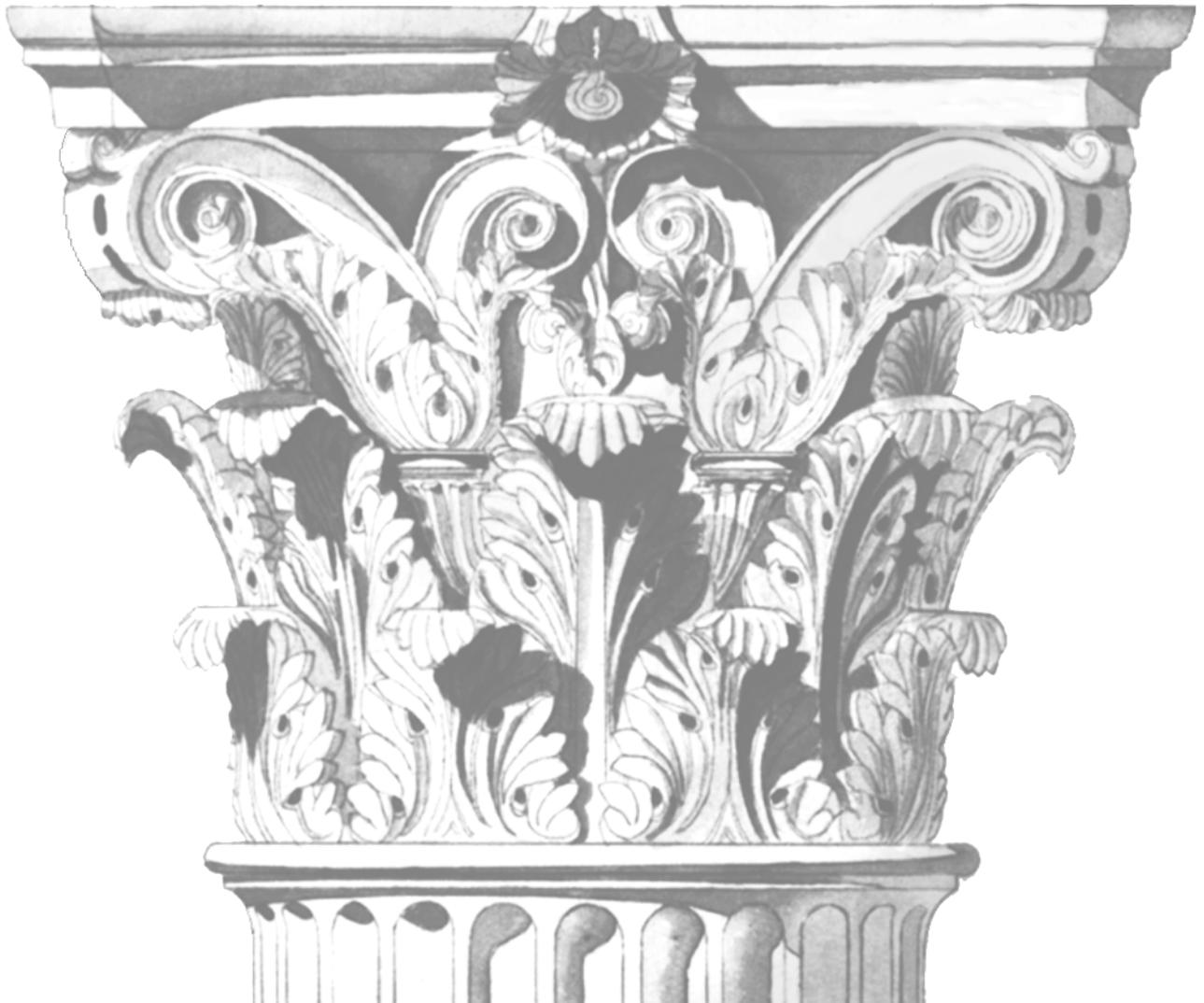


**ESSAYS ON INVESTORS'
TRADING POLICY AROUND
INTERIM EARNINGS
ANNOUNCEMENTS IN A
THINLY TRADED SECURITIES
MARKET**

**MARKKU
VIERU**

Faculty of Economics and Industrial
Management

OULU 2000



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Academic Dissertation to be presented with the assent of the Faculty of Economics and Industrial Management, University of Oulu, for public discussion in Auditorium YB210, Linnanmaa, on August 11th, 2000, at 12 noon.

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To my wife, Elina

Vieru, Markku, Essays on investors' trading policy around interim earnings announcements in a thinly traded securities market

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2000

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Abstract

This study consists introductory survey and three essays where investors' trading responses to interim earnings announcements are studied using Finnish data. The essays are individual papers, but their topics are closely connected since they address the trading response from different angles. The essays progress from an aggregated to a more detailed examination. The first essay was conducted on daily data, whereas the second and third consist of intraday trading data. In all three essays information asymmetry is assumed to affect trading behavior around interim earnings announcements.

The first article contains empirical findings regarding the effect of interim earnings announcements on investors' trading policy using Finnish data. The aim of the paper is to investigate empirically the role of pre-disclosure information asymmetry and the information content in explaining volume responses to interim earnings announcements. Evidence is provided that the trading volume response is positively associated with the information content and to some extent with the level of pre-disclosure information asymmetry. The results are in line with the theoretical trading volume proposition. However, the significance levels are lower than in similar US studies and the association between positive and negative news is slightly asymmetric.

The second article finds evidence from the Helsinki Stock Exchange that the widely documented U-shape pattern in trading activity - namely heavy trading in the beginning and at the end of the trading day and relatively light trading in the middle of the day - is affected by an anticipated information event (i.e. interim earnings announcement). Before the announcement day, trading is more concentrated at the close. This is consistent with investors' heterogeneous willingness to bear expected overnight risk, which is especially prevalent before an announcement. Moreover, a slight increase on the open is evident after the announcement day. Evidence is also provided that the change in intraday trading behavior is associated with announcement-related factors, such as the range of analysts' earnings forecasts, the magnitude of unexpected earnings and firm size. Furthermore, this association is evident to some extent during the transition between trading and non-trading regimes.

The third study examines whether the permanent price effects of individual trades are greater before or after an interim earnings announcement on the Helsinki Stock Exchange. If the permanent price effects are greater before the announcement this would suggest that investors believe that some traders are better informed before the interim earnings announcement than after. Using permanent price effects as a measure of price adjustment for private information, tests were performed to see whether price adjustments are greater in pre-announcement periods than in post-announcement periods. The results, based on interim earnings releases for the period 1993 to 1997 by HSE-listed firms, suggest that large trades do indeed produce greater permanent price effects before an announcement than after it. This suggests that large trades associated with price changes (especially uptick trades) before an announcement send a stronger signal to other investors than similar trades after the announcement. For small trades the results were insignificant.

Keywords: public disclosures, trading volume, information asymmetry, intraday trading

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Earlier working paper versions of the three empirical essays in this study have been commented by participants in the several conferences organised by European Accounting Association (EAA) and European Finance Association (EFA). They have also been published or submitted to be published in the academic journals. My work has benefitted a lot from comments and suggestions made by discussants and referees. Several other individuals also warrant a special mention for their discussions, advice, and comments: Dr. Hannu Schadewitz; Dr. Tapani Kovalainen; and Mr. Kabir Quazi, M.Sc.

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Oulu, June 15 2000

Markku Vieru

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PART A: OVERVIEW OF THE DISSERTATION

1 Introduction

A firm's communication to outside interest groups, especially to the capital markets, represents an essential part of financial accounting. Earnings announcements provide market participants with one public information source by which to evaluate performance of a firm. The response of actors in the marketplace to interim and annual accounting earnings announcements has interested both practitioners and academics for decades. The major issue has been the information value of these disclosures. Announcements are said to contain information if they alter investors' beliefs about the value of an asset (Beaver 1968:117). In the course of the years since then, researchers have become convinced that the releases are associated with both increased security price variability and increased trading volume. Ball and Brown (1968) were the first to report drift in stock returns after earnings announcements and Beaver (1968) reported increase in volume following announcements.

The volume of trade in financial markets has long appeared to be a puzzle. As Holthausen and Verrecchia (1990:192) noted, unlike price changes, researchers have been reluctant to draw strong inferences regarding the interpretation of volume reactions. However, at an intuitive level, there is a belief that abnormal volume around the release of an earnings announcement must have some significance. Beaver (1968) made a clear distinction between volume and returns, remarking (p. 68):

"The relationships posited above are consistent with the economist's notion that volume reflects a lack of consensus regarding the price. The lack of consensus is induced by a new piece of information, the earnings report. Since investors may differ in the way they interpret the report, some time may elapse before a consensus is reached, during which time increased volume would be observed. If consensus were reached on the first transaction, there would be a price reaction but no volume reaction... "

This can be interpreted as meaning that information that alters the consensus expectation affects prices and information that alters individuals' heterogeneous expectations affects volume. Thus, as noted by Karpoff (1986:1069), trading occurs when market participants assign different values to an asset.

The possibility that an announcement may be of differing usefulness to various groups was recognized long ago. For example, Hakansson (1977) demonstrated that when investor groups differ in their information acquisition abilities and/or resources, distinct patterns of information acquisition emerge. Investors with low information acquisition skills or resources (small investors) rely on public information, whereas investors with high information acquisition skills or resources (large investors) rely on pre-disclosure information in making their investment choices. Literally this means that the information content of announcements differs between investors. In addition, the assumption that investors are differently informed before an anticipated announcement and therefore respond differently to the announcement has been made frequently in theoretical studies (e.g., Kim and Verrecchia 1991a,b, and Demski and Feltham 1994).

Obviously, announcements contain differing amounts of information to heterogeneous agents. Agents' informedness, as discussed in Bhushan (1989) and Cready (1994), varies, e.g., due to differences in the availability of pre-disclosure information, the cost of information acquisition (Lev 1988), and differences between investors in interpretation and return expectations (Wilson 1975). In addition, the rationale of agents is unclear, as discussed in Shiller (1997). This implies that the process of information dissemination and interpretation in the securities markets is complex and not immediately discernible.

Lev (1988) argues that, compared to individuals, institutions are better informed because they tend to have lower marginal costs of information gathering. If the costs of information are relatively fixed while the returns from trading on that information increase, the returns realized by institutions will outperform the corresponding returns to individuals. Consequently, institutions spend substantial resources on producing information and thus maintain their well-informed status in the market (Potter 1992). Furthermore, an information-rich environment seems to attract institutions due to the lower costs of pre-disclosure information gathering. Since more information at a reasonable cost is available from large firms than from small firms, the result is a positive relationship between size and institutional share ownership (Cready 1994). Ilmanen and Keloharju (1997:12) reported the same phenomenon in Finland.

1.1 Finnish institutional setting

The disclosure of accounting earnings information is affected not only by the market mechanism but also by legislation. Although annual accounting legislation underwent a process of reform in the beginning of 1990s to make Finnish financial statements more comprehensible to foreigners, as described by Rätty (1992) and Kettunen (1993), the regulation of interim reporting is reported by Schadewitz (1997) to be fairly similar in Finland, the US and Sweden. In Finland and in Sweden, however, the reporting frequency is lower¹. The content of the interim reports during the research period was regulated by the recommendations concerning interim reports and the Securities Markets Act. The

¹ Recent legislative developments in Finland, however, are increasing reporting frequency toward quarterly interim reporting.

current legislation and regulation of interim reports in Finland conform with EU practice. Interim reports are required to be comparable with the firm's previous annual report. However, interim reports do not have to be audited and have no direct taxation implications. 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. This requirement obviously establishes anticipation in the run-up to an announcement event.

The present dissertation contains three essays where investors' trading responses to interim earnings announcements are studied using Finnish data. The essays are individual papers, but their topics are closely connected since they address the trading response from different angles. The essays progress from an aggregated to a more detailed examination. The first essay was conducted on daily data, whereas the second and third consist of intraday trading data. In all three essays information asymmetry is assumed to affect trading behavior around interim earnings announcements. This is assumed to affect investors' trading policy in several ways. Information asymmetry is proxied using analysts' interim earnings forecast data provided by Startel/Taloussanomati. Financial analysts' earnings forecasts have barely been studied in Finland. In fact, up to now it has been difficult to obtain data on variations in analysts' earnings forecasts or even analysts' mean earnings forecast for research purposes. This lack has been felt especially in trading volume studies, where pre-disclosure information asymmetry is commonly proxied by the dispersion and/or range of analysts' earnings forecasts². Also, market earnings forecasts are proxied in this study by the mean of analysts' earnings forecasts, a practice not typically used in studies employing Finnish data.

The reason for using Finnish data stems in part from the paucity of studies concerning behavior around anticipated earnings announcements using this data and in part from the different institutional setting in Finland compared for example to the US, on which a large amount of relevant literature is based. It will be interesting to see whether the results of earlier studies on the stock markets of more developed economies also carry through to the Finnish stock market. The institutional setting in Finland differs from the US in a number of ways. Despite the rapid development of the Finnish stock market as described by Vaihekoski (1997), it remained rather small and illiquid during the research period. For example, at the end of 1996 the number of companies listed on the official list was 71 and the number of separately quoted issues was 95. On the official list, share turnover relative to market capitalization in 1996 was 35.5 per cent³. Due to the success of Nokia Corporation a special feature of the list is the heavy concentration of trading. Nokia alone accounted for 37.3 per cent of share turnover and 28.0 per cent of total market capitalisation value in 1996 (Helsinki Stock Exchange (1996)). The role of institutional ownership is also larger in Finland than, for example, in the US or the UK.⁴

The trading environment and trading rules in Finland differ to some extent from the US. The Helsinki Stock Exchange trading system, HETI (Helsinki Stock Exchange

² The lack of analysts' earnings forecasts as proxies for investors beliefs is studied by Abarbanell, Lanen, and Verrecchia (1995).

³ The corresponding figures in 1996 for Nasdaq were 218 per cent and for the Stockholm Stock Exchange (A-list) 65 per cent.

⁴ The ownership structure and trading volume reaction to earnings announcements in US have been studied by. Utama and Cready (1997) and in Japan Chung and Lee (1998).

Automated Trading and Information System), is a distributed, fully-automated order-driven system. As suggested by Hedvall and Liljeblom (1994), the Finnish trading environment may contain several advantages compared to the US. The HSE has no designated market-making or price-smoothing requirements for specialists on the exchange, whereas these exist for example on the NYSE. These effects are discussed by Hasbrouck (1991), Miller (1989), and Holthausen, Leftwich, and Mayers (1987). In addition, the HSE's intraday filing classifies trades executed in different modes (pre-trading, round-lot trading, odd-lot trading, prearranged trading and after-market trading⁵). Since trades executed in different modes may differ in nature (for example, in their immediacy needs⁶), this provides possibilities for more detailed analysis.

⁵ For more details see e.g., Helsinki Stock Exchange, (1996), Regulations on the Automated Trading of Shares. Helsinki.

⁶ See e.g., Booth, Lin, Martikainen, and Tse (1998).

2 Financial reports as communicators to the capital markets

Financial reporting can be seen as the communication of financial information to decision-makers, especially to the agents operating in the capital markets. In efficient capital markets, as defined by Fama (1976), prices reflect all available information promptly and correctly, including the information comprised in financial reports. However, as both theoretical (e.g., Grossman (1976), Grossman and Stiglitz (1976, 1980), and Diamond and Verrecchia (1991)) and empirical (e.g., Ou and Penman (1989) studies have shown, prices do not fully adjust to all the information possessed the informed individuals. As demonstrated by Grossman and Stiglitz (1976, 1980), the theoretical solution is to inject into the system an uncertain (noisy) variable, information about which cannot be aggregated by the markets. With such a variable, individuals will still use their own information system in their decision-making and will be willing to pay for such information for their private use.

The crucial problem, as highlighted by Lev (1989:179), has been the silence of economic and financial models with regard to the impact of financial reporting practices, conventions, regulations, and legislation on earnings and consequently on market prices. If these affect the predictive ability (i.e., precision or quality) of reported earnings with respect to future securities' outcomes, then they will have an effect on the markets. Among others, Verrecchia (1980), Epstein and Turnbull (1980), and Holthausen and Verrecchia (1988) have considered the theoretical impact of uncertainty on the valuation of firms. These studies suggest that the greater fundamental uncertainty surrounding a firm's future cash flow the greater the stock price responses are to value-relevant information. Alternatively, earnings uncertainty may represent noise, defined as that portion of the signal with no information content in the process of generating earnings signals. The subjective nature of accrual accounting influences reported earnings (see e.g., Penno (1996)) without necessarily altering the firm's fundamental economic cash flows, either now or in the future. Hence, if earnings uncertainty is a manifestation of noise, greater uncertainty in earnings ought to result in smaller stock price responses. Thus, earnings uncertainty may have a different effect on the value of the firm, depending on whether it reflects fundamental uncertainty or noise or both.

This kind of reporting environment gives investors with better information acquisition abilities and/or resources trading incentives. Particularly around anticipated information events there tends to be an intensive flow of earnings-related information to the market (e.g., via pre-announcement communications by firms, actual earnings announcements of competitors, etc.). The following three sections highlight and provide some trading policy findings resulting from the reporting environment described briefly above. The studies dealing with the volume response to anticipated accounting earnings announcements as well as the background to and the main findings of the first essay are presented in Section 2.1. Research on the intraday trading pattern is reviewed in Section 2.2. This section also presents the findings of the second essay. In Section 2.3 studies examining the information content of a trade as well as the main findings of the third essay are presented.

2.1 Volume response to accounting disclosures

Since Beaver (1968), many researchers have used trading volume data to conduct empirical analyses of market reactions to accounting information announcements. In Beaver's framework, volume reflects a lack of consensus among market participants, capturing changes in portfolio positions that may not be manifested in price changes. While the revision of expectations is an important determinant of trading volume, other factors such as cash flow coordination, maintaining diversification, adjusting for changes in risk preferences or portfolio risk, or taxation may also drive trading activity (Foster (1986:378)). Numerous theoretical and empirical studies⁷ have examined heterogeneous investors' trading around anticipated public announcements in terms of these factors.

Varian (1985) shows, based on heterogeneous prior beliefs and homogeneous interpretation of new information, that trading volume has a positive association with the dispersion of prior beliefs. Kim and Verrecchia (1991a,b) analyzed how anticipating a forthcoming public announcement causes information asymmetry that affects the price and volume reaction to an announcement by altering investors' incentive to acquire private information. Kim and Verrecchia (1994) show how volume arises through differences between investors in the interpretation of a public announcement.

Investors' disagreement surrounding accounting earnings announcements is viewed by Bamber, Barron, and Stober (1997) as a multifaceted construct. They found three distinct aspects of disagreement that play an incremental role in explaining trading volume (after controlling for contemporaneous price change) around earnings announcements⁸: (1) prior dispersion in beliefs, (2) jumbling of beliefs, and (3) change in dispersion. These aspects

⁷ In empirical studies the role of pre-disclosure information asymmetry has been studied e.g., by Ziebart (1990), Ajinkya, Atiase, and Gift (1991), Atiase and Bamber (1994); unexpected earnings e.g., by Bamber (1986, 1987), Ziebart (1990), Kross, Ha, and Heflin (1994); firm size e.g., by Bamber (1986), Ziebart (1990), and Atiase and Bamber (1994); risk changes e.g., by Kross, Ha, and Heflin (1994).

⁸ See also Bamber, Barron, and Stober (1999).

have been present to a varying extent in prior research. For example, in Karpoff's (1986) model, trading increases with the heterogeneity of investors' revision of beliefs (belief reordering or jumbling) around an information event. Heterogeneous revision of beliefs results from disagreement as to how information should be interpreted, which in turn stimulates trading. Karpoff also concludes that, even in the absence of belief jumbling, trading arises solely from differential prior beliefs. Differential prior beliefs produce speculative positions prior to an announcement. Since investors have less incentive to continue holding these positions, trading ensues.

In Kim and Verrecchia's (1991a,b) model, Karpoff's (1986) suggestions are confirmed in a richer information environment where the process of the formation of beliefs by investors is described. Kim and Verrecchia (1991b:313) suggest that if an announcement causes only parallel belief revisions (i.e. no belief jumbling or change in dispersion) only price reactions arise and no volume reactions. They also conclude that less precise average pre-disclosure information (i.e. greater dispersion in prior beliefs) increases trading volume. The third aspect of disagreement - the change in dispersion - arises when a public announcement affects the dispersion beliefs, with investors interpreting the announcement more or less identically. In Kim and Verrecchia's (1991b) model more precise announcements always lead to converging beliefs since investors are assumed to draw identical interpretations about the announcement.

Recently Kim and Verrecchia (1994, 1997) relaxed investor homogeneity by allowing differential information-processing abilities. This challenges the nature of the announcement since information-processing abilities imply that earnings announcements could also convey private information and thus cause increased trading. Livne (1997) endorsed Kim and Verrecchia's notion of the dual role of public announcements. Firstly, public announcements eliminate the information asymmetry that prevailed in the pre-announcement period between informed and uninformed traders. The second informational role is to create a new information asymmetry in the market since firms' published reports offer a rich set of data that can be better processed by some investors. Thus it is not clear whether the announcement *per se* decreases the dispersion in investors' beliefs.

Bamber, Barron, and Stober's (1997) empirical findings suggest that trading around announcements is at least partially attributable to a divergence in beliefs, which itself suggests newfound disagreement. If trading volume and investor disagreement are positively related, trading can be viewed as a costly economic consequence of investor disagreement. In assessing the costs and benefits of the ability of financial reports to produce agreement⁹, the relation of these three aspects of disagreement and trading volume around anticipated earnings announcements will be a stimulating area for future research.

A related extension to the above is Utama and Cready's (1997) framework, which is closely based on Kim and Verrecchia's (1991a,b) proposition that volume associated with an earnings announcement increases with the level of cross-investor variation in precision,

⁹ Schadewitz (1997) has studied the determinants and implications of the information disclosed in interim reports in Finland. The interpretation of interim reports is also discussed in Kanto, Kahra, Blevins, and Schadewitz (1998).

thus providing insights into the mechanism that drives variation. They found a strong quadratic relation between institutional ownership and the trading response to earnings announcements. Specifically, with low institutional ownership, the trading response increases with increased institutional ownership, but with high (i.e. over 50%) institutional ownership the trading response decreases with increased institutional ownership. Utama and Cready (1997) interpreted this as being consistent with the spirit of Kim and Verrecchia (1991a,b) that differential pre-disclosure precision among investors increases trading volume. The quadratic form to the volume response also implies that earnings announcements are more useful to individual investors than to institutions. Choi and Choe (1998) have further extended the analysis of trading volume responses by investigating the reaction to earnings announcements in an emerging stock market (i.e. Korea). Their findings are very similar to those for the US stock market.

Recently investors' buying, holding, and selling decisions have also been considered using behavioral models as a result of a substantial number of observations of apparent anomalies (from the standpoint of the efficient markets' hypothesis) in the financial markets. These anomalies suggest that the underlying principles of rational behavior underlying the efficient markets hypothesis are not entirely correct and that it is also necessary to consider other models of human behavior, such as in the other social sciences (see e.g., Kahneman and Tversky (1979), Tversky and Kahneman (1974)). One of the most controversial issues among researchers has been whether investors overreact, and thus behave irrationally, to new information, a subject spurred by De Bondt and Thaler's (1985) study¹⁰. These behavioral models may also make it easier to understand the extraordinary degree of trading activity. Shiller (1997) connects the origins of differences of opinion among investors to excessive confidence about investors' own judgements. This may produce, for example, as suggested by Tversky and Kahneman (1974), a tendency for people to see patterns in data that are purely random. Suggestions may also affect investors' assessments, producing a so-called anchoring effect. Overconfidence connected to anchoring may be one source of the high volume of trading among investors.

The first article contains empirical findings regarding the effect of interim earnings announcements on investors' trading policy using Finnish data. The aim of the paper is to investigate empirically the role of pre-disclosure information asymmetry and the information content in explaining volume responses to interim earnings announcements. The theoretical background to the trading volume reaction is based on Kim and Verrecchia (1991a). Evidence is provided that the trading volume response is positively associated with the information content and to some extent with the level of pre-disclosure information asymmetry. The results are in line with the theoretical trading volume proposition. However, the significance levels are lower than in similar US studies and the association between positive and negative news is slightly asymmetric.

¹⁰ For a survey and Finnish findings, see Larkomaa (1999). In addition, Grinblatt and Keloharju (1999, 2000) studied whether reactions are symmetric between different investor groups.

2.2 Time-dependent trading patterns

Regular market closures such as the end-of-session close, weekends, and holidays have shown to be associated with various intraday and intraweek patterns of stock returns, volatility, and trading activity (see e.g., Hong and Wang (2000)). The discovery of these patterns has spurred extensive research, facilitated by the recent availability of transaction data from stock exchanges around the world in the last decade. The patterns reveal that: i) intraday mean returns and volatility are U-shaped¹¹; ii) intraday trading volume is U-shaped¹²; iii) open-to-open returns are more volatile than close-to-close returns¹³; iv) weekend returns are lower than weekday returns¹⁴; and v) returns over trading periods are more volatile than returns over non-trading periods¹⁵. The observed patterns have generated a strong interest to develop theoretical models to understand the origin of them. Several hypotheses have been suggested. These hypotheses consistently assume that the existence of heterogeneous investors combined with periodic market closure result in discretion by investors in timing their trades, which can lead to an endogenous concentration of trades and price changes. The most quoted are the asymmetric information hypothesis of Admati and Pfleiderer (1988) and Brock and Kleidon's (1992) increased demand hypothesis.

Admati and Pfleiderer's (1988) model proposes that the intraday trading pattern is due to the interaction between informed and uninformed discretionary (who have some ability to choose when to trade during the day on the basis of trading costs) investors. There may be concentrations of volume at arbitrage times if certain points during the trading day attract both informed and uninformed discretionary investors. Informed investors will operate in the market because there will also be uninformed investors through whom they can camouflage their trades. Uninformed discretionary investors choose to trade at the same time because the trading costs are lower due to the increased activity of informed investors relative to other periods. The result is a clustering of volume that may exist especially in the beginning and at the end of the trading day.

In a related model, Foster and Viswanathan's (1990) model, informed traders receive information each day, but the value of that information diminishes gradually over time, because there is a public signalling (as a proxy for the quality of this signal Foster and Viswanathan (1993) use the average daily dollar value of transactions) of some portion of their private information. The strategic behavior of discretionary liquidity traders is to

¹¹ U-shape in intraday returns and variance have been found in the US markets e.g., by Wood, McInish, and Ord (1985), Harris (1986), Lockwood and Linn (1990), McInish and Wood (1990a). A similar pattern has also been found in Canada (McInish and Wood, 1990b). However, in Sweden Niemeyer and Sandås (1994) did not find a U-shape.

¹² A U-shape in intraday trading has been found in the US markets e.g., by Harris (1986), Jain and Joh (1988), Foster and Viswanathan (1990), Foster and Viswanathan (1993), and Gerety and Mulherin (1992). A similar pattern has also been found in France (Biais, Hillion, and Spatt, 1995), Sweden (Niemeyer and Sandås, 1994) and recently also in Finland (Hedvall, 1994).

¹³ Such a pattern has been found e.g., by Amihud and Mendelson (1987), Stoll and Whaley (1990), and Chan, Fong, Kho, and Stulz (1996).

¹⁴ Such a pattern has been found e.g., by French (1980), and Gibbon and Hess (1981). Berglund (1986) found the opposite in Finland.

¹⁵ Such a pattern has been found e.g., by Fama (1965), and French and Roll (1986).

delay their transactions when they believe that informed traders are particularly well-informed. By waiting they can learn from the trades that occur and the public signal that is released. On the other hand the informed trader, knowing that there is a forthcoming public signal, trades more aggressively and thus more information is released through that trading. Their model predicts sharp patterns in volume when public information rapidly lays bare private information and less distinct patterns when information is a poor substitute for private information.

These propositions are more explicitly developed by Brock and Kleidon (1992). They argue that much of the trading in the beginning and at the end of the trading day stems from the inability to trade when the market is closed. Since trading is suspended for the night the volume at the opening reflects trades that would have been made earlier if trading were unbroken. The closing volume reflects differences in optimal portfolios between the overnight non-trading period and the trading period. If tastes or risk tolerances differ between investors the transition between trading and non-trading regimes will result in portfolio-rebalancing activities prior to the periodic market closures that are independent of any information effects. Symmetrically, investors trade at the open of the following day, resulting in volume that is unrelated to unanticipated overnight information.

Brock and Kleidon's insights have been followed up, e.g., by Gerety and Mulherin (1992). They focus on the assumption that investors differ in their willingness and/or ability to hold positions overnight. Accordingly, they argue that if investors transfer the risk of holding a position while the market is closed, then the volume at the end of the day should be directly related to the volatility expected to occur overnight. Correspondingly, the trading activity at the open is positively related to unexpected overnight volatility. The empirical findings supported their predictions.

In addition, an anticipated information event may affect not only the trading pattern during the transition between trading and non-trading regimes, but also during other periods in the trading day. According to Kim and Verrecchia (1991a,b), this takes place before the announcement event if the anticipated public announcement stimulates private information-gathering and trading. When the announcement is released, investors form posterior beliefs and trade on their private information and market prices. After the announcement, given slow dissemination of earnings information (Kim and Verrecchia (1994, 1997), excess portfolio-rebalancing activities may result during the trading day.

The second essay relates these propositions to the expected information event. The theoretical models above propose that an anticipated information event such as an interim report announcement affects the intraday trading pattern before and after the announcement event. These propositions give a straightforward testable hypothesis related to the anticipated information event. Before an anticipated information event, it is expected that trading activity at the end of the day increases, reflecting the volatility expected to occur overnight. Likewise, if slow information dissemination is assumed after an announcement, a relatively large amount of unexpected overnight information results in excess portfolio-rebalancing activities on the open. As a summary i) trading activity at the open of the day is higher after the announcement than before the announcement, and ii) trading activity at the end of the day is higher before the announcement than after the announcement.

The second essay finds evidence from the Helsinki Stock Exchange that the widely documented U-shape pattern in trading activity - namely heavy trading in the beginning and at the end of the trading day and relatively light trading in the middle of the day - is affected by an anticipated information event (i.e. interim earnings announcement). Before the announcement day, trading is more concentrated at the close. This is consistent with investors' heterogeneous ability to bear expected overnight risk, which is especially prevalent before an announcement. Moreover, a slight increase on the open is evident after the announcement day. Evidence is also provided that the change in intraday trading behavior is associated with announcement-related factors, such as the range of analysts' earnings forecasts, the magnitude of unexpected earnings and firm size. Furthermore, this association is evident to some extent during the transition between trading and non-trading regimes.

2.3 Information content of a trade

Previous research considers that there are several potential explanations for price changes associated with a large transaction. Firstly, liquidity or immediacy costs may create temporary price effects with large transactions¹⁶. The search for a buyer (seller) and an inventory holding of a large block may subsequently lower (raise) the price. Secondly, insufficiently close substitutes for particular securities may affect prices¹⁷. Thirdly, large transactions may have permanent price effects if the trades convey information. If informed traders prefer to trade larger amounts, then the information content of large orders should differ from that of small orders. Easley and O'Hara (1987) show that since trade size introduces an adverse selection problem into security trading, informed traders prefer to trade larger amounts at any given price¹⁸. Since uninformed traders do not share this quantity bias, the larger the trade size, the more likely the trader is to be informed. As a result, pricing strategies must also depend on trade size. Consequently, the purchase (sale) of a large amount suggests that the buyer (seller) believes that the stock is undervalued (overvalued). Moreover, the information content of a trade may depend on the identity of the buyer or seller. Potential groups include investors who have access to firm files and operations.

If the information content of earnings announcements differs between investors, as suggested in previous research, the announcement is of varying use for different investors. The existence of diversely informed investors before an anticipated announcement suggests that market participants monitor trading especially before an announcement in order to make inferences from the asset's trading history as to the value

¹⁶ Models formulated e.g., by Demsetz (1968) and Kraus and Stoll (1972).

¹⁷ This effect is known as an inelastic demand curve, see e.g., Scholes (1972) and Mikkelsen and Partch (1985).

¹⁸ However, Kyle (1985) posits a model in which informed investors maximize their profits by camouflaging their trades so that their information is gradually incorporated into market prices. See also Barclay and Warner (1993).

of the asset. A dominance of buy orders may signal good news, causing investors to raise their expected value of the asset. An opposite price revision is expected if sell orders predominate. Consequently, the trading activity of small investors may deviate from that of large investors, suggesting that announcements are of differing use. Thus the trading activity of large investors may reveal investors' pre-disclosure information, which may affect the price impact of an individual trade around an announcement.

Theoretical support is available that information asymmetry is greater prior to earnings announcements than after. For example, Demski and Feltham (1994), McNichols and Trueman (1994), and Kim and Verrecchia (1991a,b) predict that anticipation of a public announcement stimulates the acquisition of private information. However, it is doubtful whether an earnings announcement totally removes information asymmetry after the announcement. An earnings announcement communicates a firm's value, but with noise. For example, Kim and Verrecchia (1994, 1997) and Livne (1997) state that an announcement stimulates private information acquisition. Bamber, Barron, and Stober's (1997) and Bamber, Barron, and Stober's (1999) empirical findings support this proposition. Thus it is reasonable to believe that a greater permanent price effect will remain for large transactions compared to small transactions even after an announcement.

The primary goal of the third essay is to study whether the permanent price impact of a trade differs around interim earnings announcements. Permanent price effects are determined by comparing prices before and after large trades. If large trades are associated with informed traders, price changes may be interpreted as a measure of information asymmetry between informed traders and uninformed traders. A greater permanent price effect has been found to be associated with large trades compared to small trades (see Seppi 1992; Daley, Hughes, and Rayburn (1995); in Finland see Booth, Lin, Martikainen, and Tse 1998). The essay examines whether the permanent price effects of individual trades are greater before rather than after an interim earnings announcement on the Helsinki Stock Exchange. If this is the case it suggests that investors believe that some traders are better informed before an interim earnings announcement than after. The results support the existence of a change in the permanent price effects of large trades. This suggests that large trades associated with a price change (especially uptick trades) before an announcement signal to other investors more than similar trades after the announcement. For small trades the results were insignificant.

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PART B: THE ESSAYS

This thesis is based on the following articles

- Vieru, Markku. Pre-disclosure Information Asymmetry and Information Content as a Means of Explaining Trading Volume Responses to Interim Earnings Announcements in a Thinly Traded Stock Market. *Finnish Journal of Business Economics*, 3/1998, 323-346
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