Received 10 August 2010
Accepted 20 December 2010

Foreign vs domestic investors and the post-announcement drift

G. Geoffrey Booth
Department of Finance, Michigan State University, East Lansing, Michigan, USA
Juha-Pekka Kallunki and Petri Sahlström
Department of Accounting, University of Oulu, Oulu, Finland, and
Jakko Tyynelä
Department of Accounting and Finance, University of Vaasa, Vaasa, Finland

Abstract

Purpose – This paper aims to investigate who causes post-announcement drift and whether this drift is observed for various types of news announcements.

Design/methodology/approach – Using Finnish share ownership data, the authors examine the trading behavior of foreign and domestic investors during the post-announcement periods of scheduled earnings and unscheduled non-earnings announcements.

Findings – The results show that the post-announcement drift exists for both types of news, but only if the news is negative. As a group, foreign investors react first by selling shares of firms reporting negative information. Domestic investors act in the opposite manner.

Originality/value – The results imply that the post-announcement drift is a special case of a more general post-disclosure phenomenon and that investor differences (most likely information processing skills) is one likely explanation for its pervasiveness.

Keywords Announcements, Investors, Behaviour, Under-reaction, Earnings, Disclosure

Paper type Research paper

1. Introduction

During the last four decades the value-relevance of earnings announcements has been an important topic in financial accounting. In a thorough review of the literature, Ball (1992) reported that most research concludes that stock prices at the time of the announcement follow the direction and magnitude of the unexpected portion of the earnings disclosed in annual and interim financial reports, and this effect on stock prices continues even after the announcement is made. The latter phenomenon is typically referred to as the "post-announcement drift" and was first formally documented by Ball and Brown (1968) and Jones and Litzenberger (1970). Numerous association-based disclosure studies (the taxonomy of Verrecchia, 2001) confirm the existence this drift, making it unwieldy to provide a comprehensive list. Recent

The authors thank the Helsinki Stock Exchange and the Finnish Central Securities Depository for providing the data for this study and C.F. Noe for his insights concerning the complexities of earnings announcements. All errors, of course, are the authors'.

International Journal of Managerial Finance
Vol. 7 No. 3, 2011
pp. 220-237

1743-9132
DOI 10.1108/17439131111144441

published examples, however, include Bernard *et al.* (1997), Jacob *et al.* (2000), Mendenhall (2005) and Hirshleifer *et al.* (2008).

Three general explanations have surfaced to account for the presence of the drift. First, the drift is caused by investors under-reacting to news. Second, news induces an unobservable transitory risk factor that is priced. Third, the drift is simply a byproduct of a particular research design. On balance, the evidence that has been produced thus far tends to support the under-reaction story (see, for example, Bernard and Thomas, 1990; Chan *et al.*, 1996). Indeed, Fama (1998, p. 286) notes that this drift is the "[g]randdaddy of all underreaction events". Jacob *et al.* (2000), however, argue that if this were the case, then we would expect that arbitrageurs would devise some sort of trading scheme that would result in the drift's eventual demise. Nevertheless, Mendenhall (2005) counters this argument by showing that the presence of arbitrage risk prevents this from happening.

According to Ball (1992), the cost of processing information is a likely candidate to explain investor under-reaction. Because information processing skills and time available to analyze financial statements differ greatly across investors, their behavior around the earnings announcements should differ too. Nevertheless, the evidence on the existence of asymmetric information among different types of investors is somewhat mixed. For instance, Lee (1992) finds that uninformed (small) and informed (large) investors react similarly to earnings announcements. Moreover, and Hirshleifer *et al.* (2008) report that individual investors are net buyers after both negative and positive extreme earnings surprises, consistent with the so-called attention effect, but indicating that their trades are not causing the post-announcement drift. In contrast, Bartov *et al.* (2000) show that the trading activity of unsophisticated investors is an underlying reason for the post-announcement drift. In addition, Ekholm (2006), Vieru *et al.* (2006), and Ke and Ramalingegowda (2005) show that different types of investors react differently to new earnings information.

Under-reaction and the concomitant drift are not limited to earnings announcements. For example, under-reaction has been found to be associated with stock splits (Desai and Jain, 1997), seasoned equity offerings (Kadiyala and Rau, 2004), analyst recommendations (Womack, 1996), and tender offer and open market repurchases (Ikenberry *et al.*, 1995). Since these types of news events require significant information processing by investors, the presence of under-reaction is not surprising if the earnings announcement explanation holds for these events as well.

In this article, our aim is to determine whether the post-announcement drift is common to all types of news announcements and to investigate they way in which foreign and domestic investors influence this phenomenon. To accomplish our task, we investigate the changes in share ownership of these two investor classes during the post-announcement periods associated with scheduled earnings announcements and unscheduled non-earnings announcements (mergers, management changes, credit ratings, and so forth). Scheduled announcements are those that are periodically (usually annually or quarterly) made at times expected by the market participants, and unscheduled ones occur only when there is news to report. For convenience and clarity, hereafter we refer to all scheduled earnings announcements as "earnings announcements" and all unscheduled non-earnings announcements as "unscheduled announcements".

We use the Helsinki Stock Exchange (HEX) as our laboratory. In terms of annual volume, the HEX is one of the 20 largest developed-economy stock exchanges, and it is

home to more than a score of active brokerage houses that are staffed by several hundred brokers. Our sample period is 1995-2003, inclusive. During this period the HEX trading volume increased dramatically. For example, share turnover of €145,643m in 2003 is over ten times greater than it was in 1995.

We argue that foreign investors, who are primarily institutions, process announcement information more efficiently than domestic institutional and individual investors regardless of the type of news, especially if the firms being analyzed are large and have extensive international markets and networks and if the information requires rigorous, detailed analysis, as may be the case for unscheduled announcements. Our results show that the post-announcement drift exists for both types of announcements, but only if the news is negative. Moreover, our findings support the notion that the post-earnings announcement drift is the result of the different information processing abilities among the investors. This difference is observed in trading patterns. Foreign investors sell the stock of firms that report negative earnings news while domestic investors buy these stocks. The behavior of the domestic investors is consistent with the notion that on average these investors do not process information as efficiently as the foreign investors. The same trading behavior is observed in the case of unscheduled announcements, indicating that the post-announcement drift is not only related to release of earnings reports but is also a common phenomenon to all types of news. Following the logic of Ke and Ramalingegoda (2005), some of these foreign investors may trade to exploit this inefficiency.

We organize the remainder of this paper as follows. The next section provides a framework to understand the response of agents to disclosure announcements. Section 3 describes the data and variables used in the study. In Section 4, we develop our method of analysis and present our empirical results. Section 5 contains concluding remarks.

2. Information processing costs

Brav and Heaton (2002) point out that stock price over- and under-reactions to news may be explained by both rational structural uncertainty models and behavioral models. They show that although the two model classes differ greatly in their underlying assumptions, they are mathematically very similar, making it difficult to distinguish empirically between the two underlying theories. In both frameworks, under-reaction (overreaction) occurs when news, say an earnings announcement, is considered less (more) value-relevant than it would be in a rational world, and the degree of value-relevance is inversely related to the level of uncertainty. For instance, in the structural uncertainty framework, under-reaction is the result of investors having incomplete information concerning a parameter shift in the model. From the behavioral perspective, however, under-reaction is caused by investors being conservative, i.e. anchoring their actions on past beliefs. Both approaches rely on the notion that a new equilibrium will be reached once the investor understands the ramifications of the news

In the case of an earnings announcement, Ball (1992) argues that the resultant post-announcement drift is caused by the costs associated with learning its value-relevant implications. This information processing cost hypothesis, for which Francis *et al.* (2007) find empirical support, suggests that the unexpected returns

observed following an earnings announcement are associated with the quality of earnings information reported by the firm. The content of the earnings announcement is uncertain to all investors until the financial report is released. After its release, investors begin to process the information in order to assess its effect on the firm's future cash flows. This assessment includes interpreting the announcement itself as well as the implications of the subsequent induced trading volume[1]. The effect remains uncertain until the information is completely processed. Consequently, the stock price adjusts gradually to the price justified by the earnings announcement as the processing continues until the uncertainty is fully resolved. The time taken to reach full resolution is positively related to the difficulty associated with understanding the value implications of the announcement. Therefore, the information processing cost hypothesis implies that the post-announcement drift compensates for the costly processing of low-quality information.

Uncertainty in processing the information in decision-making is not a new idea. For instance, to explain the phenomenon, Heiner (1983) develops what he labels the competence-difficulty gap theory. He suggests that the gap between an agent's competence and the difficulty of the problem to be solved introduces uncertainty, which, in turn, tends to produce errors and surprises. In a financial market context, Kaen and Rosenman (1986) suggest that informed (uninformed) investors are associated with a small (large) competence-difficulty gap. They maintain that the informed investors are highly perceptive agents who react to news early while the uninformed investors wait to respond. The difference in reaction times results in a series of partial adjustments that eventually result in a new equilibrium asset price.

Kaen and Rosenman's (1986) story is consistent with Hong and Stein's (1999) behavioral model that links the over- and under-reaction of stock prices to news about the firm's future fundamentals slowly diffusing through the investment market. This idea is similar to the suggestion of Jones and Litzenberger (1970, p. 144) that the opinions of market professionals concerning a stock's fundamental value would be slowly "disseminated to the general investing public through advisory services, stock brokers, etc." The competence-difficulty theory is also consistent with the notion advanced by Daniel *et al.* (1998) that stock investors tend to overweight private information and underweight public news, and with Zhang's (2006) suggestion that the speed of adjustment is faster (slower) for stocks associated with lower (higher) levels of uncertainty. Along similar lines, Chewning *et al.* (2004) report the results of a laboratory experiment that show that when unsophisticated investors trade with sophisticated ones, they tend to learn how to interpret public information releases correctly.

Based on the above discussion, we should observe different behavior from informed and uninformed investors as a result of earnings and other firm-specific announcements. Moreover, the difference in behavior should be largest immediately after the information release and then decrease as all the market participants begin to process the information. Making a prior classification of the degree of informativeness for different investors, however, is not straightforward. Variables such as the size, trading volume and type of investors have been suggested as possible proxies. One popular investor-type demarcation is foreign versus domestic investor.

Several studies suggest that domestic investors are more informed than foreign investors. For instance, Kang and Stulz (1997) and Dahlquist and Robertsson (2001) find that foreign investors tend to invest in large, liquid Japanese and Swedish firms,

respectively. They attribute this behavior to attempts by foreign investors to lessen their informational disadvantage in domestic stocks. Addressing the issue of informativeness directly, Dvorák (2005), using data from the Jakarta Stock Exchange, and Dahlquist and Robertsson (2004), after analyzing Swedish data, report that foreign investors do not have an informational advantage. Choe *et al.* (2005) indicate that domestic investors have an edge over foreign investors in trading domestic stocks in Korea. Moreover, Lee *et al.* (2004) find that Taiwanese domestic institutions appear to be the more informed more of the time.

In contrast, Huang and Shiu (2009), who also use Taiwanese data, find evidence that foreign investors are more informed than domestic investors. They argue that in the case of large, export-oriented Taiwanese firms foreign investors engage in extensive stock research and are able to better understand the international product markets than domestic investors. Along the same lines, Bailey *et al.* (2007) use Thai and Singapore earnings announcement data to show that foreign investors are better information processors than domestic investors. In addition, Bacmann and Bolliger (2003) provide evidence that foreign analysts generate more accurate information than local analysts for Latin American stocks. Thus, whether foreign investors are more informed than domestic investors appears to depend on the specific domestic market and is an empirical question.

Foreign investors are the largest group of all investors in Finland when measured by the trading volume or ownership but they are the smallest group in terms of numbers. This suggests that the typical foreign investor is a large institution. Because Grinblatt and Keloharju (2000) find that the foreign investors outperform Finnish ones, we hypothesize that the foreign investor reaction to earnings and unscheduled announcements differ from the domestic investor response. In particular, we posit that in the case of negative (positive) information, foreign investors start to sell (buy) shares because their information processing is more efficient. Moreover, because the domestic investors initially do not understand the information, they buy (sell) shares as the stock price goes down (up) until they are able to determine content of the announcement. Further, based on the findings of Vuolteenaho (2002), Cohen *et al.* (2002) and Nagel (2005), we anticipate that the combined response of foreign and domestic investors to trade in such a manner that the stock price under-reacts to both types cash-flow news.

3. Data and variables

To conduct our analyses, we require data pertaining to the stock trades made by Finnish (domestic) and foreign investors, the returns associated with these stocks and the dates that the earnings announcements and unscheduled announcements were made. Share ownership data are from the central register of shareholdings for Finnish stocks. This database was developed in 1995 by the Finnish Central Securities Depository (FCSD). These comprehensive and accurate data cover all publicly traded Finnish listed firms. Changes in shareholdings occurring during regular trading hours as well as in the aftermarket are reported on a daily basis. The aftermarket is often used to make block trades efficiently. It is also used by brokers, who bought shares in their name on the behalf of their clients during the day, to transfer stock ownership to these investors. The FCSD daily data reflect trades made during normal trading hours plus trades in the aftermarket. A detailed description of this database is given by Grinblatt and Keloharju (2000).

To minimize the effect of thin trading of illiquid stocks, we restrict our analyses to the 20 most frequently traded stocks. These stocks constitute over 90 percent of the total trading volume of the HEX and comprise its popular HEX index. In addition, many of these firms, such as Nokia, Stora Enso and Nordea, are major firms that are well known by the international investment community. Moreover, Metso, Nokia, Stora Enso, Telia-Sonera and UPM-Kymmene are listed on the New York Stock Exchange. During the sample period Nokia was also traded on the London, Paris and Frankfurt exchanges, although the stock was voluntarily de-listed in late 2003 in an effort by the firm to concentrate the trading of its stock on only the most liquid international exchanges.

Based on information in the FCSD data, we categorize investors into domestic (institutions and households) and foreign investors (mainly institutions). Although they are relatively few in number, foreign investors typically execute larger trades and trade more often than domestic investors. By way of illustration, foreign investors account for 25.1 percent of the shares traded and 62.6 percent of the number of trades. Nevertheless, only 2.9 percent of the investors are foreign. Further the average annual number of trades per foreign investor during the nine-year sample period is 105.6, while the average annual number of shares traded is 6.29 million. In contrast, the corresponding figures for domestic investors are 5.3 and 0.56 million, respectively. The relatively much smaller values for the domestic investors is largely because a significant portion (96.1 percent) of these investors are households that are, on average, reasonably inactive traders.

Our measure of the trading behavior of investors is the buy ratio. We define this ratio for an investor type for each day to be:

$$\frac{\mathrm{BUY}_{nit}}{\mathrm{BUY}_{nit} + \mathrm{SELL}_{nit}}, \tag{1}$$

where BUY_{nit} (SELL_{nit}) is the buy (sell) volume of investor type n (foreign or domestic) for stock i on day t. We adjust this ratio to remove the potential impact of an investor type having a trade origination bias by deducting the mean buy ratio (entire sample period) from the original ratio[2]. We label this ratio for foreign investors as FRT. We do not analyze the buy ratio of domestic investors separately because the results are the opposite of the foreign investor results. This is because in aggregate the number of buy transactions must equal the number of sell transactions. When viewed together the buy ratios of domestic and foreign investors measure trading imbalances between the two investor classes[3]. These imbalances reflect differences in the outlooks for the prospects of the stocks involved such that a decrease (increase) in a buy ratio means that the corresponding investor group has become more pessimistic (optimistic). Table I provides descriptive statistics of cumulative unexpected returns and foreign investors' buy ratios during the post-announcement period.

For the 20 firms in our sample, we obtain from the HEX their stock returns and the dates of their earnings announcements and unscheduled announcements. Using the information distributed by the Helsinki Exchanges Trading and Information (HETI) system, we identify 467 earnings announcements (an average of 3.2 announcements per firm per year) and 1,189 unscheduled non-overlapping announcements. As mentioned before, the unscheduled announcements consist of various type of news, for example, profit warnings, mergers and acquisitions, joint ventures, large orders,

Table I.
Descriptive statistics of key variables during the post-announcement period

	Number of observations	Mean	Median	SD	Minimum	Maximum
Panel A: Earnings announcements						
Cumulative unexpected return, RET_i						
Positive and negative surprises	467	−0.0010	0.0029	0.1140	−0.4797	0.3686
Positive surprises	236	0.0090	0.0166	0.1194	−0.4797	0.3686
Negative surprises	231	−0.0113	−0.0080	0.1074	−0.4392	0.2771
Foreign investors' buy ratio, FRT_{ij}						
Positive and negative surprises	467	−0.0102	−0.0095	0.1561	−0.4503	0.4469
Positive surprises	236	0.0098	0.0154	0.1530	−0.4503	0.3702
Negative surprises	231	−0.0311	−0.0356	0.1568	−0.3926	0.4469
Panel B: Unscheduled announcements						
Cumulative unexpected return, RET_i						
Positive and negative surprises	1,189	−0.0072	−0.0036	0.0849	−0.5002	0.4146
Positive surprises	597	−0.0049	−0.0033	0.0781	−0.4310	0.4146
Negative surprises	592	−0.0096	−0.0043	0.0912	−0.5002	0.2672
Foreign investors' buy ratio, FRT_{ij}						
Positive and negative surprises	1,189	−0.0146	−0.0115	0.1991	−0.5011	0.4989
Positive surprises	597	0.0050	0.0071	0.1974	−0.4578	0.4987
Negative surprises	592	−0.0344	−0.0325	0.1991	−0.5011	0.4913

Notes: RET_i is the 29-day cumulative unexpected return of stock *i* and event *j* associated with the day +2 to day +30 in a case of earnings announcements and the 19-day cumulative unexpected return associated with the day +2 to day +20 in the case of unscheduled announcements. FRT_{ij} is the foreign investors' buy ratio of stock *i* at the event *j* during the post-announcement period. Positive (negative) surprises are those with a positive (negative) SURP. SURP is the announcement surprise of stock *i* and event *j* measured using the three-day cumulative abnormal return associated with the day −1 to day +1

investments, changes in management and changes in credit ratings. The rules of the HEX mandate that the firms must release all their announcements first through this information channel. If the release of important information concerning a firm is postponed for any reason, the trading of its stock is halted until the information is released through the HETI system. This regulation helps to ensure that firm news is equitably distributed to all parties.

We define stock returns to be the first difference of logarithmic daily prices adjusted for stock splits, secondary issues and dividends. For earnings news, we use a 29-day event window after the announcement (day +2 to day +30). This allows us to avoid overlapping periods since the reports are released regularly every three or four months. Unscheduled announcements, however, arrive randomly and, on average, more often. Thus, to reduce the probability of overlapping observations, we use a shorter event window, i.e. 19 days after the announcement day (day +2 to day +20)[4]. Overlapping events are removed from the sample.

To measure the impact of report release, we use the realized cumulative unexpected return for the three-day window (day −1 to day +1) around the earnings announcement (day 0)[5]. The daily unexpected return is the return of an individual stock less the return on the value-weighted HEX portfolio index, which is constructed and provided by the HEX[6]. The three-day unexpected return, which we label SURP, is our measure for the surprise (unexpected) impact of the announcement. The impact is regarded as positive (negative) if the three-day abnormal return is positive (negative). There are 236 (597) positive earnings (unscheduled) announcements and 231 (592) negative ones. The mean positive SURP is 0.056 (0.033) and the corresponding value for the negative SURP is −0.050 (−0.037) in a case of earnings (unscheduled) announcements. These averages are statistically significant and support the view that the both type of announcements contain value-relevant information.

In a case of earnings announcements, the difference between the reported and expected earnings is sometimes used to measure the announcement surprise. This approach, however, is not without problems because the reported earnings (and by extension expected earnings) may not accurately portray the firm's financial condition. For example, the financial reports on which earnings announcements are based often contain a plethora of value-relevant information in addition to current and past earnings numbers[7]. This information most likely will affect expected earnings. Moreover, a firm may intentionally "manage" earnings by using write-offs, accruals and off-balance sheet accounts as well as potentially unrealistic assumptions that are acceptable under GAAP. If this is the case sophisticated investors will restate the earnings before making investment decisions. Thus, the only way to determine whether "news" is good or bad is to let the market "speak for itself"[8]. As a result, we use the unexpected return approach, which enables us to use the same announcement surprise variable for both earnings and unscheduled announcements.

4. Method of analysis and empirical results

4.1 Documenting the drift

We begin our analysis by showing that a post-announcement drift exists. We accomplish this task by regressing the post-announcement period cumulative unexpected returns on our announcement surprise measure. Because the price adjustment process can be different for negative and positive news, we estimate the

regression separately for negative and positive announcement events[9]. In particular, we model the relationship as:

$$\mathrm{RET}_{ij} = \alpha + \beta \mathrm{SURP}_{ij} + \varepsilon_{ij}, \quad (2)$$

where RET_{ij} is the 29-day cumulative unexpected return of stock i and event j associated with day +2 to day +30 in a case of earnings announcements and 19-day cumulative unexpected return of stock i and event j associated with day +2 to day +20 for unscheduled announcements. SURP_{ij} is the announcement surprise of stock i and event j measured using the three-day cumulative abnormal return of stock i and event j associated with day −1 to day +1.

Equation (2)'s estimation results are reported in Table II. The results in Panel A for the earnings announcements show that these surprises are positively related to the post-announcement unexpected return. However, when positive and negative announcements are separated, the drift is observed only in a case of negative surprises. The results are virtually the same for the unscheduled announcements shown in Panel B. Thus, these results not only indicate that this post-announcement phenomenon is common to a wide variety of announcement types, but also indicate that investors as a group tend to under-react to announcements, but only if the news is negative. The latter finding means that positive news is incorporated into stock prices more quickly than negative news. Our subsequent analyses focus on the under-reaction associated with negative news[10].

4.2 Investor trading behavior as a result of news announcement

We next investigate whether negative news announcements causing the post-announcement drift also affect investors' trading behavior during the post-announcement period. In particular, we estimate the following regression model for negative earnings and unscheduled announcements:

Positive and negative surprises			Positive surprises			Negative surprises		
Intercept	SURP	R^2	Intercept	SURP	R^2	Intercept	SURP	R^2
Panel A: Earnings announcements[a]								
−0.005	0.145	0.010	0.004	0.032	0.000	0.005	0.329	0.028
(0.376)	(0.020)		(0.695)	(0.763)		(0.638)	(0.011)	
Panel B: Unscheduled announcements [b]								
−0.007	0.098	0.003	−0.002	−0.081	0.001	−0.001	0.246	0.013
(0.004)	(0.040)		(0.644)	(0.413)		(0.919)	(0.006)	

Notes: The model is $\mathrm{RET}_{ij} = \alpha + \beta \mathrm{SURP}_{ij} + \varepsilon_{ij}$, where RET_i is the 29-day cumulative unexpected return of stock i and event j associated with the day +2 to day +30 in a case of earnings announcements and the 19-day cumulative unexpected return associated with the day +2 to day +20 in the case of unscheduled announcements, SURP is the announcement surprise of stock i and event j measured using the three-day cumulative abnormal return associated with the day −1 to day +1. Positive (negative) surprises are those with a positive (negative) SURP. [a]Number of observations: positive surprises = 236, negative surprises 231. [b]Number of observations: positive surprises = 597, negative surprises 592

Table II.
Documenting the post-announcement drift

$$FRT_{ij} = \alpha + \beta_1 SURP_{ij} + \beta_2 CROSS_{ij} + \beta_3 MOM_{ij} + \beta_4 SIZE_{ij} + \beta_5 PB_{ij} + \varepsilon_{ij}, \quad (3)$$

where FRT_{ij} is foreign investors' buy ratio of stock i at the event j during the post-announcement period, and $SURP_{ij}$ continues to be the announcement surprise of stock i and event j.

Equation (3) also contains four control variables[11]. The cross-listing dummy variable, $CROSS_{ij}$, is a dummy variable having a value of 1 if the firm's stock is listed on the New York Stock Exchange (NYSE) and 9 otherwise. We include this variable because the results by Bailey *et al.* (2006) indicate that the cross-listing affects the disclosure environment and, consequently, the return reactions to news announcements. Because Grinblatt and Keloharju (2000) report that foreign investors in Finland employ a momentum strategy, we control for this phenomenon by adding a momentum variable, MOM_{ij}. We define this variable to be the pre-announcement period abnormal returns[12]. Moreover, we control for possible size and price-to-book effects by using $SIZE_{ij}$ and PB_{ij}, respectively, because Fama and French (1992), among others, show that these variables explain stock returns and may, therefore, affect the trading behavior of investors[13]. $SIZE_{ij}$ is a dummy variable having a value of 1 if stock belongs to the upper 50 percent of the largest firms at the beginning of the year and 0 otherwise, and PB_{ij} is a dummy variable having a value of 1 if the stock belongs to the upper 50 percent of the highest price-to-book ratio firms at the beginning of the year and 0 otherwise. We estimate equation (3) with and without the control variables. In the latter case the control variables are included individually and as a group.

Table III reports the results of estimating equation (3). The results in Panel A clearly support the view that foreign investors sell stocks with a negative earnings announcement surprise during the post-announcement period as the coefficient of SURP is significantly positive in all model specifications. Of course, this also means that Finnish investors buy stocks with negative earnings announcements. Regarding the unscheduled announcements, the results in Panel B of Table III show that the investors trade virtually in the same manner as they do for earnings announcements, indicating that different types of value-relevant announcements result in a similar trading patterns. All these results do not change after including the control variables in the model[14].

4.3 Post-announcement drift explained by investor behavior

The results reported in the previous subsection indicate that foreign investors sell and Finnish investors buy shares after receiving negative news. Therefore, it is likely that the post-announcement drift reported in Table II is caused by the differences in investors' information processing abilities as reflected in their trading behavior. In particular, foreign investors seem to process the information content of announcement faster than Finnish investors do. To investigate this observation directly we regress the post-announcement period, unexpected returns on the foreign investors' buy ratio and the aforementioned control variables:

$$RET_{ij} = \alpha + \beta_1 FRT_{ij} + \beta_2 CROSS_{ij} + \beta_3 MOM_{ij} + \beta_4 SIZE_{ij} + \beta_5 PB_{ij} + \varepsilon_{ij}, \quad (4)$$

where all the variables are as defined previously. We handle the inclusion of the control variables in the same way as we do for equation (3).

Intercept	SURP	CROSS	MOM	SIZE	P/B	R^2
Panel A: Earnings announcements [a]						
0.008	0.733					0.071
(0.561)	(0.000)					
0.002	0.724	0.026				0.076
(0.880)	(0.000)	(0.279)				
0.007	0.691		0.101			0.079
(0.594)	(0.001)		(0.168)			
−0.018	0.652			0.047		0.093
(0.303)	(0.000)			(0.022)		
−0.003	0.773				0.026	0.078
(0.853)	(0.000)				(0.197)	
−0.025	0.660	0.008	0.081	0.039	0.020	0.103
(0.194)	(0.000)	(0.770)	(0.267)	(0.076)	(0.317)	
Panel B: Unscheduled announcements [b]						
−0.005	0.809					0.029
(0.679)	(0.000)					
−0.006	0.809	0.006				0.029
(0.610)	(0.000)	(0.748)				
−0.006	0.787		0.200			0.033
(0.603)	(0.000)		(0.107)			
−0.023	0.804			0.038		0.038
(0.079)	(0.000)			(0.018)		
−0.013	0.838				0.022	0.032
(0.270)	(0.000)				(0.176)	
−0.029	0.801	−0.011	0.309	0.040	0.014	0.045
(0.053)	(0.000)	(0.590)	(0.122)	(0.029)	(0.394)	

Notes: The model is $FRT_{ij} = \alpha + \beta_1 SURP_{ij} + \beta_2 CROSS_{ij} + \beta_3 MOM_{ij} + \beta_4 SIZE_{ij} + \beta_5 PB_{ij} + \varepsilon_{ij}$, where FRT_{ij} is foreign investors' buy ratio of stock i at the event j during the post-announcement period, $SURP_{ij}$ is the announcement surprise of stock i and event j measured using the three-day cumulative unexpected return associated with the day −1 to day +1, $CROSS_{ij}$ is a dummy variable having a value one if the firm's stock is listed on the NYSE, zero otherwise, MOM_{ij} is a momentum measure, i.e. the stock return during the pre-announcement period, $SIZE_{ij}$ is a dummy variable having a value of 1 if the stock belongs to the upper 50 percent of the largest firms at the beginning of the year and 0 otherwise, and PB_{ij} is a dummy variable having a value of 1 if the stock belongs to the upper 50 percent of the highest price-to-book ratio firms at the beginning of the year and 0 otherwise. For earnings announcements the post-announcement period is day +2 to day +30, and for unscheduled announcements it is from day +2 to day +20. *p*-values of the *t*-tests are shown in parentheses, with 0.000 denoting a *p*-value of less than 0.0005. [a]Number of observations = 231; [b]number of observations = 592

Table III.
Relationship between trading behavior and announcement surprise during the post-announcement period: negative surprises

We report the results of estimating equation (4) in Table IV. The coefficient of FRT is significantly positive, indicating that the foreign investor buy ratio explains the post-announcement unexpected returns. The same result is obtained both for the earnings and unscheduled announcements. These findings confirm our expectation that the post-announcement drift is caused by differences in the information processing abilities between the different types of investors. To confirm that earnings surprise itself is not behind the result, we added SURP to equation (4). The results remain qualitatively unchanged, the coefficient of SURP not being statistically significant. We

Intercept	FRT	CROSS	MOM	SIZE	P/B	R^2
Panel A: Earnings announcements [a]						
−0.005	0.181					0.069
(0.418)	(0.000)					
−0.004	0.183	−0.010				0.071
(0.639)	(0.000)	(0.567)				
−0.005	0.172		0.073			0.078
(0.492)	(0.000)		(0.144)			
−0.015	0.169			0.018		0.077
(0.131)	(0.001)			(0.183)		
−0.009	0.180				0.006	0.071
(0.364)	(0.000)				(0.635)	
−0.014	0.163	−0.021	0.067	0.023	0.004	0.091
(0.252)	(0.000)	(0.249)	(0.181)	(0.131)	(0.797)	
Panel B: Unscheduled announcements [b]						
−0.005	0.129					0.081
(0.157)	(0.000)					
−0.007	0.130	0.006				0.081
(0.116)	(0.000)	(0.482)				
−0.005	0.129		0.052			0.081
(0.156)	(0.000)		(0.558)			
−0.008	0.129			0.005		0.081
(0.141)	(0.000)			(0.501)		
−0.009	0.129				0.008	0.083
(0.071	(0.000)				(0.257)	
−0.012	0.128	0.006	0.052	0.001	0.008	0.084
(0.056)	(0.000)	(0.492)	(0.558)	(0.881)	(0.253)	

Notes: The model is $RET_{ij} = \alpha + \beta_1 FRT_{ij} + \beta_2 CROSS_{ij} + \beta_3 MOM_{ij} + \beta_4 SIZE_{ij} + \beta_5 PB_{ij} + \varepsilon_{ij}$, where RET_{ij} is the 29-day cumulative unexpected return of stock i and event j associated with day +2 to day +30 in the case of earnings announcements and the 19-day cumulative unexpected returns associated with day +2 to day +20 in the case of unscheduled announcements. FRT_{ij} is foreign investors' buy ratio of stock i at event j during the post-announcement period. $CROSS_{ij}$ is a dummy variable having a value of 1 if the firm's stock is listed on the NYSE and 0 otherwise. MOM_{ij} is a momentum measure, i.e. the stock return during the pre-announcement period. $SIZE_{ij}$ is a dummy variable having a value of 1 if the stock belongs to the upper 50 percent of the largest firms at the beginning of the year and 0 otherwise. PB_{ij} is a dummy variable having a value of 1 if the stock belongs to the upper 50 percent of the highest price-to-book ratio firms at the beginning of the year and 0 otherwise. *p*-values of the *t*-tests are shown in parentheses, with 0.000 denoting a *p*-value of less than 0.0005. [a]Number of observations = 231; [b]number of observations = 592

Table IV. Post-announcement returns explained by investor trading behavior: negative surprises

also addressed the possibility that there is a cross-sectional dependence in the dependent variable by including in the models the firm-specific fixed effects. This has no effect on our results.

As a final check, we regress the residuals from equation (4), i.e. the post-announcement period returns that are not explained by investor trading behavior, on SURP. Our purpose is to determine whether the post-announcement drift disappears after the investors' trading behavior is controlled. The regression results (not reported) show that the estimated coefficients for SURP are not statistically

significant at any conventional level (the p-values are 0.182 and 0.098 for earnings and unscheduled announcements, respectively.) This lack of significance confirms that post-announcement drift does indeed disappear.

5. Concluding remarks

We extend the current financial accounting literature on post-earnings-announcement drift in two ways. First, we investigate whether the drift also occurs for unscheduled firm news announcements that have the potential to impact future earnings. Examples of these latter value-relevant events include announcements relating to mergers, management changes, profit warnings and the like. Second, we explore whether the trading behaviors of foreign or domestic investors are likely cause the drift. We argue that this may be the case because of differences in information processing abilities among foreign and domestic traders. Our empirical results support this hypothesis[15].

We document that the post-announcement drift exists for both types of announcements, but only if the news is negative. This finding is in line with the notion that the price adjustment process may be different for negative and positive news announcements not only because of firm characteristics such as financial leverage and liabilities with embedded options such as convertible debt, but also because of meaningful short-sale costs.

In addition, we observe a trading pattern in which the more sophisticated investors, in our case foreign institutional investors, are the first to understand the information content of news announcements. Consequently, they sell stocks with negative news. In contrast, domestic investors trade in the opposite fashion. These trading behaviors support the empirical studies that suggest that foreign investors are better information processors than domestic investors. They also suggest that foreign investors react quickly to negative events while domestic investors delay in doing so, perhaps being unwilling to act until they discuss the news with their friends and neighbors[16]. In sum, our results imply that the post-earnings announcement drift is a special case of a more general post-disclosure phenomenon and that investor differences (most likely information processing skills) is one likely explanation for its pervasiveness.

Notes

1. Trading volume (order flow) is an ongoing aggregate measure of the market participants' interpretation of the news announcement.
2. An alternative measure could be constructed by replacing the numerator of equation (1) with the difference between the buy and sell volume. This metric is equivalent to twice the value of our measure if our adjustment factor instead is 0.50, i.e. an equal number of buys and sells. Our subsequently reported results, however, are qualitatively the same as those using this alternate measure.
3. This ratio is similar to but not the same as an order imbalance (or price pressure) measure. As pointed out by Chordia *et al.* (2002, 2005), among others, the latter metric requires that the transaction be classified as buyer- or seller-initiated. This information is not provided in our end-of-day dataset nor is sufficient information available given to allow us to use some sort an numeric algorithm to identify the initiator. For a discussion of the competing algorithm data requirements and accuracies, see Finucane (2000).

4. We also use the 19-day window (day +2 to day +20) for earnings announcements. These results are not qualitatively different from those based on 29-day event window and are not reported.
5. Examples using this approach include Pownall *et al.* (1993), Frankel *et al.* (1999), and Noe (1999). Daniel *et al.* (1998) use this earnings measure to define the under-reaction of stock prices to public news events.
6. In the value-weighted HEX portfolio index, a maximum weight of a given stock is 10 percent. Therefore, individuals stocks should not dominate our measure of unexpected returns, even though the sample firms are components of the index return. Nevertheless, such a bias works against finding significant results in regressions.
7. For example, Pownall *et al.* (1993) find that financial reports contain management forecasts of future profitability of the firm that are value-relevant to investors. Moreover, accounting standards, such as International Financial Reporting Standards, require firms to disclose additional information such as cash flow figures, business segment information and important events that occurred after the fiscal year-end. These reports are typically 20-30 pages, supporting our view that it takes time for investors and analysts to analyze the reports. For an example of one of these reports, see the following Nokia website: http://press.nokia.com/pressreleases.html
8. The correlation coefficient between SURP and the earnings surprise proxy measured as change in earnings from year $t-1$ to year t scaled by the market value of the firm in the end of year t is -0.015 ($p-$value $= 0.735$), suggesting that these two variables measure different aspects of the information released in earnings announcements. This lack of correlation is not surprising because the Finnish stock market is dominated by high-technology firms for which the future growth prospects of a firm is a typically a more important value driver than its past earnings, especially during the late 1990s.
9. Using a theoretical model, Fischer and Verrecchia (1997) point out that differential responses to positive and negative news occur when the traditional assumption that stockholders have unlimited liability (i.e. that stockholders are the sole responders to negative news) is removed. The alternate assumption, limited liability, explicitly recognizes that firms have other financial stakeholders besides their stockholders and these stakeholders' actions also influence the returns-news relationship. This non-linear response to news is documented by Freeman and Tse (1992), Das and Lev (1994) and Hayn (1995), among others.
10. Nagel (2005) points out that the under-reaction to announcements by investors may be the result of short -sale constraints. However, the short-selling costs faced by investors trading on the HEX are most likely low because the exchange offers a readily available mechanism to provide funds for short trading. In addition, our data include only the most actively traded stocks, thereby reducing the possibility that there are not enough stocks for short-trading purposes.
11. If the control variables are incorporated as interaction terms with $SURP_{ij}$ the results are materially the same.
12. Following our definitions for the post-announcement windows, we use a 29-day pre-announcement window (day -30 to day -2) in the case of earnings announcements and a 19-day pre-announcement window (day -20 to day -2) in the case of unscheduled announcements.
13. Since the dependent variable in equation (3) is a buy ratio rather than a stock return, we do not use the actual Fama-French three-factor model of abnormal returns.

14. We also replaced FRT by domestic investors' buy ratio and re-estimated equation (3). As expected, the coefficient of SURP is negative for both types of announcements, but it is not statistically significant for unscheduled announcements.
15. In our analyses the domestic investor category includes both households and institutions. Institutional investors, who typically execute large trades, are often considered to be informed, although it has been argued that many of their trades may be motivated by liquidity. Nevertheless, considering these groups separately does not change our conclusions because the empirical results for both groups are materially the same.
16. Several empirical studies show that people to live and work in the same location tend to make similar financial decisions. See, for example, Grinblatt and Keloharju (2001), Ivković and Weisbenner (2005, 2007) and Hong *et al.* (2005).

References

Bacmann, J.-F. and Bolliger, G. (2003), "Who are the best? Local versus foreign analysts on the Latin American stock markets", FAME Working Paper No. 75, International Center for Financial Management and Engineering, Geneva.

Bailey, W., Karolyi, G.A. and Salva, C. (2006), "The economic consequences of increased disclosure: evidence from international cross-listings", *Journal of Financial Economics*, Vol. 81, pp. 175-213.

Bailey, W., Mao, C.X. and Sirodom, K. (2007), "Investment restrictions and the cross-border flow of information: some empirical evidence", *Journal of International Money and Finance*, Vol. 26, pp. 1-25.

Ball, R. (1992), "The earnings-price anomaly", *Journal of Accounting and Economics*, Vol. 15, pp. 319-45.

Ball, R. and Brown, P. (1968), "An empirical evaluation of accounting income numbers", *Journal of Accounting Research*, Vol. 6, pp. 159-78.

Bartov, E., Radhakrishnan, S. and Krinsky, I. (2000), "Investor sophistication and patterns in stock returns after earnings announcements", *Accounting Review*, Vol. 75, pp. 43-63.

Bernard, V.L. and Thomas, J.K. (1990), "Evidence that stock prices do not fully reflect the implications of current earnings for future earnings", *Journal of Accounting and Economics*, Vol. 13, pp. 305-40.

Bernard, V.L., Thomas, J.K. and Wahlen, J.M. (1997), "Accounting-based stock price anomalies: separating market inefficiencies from risk", *Contemporary Accounting Research*, Vol. 14, pp. 89-136.

Brav, A. and Heaton, J.B. (2002), "Competing theories of financial anomalies", *Review of Financial Studies*, Vol. 15, pp. 575-606.

Chan, L.K.C., Jegadeesh, N. and Lakonishok, J. (1996), "Momentum strategies", *Journal of Finance*, Vol. 51, pp. 1681-713.

Chewning, E.G. Jr, Coller, M. and Tuttle, B. (2004), "Do market prices reveal the decision models of sophisticated investors? Evidence from the laboratory", *Accounting Organizations and Society*, Vol. 29, pp. 739-58.

Choe, H., Kho, B.-C. and Stultz, R.M. (2005), "Do domestic investors have an edge? The trading experience of foreign investors in Korea", *Review of Financial Studies*, Vol. 18, pp. 743-93.

Chordia, T., Roll, R. and Subrahmanyam, A. (2002), "Order imbalance, liquidity, and market returns", *Journal of Financial Economics*, Vol. 65, pp. 111-30.

Chordia, T., Roll, R. and Subrahmanyam, A. (2005), "Evidence on the speed of convergence to market efficiency", *Journal of Financial Economics*, Vol. 76, pp. 271-92.

Cohen, R.B., Gompers, P.A. and Vuolteenaho, T. (2002), "Who underreacts to cash-flow news? Evidence from trading between individuals and institutions", *Journal of Financial Economics*, Vol. 66, pp. 409-62.

Dahlquist, M. and Robertsson, G. (2001), "Direct foreign ownership, institutional investors, and firm characteristics", *Journal of Financial Economics*, Vol. 59, pp. 413-40.

Dahlquist, M. and Robertsson, G. (2004), "A note on foreigners' trading and price effects across firms", *Journal of Banking and Finance*, Vol. 28, pp. 615-32.

Daniel, K., Hirshleifer, D. and Subrahmanyan, A. (1998), "Investor psychology and security market under- and overreactions", *Journal of Finance*, Vol. 53, pp. 1839-85.

Das, S. and Lev, B. (1994), "Non-linearity in the returns-earnings relation: tests of alternative specifications and explanations", *Contemporary Accounting Research*, Vol. 11, pp. 353-79.

Desai, H. and Jain, P. (1997), "Long-run common stock returns following stock splits and reverse splits dividends", *Journal of Business*, Vol. 70, pp. 409-34.

Dvorák, T. (2005), "Do domestic investors have an information advantage? Evidence from Indonesia", *Journal of Finance*, Vol. 60, pp. 817-39.

Ekholm, A. (2006), "How do different types of investors react to new earnings information?", *Journal of Business Finance & Accounting*, Vol. 33, pp. 127-44.

Fama, E.F. (1998), "Market efficiency, long-term returns, and behavioral finance", *Journal of Financial Economics*, Vol. 49, pp. 283-306.

Fama, E.F. and French, K.R. (1992), "The cross-section of expected stock returns", *Journal of Finance*, Vol. 47, pp. 427-65.

Finucane, T.J. (2000), "A direct test of methods for inferring trade direction from inter-day data", *Journal of Financial and Quantitative Analysis*, Vol. 35, pp. 553-76.

Fischer, P.E. and Verrecchia, R.E. (1997), "The effect of limited liability on the market response to disclosure", *Contemporary Accounting Research*, Vol. 14, pp. 515-41.

Francis, J., LaFond, R., Olsson, P. and Schipper, K. (2007), "Information uncertainty and post-earnings-announcement-drift", *Journal of Business Finance & Accounting*, Vol. 34, pp. 403-33.

Frankel, R., Johnson, M. and Skinner, D.J. (1999), "An empirical examination of conference calls as a voluntary disclosure medium", *Journal of Accounting Research*, Vol. 37, pp. 133-50.

Freeman, R. and Tse, S. (1992), "A nonlinear model of security response to accounting earnings", *Journal of Accounting Research*, Vol. 30, pp. 185-209.

Grinblatt, M. and Keloharju, M. (2000), "The investment behavior and performance of various investor types: a study of Finland's unique data set", *Journal of Financial Economics*, Vol. 55, pp. 43-67.

Grinblatt, M. and Keloharju, M. (2001), "How distance, language and culture influence stockholdings and trades", *Journal of Finance*, Vol. 56, pp. 1053-73.

Hayn, C. (1995), "The information content of losses", *Journal of Accounting and Economics*, Vol. 20, pp. 125-53.

Heiner, R.A. (1983), "The origin of predictable behavior", *American Economic Review*, Vol. 73 No. 4, pp. 560-95.

Hirshleifer, D., Myers, J.N., Myers, L.A. and Teoh, S.H. (2008), "Do individual investors drive post-earnings announcement drift? Direct evidence from personal trades", *Accounting Review*, Vol. 3 No. 6, pp. 1521-50.

Hong, H. and Stein, J.C. (1999), "A unified theory of underreaction, momentum trading, and overreaction in asset markets", *Journal of Finance*, Vol. 54, pp. 2143-84.

Hong, H., Kubik, J.D. and Stein, J.C. (2005), "Thy neighbor's portfolio: word-of-mouth effects in the holdings and trades of money managers", *Journal of Finance*, Vol. 60, pp. 2801-24.

Huang, R.D. and Shiu, C.-Y. (2009), "Local effects of foreign ownership in an emerging financial market: evidence from qualified foreign institutional investors in Taiwan", *Financial Management*, Vol. 38, pp. 567-602.

Ikenberry, D., Lakonishok, J. and Vermaelen, T. (1995), "Market underreaction to open market share repurchases", *Journal of Financial Economics*, Vol. 39, pp. 181-208.

Ivković, Z. and Weisbenner, S. (2005), "Local is as local does: information content of the geography of individual investors' common stock investments", *Journal of Finance*, Vol. 60, pp. 267-306.

Ivkovic, Z. and Weisbenner, S. (2007), "Information diffusion effects in individual investors' common stock purchases: covet thy neighbors' investment choices", *Review of Financial Studies*, Vol. 20, pp. 1327-57.

Jacob, J., Lys, T. and Sabino, J. (2000), "Autocorrelation structure of forecast errors from time-series models: alternative assessments of the causes of post-earnings announcement drift", *Journal of Accounting and Economics*, Vol. 28, pp. 329-58.

Jones, C.P. and Litzenberger, R.H. (1970), "Quarterly earnings reports and intermediate stock price trends", *Journal of Finance*, Vol. 25, pp. 143-8.

Kadiyala, P. and Rau, P.R. (2004), "Investor reaction to corporate event announcements: underreaction or overreaction?", *Journal of Business*, Vol. 77, pp. 357-86.

Kaen, F.R. and Rosenman, R.E. (1986), "Predictable behavior in financial markets: some evidence in support of Heiner's hypothesis", *American Economic Review*, Vol. 76, pp. 212-20.

Kang, J.-K. and Stulz, R. (1997), "Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan", *Journal of Financial Economics*, Vol. 46, pp. 3-28.

Ke, B. and Ramalingegowda, S. (2005), "Do institutional investors exploit the post-earnings announcement drift?", *Journal of Accounting and Economics*, Vol. 39, pp. 25-53.

Lee, C.M.C. (1992), "Earnings news and small traders", *Journal of Accounting and Economics*, Vol. 15, pp. 265-302.

Lee, Y.-T., Liu, Y.-J., Roll, R. and Subrahmanyam, A. (2004), "Order imbalances and market efficiency: evidence from the Taiwan Stock Exchange", *Journal of Financial and Quantitative Analysis*, Vol. 39, pp. 327-41.

Mendenhall, R.R. (2005), "Arbitrage risk and post-earnings-announcement drift", *Journal of Business*, Vol. 77, pp. 875-94.

Nagel, S. (2005), "Short sales, institutional investors and the cross-section of stock returns", *Journal of Financial Economics*, Vol. 78, pp. 277-309.

Noe, C.F. (1999), "Voluntary disclosures and insider transaction", *Journal of Accounting and Economics*, Vol. 27, pp. 305-26.

Pownall, G., Wasley, C. and Waymire, G. (1993), "The stock price effects of alternative types of management earnings forecasts", *Accounting Review*, Vol. 68, pp. 896-912.

Verrecchia, R.E. (2001), "Essays on disclosure", *Journal of Accounting and Economics*, Vol. 32, pp. 97-180.

Vieru, M., Perttunen, J. and Schadewitz, H. (2006), "How investors trade around interim earnings announcements", *Journal of Business Finance & Accounting*, Vol. 33, pp. 145-79.

Vuolteenaho, T. (2002), "What drives firm-level stock returns?", *Journal of Finance*, Vol. 57, pp. 233-64.

Womack, K.L. (1996), "Do brokerage analysts' recommendations have investment value?", *Journal of Finance*, Vol. 51, pp. 137-68.

Zhang, X.F. (2006), "Information uncertainty and stock returns", *Journal of Finance*, Vol. 61, pp. 105-37.

Corresponding author
G. Geoffrey Booth can be contacted at: boothg@msu.edu