Journal of Business Finance & Accounting, 33(1) & (2), 145–178, January/March 2006, 0306-686X
doi: 10.1111/j.1468-5957.2006.01358.x

How Investors Trade Around Interim Earnings Announcements

MARKKU VIERU, JUKKA PERTTUNEN AND HANNU SCHADEWITZ*

Abstract: This study focuses on non-institutional trading behaviour around interim earnings announcements in the emerging market. We separate the stock trading activity of Finnish households into five trading classes and compare the results to institutional trading. Data covering the years 1996–2000 shows that earnings news triggers trading in every trading class. We also find some evidence that actively trading individuals especially (compared to passively trading ones) show increased buying and selling activity before the event compared to the non-event period. After the event we find that Finnish households in the most active investor class tend to follow a contrarian strategy, especially selling after good news. This adds to previous evidence by Grinblatt and Keloharju (2000b). Furthermore, the performance of the active investor classes is superior to that of passive ones. Finally, the institutional trading class is clearly less affected by the announcement than the active investor classes, suggesting that institutions utilize a broader information set than individual investors.

Keywords: investor behaviour, event study, accounting disclosure, trading activity

1. INTRODUCTION

During recent years, the prevalence of individuals investing in the stock markets has increased heavily around the world. For example, the NYSE's shareownership survey (NYSE, 2000) documents a tremendous increase in the number of shareholders – both direct and indirect – as a percentage of the adult population. In many other countries the development has been very similar during recent years.[1]

*The first and second authors are from the Department of Accounting and Finance, University of Oulu, Finland. The third author is from the Turku School of Economics and Business Administration, Turku, Finland. They would like to thank Markku Rahiala and an anonymous referee for helpful comments and suggestions on an earlier draft of this paper. They are grateful to Mr. Henri Bergström and Mrs. Anna-Riikka Haapalehto of the Finnish Central Securities Depository (FCSD) for providing access to the data. Feedback from seminar participants from the 2003 European Accounting Association meetings, 2002 European Finance Association meetings and 2nd International Conference on Corporate Governance at the Birmingham Business School are appreciated. Financial support from the OKO Foundation is gratefully acknowledged. (Paper received June 2002, revised version accepted March 2005.)

Address for correspondence: Markku Vieru, University of Oulu, Department of Accounting and Finance, P.O. Box 4600, FIN- 90401 Oulu, Finland.
e-mail: markku.vieru@oulu.fi

1 For example, in Finland the growing interest in investing among individuals resembles that occurring in the US markets. For example, from the beginning of year 1997 through the end of year 2001 the number of direct household shareowners increased by over 60 per cent – from 478,000 to 794,000 in Finland (Topi, 2002, p. 83).

This development is due to several reasons. A common interest towards investing in shares has emerged as a result of a large amount of information, easier access to online trading facilities and favourable long-term price developments in the market. Further, the presence of individual investors has laid a foundation for growing online trading services. These Internet investment providers can offer cost efficient trading and information acquisition services especially for individual investors. On the whole, lower trading costs and increased transparency have facilitated the broader market participation.

Despite the emergent individual activity, relatively little is known about the actual trading behaviour of individuals and especially how individuals with varying trading frequencies behave and perform when facing an anticipated announcement. Individual investors are often regarded as uninformed whose trades are driven by liquidity or psychological considerations (see, e.g. Black, 1986; and De Long, Shleifer, Summers and Waldmann, 1990). For example, individuals trade too much, hold only few stock in their portfolios and cash winners too quickly and ride on losers too long (see e.g. Odean, 1998 and 1999; Barder and Odean, 2000; and Grinblatt and Keloharju, 2000b). However, evidence shows also that there exist well-performers among individuals (see, e.g. Barber and Odean, 2000; and Coval, Hirshleifer and Shumway, 2002).

In order to study individual trading behaviour in more detail there is a call for individual trading data. This study uses data which allows us to trace individual investors and their trades. We contribute by providing new evidence about the actual trading behaviour of individual investors and compare their trading to institutional trades. This study is carried out in the context of the Helsinki Stock Exchange (HSE), which represents an emerging market. The event around which the trading behaviour is studied is the interim earnings announcement. Compared to annual earnings announcements, interim earnings announcements have certain benefits (see e.g. Kothari, 2001, p. 148). Among other things, interim earnings announcements are more timely and their announcement frequency is higher compared to annual financial statements.

The main contribution of this study is to analyze each investor as an individual market actor. This facilitates the drawing of a more complete picture for announcement-induced trading and performance in various categories of investors. Increased understanding, in turn, should provide guidelines for theoretical work as well as being useful for managers in their communication efforts and for legislators in their regulatory actions.

The proceeding of this paper is as follows. Section 2 reviews the literature on trading around earnings announcements and develops the hypotheses; Section 3 describes the trading principles of the HSE and also interprets the data; Section 4 explains the applied methodology; Section 5 reports the empirical results; and the final section concludes the paper.

2. INVESTORS' INFORMATION USAGE, TRADING AND HYPOTHESES

This section reviews the literature regarding trading by individuals and derives the hypotheses. Previous empirical studies show that, in general, investors use information released at earnings announcements. It is less clear, however, how individual investors specifically use that information in their trading decisions. Subsection (*i*) reviews the

theoretical settings and subsection (*ii*) reviews previous empirical evidence laying a foundation for the hypotheses in this paper presented in subsection (*iii*).

(i) Theoretical Settings of Information Acquisition and Usage

The information usage of markets has gained a lot of attention by researchers. We review the theme first in the rational information usage regime and then relax the rational information usage assumption.

On average, in the efficient capital markets defined by Fama (1965), competition among rational, profit maximizing participants will cause prices to fully reflect new information instantaneously. This means that when assets are traded, prices accurately reflect the value of underlying assets and are therefore good signals for capital allocation decisions. Rational investors are not likely to make systematic mistakes since they adjust their trading accordingly. Theoretical work by Hakansson (1977) demonstrated that when investors have varying information acquisition abilities and/or resources, their information acquisition patterns may also be diverse. This means that the information content of announcements varies depending on the type of investor. Under costly information acquisition, Grossman and Stiglitz (1976 and 1980) and Cornell and Ross (1981) have shown that it is consistent with efficient markets that investors can earn different gross returns because they pay different costs for information gathering and processing. Merton (1981) proposed that rational investors should not trade unless they have market timing ability and /or security selection ability. Since investors infer their trading abilities from their past trading experience their future trading pattern is conditional on their performance. Models with the rational learning process assume that agents learn to form correct expectations through repeated observations of market data (see e.g. Blume and Easley, 1982; and Vives, 1993). Thus, if investors have (lack) ability to select and/or time the trades to select winnings stocks, they trade more (less) actively.

More recently Lev (1988) argues theoretically that, compared with individuals (representing small investors), institutions (representing large investors) are better informed because they tend to have lower marginal costs with respect to gathering information. Also models by Kim and Verrecchia, (1991a; 1991b; 1994 and 1997) and Demski and Feltham (1994), among others, predict that investors are asymmetrically informed before the anticipated announcements. The asymmetry may increase since a forthcoming public announcement stimulates rational investors to acquire private information.

Besides the rational information usage settings presented above, there are also models that are based on less rational market actors. Psychologists and some economists, led by Kahneman and Tversky (1979 and 1984) put forward the view that all investors do not always behave as rational agents. It is argued that individual investors behave less rationally than institutional investors. This view is supported by Daniel, Hirshleifer and Subrahmanyam (1998), who categorize explanations for securities market under- and overreactions into two psychological biases: investor overconfidence and biased self-attribution. The first bias is investor overconfidence about the precision of private information. These types of investors trust and lean too much on the information they have. The second prejudice is biased on

self-attribution. This psychological bias claims that good performance leads to overconfidence and thus more trading, but poor performance does not necessarily lead to less trading. Related to these biases, the growing area of behavioural finance seeks to explain market anomalies (reviewed e.g. by Fama, 1998; and Kothari, 2001) by using behavioural models. For example, in these models investors are supposed to be loss averse, rather than risk averse, and the purchase price is allowed to influence their decision to sell (so-called anchoring) instead of selling independently of the purchase price.

Gervais and Odean (2001) developed a behavioural model where traders are learning through their trading and that is causing them to be too confident of their trading ability. Overconfidence builds up when traders overweight the possibility that their success is due to their superior trading ability. Overconfidence in their skills, in turn, creates excess trading (also Wang, 2001). Gervais and Odean (2001) also show that the degree of overconfidence varies over time. The model suggests that bull markets in particular can increase investors' overconfidence. In line with this are models by Odean (1998) and Benos (1998), among others, predicting that overconfident investors will trade more compared to rational ones. Daniel, Hirshleifer and Subrahmanyam's (1998) model demonstrates, among other things, that the post-earnings announcement drift results when overconfident-informed investors overweight their private signals at the cost of public announcements.

Researchers and market professionals have long been puzzled by the tendency of individual investors to sell their past winners too early and to hold on to their past losers too long – known as the disposition effect. Shefrin and Statman (1985) show that Kahneman and Tversky's (1979) prospect theory predicts this kind of behaviour. The disposition effect is especially puzzling in respect of capital gains taxes (because people pay capital gains taxes on realized gains while being allowed to deduct all realized losses).[2] However, there are also rational reasons why investors may choose to hold their losers and sell their winners. An investor may follow a so-called contrarian investment strategy, which posits that investors sell winners and ride losers because they perceive today's losers to be tomorrow's winners and vice versa (Conrad and Kaul, 1998; and Lakonishok, Shleifer and Vishny, 1994), thus taking advantage of time-series properties of security returns. Investors can also have diversification reasons (Lakonishok and Smith, 1986) or transaction cost minimization reasons to sell winners and ride losers (Harris, 1988).

Theoretical emphasis in this area has changed from homogeneous investors towards modelling heterogeneous investors' behaviour by allowing their sophistication to vary. Typically, in the theoretical literature, the main conclusion has been that trading behaviour varies during pre-, at- and post-event periods depending on the sophistication level of investors. However, since both rational and behavioural models suggest certain trading implications evaluating whether sophistication is

2 Thus under capital gains taxes people should have relatively lower threshold to realize losses compared to gains. According to Shefrin and Statman (1985) investors are eager to sell winners because they experience pride from realized capital gains and are hesitant to sell losers because they feel regret from realized losses. Consequently, they become risk-seeking and hold on to current loser stock in order to prevent losses.

actually related to trading frequency is a more empirical issue. The subsection below reviews some empirical evidence on investor behaviour.

(ii) Review of Empirical Evidence on Information Use

Fama's (1965) definition of efficient markets has proved to be a functional one to evaluate the usefulness of information in financial statements. Starting from Ball and Brown (1968) and Beaver (1968) research has been conducted using security market responses as an external outcome to infer whether information in accounting reports is useful to investors (see e.g. Kormendi and Lipe, 1987). On the other hand, releases of accounting information events are used to evaluate the degree of markets efficiency. A large portion of the obtained evidence is consistent with market efficiency (Kothari, 2001, p. 192).

Despite the wide evidence supporting market efficiency, anomalous stock price movements after earnings announcements have seriously challenged some aspects of it (e.g., Ball and Brown, 1968; Bernard and Thomas, 1989 and 1990; and Bartov, Radhakrishnan and Krinsky, 2000; and in Finland, Kallunki, 1996; and Schadewitz and Kanto, 2002). The observed post-earnings announcement drift is frequently attributed to research design issues (e.g. time-series properties of earnings), market infrastructure issues (especially transaction costs), ownership structure issues (especially investors' sophistication) and to other anomalies (e.g. size, book-to-market, momentum, trading volume, earnings-to-price).[3]

As an alterative to the efficient market reaction to new information there is reported evidence that investors' information processing is biased causing investors either to underreact or overreact to new information (e.g., De Bondt and Thaler, 1985). Barber and Odean (2001) argued that overconfident investors depend too much on their own ability to interpret multifaceted, ambiguous and anecdotal information and they are sluggish to process and interpret statistical and relevant information. This can result in underreaction to information, which is consistent with buying past winners and selling past losers. Also Liang (2003) reports that investors' overconfidence about their private information and the reliability of the earnings information are factors that explain the post-earnings announcement drift. Barber and Odean (2000 and 2001) and Odean (1999) show that overconfident investors trade too much, gaining lower returns than rational investors and hold high-risk portfolios.

Finnish evidence is in line with Anglo-American findings. Grinblatt and Keloharju (2000a) show that investors of Finnish listed firms are, on average: reluctant to realize losses, engaged in tax-loss selling activity, affected in their trading by past returns and historical price patterns (such as being at a monthly high or low). In addition, Grinblatt and Keloharju (2000b) analyze the extent to which past returns determine the propensity to buy and sell in Finland. They analyze whether these

3 Kallunki (1996) finds in Finland that risk mismeasurement is related to the drift. Bartov, Radhakrishnan and Krinsky (2000) find that the drift is related to the extent of institutional ownership in a stock. Hirshleifer, Myers, Myers and Teoh (2003) studied whether individual investors drive post-earnings announcement drift using quarterly earnings. Although individuals are highly significant net buyers after negative earnings surprises, they are insignificant net buyers after positive earnings surprises. Inconsistent with the hypothesis, Hirshleifer et al. find no evidence that individual investors' trading following the earnings announcement is associated with subsequent abnormal returns.

differences in past-return-based behaviour and differences in investor sophistication drive the performance of various investor types. They find that, on average, foreign investors tend to be momentum investors, buying past winning stocks and selling past losers. Domestic investors, particularly the less sophisticated households, tend to be contrarians, selling past winners and buying past losers. The distinctions in behaviour are consistent with short as well as with longer past-return horizons. Furthermore, Grinblatt and Keloharju (2001) show how the degree of the investor's sophistication impacts on 'home bias', the tendency to prefer familiar stocks.

Regarding trading volume, Cready (1988) finds that abnormal volume reaction to earnings announcements is weaker and slower in small trades. Consistently, in an intraday framework, Lee (1992) finds that volume reaction is weaker in small trades than in large ones. Also contrary results have been reported (Cready and Mynatt, 1991). In the post-announcement period, the small traders display a propensity toward buying. Recently, Barber and Odean (2003) found that individuals exhibit attention-based buying associated with high trading volume, extreme price movements and news releases. Consistent with their model, investors who buy on high-attention days tend to underperform those who sell. Nofsinger (2001) shows that institutions buy and sell on both good and bad news, while individual investors only trade on good news. On the other hand, in Finland, Booth, Kallunki and Martikainen (1997) and Vieru (2002) find that small traders increase their sell orders after negative earnings news. Vieru (2002) shows that on the HSE individual large trades (especially uptick trades) produce greater permanent price effects before an announcement than after it. The finding is in line with that of Daley, Hughes and Rayburn (1995) in the US market. Altogether the obtained evidence shows that announcements have an impact on trading but some of the findings are mixed.

All in all the empirical evidence supports the view that institutional trading is more informed and more sophisticated in relation to non-institutional trading. However, much less is known about the trading behaviour within the non-institutional trading category. Our hypotheses in subsection (*iii*) below are targeted especially to shed some light on actual non-institutional trading.

(iii) Hypotheses

Our hypotheses are targeted to give insight to non-institutional trading behaviour. We formulate hypotheses from the view point of active individuals, where 'active' refers to trading activity. Hypotheses one, two and three are directly related to the trading patterns and the fourth hypothesis focuses on the performance of the applied trading pattern. Based on the prior literature we hypothesize that active individuals attempt to anticipate the information announcement and will act accordingly (Kim and Verrecchia, 1991a and 1991b; Demski and Feltham, 1994; and Barber and Odean, 2001). Assuming that investors learn to improve their estimates through repeated trials (e.g., Vives, 1993) investors do not trade unless they have rational reasons to do so. Thus, investors with skills survive in the markets whereas investors without these skills will leave the markets. Rational learning suggests that trading experience will also improve trading skill (see, e.g. List, 2003; and Nicolasi, Peng and Zhu, 2003). Thus, an active trader can be characterized as a more devoted

investor and the buying and selling decisions are expected to be more information-triggered compared to a passive trader. Furthermore, Gerety and Mulherin (1992) focus on the assumption that investors differ in their willingness and/or ability to hold positions overnight. Their theoretical model proposes that an anticipated information event calls for more efficient diversification before the announcement event. It is well-grounded to assume that more sophisticated and active traders are more aware of diversification benefits.

Also the theoretical prediction about the overconfident investor by Barber and Odean (2001) suggests that an active investor acts before the announcement. A forthcoming earnings announcement especially activates overconfident investors to spend time and resources in order to gather earnings-related information and to assess whether the coming announcement provides a positive or negative surprise to the market. However, this may make the investor believe that the gathered data are useful information that has to be used somehow, causing excess trading. Our review supports the conclusion that both rational and behavioural trading theories are in favour of timely trading before the announcement. This leads us to the following hypothesis:

H_1: Active individuals trade before the announcement.

As reviewed above, a great deal of evidence in the behavioural finance literature shows that individual investors exhibit a contrarian investment style rather than a momentum investment style (see e.g. Odean, 1998; Conrad and Kaul, 1998; and Grinblatt and Keloharju, 2000b). Grinblatt and Keloharju (2000a), among others, have argued that the disposition effect (investors' reluctance to realize losses) and contrarian investment style (investors sell winners and buy losers) are related. Grinblatt and Keloharju (2000b) also report that domestic investors generally engage in short-term contrarian behaviour, especially in their tendency to sell stocks that have gained value over the prior few days. Frequent market participation can affect a trader's investment style too. Dhar and Zhu (2002), based on experimental economics, have hypothesized that trading experience decreases the disposition effect due to individual learning from trading. However, bull markets will strengthen overconfidence and can cause a delayed learning process. Also a contrarian investment style can diminish with active trading and with more sophistication (Grinblatt and Keloharju, 2000b). Contrarian behaviour can be translated into a tendency to sell after positive news and buy after negative news around the announcement. If the disposition effect exists around the announcement, investors are reluctant to sell after negative news.

Another issue related to trading around the event is the post-earnings announcement drift (Kothari, 2001). If the drift reflects mispricing (Hirshleifer, Myers, Myers and Teoh, 2003), the more sophisticated investors can take advantage of the drift by buying after a positive earnings surprise and by selling after a negative earnings surprise. Likewise, less sophisticated traders should trade in the opposite way. When less sophisticated investors tend to moderate the pricing impact of earnings news, this kind of trading behaviour can result in underreaction of prices to earnings news. Consequently, this appears as short-term contrarian behaviour. Therefore, the second and third hypotheses are:

H_2: Active individuals exhibit less contrarian behaviour around the announcement than passive ones.
H_3: Active individuals exhibit less of the disposition effect around the announcement than passive ones.

The last hypothesis (H_4) examines whether the trading frequency affects the individual investors' portfolio performance. The results may thus give us further insight into whether trading experience is related to the profitability of trading. Based on the rational learning process, one can assume that trading frequency increases the ability to make profitable investment decisions (see e.g. Vives 1993; List, 2003; and Nicolosi, Peng and Zhu, 2003).

Active individuals attempt to anticipate the information announcement and will act accordingly (Kim and Verrecchia, 1991a and 1991b; and Demski and Feltham, 1994). Some models predict that overconfident investors will trade more than rational investors resulting in less profits for the overconfident ones (see e.g. Odean, 1998; Benos, 1998; Daniel, Hirshleifer and Subrahmanyam, 1998; and Barber and Odean, 2001). However, Coval, Hirshleifer and Shumway (2002) find that at least some individuals are able to earn excess returns, suggesting abilities to beat the market. One possible outcome could well be that psychological reasons, such as overconfidence, will decrease the success and moderate the most active investor's performance. In order to find out whether the trading by active investors is profitable, we state the fourth hypothesis below:

H_4: Active individuals' trading before the announcement precedes post-announcement abnormal returns.

The next section describes the institutional setting of the study and the data applied.

3. MARKET MICROSTRUCTURE AND DATA

This section interprets the institutional regime and the sources as well as characteristics of the data. Subsection (*i*) deals with the institutional regime by representing trading on the Helsinki Stock Exchange. Shareholding data is presented in subsection (*ii*) and event data (interim reports) is detailed in subsection (*iii*).

(i) Trading on the Helsinki Stock Exchange and Return Data

The HEX trading system, HETI (Helsinki Stock Exchange Automated Trading and Information System), is a distributed, fully automated order-driven system. The market structure is a continuous open limit order book (see Hedvall, 1994; and Hedvall, Niemeyer and Rosenquist, 1997). The system is a strict market-by-order type, in which the individual orders are ranked and displayed by price and time priority. The identity of the broker/dealer behind each limit order is displayed to members of the exchange. Since the order size and the submitter of an order are visible on the trading screen, the HETI system provides a high degree of ex ante transparency. Broker/dealer and customer orders are treated similarly and cannot

be distinguished from each other. The trade can be executed within five different trading modes: pre-trading, round-lot trading, odd-lot trading, prearranged trading, and after-market trading. During the pre-trading phase brokers key their opening buy and sell orders into the system, which are then matched resulting in the opening quotations for the day. In this study, only trades executed in the round-lot trading mode are considered since the prices of trades executed in the other modes after the market open are restricted.[4] During the sample period, free trading on the HSE was amended a couple of times. The free trading period has been lengthened and nowadays the period starts later compared to earlier years. The changes were launched to bring the free trading period into line with trading in the European and US markets.

Daily return data used in this study were calculated as differences in logarithmic price indices, including splits, stock dividends, and new issues computed by the HSE. Cash dividends are converted and cumulatively added to the price index data of the stock on the ex-dividend day. An estimate of the market return is based on the difference in the logarithmic HEX-portfolio index and is computed by the HSE too. In addition, this index includes cash dividends paid to stockholders. The index reflects the general price movements of HSE-listed firms. The portfolio-index is a value-weighted index, where the maximum weight for one company is 10 per cent. A special feature of the HSE-list is the heavy concentration of trading for Nokia shares. Nokia alone accounted for 56.5 per cent of the share turnover and 48.8 per cent of the total market capitalization in 1998 (Helsinki Stock Exchange, 1998). The return calculations in HSE are originally based on Hernesniemi (1990).[5] Due to the thin trading volume a number of missing prices could cause misspecification in abnormal returns (see e.g. Maynes and Rumsey, 1993; and Kallunki, 1996). In order to control the potential problems of non-trading a uniform return procedure was also used. Multiperiod returns are based on one day before and after the non-trading period. The average on that return is allocated to each non-trading day.

In order to determine whether the earnings release is positive, neutral, or negative news, we calculate an abnormal daily return in the vicinity of the event days. A positive, neutral, or negative abnormal return was supposed to reflect positive, neutral, or negative earnings news, respectively. The abnormal return is the firm's stock return less the value-weighted return based on HEX portfolio index returns.

(ii) Shareholdings Register Data

The database used in this study consists of direct shareholdings and every stock transaction of all Finnish investors on a daily basis. These records represent the official central register of shareholdings for stocks maintained by the Finnish Central Securities Depository (FCSD). The records cover all companies represented in the Book Entry System. A Finnish investor who executes a buy order has to open an account in the FCSD's register where holdings and all changes are filed. For

4 Prices in prearranged trades are restricted within the price limits set during the free trading session, prices in odd-lot trades are matched every 20 minutes at the latest prices for a full lot deal and after-market trades are also restricted within the price limits set during the free trading session.
5 For more information how the index is calculated see also Helsinki Stock Exchange (2000).

foreign investors a possibility for nominee-registration is provided. Accordingly, foreigners can opt for registration as a nominee name in which case these holdings cannot be separated from each other. The data does not cover indirect shareholdings through financial institutions, e.g., holdings in mutual funds. Finnish mutual funds are classified as institutions.

The register is extremely comprehensive since practically all major publicly traded Finnish companies have joined it (97 per cent of the total market capitalization of Finnish stocks, 200 billion FIM (6 FIM $\approx$ 1 USD $\approx$ 1 EUR)) as of the beginning of 1995. The investor can execute a trade on many stock exchanges. For example, Nokia is traded on HSE, NYSE and four other European stock exchanges. All these trades are recorded in the register. In order to facilitate the analysis we have removed trades executed outside the HSE from the analysis. The HSE has a three-trading-day settlement lag. The database includes trade execution days, which provide a means to compare the day of trades with the interim earnings announcement dates. We performed a cross-check with the HSE's transaction data, which consists of daily transactions of each listed stock. The singularity with these two databases, FCSD and HSE, was almost one-to-one covering the period from October 1, 1996 to November 30, 2000. In order to control whether the observed mismatches affect the results, we performed additional tests. The results are substantially the same.

Karhunen and Keloharju (2001) describe the shareownership by individuals in Finland. According to them the median investment wealth for individuals who own shares is 8,100 FIM, whereas the mean is ten times as large as that, 82,900 FIM. For institutions the median investment wealth is 59,000 FIM and the mean 8,583,000 FIM. Investment wealth has increased towards the end of the sample period: the median (mean) wealth was FIM 31,000 (FIM 267,600) for individuals and FIM 62,400 (FIM 13,817,000) for institutions in June 2000.

(iii) Interim Earnings Announcement Sample

The rules of the Helsinki Stock Exchange require firms to announce to the public the date(s) on which their interim report(s) will be released. Those dates are available to all interested parties. Market monitoring of the HSE also verifies that firms are announcing according to their given time-table. A few listed firms did not publish their interim reports in line with the regulations during 1996–2000. However, no cases that have been brought up for discussion regarding interim report publishing and no cases have been made public by the Disciplinary Board of the HSE. Further, according to the Legal Advisor of the HEX Securities Exchange there are no published court cases regarding the interim report announcements. Although interim earnings announcements are usually not audited, they are more current than annual reports. In addition, firms do not typically provide preliminary interim earnings reports in Finland. These facts strongly support the conclusion that almost without exception interim report publishing occurs properly and in a timely fashion. Thus information about a forthcoming announcement has the potential to create interest and anticipation before the actual event.

During the sample period the number of interim reports released by HSE-listed firms per year has significantly increased. For example, in 1997, only about 20 per cent

of HSE-listed firms released three interim reports when the corresponding number for year 2000 is about 70 per cent. Nowadays the requirement is quarterly reporting. The increased frequency of interim reports characterises their importance. During the research period the content of interim reports was regulated by the recommendations concerning interim reports (Helsinki Stock Exchange, 1996) and by the Securities Markets Act. The current legislation and regulation of interim reports in Finland conform to EU practices (for more details, see Schadewitz, 1997; www.hex.com).

The rules relating to insider trading stipulated by the Securities Market Act have changed during the research period. Before July 26, 1996, short-term trading by insiders was prohibited. Short-term trading was defined as six months. An amendment to the Securities Market Act abolished the six-month trading rule and the public insider register was introduced. According to the Act, an individual who is considered an insider is obliged to publicly announce all changes in his/her stock holdings. In addition, the HSE has issued rules on the trading of insiders in listed companies that restrict, for example, short-term trading and trading during a pre-announcement period.

In Finland, several firms have more than one share-series listed on the HSE. These series typically differ in their voting power and/or the dividends. This makes the series imperfect substitutes for each other and may result in different owner clienteles. Therefore, the different share series of an underlying firm are considered separate stocks. The data cover the period from October 1, 1996 to November 30, 2000. The period was selected to achieve a long and relatively stable trading period. During this period, there were a total of 834 interim earnings announcements. Releases by newly listed firms were omitted in order to eliminate announcements released shortly after their listing. Especially during the second half of the sample period, there were numerous IPOs for high-tech firms with intensive trading during their first trading days.

To facilitate the analysis and to ensure the most feasible data set, the mean daily number of buyers was required to exceed one in each trading activity class during −60 to −4 days relative to the interim earnings announcements. This liquidity requirement filters out less actively traded stocks from the sample. In addition, three announcements were excluded since the company's main owners had decreased their stock ownership significantly in the underlying company during −60 to 10 days relative to the interim earnings announcements.[6] Some 217 interim earnings announcements for 92 stock issues remained after the filtering. Despite its subsequent rapid development, the Finnish stock market was still rather small and relatively illiquid during the research period. For example in 1997 the value of trading was 36 billion USD and the number of listed companies was 126. The value of trading relative to market capitalization in 1997 was 49.4 per cent.[7]

4. METHODOLOGY

In an attempt to capture the buying and selling behaviour of different investors in the vicinity of interim earnings announcements, we separate the individuals into

6 These companies are JOT Automation Group Plc, where the main owners decreased their stock ownership on 28 September, 1999; TJ Group Plc on 11 February, 2000; and PKC Cables Plc on 28 April, 1998.

7 According to Hasan and Malkamäki (2001), the corresponding figure for Nasdaq was 258 per cent, and for the Stockholm Stock Exchange 66.4 per cent in 1997.

five trading frequency (activity) classes (for more details see subsection (*i*) below). As a benchmark for individual trading we present also institutional buying and selling behaviour around interim earnings announcements. The data allow us to test the hypotheses presented previously in the end of Section 2.

The Finnish Central Securities Depository (FCSD) maintains an official central register of shareholdings for Finnish stocks. The data enable us to observe each shareowner's single sells and buys. Firstly, five different individual investor groups are formed based on their trading activity during a non-event period; institutions constitute the sixth class. The trading activity is assumed to be related to the sophistication of the investor. Secondly, in each class, abnormal buying and selling activity is measured based on corresponding activity during the non-event period (more details are presented in subsection (*i*) below). This grouping allows us to test hypotheses in various trading activity classes. First, whether abnormal buying and selling activity exists around the announcement will be tested. Whether buying and selling activity is in balance in each investor activity class will also be tested.

(i) Formation of Investors' Activity Classes

An individual investor is categorized into a trading frequency class based on his/her trading activity on a yearly basis. Class 1 constitutes the most passive investors and contains one-fifth of all trades made by individuals. Class 5 consists of the most active traders, and the number of these trades corresponds to one-fifth of all trades made by individuals. Classes 2 though 4 are based on the same principle in the continuum from the most passive (Class 1) to the most active (Class 5). The classification rule gives an equal possibility for a trade to be classified in each group. Institutions constitute the sixth group named Institutions.

The investor's trading frequency concerning each individual stock series during the current calendar year is used as a criterion to classify individuals into trading activity classes. The classification is based on individual stock series because this provides a more complete picture about the role of the stock in an investor's portfolio. An investor having multiple stocks in his/her portfolio can be an active market participant regarding certain stocks and a passive trader regarding other stocks. No distinction is made as to whether he/she is buying or selling the stock, so this does not affect the classification. The basic reason for not using solely backward-looking classification criteria is that an investor's trading activity can change rapidly (evidenced by sudden peeks in the data set). Long-term trading passivity can abruptly turn into very active trading. The reasons for this remain unclear. Nevertheless, we considered that a partly forward-looking classification rule would be more robust in revealing an investor's perception of a certain stock.

After individual investors are classified, the buy and sell volumes of those classes are computed. We observe daily buy and sell volumes in each class separately. We apply netting if the investor is buying and selling a given stock on the same day.[8] The same principle is also applied to the institutions class except for the nominee-registered institutions, in which trades are pooled and thus cannot be separated

8 This rule eliminates the so called day trades, trades where the same amount of the same stock is bought and sold on one day. According to Linnainmaa (2003, p. 4) amount of these trades is about 1.1 per cent of all householders' trades during January 1998 to May 2000, thus being quite low.

from each other. Observing buy and sell volumes in each class enables us to measure class-based buy-sell ratios. In addition to the buying and selling volumes we also compute the number of individual investors buying and selling on each day.

(ii) Abnormal Buying and Selling Measure

Abnormal trading activity is specified in the literature by various trading inducement models. These models include mean-adjusted trading models based on the mean trading volume for the stock during non-event periods, and market models for trading volume analogous to the market model for returns frequently used in estimating abnormal returns. In order to model the normal activity, a mean-adjusted model is employed. During the sample period trading volume and the number of investors participating in the market have increased remarkably. In order to mitigate possible heteroscedasticity, standardized abnormal buying and selling measures are used. The measure used is closely related to that of Nofsinger (2001). Firstly, the number of shares bought and sold is analysed. Secondly, the number of investors participating in the market is considered.

Standardized measures are used to identify whether investor class *j's* trading activity differs from the pre-event period ($t = -60,\ldots,-4$) relative to announcement day ($t = 0$). We relate the trading behaviour of investor class j with respect to individual stocks during day t to the behaviour during the non-announcement period ($t = -60,\ldots,-4$, announcement day $t = 0$). Standardized buy volume for investor class j related to the announcement i during day t is as follows:

$$\mathrm{STDBUY}_{it}^{j} = \frac{\mathrm{BUY}_{it}^{j}}{\frac{1}{57}\sum_{t=-60}^{-4}\mathrm{BUY}_{it}^{j}} - 1 \tag{1}$$

where BUY_{it}^{j} denotes the total number of shares of the underlying firm's stock issue purchased by investor class j in conjunction with announcement i during day t. The denominator indicates the average level of trading during the non-announcement period. The standardized sells, $\mathrm{STDSELL}_{it}^{j}$, for investor class j follow the same principle. A positive (negative) value for STDBUY_{it}^{j} indicates abnormally high (low) buying activity for class j during day t for announcement i. Correspondingly, a positive (negative) value for $\mathrm{STDSELL}_{it}^{j}$ indicates abnormally high (low) selling activity for class j during day t for announcement i.

In order to have a more complete picture of the trading, the number of investors operating in the market on a given day is also observed. The benefit of this approach is that it is unaffected by the trade size. Standardized buying and selling measures for the number of investors are also computed in a similar fashion as for trading volumes (see equation (1) above).

It is well documented that trading volume varies on different days of the week. Also participation in the market may differ between individual investors and institutional investors on different days (see e.g., Kallunki and Martikainen, 1997). Our descriptive analysis supports these views (results available on request from the authors). In general, on the first/last trading days of the week the trading volume is abnormally low/high. Some differences though exist between investor classes.

Institutions seem to be, on average, sellers on Mondays. In order to take into account the observed day of the week effect, the standardized measures are modified. The modification is especially important because interim earnings announcements are clustered to certain weekdays.[9] The day of the week modification is carried out by computing the cross-sectional average of standardized buying and selling measures for all 217 announcements in the sample. This day of the week specific average (the last term in parentheses in equation (2) below) is used to correct the standardized buying (see equation (1) above) and selling measures. Abnormal, day of the week adjusted, buying activity for announcement i, on day t and for investor class j, ABNBUY_{it}^{j}, is as follows:

$$\mathrm{ABNBUY}_{it}^{j} = \left(\frac{\mathrm{BUY}_{it\tau}^{j}}{\frac{1}{57} \sum_{t=-60}^{-4} \mathrm{BUY}_{it}^{j}} \right) - \left(\frac{1}{217} \sum_{i=1}^{217} \frac{\mathrm{BUY}_{it\tau}^{j}}{\frac{1}{57} \sum_{t=-60}^{-4} \mathrm{BUY}_{it}^{j}} \right) \tag{2}$$

where τ refers to day of the week. Abnormal selling activity for announcement i during day t and for investor class j, $\mathrm{ABNSELL}_{it}^{j}$, is defined in a similar fashion. Also the abnormal number of individual buyers and sellers is adjusted using the same principle (see also equation (2) above). H_1 (active individuals trade before the announcement) is tested using these standardized weekday-adjusted measures.

(iii) Buy-sell Analysis

So far in this paper buying and selling have been tackled separately. Here we examine the balance between selling and buying activity. In order to compare trading behaviour between active and passive investors around interim earnings announcements, a buy-sell ratio analysis (see Lee, 1992; and Nofsinger, 2001) is employed. The buy-sell ratio measures the potential imbalance in buying and selling activity for announcement i during day t and for investor class j, BS_{it}^{j}, as follows:

$$\mathrm{BS}_{it}^{j} = \frac{\mathrm{BUY}_{it}^{j}}{\mathrm{BUY}_{it}^{j} + \mathrm{SELL}_{it}^{j}}. \tag{3}$$

In balance the obtained BS figure equals 0.5. In order to calculate a standardized buy-sell ratio for each investor class j, the normal buy-sell ratio is measured during the non-announcement period ($t = -60, \ldots, -4$ relative to announcement day $t = 0$). The analysis was broken down by trade type (purchase vs. sale), by investor class (Class 1 through Class 5, and Institutions), and by the content of the announcement (negative, neutral and positive earnings news). To provide an estimate of the magnitude of abnormal volumes in terms of the buy-sell ratio around the event, the following standardized buy-sell ratio for announcement i during day t and for investor class j, STBS_{it}^{j}, is introduced:

9 On Mondays there are 13, on Tuesdays 44, on Wednesdays 56, on Thursdays 70, and on Fridays 34 interim earnings announcements, respectively.

$$\mathrm{STBS}_{it}^{j} = \mathrm{BS}_{it}^{j} - \frac{1}{57}\sum_{t=-60}^{-4}\mathrm{BS}_{it}^{j}. \tag{4}$$

Positive/negative STBS value indicates an abnormally low/high sell volume. Our descriptive analysis shows (data available on request from the authors) that, in general, there is a tendency towards increased sell volumes compared to buys on Mondays and especially on Tuesdays in certain classes. In particular, institutions decrease their buys compared to sells on Mondays. We modify equation (4) in order to take into account the day of the week pattern in selling and buying. This is carried out by computing a cross-sectional average of the standardized volume buy-sell ratio for all 217 announcements in the sample for the day of the week. The positive (negative) volume buy-sell ratio implies that the given class of investors are predominantly buying (selling). A similar day-of-the-week adjustment is employed as presented earlier in equation (2). The abnormal, day of the week– adjusted, buy-sell ratio for announcement i during day t and for investor class j, ASTBS_{it}^{j}, is as follows:

$$\mathrm{ASTBS}_{it}^{j} = \left(\mathrm{BS}_{it}^{j} - \frac{1}{57}\sum_{t=-60}^{-4}\mathrm{BS}_{it}^{j}\right) - \frac{1}{217}\sum_{i=1}^{217}\left(\mathrm{BS}_{it\tau}^{j} - \frac{1}{57}\sum_{t=-60}^{-4}\mathrm{BS}_{it}^{j}\right) \tag{5}$$

where τ refers to day of the week. The above modification is also made for the buy-sell ratio focusing on the number of investors. We are able to test H_2 (active individuals exhibit less contrarian behaviour around the announcement than passive ones) and H_3 (active individuals exhibit less of the disposition effect around the announcement than passive ones) using these standardized weekday-adjusted buy-sell measures. If ASTBS_{it}^{j} is significantly positive after negative news and negative after positive news it is in line with the contrarian behaviour. The disposition effect, in turn, produces significantly positive values for ASTBS_{it}^{j} after negative news.

(iv) Investment Strategy and Performance

The last hypothesis (H_4) focuses on active individuals' trading, especially on whether pre-event trading precedes abnormal returns at and after the event. Investment strategy around the announcement is measured by comparing past market-adjusted returns and subsequent abnormal buy-sell behaviour in each trading activity class. Cumulative abnormal buy-sell behaviour for announcement i in period T and for an investor class j, CASTBS_{iT}^{j}, is measured by summing abnormal daily standardized buy-sell ratios during the post-announcement period as follows:

$$\mathrm{CASTBS}_{iT}^{j} = \sum_{t=1}^{10}\mathrm{ASTBS}_{it}^{j}. \tag{6}$$

The assessment of the investment strategy is based on the following regression model:

$$\text{CASTBS}_{iT}^{j} = \alpha^{j} + b^{j}\text{AR}_{i0} + \varepsilon_{iT}^{j} \tag{7}$$

where AR_{i0} is the market-adjusted return on the interim earnings announcement day ($t = 0$) indicating the direction and magnitude of earnings surprise, α^{j} is the intercept term for investor class j, b^{j} is the estimated parameter, and ε_{iT}^{j} is the error term. Also risk-adjusted abnormal returns were applied using Sharpe's (1964) market model. Using daily data, the model parameters were estimated using OLS regression with 250 return observations based on the period (-261, …, -11) trading days before each announcement date. In a few cases (caused by mergers, IPOs etc.) less observations caused the parameters estimation period to be shorter.

From complementing tests based on buy-sell ratio analyses for H_2 (active individuals exhibit less contrarian behaviour around the announcement than passive ones) presented above, we are able to make investment style assessments also using parameters estimates on equation (7). If investors for class j, on average, follow a contrarian (momentum) strategy then the estimated parameter b^{j} is significantly negative (positive). In other words, after positive news investors with a contrarian (momentum) strategy sell (buy) more than buy (sell). The above regression (equation (7)) is employed for both trading volume and the number of investors.

In order to test H_4 (active individuals' trading before the announcement precedes post-announcement returns) we observe the abnormal buy-sell ratio in each class and study whether the active buying (selling) is connected to favourable (unfavourable) news at and after the event. The employed test design distinguishes from equation (7) where, as a consequence of investment style, subsequent buy-sell ratio is assumed to be related to past stock returns. In order to study an investor's ability to buy (sell) before favourable (unfavourable) news we perform a test where subsequent returns are assumed to be related to buy-sell ratio before the announcement. Thus, we modify equation (7) and cumulate buy-sell behaviour before the announcement for days -3 through -1 and abnormal returns for days 0 through 5. Equation (8) below shows the performance measure:

$$\text{CASTBS}_{iT-1}^{j} = \alpha^{j} + b^{j}\text{CAR}_{iT} + \varepsilon_{iT-1}^{j} \tag{8}$$

where CASTBS_{iT-1}^{j} is abnormal buy-sell behaviour for announcement i, for investor class j during period T-1 measured as $\text{CASTBS}_{iT-1}^{j} = \Sigma_{t=-3}^{-1}\text{ASTBS}_{it}^{j}$ relative to interim earnings announcement day $t = 0$, CAR_{iT} is the market-adjusted return during the subsequent period measured as $\text{CAR}_{iT} = \Sigma_{t=0}^{5}\text{AR}_{it}$, α^{j} is the intercept term for investor class j, b^{j} is the estimated parameter, and ε_{iT-1}^{j} is the error term. Correspondingly, also cumulative risk-adjusted abnormal returns were computed using Sharpe's market model. The procedure is the same as described earlier.

Differences in variability between actively and thinly traded stocks may cause heteroscedasticity for the regressions. Therefore, the statistical significance is tested by the t-statistic adjusted for an unknown type of heteroscedasticity using White's (1980) correction. The performance is favourable for investor class j if estimated parameter b^{j} is significantly positive. In other words, investors increase buying (selling) relative to selling before positive (negative) news suggesting an ability to pick outperforming shares. Since the investor classes are formed according to trading activity, trading and service fees are not equal across the classes. The total

amount of trading fees is likely to be greater for active investors, but on the other hand, in a relative sense their fees can be even lower. Thus, we have not been able to take transaction costs into account in a reliable way in the analysis.

5. EMPIRICAL RESULTS

An empirical inquiry should reveal the actual investor trading activity. Abnormal buying and selling behaviour will be studied in the various investor activity classes reflecting the degree of sophistication in each of the class. We hypothesize that active individuals trade before the announcement (H_1). Further, we assess whether investors follow a certain investment strategy around the announcement. We hypothesize that active individuals exhibit less contrarian behaviour around the announcement than passive ones (H_2). It is also hypothesized that active individuals exhibit less of the disposition effect around the announcement than passive ones (H_3). Finally, we study whether trading behaviour during the pre-announcement period is associated with the post-announcement returns as hypothesis H_4 states. To control potential imbalances in trading, our tests are conducted separately on positive and negative earnings news. The direction of news is based on a market-adjusted one-day return on the announcement date.

(i) Descriptive Statistics

Five different individual investor groups from passive trading to active trading (Classes 1 through 5) are formed according to the number of an individual investor's trades during the current calendar year. The institutional investors (Institutions) constitute the sixth class for comparison purposes. Table 1 summarizes the average share-specific buying and selling activity in each investor class on a yearly basis. Our trade classification rule gives an equal possibility for a trade to be classified in each group. Thus, the number of yearly trades is closely related in each individual class in Table 1 where buys and sells are presented around the announcement event.

Overall Panel A: stock buys in Table 1 show that the number of institutional traders (Institutions) is multiple compared to the number of investors in individual classes (Class 1 through Class 5) during the first sample years. For example, in 1997 the mean daily number of buying investors in Class 1 is 2.6 and the corresponding number of daily buying Institutions is 9.1. The mean number of individual investors has increased relatively monotonically during the research period 1996–2000. Compared to that the development of the mean daily-number of investors in institutional trading category has been more stable. Regarding stock sells Table 1 shows that the mean number of investors in Class 1 and Class 2 has been relatively stable during the whole period. The mean number of investors has increased strongly especially in classes 3–5 showing about a three to four fold increase from 1996 to 2000. The numbers of sellers and buyers in each investor class are closely in balance excluding year 2000 where buys dominates, especially most passive investor class. The result is very much the same based on the number of stock bought and sold. This suggests that when a passive investor has participated in trading it is likely to have been a buy transaction during year 2000.

Table 1

Share-Specific Buying and Selling Activity for Each Investor Class Around the Interim Earnings Announcement (days from −60 to 10)

	1996		*1997*		*1998*		*1999*		*2000*	
	Mean Number of		*Mean Number of*		*Mean Number of*		*Mean Number of*		*Mean Number of*	
	Investors	*Stocks*	*Investors*	*Stocks*	*Investors*	*Stocks*	*Investors*	*Stocks*	*Investors*	*Stocks*
Panel A: Stock Buys										
Class 1	1.4	165	2.6	1,410	4.4	948	8.6	1,419	18.5	3,094
Class 2	2.0	1,017	2.5	4,694	4.5	3,676	7.2	2,637	15.1	6,024
Class 3	2.4	1,072	2.3	3,276	3.8	2,905	6.9	3,199	13.5	5,472
Class 4	3.6	3,093	2.5	4,934	4.3	4,795	7.1	4,535	13.6	6,901
Class 5	3.0	1,757	2.8	6,286	4.3	8,098	7.7	7,387	12.6	8,935
Institutions	11.1	109,984	9.1	131,180	9.5	158,956	12.8	189,954	14.4	182,671
Panel B: Stock Sells										
Class 1	3.6	347	4.0	885	3.7	723	6.4	1,352	5.5	2,098
Class 2	3.9	2,174	4.0	3,585	3.5	2,738	7.2	3,574	9.0	4,161
Class 3	3.7	2,517	3.8	3,356	4.0	4,767	8.1	4,802	10.4	5,202
Class 4	3.2	2,654	3.5	4,996	3.7	4,890	7.7	5,905	11.0	8,928
Class 5	2.3	2,462	3.2	6,254	3.7	8,645	7.3	7,760	10.9	9,813
Institutions	12.0	106,933	10.2	132,704	9.0	157,616	12.8	185,736	11.8	182,895

Notes:
The table reports, for each sample year, the stock-specific daily mean number of buying and selling investors and the stock-specific daily mean number of stocks bought and sold for each investor class. The years 1996 and 2000 do not cover the whole year.

(ii) Investors' Buying and Selling Behaviour Around Interim Earnings Announcements

In this section we report trading behaviour around interim earnings announcements. H_1 states that active individuals trade before the announcement (Section 2, above). The significance is tested using Student's t-test and the related p-value (p_s) is computed. Since this statistic relies on normal distribution Tchebysheff's inequality statistic (Mood and Graybill, 1963, p. 148) is also computed. The statistic gives a lower bound for the probability (p_t) that a value of a random variable with finite variance lies within a certain distance from the variable's mean. This inequality statistic of Tchebysheff provides a 'conservative' measure as to whether the sample mean deviates from zero. Table 2, Panel A (Panel B) shows the abnormal buying (selling) volume around ($t = -3, \ldots, +5$ relative to the announcement day $t = 0$) interim earnings announcements. Table 2 reports a significant ($p_s < 0.001$, $p_t < 0.10$) increase in buying and selling volume (Panel A and Panel B respectively) throughout the classes on the announcement day ($t = 0$) and somewhat weaker evidence of increased buying and selling volume ($p_s < 0.01$, $p_t < 0.15$) on the first subsequent day after the announcement ($t = 1$). There is only weak evidence of longer lasting buying activity for most passive individual investors classes (i.e., Class 1, 2 and 3) compared to institutions and to more active individual investors. Before the event, there is weak evidence that active individuals show increased buying and selling activity compared to the non-event period indicated by almost significant p_s and p_t-values for mean abnormal buying and selling volumes.

Although both mean abnormal buying and selling volumes are shown to be above normal for active individuals before the announcement, only selling volumes seem to persist abnormal after the announcement especially for active individual investors. This asymmetry around the event between buying and selling could be caused by several things. First, it may indicate that investors who buy just before the announcement sell their stocks and perhaps realize their short-term capital gains.

The possibility to benefit from short selling may require much bigger positions than those reported in Table 1.[10] This suggests that, for individuals, the possibility of gaining from adverse information is much lower than it is from favourable information. Also the disposition effect, usually associated with individuals, can decrease selling activity after unfavourable news. The investors' investment style (contrarian vs. momentum) and their sophistication to exploit the post-earnings announcement drift may also provide an explanation for the evidence that selling volume is more permanent for active investors than for passive ones.[11] For example, Barron, Byard and Enis (2000) suggest that individuals, compared to institutions, are more likely to interpret disclosures heterogeneously. They argue that high business complexity reduces the informativeness of traditional financial

10 Market participants' ability to react to announcements containing unfavourable news is restricted if short-selling is not permitted. In HSE short selling was prohibited until May 1995 when LEX lending contracts were introduced. In addition, stock-lending volumes have been rather low, partly due to their novelty, tax considerations and long settlement period.

11 For example, Barron, Byard and Enis (2000) suggest that individuals, compared to institutions, are more likely to interpret disclosures heterogeneously. They argue that high business complexity reduces the informativeness of traditional financial reporting and challenges the stock valuation task. Long-term bull markets could accelerate overconfidence since luck and skills are more difficult to separate from each other (see Gervais and Odean, 2001; and Daniel, Hirshleifer and Subrahmanyam, 1998).

Table 2

Abnormal Buying and Selling Volume Around Interim Earnings Announcements in Each Investor Class

Day	*Class 1 (Passive)*	*Class 2*	*Class 3*	*Class 4*	*Class 5 (Active)*	*Institutions*
Panel A: Abnormal Buying Volume						
−3	−0.06[a]	−0.03	−0.12	0.33	0.13	−0.05
	(0.407)[b]	(0.744)	(0.192)	(0.267)	(0.377)	(0.558)
	(1.000)[c]	(1.000)	(0.584)	(0.809)	(1.000)	(1.000)
−2	0.03	0.14	0.31	0.53	0.46	0.37
	(0.736)	(0.225)	(0.073)	(0.019)	(0.040)	(0.353)
	(1.000)	(0.675)	(0.307)	(0.172)	(0.235)	(1.000)
−1	0.10	0.26	0.64	0.67	0.49	0.13
	(0.383)	(0.087)	(0.002)	(0.003)	(0.003)	(0.463)
	(1.000)	(0.337)	(0.100)	(0.113)	(0.113)	(1.000)
0	**1.05**	**1.75**	**1.99**	**2.07**	**1.70**	**1.59**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	(0.063)	(0.070)	(0.083)	(0.060)	(0.031)	(0.039)
1	1.09	1.11	1.34	1.08	0.68	1.08
	(0.002)	(0.002)	(0.002)	(0.007)	(0.001)	(0.000)
	(0.106)	(0.105)	(0.106)	(0.137)	(0.094)	(0.072)
2	0.33	0.30	0.35	0.20	0.43	0.33
	(0.052)	(0.040)	(0.063)	(0.177)	(0.154)	(0.107)
	(0.262)	(0.235)	(0.287)	(0.544)	(0.489)	(0.381)
3	0.16	0.03	−0.11	−0.00	0.05	0.16
	(0.109)	(0.728)	(0.240)	(0.984)	(0.762)	(0.216)
	(0.387)	(1.000)	(0.719)	(1.000)	(1.000)	(0.651)
4	−0.00	0.10	−0.12	−0.08	−0.17	0.07
	(0.968)	(0.446)	(0.226)	(0.371)	(0.067)	(0.639)
	(1.000)	(1.000)	(0.678)	(1.000)	(0.296)	(1.000)
5	0.11	0.06	−0.18	−0.01	−0.13	−0.10
	(0.287)	(0.621)	(0.062)	(0.964)	(0.162)	(0.302)
	(0.878)	(1.000)	(0.284)	(1.000)	(0.507)	(0.935)
Panel B: Abnormal Selling Volume						
−3	0.03[a]	−0.10	−0.06	−0.04	−0.08	0.02
	(0.749)[b]	(0.346)	(0.628)	(0.707)	(0.396)	(0.876)
	(1.000)[c]	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
−2	−0.06	0.01	0.17	0.20	0.00	0.43
	(0.543)	(0.944)	(0.233)	(0.124)	(0.998)	(0.301)
	(1.000)	(1.000)	(0.700)	(0.420)	(1.000)	(0.930)
−1	0.02	0.37	0.27	0.33	0.37	0.18
	(0.875)	(0.020)	(0.036)	(0.029)	(0.027)	(0.294)
	(1.000)	(0.182)	(0.225)	(0.207)	(0.200)	(0.903)
0	**0.83**	**1.46**	**2.06**	**2.01**	**2.19**	**1.57**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	(0.058)	(0.051)	(0.052)	(0.027)	(0.027)	(0.040)
1	0.35	1.07	0.88	1.32	1.24	0.90
	(0.022)	(0.003)	(0.001)	(0.000)	(0.000)	(0.000)
	(0.187)	(0.109)	(0.091)	(0.036)	(0.033)	(0.077)
2	0.12	0.25	0.42	0.68	0.71	0.19
	(0.321)	(0.060)	(0.001)	(0.010)	(0.006)	(0.208)
	(1.000)	(0.279)	(0.092)	(0.147)	(0.130)	(0.628)
3	0.14	0.08	0.44	0.82	0.25	0.14
	(0.166)	(0.462)	(0.012)	(0.049)	(0.051)	(0.251)
	(0.519)	(1.000)	(0.155)	(0.256)	(0.259)	(0.755)

Table 2 (Continued)

Day	*Class 1 (Passive)*	*Class 2*	*Class 3*	*Class 4*	*Class 5 (Active)*	*Institutions*
4	−0.09	0.10	0.18	0.39	0.88	−0.00
	(0.331)	(0.380)	(0.149)	(0.023)	(0.075)	(0.999)
	(1.000)	(1.000)	(0.477)	(0.192)	(0.312)	(1.000)
5	0.17	0.05	0.17	0.95	0.47	−0.16
	(0.163)	(0.673)	(0.170)	(0.003)	(0.054)	(0.080)
	(0.511)	(1.000)	(0.527)	(0.114)	(0.265)	(0.324)

Notes:
[a] Mean abnormal volumes are presented in this row through all classes (columns: Class1 through Institutions).
[b] Two-sided p-values (p_s) based on Student's t-test are presented (in parentheses) in this row through all classes (columns: Class1 through Institutions).
[c] This p-value (p_t) is based on Tchebysheff's inequality giving statistics for lower bound of the probability that a value of a random variable with finite variance lies within a certain distance from the variable's mean. The same p-values are presented (in parentheses) in this row through all classes (columns: Class1 through Institutions).
The reporting of results for day −3 in the block of rows with superscripts[a, b, c] is also performed in a similar manner for other days −2 through 5.

reporting and challenges the stock valuation task. Long-term bull markets could accelerate overconfidence since luck and skills are more difficult to separate from each other (see Gervais and Odean, 2001; and Daniel, Hirshleifer and Subrahmanyam, 1998).

For institutions, abnormal buying and selling is limited to the announcement day ($t = 0$) and to the first subsequent day ($t = 1$) at the 0.01 level. The results as well as the data itself indicate that the Institutions category consists of heterogeneous groups of market participants (e.g. non-profit institutions, general government, finance and insurance institutions, non-financial institutions and foreign institutions) with various trading purposes. Focusing more on individuals' trading around the announcement rather than trading by institutions, we have pooled institutions into one class.

Table 3, Panel A (Panel B) reports whether interim earnings announcements affect the number of buyers (sellers) participating in the market compared to the non-event period. There seems to be weak evidence of longer-lasting buying activity after the event for the most passive classes compared to institutions and to the more active classes. For example, in Class 2 the number of buyers is slightly significantly ($p_s < 0.01$, $p_t < 0.15$) greater on the first two subsequent days after the announcement whereas in Class 4 there is only a slightly significantly greater number of buyers on the announcement day. Before the event, active individuals show somewhat increased buying and selling activity compared to the non-event period. For example, in Class 3, 4 and 5 the number of buyers is slightly significantly ($p_s < 0.01$, $p_t < 0.15$) greater on one day ($t = -1$) before the announcement whereas in Class 1 and 2 there is only a slightly significantly greater number of buyers on the announcement day. Consistent with Table 2, Table 3 reports that an abnormally high number of individuals keep on selling after the announcement. The results in these two tables resemble each other. Therefore we can conclude that trading volumes and the number of investors participating in the market are closely related.

Table 3

Abnormal Number of Buyers and Sellers Around Interim Earnings Announcements in Each Investor Class

Day	*Class 1 (Passive)*	*Class 2*	*Class 3*	*Class 4*	*Class 5 (Active)*	*Institutions*
Panel A: Abnormal Number of Buyer						
−3	−0.07[a]	−0.10	−0.07	0.08	0.03	−0.10
	(0.300)[b]	(0.070)	(0.327)	(0.595)	(0.785)	(0.040)
	(0.925)[c]	(0.302)	(1.000)	(1.000)	(1.000)	(0.237)
−2	0.01	−0.00	0.20	0.20	0.10	−0.08
	(0.951)	(0.954)	(0.071)	(0.132)	(0.262)	(0.090)
	(1.000)	(1.000)	(0.304)	(0.438)	(0.791)	(0.345)
−1	0.09	0.16	0.30	0.37	0.24	0.05
	(0.434)	(0.283)	(0.007)	(0.009)	(0.008)	(0.459)
	(1.000)	(0.864)	(0.135)	(0.142)	(0.139)	(1.000)
0	**0.79**	**1.15**	**1.24**	**1.29**	**1.02**	**0.89**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	(0.057)	(0.039)	(0.055)	(0.046)	(0.025)	(0.018)
1	0.89	0.91	0.91	0.79	0.50	0.36
	(0.001)	(0.000)	(0.002)	(0.012)	(0.002)	(0.000)
	(0.091)	(0.064)	(0.098)	(0.154)	(0.100)	(0.051)
2	0.24	0.31	0.31	0.11	0.04	0.05
	(0.071)	(0.009)	(0.017)	(0.326)	(0.670)	(0.286)
	(0.304)	(0.143)	(0.173)	(1.000)	(1.000)	(0.873)
3	0.09	0.05	−0.01	−0.08	−0.14	−0.08
	(0.233)	(0.544)	(0.933)	(0.289)	(0.027)	(0.093)
	(0.699)	(1.000)	(1.000)	(0.887)	(0.201)	(0.352)
4	−0.02	0.08	−0.08	−0.09	−0.14	−0.06
	(0.810)	(0.442)	(0.367)	(0.181)	(0.032)	(0.255)
	(1.000)	(1.000)	(1.000)	(0.556)	(0.216)	(0.768)
5	0.05	−0.04	−0.16	−0.17	−0.13	−0.18
	(0.499)	(0.664)	(0.023)	(0.031)	(0.043)	(0.000)
	(1.000)	(1.000)	(0.190)	(0.213)	(0.241)	(0.064)
Panel B: Abnormal Number of Sellers						
−3	0.07[a]	−0.07	−0.06	0.04	0.04	−0.01
	(0.428)[b]	(0.402)	(0.413)	(0.538)	(0.589)	(0.871)
	(1.000)[c]	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
−2	−0.04	0.09	0.07	0.10	0.06	−0.05
	(0.635)	(0.315)	(0.475)	(0.262)	(0.511)	(0.279)
	(1.000)	(0.988)	(1.000)	(0.790)	(1.000)	(0.848)
−1	−0.05	0.19	0.17	0.22	0.19	0.07
	(0.554)	(0.032)	(0.036)	(0.015)	(0.035)	(0.222)
	(1.000)	(0.214)	(0.224)	(0.167)	(0.222)	(0.666)
0	**0.65**	**1.00**	**1.26**	**1.13**	**1.19**	**0.64**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	(0.061)	(0.060)	(0.043)	(0.029)	(0.015)	(0.019)
1	0.21	0.62	0.67	0.79	0.79	0.26
	(0.097)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	(0.360)	(0.063)	(0.068)	(0.038)	(0.036)	(0.070)
2	−0.05	0.20	0.30	0.27	0.33	0.06
	(0.519)	(0.033)	(0.004)	(0.005)	(0.001)	(0.234)
	(1.000)	(0.216)	(0.121)	(0.122)	(0.089)	(0.701)

Table 3 (Continued)

Day	*Class 1 (Passive)*	*Class 2*	*Class 3*	*Class 4*	*Class 5 (Active)*	*Institutions*
3	0.11	0.19	0.29	0.34	0.22	0.07
	(0.217)	(0.032)	(0.010)	(0.001)	(0.015)	(0.228)
	(0.652)	(0.215)	(0.148)	(0.093)	(0.167)	(0.685)
4	−0.13	0.15	0.16	0.20	0.24	−0.01
	(0.099)	(0.128)	(0.101)	(0.016)	(0.021)	(0.817)
	(0.366)	(0.428)	(0.368)	(0.170)	(0.185)	(1.000)
5	0.12	0.06	0.15	0.32	0.30	−0.07
	(0.247)	(0.427)	(0.127)	(0.002)	(0.012)	(0.107)
	(0.743)	(1.000)	(0.426)	(0.103)	(0.154)	(0.382)

Notes:
[a] Mean abnormal volumes are presented in this row through all classes (columns: Class1 through Institutions).
[b] Two-sided p-values (p_s) based on Student's t-test are presented (in parentheses) in this row through all classes (columns: Class1 through Institutions).
[c] This p-value (p_t) is based on Tchebysheff's inequality giving statistics for lower bound of the probability that a value of a random variable with finite variance lies within a certain distance from the variable's mean. The same p-values are presented (in parentheses) in this row through all classes (columns: Class1 through Institutions).
The reporting of results for day −3 in the block of rows with superscripts [a, b, c] is also performed in a similar manner for other days −2 through 5.

This can be interpreted so that earnings announcements slightly increase buying and selling before the announcement. Overall, these results suggest a slight support for H_1, i.e. active individuals trade before the announcement.

(iii) Trading Imbalance Around Interim Earnings Announcements

This subsection reports the results of buy-sell ratios (BS-ratios, presented above in equation (5)) around the announcements in every investor activity class. BS-ratio shows us the potential imbalance of buying and selling activity. In order to find out how investors respond when they are experiencing favourable or unfavourable news announcements are classified into three groups based on the information content of the announcement. In each group there are about one third of 217 observations. The interim earnings announcement that provides the most favourable market-adjusted return (totalling 76 announcements) is classified in the positive news category (the market-adjusted return exceeds one per cent on the announcement day). The negative category consists of interim earnings announcements (totalling 70 announcements) that are considered to provide the most negative news to the markets (the market-adjusted return is lower than −3 per cent on the announcement day). In the neutral news category the market-adjusted return lies between 1% and −3% on the announcement day (totalling 71 announcements). This classification rule, although somewhat *ad hoc*, divides the whole sample into three classes, where the number of announcements is about the same. The results are presented in Tables 4 and 5.

Table 4 shows whether an event causes a buy-sell ratio to deviate from the corresponding average buy-sell ratio during the non-event period (see equation (5) above). The positive deviation indicates an abnormally high buy-sell ratio. Panel A in Table 4 shows a modest imbalance between buy and sell volumes on the

Table 4

Abnormal Buy-Sell Ratio in the Trading Volume Around Interim Earnings Announcements with Negative and Positive Earnings Surprise in Each Investor Class

Day	*Class 1 (Passive)*	*Class 2*	*Class 3*	*Class 4*	*Class 5 (Active)*	*Institutions*
Panel A: Negative Earnings Surprise, $N = 70$						
−3	0.01[a]	−0.01	0.01	0.02	0.02	−0.02
	(0.694)[b]	(0.835)	(0.739)	(0.649)	(0.578)	(0.372)
	(1.000)[c]	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
−2	0.05	−0.03	−0.00	−0.04	0.02	0.01
	(0.264)	(0.478)	(0.924)	(0.377)	(0.688)	(0.778)
	(0.788)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
−1	0.02	−0.04	0.02	0.01	−0.02	0.01
	(0.536)	(0.289)	(0.632)	(0.754)	(0.664)	(0.677)
	(1.000)	(0.874)	(1.000)	(1.000)	(1.000)	(1.000)
0	**0.07**	**0.10**	**0.00**	**0.07**	**0.08**	**−0.01**
	(0.033)	(0.003)	(0.924)	(0.059)	(0.020)	(0.515)
	(0.211)	(0.101)	(1.000)	(0.270)	(0.177)	(1.000)
1	0.10	0.07	0.09	0.06	0.02	0.01
	(0.007)	(0.095)	(0.031)	(0.155)	(0.675)	(0.648)
	(0.128)	(0.348)	(0.205)	(0.482)	(1.000)	(1.000)
2	0.07	0.02	0.01	0.02	−0.04	0.04
	(0.073)	(0.698)	(0.882)	(0.679)	(0.290)	(0.051)
	(0.302)	(1.000)	(1.000)	(1.000)	(0.879)	(0.254)
3	0.01	−0.02	−0.02	0.01	0.01	−0.03
	(0.808)	(0.683)	(0.668)	(0.774)	(0.838)	(0.266)
	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(0.794)
4	0.68	0.05	0.01	0.02	−0.01	0.01
	(0.100)	(0.279)	(0.860)	(0.699)	(0.870)	(0.510)
	(0.360)	(0.838)	(1.000)	(1.000)	(1.000)	(1.000)
5	0.03	0.09	0.02	−0.07	−0.02	−0.02
	(0.431)	(0.028)	(0.632)	(0.143)	(0.608)	(0.531)
	(1.000)	(0.197)	(1.000)	(1.455)	(1.000)	(1.000)
Panel B: Positive Earnings Surprise, $N = 67$						
−3	0.02[a]	−0.02	−0.00	0.03	0.01	−0.01
	(0.628)[b]	(0.592)	(0.968)	(0.504)	(0.869)	(0.638)
	(1.000)[c]	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
−2	0.05	0.00	0.07	0.01	0.05	−0.01
	(0.151)	(0.981)	(0.095)	(0.761)	(0.247)	(0.489)
	(0.474)	(1.000)	(0.348)	(1.000)	(0.732)	(1.000)
−1	0.05	0.03	0.09	0.06	0.02	−0.06
	(0.069)	(0.442)	(0.039)	(0.169)	(0.714)	(0.003)
	(0.291)	(1.000)	(0.225)	(0.516)	(1.000)	(0.103)
0	**−0.01**	**−0.07**	**−0.05**	**−0.04**	**−0.14**	**0.01**
	(0.669)	(0.048)	(0.178)	(0.312)	(0.000)	(0.299)
	(1.000)	(0.245)	(0.537)	(0.962)	(0.062)	(0.912)
1	0.04	−0.04	−0.04	−0.15	−0.16	0.03
	(0.293)	(0.183)	(0.299)	(0.000)	(0.000)	(0.099)
	(0.892)	(0.552)	(0.912)	(0.064)	(0.050)	(0.358)
2	−0.00	−0.04	−0.04	−0.11	−0.13	0.01
	(0.958)	(0.312)	(0.332)	(0.017)	(0.002)	(0.430)
	(1.000)	(0.962)	(1.000)	(0.167)	(0.098)	(1.000)

Table 4 (Continued)

Day	*Class 1 (Passive)*	*Class 2*	*Class 3*	*Class 4*	*Class 5 (Active)*	*Institutions*
3	0.00	−0.05	−0.15	−0.17	−0.11	0.03
	(0.891)	(0.244)	(0.000)	(0.000)	(0.016)	(0.186)
	(1.000)	(0.723)	(0.062)	(0.048)	(0.164)	(0.560)
4	−0.03	−0.06	−0.14	−0.12	−0.19	0.03
	(0.439)	(0.138)	(0.003)	(0.006)	(0.000)	(0.051)
	(1.000)	(0.443)	(0.102)	(0.124)	(0.056)	(0.253)
5	−0.03	−0.13	−0.11	−0.19	−0.16	0.04
	(0.391)	(0.003)	(0.009)	(0.000)	(0.000)	(0.004)
	(1.000)	(0.104)	(0.139)	(0.050)	(0.057)	(0.113)

Notes:
[a] Mean abnormal volumes are presented in this row through all classes (columns: Class1 through Institutions).
[b] Two-sided p-values (p_s) based on Student's t-test are presented (in parentheses) in this row through all classes (columns: Class1 through Institutions).
[c] This p-value (p_t) is based on Tchebysheff's inequality giving statistics for lower bound of the probability that a value of a random variable with finite variance lies within a certain distance from the variable's mean. The same p-values are presented (in parentheses) in this row through all classes (columns: Class1 through Institutions).
The reporting of results for day −3 in the block of rows with superscripts [a, b, c] is also performed in similar manner for other days −2 through 5.

negative news announcement day ($t = 0$) and on the first day after it ($t = 1$). The findings in Panel B: Positive earnings surprises are rather unlike. Actively trading individuals increase their sells significantly ($p_s < 0.001$ based on Student's t- statistic and $p_t < 0.10$ based on Tchebysheff's inequality statistic) after the positive earnings announcement. The results are very similar in Table 5, where the number of buyers and sellers are displayed. The findings are consistent with Odean (1998) and Grinblatt and Keloharju (2000b), who show that individuals tend to cash in on winning shares, i.e., in this context, firms with a positive earnings surprise. This is in line with the short-term contrarian (buying losers and selling winners) investment style frequently associated with individuals. H_2 gains weak support when negative earnings surprises are studied (Table 4, Panel A and Table 5, Panel A): passive individuals seem to buy more frequently than sell. However, inconsistently with H_2 (supporting the view that active individuals are less contrarian than passive ones) active individuals sell mostly after positive news (contrarian behaviour). One explanation for this is that active individuals use their potential privileged information for profitable short horizon trading.

The disposition effect suggests that investors ride on losers, thus being reluctant to realize losses. It is hypothesized (H_3) that active individuals exhibit less of the disposition effect around the announcement than passive ones. However, we could not distinguish any difference between the investors' activity classes regarding H_3. Rather, the negative earnings news triggered abnormally low selling volume throughout the activity classes. Contrary to that, for Institutions, negative earnings surprises trigger abnormally high selling activity. However, the statistical significance for trading activity is low. This increased selling activity could indicate that institutions have better possibilities to trade based on negative news compared to individual investor classes.

Table 5

Abnormal Buy-Sell Ratio in the Number of Investors Participating in the Market Around Interim Earnings Announcements with Negative and Positive News in Each Investor Class

Day	*Class 1 (Passive)*	*Class 2*	*Class 3*	*Class 4*	*Class 5 (Active)*	*Institutions*
Panel A: Negative Earnings Surprise, $N = 70$						
−3	−0.00[a]	0.00	0.02	−0.00	−0.00	−0.02
	(0.955)[b]	(0.932)	(0.562)	(0.956)	(0.949)	(0.364)
	(1.000)[c]	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
−2	0.04	−0.04	−0.01	−0.03	0.02	−0.01
	(0.295)	(0.401)	(0.881)	(0.382)	(0.625)	(0.769)
	(0.897)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
−1	0.01	−0.03	0.00	−0.00	−0.02	−0.02
	(0.638)	(0.440)	(0.921)	(0.978)	(0.559)	(0.494)
	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
0	**0.07**	**0.10**	**0.02**	**0.09**	**0.09**	**0.06**
	(0.027)	(0.001)	(0.556)	(0.003)	(0.002)	(0.006)
	(0.195)	(0.091)	(1.000)	(0.111)	(0.097)	(0.124)
1	0.09	0.08	0.10	0.08	0.06	0.07
	(0.005)	(0.021)	(0.011)	(0.026)	(0.120)	(0.004)
	(0.119)	(0.179)	(0.147)	(0.191)	(0.403)	(0.112)
2	0.04	0.02	0.04	0.06	−0.01	0.04
	(0.193)	(0.662)	(0.303)	(0.076)	(0.716)	(0.040)
	(0.577)	(1.000)	(0.927)	(0.307)	(1.000)	(0.229)
3	−0.01	−0.01	0.00	0.01	−0.00	−0.00
	(0.877)	(0.889)	(0.902)	(0.770)	(0.978)	(0.936)
	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
4	0.08	0.03	0.03	0.03	0.03	0.02
	(0.027)	(0.411)	(0.433)	(0.546)	(0.482)	(0.347)
	(0.196)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
5	0.02	0.08	0.03	−0.01	0.01	−0.01
	(0.604)	(0.017)	(0.500)	(0.743)	(0.927)	(0.807)
	(1.000)	(0.165)	(1.000)	(1.000)	(1.000)	(1.000)
Panel B: Positive Earnings Surprise, $N = 67$						
−3	0.00[a]	−0.03	0.01	0.03	0.01	−0.01
	(0.893)[b]	(0.509)	(0.863)	(0.501)	(0.867)	(0.648)
	(1.000)[c]	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
−2	0.05	−0.02	0.07	−0.01	0.03	0.01
	(0.169)	(0.693)	(0.051)	(0.839)	(0.465)	(0.508)
	(0.516)	(1.000)	(0.254)	(1.000)	(1.000)	(1.000)
−1	0.03	0.03	0.07	0.04	−0.00	−0.00
	(0.318)	(0.499)	(0.040)	(0.232)	(0.998)	(0.878)
	(0.985)	(1.000)	(0.227)	(0.686)	(1.000)	(1.000)
0	**−0.03**	**−0.06**	**−0.08**	**−0.07**	**−0.13**	**−0.01**
	(0.337)	(0.068)	(0.010)	(0.046)	(0.000)	(0.785)
	(1.000)	(0.290)	(0.144)	(0.242)	(0.046)	(1.000)
1	0.05	−0.04	−0.07	−0.11	−0.16	−0.06
	(0.163)	(0.165)	(0.093)	(0.002)	(0.000)	(0.013)
	(0.502)	(0.506)	(0.344)	(0.101)	(0.041)	(0.155)
2	−0.01	−0.04	−0.03	−0.12	−0.14	−0.03
	(0.831)	(0.354)	(0.420)	(0.006)	(0.000)	(0.135)
	(1.000)	(1.000)	(1.000)	(0.122)	(0.051)	(0.437)

Table 5 (Continued)

Day	*Class 1 (Passive)*	*Class 2*	*Class 3*	*Class 4*	*Class 5 (Active)*	*Institutions*
3	0.02	−0.09	−0.11	−0.16	−0.12	−0.05
	(0.623)	(0.014)	(0.004)	(0.000)	(0.004)	(0.029)
	(1.000)	(0.155)	(0.111)	(0.040)	(0.115)	(0.202)
4	−0.03	−0.08	−0.15	−0.11	−0.16	−0.04
	(0.414)	(0.024)	(0.001)	(0.005)	(0.000)	(0.046)
	(1.000)	(0.187)	(0.086)	(0.119)	(0.069)	(0.241)
5	−0.04	−0.14	−0.11	−0.20	−0.15	−0.06
	(0.230)	(0.000)	(0.008)	(0.000)	(0.000)	(0.002)
	(0.682)	(0.069)	(0.131)	(0.039)	(0.053)	(0.093)

Notes:
[a] Mean abnormal volumes are presented in this row through all classes (columns: Class1 through Institutions).
[b] Two-sided p-values (p_s) based on Student's t-test are presented (in parentheses) in this row through all classes (columns: Class1 through Institutions).
[c] This p-value (p_t) is based on Tchebysheff's inequality giving statistics for lower bound of the probability that a value of a random variable with finite variance lies within a certain distance from the variable's mean. The same p-values are presented (in parentheses) in this row through all classes (columns: Class1 through Institutions).
The reporting of results for day −3 in the block of rows with superscripts [a, b, c] is also performed in similar manner for other days −2 through 5.

The results reveal the existence of different investing styles among investor classes. In order to gain an additional insight into the investment style, we employed a regression model (equation (7) above). The results are presented in Table 6. The regression is employed for both trading volume (Panel A) and for the number of investors (Panel B). If investors for class j on average follow a contrarian (momentum) strategy, then the estimated parameter b^j should be significantly negative (positive). Table 6 contains market-adjusted returns and risk-adjusted returns according to the market model. Since the obtained results are substantially the same with these two return models, we discuss solely the results based on market-adjusted results. In order to control the potential problems of non-trading uniform returns are computed (see e.g. Maynes and Rumsey, 1993; and Kallunki, 1996). Risk-adjusted returns are computed based on the uniform returns procedure. The results are quite convincing. Activity among individual investors exhibits contrarian tendencies around the announcement, both in terms of trading volume and number of traders. An exception to this is Class 1 (comprising the most passive investors), where the association between abnormal returns and buy-sell ratios is not found. Individuals tend to cash in on winning shares after the announcement. This result holds irrespective of whether the trading volume or the number of investors is used. This result is inconsistent with the presented hypothesis three. Finally, it should be noted that R^2s are low for models presented in Table 6 ranging from 0.003 to 0.056.

Institutions (the benchmark) seem to follow the momentum strategy measured in terms of trading volume. If the number of investors is used, however, also Institutions as a whole apply contrarian strategy. The likely explanation for these contradictory results between trading volumes is the fact that Institutions category consists of rather heterogeneous groups of market participants (e.g. non-profit institutions, general government, finance and insurance institutions, non-financial

Table 6

Connection Between Past Returns and Subsequent Buy Sell Ratio

	Dependent Variable (AR_{i0}) is the Market-Adjusted Return						*Dependent Variable (AR_{i0}) is the Risk-Adjusted Return*					
	Class 1	*Class 2*	*Class 3*	*Class 4*	*Class 5*	*Institutions*	*Class 1*	*Class 2*	*Class 3*	*Class 4*	*Class 5*	*Institutions*
Panel A: Trading Volume												
Intercept	0.005	−0.021	−0.056	−0.076	−0.067	0.025	0.004	−0.021	−0.055	−0.076	−0.067	0.025
p-value	(0.722)	(0.135)	(0.000)	(0.000)	(0.000)	(0.000)	(0.732)	(0.143)	(0.000)	(0.000)	(0.000)	(0.000)
AR_{i0}	−0.213	−0.698	−0.742	−0.712	−0.429	0.148	−0.254	−0.684	−0.733	−0.720	−0.460	0.147
p-value	(0.381)	(0.010)	(0.008)	(0.003)	(0.035)	(0.057)	(0.284)	(0.013)	(0.009)	(0.003)	(0.025)	(0.071)
F-value	1.03	8.62	9.37	9.14	3.57	2.63	1.41	7.90	8.72	8.92	3.94	2.46
R^2	0.005	0.039	0.042	0.041	0.016	0.012	0.007	0.035	0.039	0.040	0.018	0.011
Panel B: Number of Traders												
Intercept	0.001	−0.030	−0.051	−0.070	−0.066	0.000	0.001	−0.030	−0.051	−0.070	−0.066	0.000
p-value	(0.926)	(0.029)	(0.000)	(0.000)	(0.000)	(0.998)	(0.936)	(0.031)	(0.001)	(0.000)	(0.000)	(0.971)
AR_{i0}	−0.163	−0.700	−0.764	−0.804	−0.579	−0.374	−0.195	−0.691	−0.760	−0.796	−0.616	−0.375
p-value	(0.454)	(0.006)	(0.006)	(0.000)	(0.005)	(0.001)	(0.358)	(0.007)	(0.006)	(0.000)	(0.003)	(0.000)
F-value	0.67	9.25	10.25	12.74	7.05	11.25	0.93	8.60	9.68	11.89	7.66	10.73
R^2	0.003	0.041	0.046	0.056	0.032	0.050	0.004	0.039	0.043	0.052	0.034	0.048

Notes:
The assessment of investment style is based on the following regression model:

$$\text{CASTBS}_{iT}^{j} = \alpha^{j} + b^{j}\text{AR}_{i0} + \varepsilon_{iT}^{j}$$

where CASTBS_{iT}^{j} is abnormal buy-sell behaviour in period T for an investor class j measured by cumulative abnormal buy-sell behaviour during the post-announcement period T ($t = 1,\ldots,10$), AR_{i0} is the market-adjusted return (risk-adjusted return) on interim earnings announcement day ($t = 0$), α^{j} is the intercept term for investor class j, b^{j} is the estimated parameter, and ε_{iT}^{j} is the error term. Statistical significance is tested by a t-statistic adjusted for an unknown type of heteroscedasticity using White's (1980) estimate of parameter standard error.

institutions and foreign institutions) with a wide variety of investment purposes and strategies and decision mechanisms.

(iv) Trading Performance Through Investor Classes

We compare the trading performance of each investor class concentrating on the investing success around the event. Hypothesis four states that active individuals' trading before the announcement precedes post-announcement abnormal returns. Tables 2 and 3 show somewhat increased trading activity even before the announcement. A logical extension to this is to study whether abnormally high pre-event buying and selling are associated with the information content of the announcement. Based on equation (8), the performance is favourable for investor class j if the estimated parameter b^j is significantly positive. In other words, investors increase buying (selling) relative to selling (buying) before positive (negative) news, suggesting an ability to pick winning shares and avoid losing shares.

Table 7 contains market-adjusted returns and risk-adjusted returns[12] according to the market model. Panel A, in Table 7, shows that active individuals (Class 5) are anticipating the information content of the announcement: active buying (selling) volume is significantly ($p = 0.019$) connected to favourable (unfavourable) news measured as market-adjusted returns during the short period ($t = 0, \ldots, 5$) at and after the event.[13] This gives support for our H_4: active individuals' trading before the announcement precedes post-announcement abnormal returns. The performance for institutions, in turn, is significantly negative ($p = 0.008$) suggesting poor performance. The remainder of the classes (Class 1 through Class 4) have statistically insignificant coefficients for the intercept and CAR.

In Panel B the corresponding results are shown for the number of investors. The results show that the number of active investors (Class 5) immediately before the event is positively associated with abnormal returns at and after the event. This suggests that abnormal returns activate Class 5 investors already before the event. These results may well support the view that minority protection is well established. In other words, institutions could well restrict themselves to trading before the event in order to avoid a bad reputation or even lawsuits due to the use of privileged information. The overall caveat for the results presented in Table 7 is the low R^2–values.

6. SUMMARY

This paper has focused on the information usage by individual investors in various trading activity classes. It belongs to the increasing number of behavioural finance oriented studies on the information usage of markets. We began the paper by reviewing the theme in the rational information usage regime and then relaxed the rational information usage assumption. Approximating variations in investors'

12 For the sake of comparison, we have presented market-adjusted returns using HSE's own return procedure (described e.g. in Helsinki Stock Exchange, 2000) and risk-adjusted returns using the uniform returns procedure (see e.g., Maynes and Rumsey, 1993; and Kallunki, 1996). The figures based on risk-adjusted returns with HSE's own return procedure are almost the same (available upon request from the authors).

13 The figures based on risk-adjusted returns with HSE's own return procedure are almost the same (available upon request from the authors).

Table 7

Connection Between Buy-Sell Ratio and Subsequent Returns

	Dependent Variable (CAR_{it}) is the Market-Adjusted Return						*Dependent Variable (CAR_{it}) is the Risk-Adjusted Return*					
	Class 1	*Class 2*	*Class 3*	*Class 4*	*Class 5*	*Institutions*	*Class 1*	*Class 2*	*Class 3*	*Class 4*	*Class 5*	*Institutions*
Panel A: Trading Volume												
Intercept	0.020	−0.009	0.020	−0.004	0.018	−0.014	0.020	−0.010	0.019	−0.004	0.018	−0.014
p-value	(0.178)	(0.610)	(0.263)	(0.828)	(0.280)	(0.103)	(0.185)	(0.592)	(0.269)	(0.818)	(0.300)	(0.105)
CAR_{it}	0.039	0.290	0.226	0.232	0.375	−0.187	−0.010	0.250	0.222	0.219	0.312	−0.204
p-value	(0.828)	(0.120)	(0.212)	(0.212)	(0.019)	(0.008)	(0.957)	(0.218)	(0.260)	(0.291)	(0.068)	(0.010)
F-value	0.06	2.24	1.46	1.36	4.32	4.36	0.00	1.48	1.27	1.09	2.65	4.61
R^2	0.000	0.010	0.007	0.006	0.020	0.020	0.000	0.007	0.006	0.005	0.012	0.021
Panel B: Number of Traders												
Intercept	0.013	−0.012	0.013	−0.009	0.004	−0.012	0.013	−0.012	0.013	−0.010	0.004	−0.012
p-value	(0.370)	(0.474)	(0.423)	(0.580)	(0.794)	(0.192)	(0.383)	(0.462)	(0.432)	(0.566)	(0.816)	(0.180)
CAR_{it}	(0.035)	0.252	0.225	0.253	0.290	0.019	−0.013	0.227	0.218	0.226	0.257	−0.027
p-value	(0.838)	(0.119)	(0.191)	(0.132)	(0.052)	(0.857)	(0.938)	(0.192)	(0.244)	(0.225)	(0.105)	(0.791)
F-value	0.05	2.01	1.64	1.96	3.00	0.04	0.01	1.46	1.39	1.40	2.11	0.07
R^2	0.000	0.009	0.008	0.009	0.014	0.000	0.000	0.007	0.006	0.007	0.010	0.000

Notes:
The following regression tests whether the active buying (selling) is connected to favourable (unfavourable) news afterwards. The conducted performance measure takes the following form:

$$\mathrm{CASTBS}^{j}_{iT-1} = \alpha^{j} + b^{j}\mathrm{CAR}_{iT} + \varepsilon^{j}_{iT-1}$$

where $\mathrm{CASTBS}^{j}_{iT-1}$ is abnormal buy-sell behaviour for investor class j during period $T-1$ measured as the sum of abnormal buy-sell ratio during days −3 to −1 relative to interim earnings announcement day $t = 0$, CAR_{iT} is the market-adjusted return (risk-adjusted return) during the subsequent period measured as the sum of market-adjusted return (risk-adjusted return) during days 0 to 5 relative to interim earnings announcement day $t = 0$, α^{j} is the intercept term for investor class j, b^{j} is the estimated parameter, and ε^{j}_{iT-1} is the error term. Statistical significance is tested by a *t*-statistic adjusted for an unknown type of heteroscedasticity using White's (1980) estimate of parameter standard error.

experience with share trading activity we distinguished between inexperienced (passive) and experienced (active) investors applying institutional investors as a benchmark category. Specifically, we investigated the trading behaviour and performance of individual investors around the interim earnings announcements using the official central register of shareholdings for Finnish stocks maintained by the Finnish Central Securities Depository (FCSD). A noticeable benefit from using the investors' trading data is its high level of detail and accuracy. The register identifies every single trade and therefore provides detailed information of the underlying investor's buying and selling behaviour. We separated Finnish household stock trading into five trading activity classes and compared their trading to institutional trading around interim earnings announcements.

Based on the prior theoretical literature as well as empirical evidence we hypothesize that: active individuals trade before the announcement (H_1), active individuals exhibit less contrarian behaviour around the announcement than passive ones (H_2), active individuals exhibit less of the disposition effect around the announcement than passive ones (H_3), and active individuals' trading before the announcement precedes post-announcement abnormal returns (H_4).

Data, covering the years 1996–2000, shows that earnings news triggers trading in every trading class. Before the event especially active individuals show slightly increased buying and selling figures compared to the non-event period. This finding supports H_1. In addition, consistent with Grinblatt and Keloharju (2000b), we find that the individual investors tend to follow a short-term contrarian strategy after the announcement, especially in selling after good news. In other words, after positive news investors with a contrarian strategy sell more than buy. Activity among individual investors increases the contrarian tendency especially after positive earnings surprises. This finding does not support H_2. The hypothesis concerning the disposition effect is weakly supported in favour of H_3. Furthermore, we find that active individuals trading before the announcement predicts post-announcement returns. More specifically, active investors increase buying (selling) relative to selling (buying) before positive (negative) news. This provides support for H_4.

To conclude, based on the prior theoretical and empirical literature, we have formulated hypotheses about investor behaviour in five trading activity classes. The obtained results mainly support the hypotheses and provide insights into how investors trade around the anticipated announcements in the emerging markets.

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