriers	23	3.2%	60.4%	411	1.9%	20,277	1.2%
59	Miscellaneous retail	21	3.0%	63.4%	415	1.9%	19,025	1.2%
50	Wholesale trade--durable goods	17	2.4%	65.8%	581	2.6%	23,037	1.4%
51	Wholesale trade--nondurable goods	15	2.1%	67.9%	341	1.5%	15,076	0.9%
87	Engineering and management services	15	2.1%	70.0%	397	1.8%	15,055	0.9%
37	Transportation equipment	15	2.1%	72.1%	424	1.9%	53,045	3.3%
60	Depository institutions	14	2.0%	74.1%	1,454	6.6%	23,733	1.5%
61	Nondepository credit institutions	14	2.0%	76.1%	344	1.6%	10,024	0.6%
20	Food and kindred products	13	1.8%	77.9%	531	2.4%	46,951	2.9%
58	Eating and drinking places	11	1.5%	79.4%	351	1.6%	23,229	1.4%
62	Security, commodity brokers, and services	11	1.5%	81.0%	199	0.9%	18,516	1.1%
30	Rubber and miscellaneous plastics products	11	1.5%	82.5%	278	1.3%	9,220	0.6%
39	Miscellaneous manufacturing industries	9	1.3%	83.8%	268	1.2%	14,512	0.9%
45	Transportation by air	9	1.3%	85.1%	162	0.7%	17,314	1.1%
27	Printing and publishing	7	1.0%	86.1%	318	1.4%	14,662	0.9%
56	Apparel and accessory stores	7	1.0%	87.0%	135	0.6%	17,140	1.1%
23	Apparel and other textile products	7	1.0%	88.0%	254	1.1%	7,416	0.5%
13	Oil and gas extraction	5	0.7%	88.7%	923	4.2%	33,596	2.1%

Table 1 continued on next page.

Table 1, contd.

SIC 2-Digit Category	SIC Description	No. of Class Action Coys.	% of Class Action Coys.	Cum % of Class Action Coys.	No. of Compust at Coys.[1]	Cum. % of Compustat Coys.	No. of Discount Brokerage Coys.[2]	Cum. % of Discount Brokerage Coys.
33	Primary metal industries	5	0.7%	89.4%	286	1.3%	19,231	1.2%
53	General merchandise stores	5	0.7%	90.1%	173	0.8%	40,107	2.5%
70	Hotels, rooming houses, camps, and other lodging places	5	0.7%	90.8%	140	0.6%	12,065	0.7%
33	Primary metal industries	5	0.7%	91.5%	286	1.3%	19,231	1.2%
65	Real estate	4	0.6%	92.1%	360	1.6%	3,534	0.2%
82	Educational services	4	0.6%	92.7%	60	0.3%	1,238	0.1%
78	Motion pictures	3	0.4%	93.1%	222	1.0%	6,305	0.4%
79	Amusement and recreational services	3	0.4%	93.5%	253	1.1%	5,225	0.3%
22	Textile mill products	2	0.3%	93.8%	174	0.8%	2,898	0.2%
57	Furniture, home furnishings and equipment stores	1	0.1%	93.9%	130	0.6%	12,068	0.7%
54	Food stores	1	0.1%	94.1%	173	0.8%	9,882	0.6%
Other	Other[3]	42	5.9%	100.0%	2,344	10.6%	127,886	7.9%
Tot.Coys.		710	100%		22,182	100.0%	1,626,176	100.0%

Notes to table 1.
1. Compustat categories based on 1996 DNUM codes
2. Based on number of company-years in Discount Brokerage sample.
3. Excludes Discount Brokerage companies with missing SIC code.

Table 2
Sample Characteristics for Discount Brokerage and Securities Class Action Samples

Sample Characteristic/Year[1]	1991	1992	1993	1994	1995	1996
A: Discount Brokerage Sample[2]						
Number of buy trades	184,358	174,466	168,790	141,570	167,134	179,417
Number of sell trades	133,845	132,541	146,768	120,209	151,427	154,251
Average trade size (buys)	$12,941	$13,166	$13,114	$12,698	$13,004	$12,815
Average trade size (sells)	$13,147	$12,927	$12,953	$12,977	$13,043	$12,853
Total number of stocks traded	5,930	6,010	6,514	6,804	7,206	7,096
Total number of investors	42,109	41,222	39,712	35,850	35,800	34,262
B: Securities Class Action Sample						
Number of buy trades	29,607	32,129	31,570	28,264	44,557	50,394
Number of sell trades	23,204	24,685	27,500	24,597	37,564	41,114
Average trade size (buys)	$11,522	$12,510	$13,136	$13,367	$16,183	$15,500
Average trade size (sells)	$14,947	$16,120	$15,693	$16,056	$19,683	$19,674
Total number of stocks traded	591	621	569	604	645	658
Total number of investors	16,500	17,972	17,443	16,021	18,671	18,938

Notes to table 2.
1. Year of the date of the end of the class period.
2. Same as Kumar and Lee (2004), table 1, panel A.

Table 3
Descriptive Statistics for Market Capitalization, Excess Return, Buy-Sell Imbalance, and Buy-Sell Imbalance Difference at Start and End of Class Period

Variable	Mean	Standard Deviation	Binom. Prob.[1]	10% Tr. Mean	Median	Count
A. Market capitalization and Other						
End of class period	6,356,140	18,849,944	na	1,778,855	518,073	685
Start of class period	7,536,123	23,475,551	na	2,067,334	735,961	674
Settlement	16,083,857	49,702,391	na	6,491,658	3,775,000	330
B. Excess Return						
End of class period -20, 20	(0.2012)	0.5151	<0.001	(0.1868)	(0.2048)	660
End of class period -5,5	(0.1817)	0.4486	<0.001	(0.1555)	(0.1807)	660
Start of class period -20, 20	0.0872	0.3394	<0.001	0.0589	0.0570	676
Start of class period -5,5	0.0373	0.2155	<0.001	0.0124	0.0247	650
C. Buy-Sell Imbalance (BSI)						
End of class period -20, 20	(0.2571)	4.7051	0.9287	0.6280	0.0991	419
End of class period -5,5	(0.0258)	2.1298	0.5454	0.1936	0.0426	307
Start of class period -20, 20	0.2710	4.6246	0.0385	1.0000	0.3356	538
Start of class period -5,5	0.1388	2.1296	0.0371	1.0000	0.2208	407
D. BSI Difference[2]						
End-Cntrl of class period (-51 -26)	(0.5032)	5.0591	0.1462	0.0000	(0.387)	256
End-Cntrl of class period (-25 -5)	(0.5479)	4.8132	0.0246	0.0000	(0.566)	256
End-Cntrl of class period (5 25)	(0.2915)	4.6772	0.1503	0.0000	(0.409)	259
End-Cntrl of class period (26 51)	(0.2071)	4.6609	0.2516	0.0000	(0.315)	240
Start-Cntrl of class period (-51 -26)	0.0595	4.9551	0.8479	0.0000	(0.093)	343
Start-Cntrl of class period (-25 -5)	0.4959	4.3870	0.0002	1.0000	0.677	337
Start-Cntrl of class period (5 25)	0.1180	4.5449	0.0311	0.0000	0.195	335
Start-Cntrl of class period (26 51)	(0.1311)	4.7035	0.6422	0.0000	(0.008)	326

Notes to table 3.
1. Probability that the proportion of BSI that is negative for the ECP (end of class period) or positive for SCP (start of class period) > 50%.
2. ECP or SCP less Control, where the control period BSI is the class action sample BSI relative to 250 days prior to the class action event date.

Table 4
Buy Sell Imbalance (BSI)[1] By Investor Informedness[2] Relative to Class Period Event Date

Period (in Days) Relative to Class Period Event Date	Mean	Standard Deviation	t Statistic Prob.[3]	Median	Binom. Prob.[4]	Count
A: More Informed at End of Class Period[1]						
(-51, -26)	0.0493	0.8099	0.1211	0.0000	0.4774	315
(-25, -5)	(0.0942)	0.8309	0.1480	(0.2308)	0.0167	293
(5, 25)	0.0328	0.8432	0.1907	0.0000	0.4529	293
(26, 51)	(0.0625)	0.8208	0.2829	(0.0521)	0.0453	306
B: Less Informed at End of Class Period						
(-51, -26)	0.0290	0.8293	0.1965	0.0833	0.8253	334
(-25, -5)	0.0041	0.8308	0.3252	0.0000	0.3224	309
(5, 25)	0.0199	0.8429	0.2423	0.0645	0.8910	324
(26, 51)	(0.0253)	0.8055	0.5000	(0.0035)	0.2884	328
C: More Informed at Start of Class Period						
(-51, -26)	0.0262	0.8037	0.4408	0.0000	0.4117	328
(-25, -5)	(0.0123)	0.8366	0.2376	0.0000	0.5000	275
(5, 25)	(0.0980)	0.8358	0.0204	(0.1421)	0.0275	301
(26, 51)	(0.0145)	0.8487	0.2196	0.0000	0.3047	322
D: Less Informed at Start of Class Period						
(-51, -26)	0.0051	0.8096	0.3125	0.0000	0.4780	338
(-25, -5)	0.0274	0.8182	0.4505	0.0000	0.4291	291
(5, 25)	0.0510	0.8392	0.4030	0.0768	0.7778	342
(26, 51)	0.0355	0.7782	0.5000	0.0370	0.7540	315

Notes to table 4.
1. The BSI for an investor type is the mean/median across those class action companies whose trades on a given day are by More Informed or Less Informed investors.
2. Investor informedness is based on reported annual investor income. High (low) income refers to income higher than $100,000 (lower than $50,000).
3. One-tailed test that BSI<0 (BSI >0) at End (Start) of Class Period.
4. Probability that the proportion of BSI that is negative for the ECP or positive for SCP exceeds 50%.

Table 5
Difference in Buy Sell Imbalance (BSI)[1] By Investor Informedness Relative to Class Period Event Date

Period (in Days) Relative to Class Period Event Date	Mean	Standard Deviation	t Statistic Prob.[4]	Median	Binom. Prob.[5]	Count
A. End of Class Period						
1. Income[2]						
(-51, -26)	0.0159	0.9848	0.4630	0.0855	0.6805	334
(-25, -5)	(0.0849)	0.9571	0.0305	(0.1454)	0.0715	309
(5, 25)	0.0090	1.0299	0.4251	0.0758	0.7022	324
(26, 51)	0.0459	1.0224	0.7766	0.1333	0.7448	328
2. Occupation[3]						
(-51, -26)	(0.2403)	0.9701	0.0105	(0.2240)	0.0040	288
(-25, -5)	(0.1222)	0.9409	0.0326	(0.3325)	0.0020	289
(5, 25)	0.0524	0.9948	0.0957	(0.1039)	0.0320	269
(26, 51)	(0.0522)	0.9806	0.1004	0.3390	0.0290	300
B. Start of Class Period						
1. Income[2]						
(-51, -26)	0.0604	0.9009	0.6640	0.1818	0.8755	334
(-25, -5)	(0.0355)	0.9561	0.4274	(0.1869)	0.1202	309
(5, 25)	(0.1262)	0.9950	0.0036	(0.3508)	0.0021	324
(26, 51)	(0.0413)	0.9796	0.1157	(0.0826)	0.1789	328
2. Occupation[3]						
(-51, -26)	(0.0120)	0.9404	0.3340	(0.0390)	0.6590	248
(-25, -5)	(0.0190)	0.9238	0.2950	(0.1299)	0.1740	245
(5, 25)	(0.0907)	0.9915	0.0400	(0.2790)	0.0284	240
(26, 51)	(0.0020)	0.9746	0.7840	0.2000	0.0955	281

Notes to table 5.
1. Buy-Sell Imbalance (BSI) difference is the difference in the mean BSI for each class action company whose trades on a given day are by More Informed or Less Informed investors based on income and occupation.
2. Investor income: BSI difference based on High (Low) Income, i.e., annual income higher than $100,000 (lower than $50,000).
3. Investor occupation: BSI difference based on Professional refers to those whose job description falls in "Managerial-Technical" or "Administrative-Managerial" and Non-professional refers to those whose job falls in other categories.
4. One-tailed test that BSI difference < 0.
5. Probability that the proportion of BSI difference that is negative for the ECP or positive for SCP exceeds 50%.

Table 6
Transition Matrix of Shares Sold that are Purchased Within an Earlier Subperiod

		Total Trans-actions	Sells	Buys	Percent of Total Buys	Percent Sold Within Each Subperiod						Percent Sold Before ECP	Percent Retained After ECP
						Pre SCP	One	Two	Three	Four	Post ECP		
A. All Investors													
Purchase within Each Subperiod	Pre SCP	4,457	2,106	2,351	6.1%	0.9%	24.5%	9.5%	8.5%	6.2%	4.5%	49.7%	50.3%
	One	14,624	7,039	7,585	19.6%		1.4%	26.0%	10.4%	7.9%	5.8%	45.7%	54.3%
	Two	13,729	6,682	7,047	18.2%			1.2%	19.8%	9.7%	5.2%	30.7%	69.3%
	Three	12,961	5,750	7,211	18.7%				1.0%	22.6%	6.8%	23.6%	76.4%
	Four	11,404	5,447	5,957	15.4%					0.9%	12.4%	0.9%	99.1%
	Post ECP	16,069	7,575	8,494	22.0%						1.2%	0.0%	100.0%
	Total	73,244	34,599	38,645	100.0%								
B. All Investors. Control Period													
Purchase within Each Subperiod	Pre SCP	5,955	2,906	3,049	11.9%	7.2%	14.5%	5.2%	3.8%	3.4%	1.8%	34.2%	65.8%
	One	13,081	6,248	6,833	26.7%		1.1%	19.9%	6.6%	2.0%	2.9%	29.6%	70.4%
	Two	11,104	5,330	5,774	22.6%			0.8%	15.8%	2.4%	1.9%	19.0%	81.0%
	Three	7,758	3,424	4,334	17.0%				1.1%	13.9%	1.8%	15.0%	85.0%
	Four	3,367	1,469	1,898	7.4%					1.2%	4.7%	1.2%	98.8%
	Post ECP	6,966	3,285	3,681	14.4%						0.8%	0.0%	100.0%
	Total	48,231	22,662	25,569	100.0%								

Notes to table 6.
Pre SCP is the -50 to -1 day period before the start of the class period. Subperiods one through four are four periods of equal length between the start of the class period and the end of the class period. Subperiods exclude days when class periods start and end. Post ECP is the 1 to 50 day period after the end of the class period.

Table 7
Transition Matrix of the Shares Sold that are Purchased Within an Earlier Subperiod: By Investor Informedness

		Total Trans-actions	Sells	Buys	Percent of Total Buys	Percent Sold Within Each Subperiod						Percent Sold Before ECP	Percent Retained After ECP
						Pre SCP	One	Two	Three	Four	Post ECP		
A More Informed Investors													
1. Income													
Purchase within Each Subperiod	Pre SCP	474	214	260	3.2%	1.5%	21.5%	13.1%	10.0%	7.3%	4.6%	53.5%	46.5%
	One	2,855	1,327	1,528	18.6%		1.3%	22.4%	11.0%	8.0%	6.2%	42.7%	57.3%
	Two	2,798	1,305	1,493	18.2%			1.5%	19.9%	8.9%	5.5%	30.3%	69.7%
	Three	2,885	1,285	1,660	20.2%				1.4%	21.6%	7.5%	23.1%	76.9%
	Four	2,678	1,220	1,458	17.7%					0.8%	13.6%	0.8%	99.2%
	Post ECP	3,490	1,670	1,820	22.1%						2.2%	0.0%	100.0%
	Total	15,180	7,021	8,219	100.0%								
2. Occupation													
Purchase within Each Subperiod	Pre SCP	1,404	679	725	9.5%	6.8%	17.2%	11.7%	6.8%	6.2%	2.6%	48.7%	51.3%
	One	2,747	1,353	1,394	18.3%		2.5%	24.5%	12.6%	7.5%	5.2%	47.1%	52.9%
	Two	2,671	1,281	1,390	18.3%			2.8%	19.2%	9.2%	5.5%	31.2%	68.8%
	Three	2,508	1,109	1,399	18.4%				1.6%	21.8%	6.4%	23.4%	76.6%
	Four	2,148	1,026	1,122	14.8%					1.7%	12.2%	1.7%	98.3%
	Post ECP	3,004	1,436	1,568	20.6%						5.7%	0.0%	100.0%
	Total	14,482	6,884	7,598	100.0%								

Table 7 continued on next page.

Table 7 continued.

		Total Trans-actions	Sells	Buys	Percent of Total Buys	Percent Sold Within Each Subperiod: Pre SCP	One	Two	Three	Four	Post ECP	Percent Sold Before ECP	Percent Retained After ECP
B. Less Informed Investors													
1. Income													
Purchase within Each Subperiod	Pre SCP	946	441	505	3.6%	2.2%	20.0%	11.9%	8.7%	5.3%	4.0%	48.1%	51.9%
	One	5,504	2,690	2,814	20.1%		1.2%	27.6%	9.2%	8.1%	5.8%	46.1%	53.9%
	Two	5,196	2,690	2,506	17.9%			1.9%	20.1%	10.7%	5.8%	32.7%	67.3%
	Three	4,866	2,192	2,674	19.1%				1.5%	22.8%	7.2%	24.3%	75.7%
	Four	4,280	2,006	2,274	16.3%					0.9%	13.7%	0.9%	99.1%
	Post ECP	6,110	2,908	3,202	22.9%						1.4%	0.0%	100.0%
	Total	26,902	12,927	13,975	100.0%								
2. Occupation													
Purchase within Each Subperiod	Pre SCP	229	104	125	9.8%	1.6%	20.8%	12.8%	8.0%	8.0%	9.6%	51.2%	48.8%
	One	475	241	234	18.3%		3.0%	23.9%	12.0%	9.8%	5.6%	48.7%	51.3%
	Two	438	221	217	17.0%			3.7%	19.4%	5.5%	5.5%	28.6%	71.4%
	Three	410	167	243	19.0%				3.7%	15.2%	2.5%	18.9%	81.1%
	Four	353	168	185	14.5%					2.2%	11.9%	2.2%	97.8%
	Post ECP	534	261	273	21.4%						16.8%	0.0%	100.0%
	Total	2,439	1,162	1,277	100.0%								

Notes to table 7.
Pre SCP is the -50 to -1 day period before the start of the class period. Subperiods one through four are four periods of equal length between the start of the class period and the end of the class period. Subperiods exclude days when class periods start and end. Post ECP is the 1 to 50 day period after the end of the class period. See table 5 for definitions of income and occupation.

Table 8
Transition Matrix of the Shares Sold that are Purchased Within an Earlier Subperiod: More Active and Less Active Investors

						Percent Sold Within Each Subperiod							
		Total Trans-actions	Sells	Buys	Percent of Total Buys	Pre SCP	One	Two	Three	Four	Post ECP	Percent Sold Before ECP	Percent Retained After ECP
A. More Active Investors													
Purchase within Each Subperiod	Pre SCP	4,575	2,169	2,406	11.7%	5.9%	32.9%	7.8%	7.0%	2.4%	6.7%	56.1%	43.9%
	One	10,343	4,898	5,445	26.4%		7.0%	35.1%	9.8%	4.6%	4.1%	56.5%	43.5%
	Two	8,694	4,180	4,514	21.9%			5.2%	25.9%	3.5%	2.7%	34.6%	65.4%
	Three	6,282	2,964	3,318	16.1%				3.4%	22.2%	2.7%	25.6%	74.4%
	Four	3,187	1,417	1,770	8.6%					2.5%	10.3%	2.5%	97.5%
	Post ECP	6,031	2,848	3,183	15.4%						4.1%	0.0%	100.0%
	Total	39,112	18,476	20,636	100.0%								
B. Less Active Investors													
Purchase within Each Subperiod	Pre SCP	411	186	225	12.2%	3.1%	8.4%	3.1%	2.2%	1.8%	3.6%	18.7%	81.3%
	One	914	430	484	26.2%		2.3%	10.5%	2.5%	0.8%	0.8%	16.1%	83.9%
	Two	792	380	412	22.3%			2.4%	5.6%	0.5%	0.5%	8.5%	91.5%
	Three	716	341	375	20.3%				1.9%	5.3%	0.3%	7.2%	92.8%
	Four	225	101	124	6.7%					4.0%	1.6%	4.0%	96.0%
	Post ECP	473	248	225	12.2%						2.7%	0.0%	100.0%
	Total	3,531	1,686	1,845	100.0%								

Notes to table 8.
Pre SCP is the -50 to -1 day period before the start of the class period. Subperiods one through four are four periods of equal length between the start of the class period and the end of the class period. Subperiods exclude days when class periods start and end. Post ECP is the 1 to 50 day period after the end of the class period.

Figure 1. Stock Market Reaction Around Start and End of Class Period

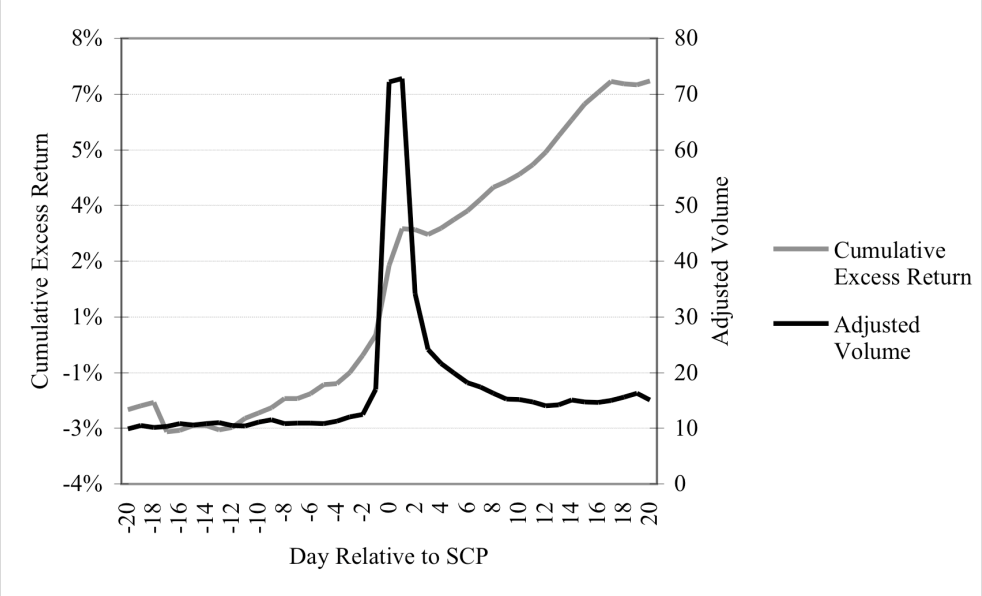

Figure 1a: Cumulative Excess Return and Adjusted Volume from 20 days prior to and 20 days after the start of the class period (SCP).

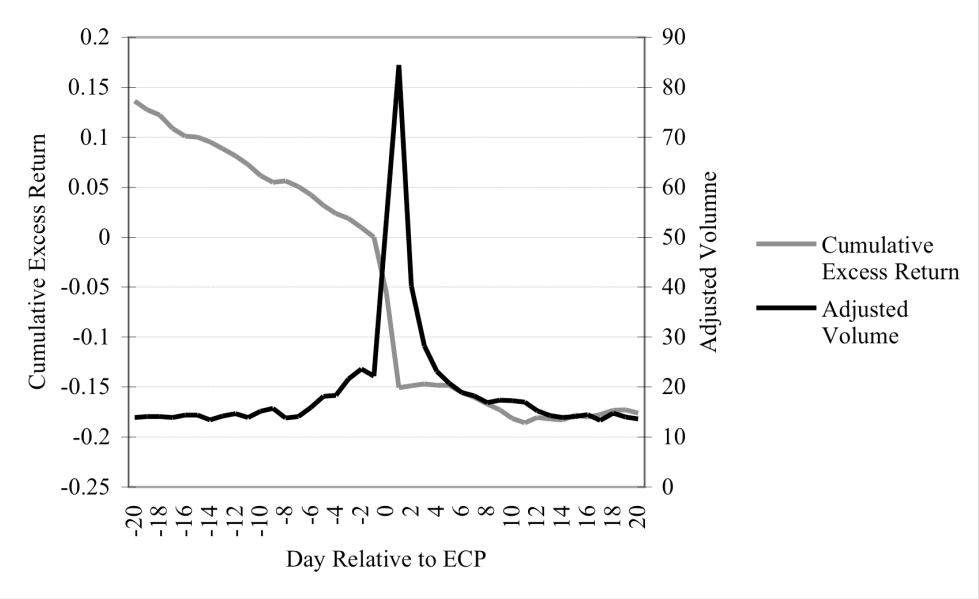

Figure 1b: Cumulative Excess Return and Adjusted Volume from 20 days prior to and 20 days after the end of the class period (ECP).

Notes to figure 1.
1. Cumulative Excess Return is arbitrarily set to zero as of day 0.
2. Adjusted Volume is Actual Volume divided by Common Shares outstanding x 10^{-3}

Figure 2. Cumulative Buy-Sell Imbalance (BSI) from 100 days prior to 50 days after the class action event

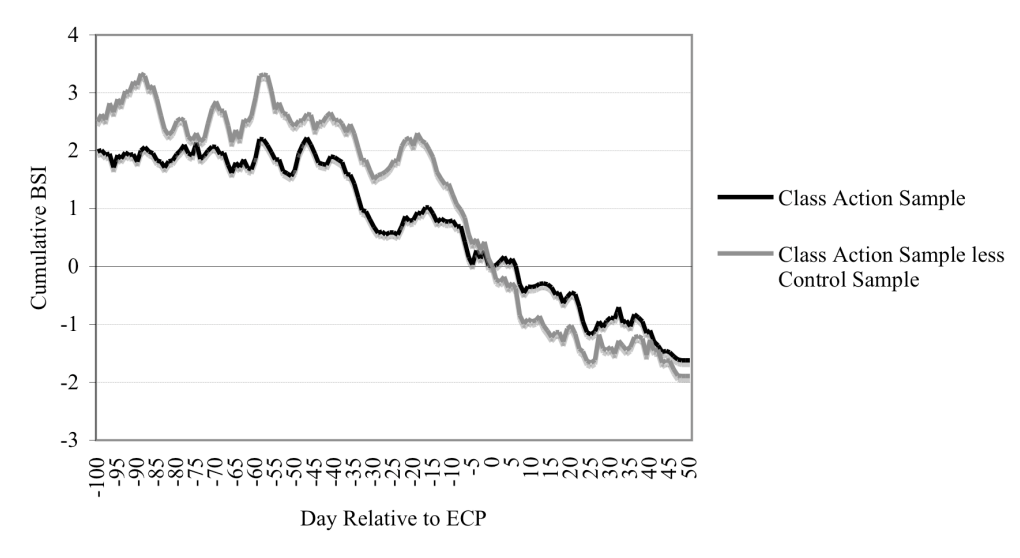

Figure 2a: Cumulative Buy-Sell Imbalance (BSI) from 100 days prior to 50 days after the end of the class period (ECP).

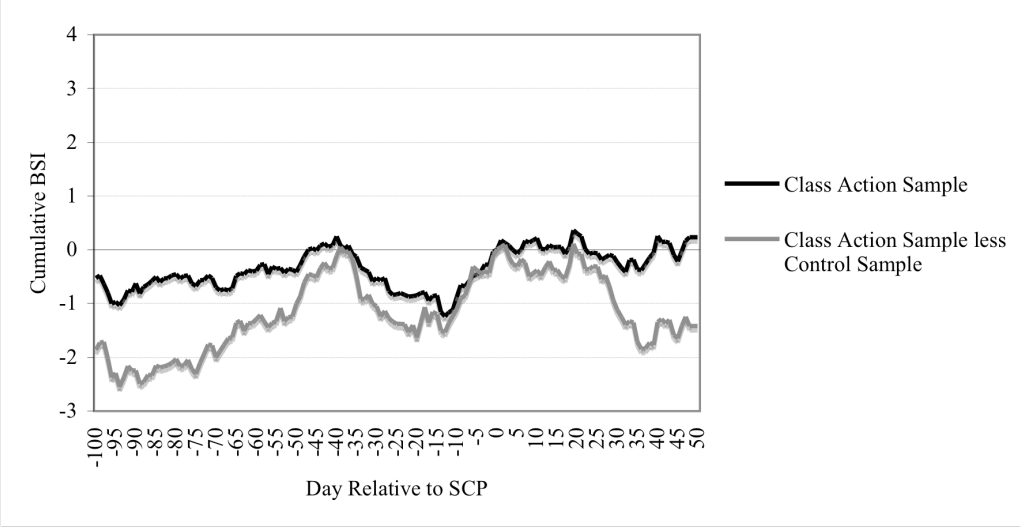

Figure 2b: Cumulative Buy-Sell Imbalance (BSI) from 100 days prior to 50 days after the start of the class period (SCP).

Notes to figure 2.
1. Cumulative BSI is arbitrarily set to zero as of day 0.
2. The control period BSI is the class action sample BSI relative to 250 days prior to the class action event date.

Figure 3. BSI Difference (BSI More Informed – BSI Less Informed) Relative to Class Action Event Date

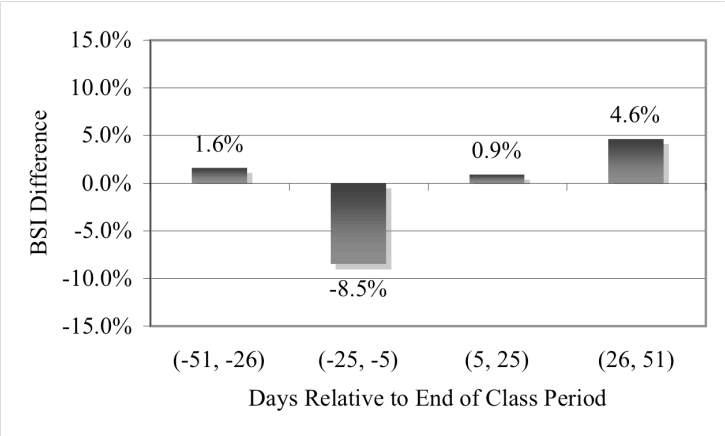

Figure 3a. BSI Difference (BSI More Informed - BSI Less Informed) Relative to End of Class Period

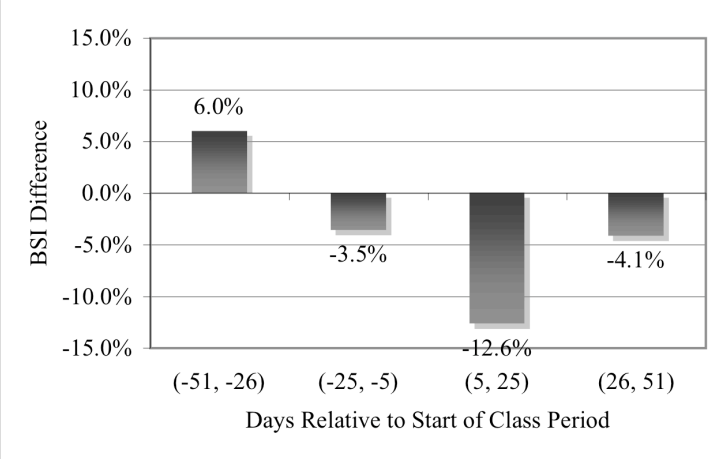

Figure 3b. BSI Difference (BSI More Informed - BSI Less Informed) Relative to Start of Class Period

Note to figure 3.

1. BSI Difference is the difference between the More Informed mean BSI and Less Informed mean BSI, where the mean BSI for an investor type is the average across those class action companies whose trades on a given day are by More Informed or Less Informed investors.

Footnotes

[1] The class action securities litigation events in this study comprise only those that allege violations under Section 10(b) of the Securities Exchange Act of 1934. These suits typically allege that certain false disclosures made by a company and/or its officers over a specified period, known as the litigation class period, misinformed those who purchased or sold the stock and caused them to suffer financial damages.

[2] For example, Hirshleifer et al. (2003). The data set comprises the position statements and records relating to approximately one million trades by some 78,000 investor accounts at a large discount brokerage firm over 1991-1996. Tables 1 and 2 provide summary statistics.

[3] These results are broadly consistent with Dhar and Zhu (2002), who report that wealthier investors, frequent traders, and those in professional occupations show a significantly smaller disposition effect.

[4] Studies of these models (PTM, ATM, and MTM) include Bassin (2000), Cornell and Morgan (1990), Crew et al. (2001), Furbush and Smith (1994), Koslow (1997), McCann and Hsu (1998), and Scudder (1997).

[5] Barclay and Torchio (2001) survey and comment on the limited and anecdotal nature of the empirical evidence used to support assumptions about trading behavior in various class action damages trading models, particularly the use of actual claims submitted by damaged investors, which they argue involves a critical circularity in that while larger damages invite larger claims, larger claims will also result in larger damages. Finnerty and Pushner (2003) also summarize the limited evidence on investor trading behavior.

[6] Courts may be required to opine on the use of a particular trading model for the calculation of damages. Recently, for example, in the Broadcom securities litigation (In re Broadcom 2005), the court rejected a two-trader model of damaged shares in favor of using shareholder claims to determine the

damaged shares. The court commented, more generally, that such trading models have not been subject to adequate peer review and scientific inquiry.

[7] These results, however, are not a direct test of the different class action damages trading models, since they analyze only the buys and sells within the class period for different individual investor types and not the percentage of the float held by such investor types.

[8] Our tests, however, are unable to distinguish whether individual investor groups respond differently because they have more information (e.g., due to better access) or process the same information better (e.g., due to sophistication and insight). Our hypotheses, therefore, test a joint hypothesis of informedness and sophistication.

[9] Hirshleifer et al.'s (2003) study of the effects of extreme earnings announcements on individual investor trading, however, may be partially relevant, although its focus on the impact of earnings surprise on post announcement trading differs from ours, which is on individual trading before and after irregular and significant adverse corrective disclosures. These do not usually occur concurrent with an earnings announcement.

[10] Many studies use or advocate stock trading activity as a measure of investor response. For example, Karpoff (1986) reviews the literature on volume metrics, and Cready and Hurtt (2002) compare the power of return and stock trading measures to detect investor response. Empirical studies of trading activity around earnings announcements include Bamber (1987) and Bamber et al. (1997). These studies, however, generally do not separate trading volume into buyer and seller trading, as we do here, although Lee and Ready (1991) and Lee (1992) *approximate* buyer and seller trading from a model based on bid and ask prices. Those studies use a frequency-based (FDIR) measure of the direction of trading (based on buy and sell orders) similar to the BSI metric used in this study.

[11] Observe, also, that more than 20% of the discount brokerage sample buys (e.g., 28.1% in 1996) are class action companies, which by definition means they would have experienced periods of elevated trading potentially due to false positive information. We are not aware of any mention of this aspect of

the brokerage sample in the prior literature, although Barber and Odean (2000) comment that brokerage sample investors "tilt" their investments to small, high beta stocks. Investors tend to sue such stocks more often than larger, lower beta stocks.

[12] In the few cases where the control period precedes the data set period, we apply the class period of the litigation company to a non-litigation company of approximately the same size with the same two-digit SIC code.

[13] We also calculated the mean BSI for the same subperiods around each event, with no difference in the results.

[14] The income measure is similar to Dhar and Zhu (2002), who document that lower income investors tend to buy more local stocks than higher income investors who are more geographically diversified, and Dhar et al. (2004), who find that higher income investors (and investors in professional occupations) reduce their purchases of split stocks following a split announcement. Other measures of investor informedness or sophistication include the number of individual stocks held (e.g., Grinblatt and Keloharju 2000, 2001).

[15] We also developed an informedness proxy based on the notion that out-performing investors would be more informed. Outperforming investors were defined as those with a positive Fama-French alpha, and under-performing investors were those with a negative alpha. Ex post performance, however, is less satisfactory than income or occupation as a measure of informedness (e.g., superior performance could occur often simply by chance), and so we do not report the results based on this proxy. Undocumented results indicate that they are qualitatively similar.

[16] The earnings surprise groups are not completely independent of the effects of securities litigation, as some extreme negative earnings surprises may trigger a securities class action lawsuit. This, however, makes our comparison more conservative. See, also, note 17.

[17] This result is also consistent with Hirshleifer et al. (2003), who report no statistically significant difference in post earnings announcement trading between affluent (more sophisticated) and general

(less sophisticated) investors. Table 8 of Hirshleifer et al. does, however, report results that, under specific conditions, are directionally similar to those in table 5 of this paper. For example, for their extreme negative earnings group (table 8, panel B), post announcement net buying is directionally greater for affluent than general investors. If both groups were equivalently affected by common buying due to, say, a market-wide factor, and this were deducted, then their post announcement net selling would be less for affluent investors and greater for general investors, which is directionally similar to table 5. Hirshleifer et al. do not analyze differences in trading before the earnings announcement (quarter 0 relative to the subsequent earnings announcements at quarters 1 ,2, 3, and 4), and so provide no evidence of differences in trading in anticipation of extreme bad news.

[18] Cone and Lawrence (1994) use a similar calendar day allocation applied to two stocks.

[19] See Beaver et al. (1997) for a case study of shares traded under different trading assumptions based on depository records. Their one-trader (PTM) model predicts 94.1 percent of purchases are held through the ECP. However, based on depository records, only 49.5 percent are actually held to the end. The one-trader model in their analysis overstates class action damages by 36.2%.

[20] Our results cannot be dispositive, however, because class action damage calculations typically use (adjusted) daily stock price and trading volume data rather than the quartile periods as used in this study.

[21] Cone and Lawrence (1994) perform a similar analysis based on claims records of two stocks (Midwestern and Storage Technology) by comparing the percentage of shares held through the end of the class period that were purchased in one of four class period quartiles to the percentage assumed held under the PTM. The percentage of shares assumed sold is much lower in quartiles one, two, and three based on the PTM than based on actual claims. The results in tables 6, 7, and 8 are broadly consistent with Cone and Lawrence (1994).