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Information Content and Market Microstructure Effects of Analysts' Recommendations.

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INFORMATION CONTENT AND MARKET MICROSTRUCTURE EFFECTS OF ANALYSTS' RECOMMENDATIONS

A Dissertation

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By

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Abstract

This dissertation examines the information content and market microstructure effects of analysts' initial coverage. The first essay centers on the valuation effect of analysts' initial coverages and discusses the roles of trading volume and firm size in the revaluation process. First, a large average abnormal return (7.46%) is observed on the day the initial coverages are released via the Dow Jones News Wire. The average abnormal return of initial coverages is significantly larger than the average abnormal returns of analysts' upgrade recommendations, implying marginal information content for firms with initial coverage is greater than firms which are already in the analysts' recommendation lists. Second, small firms with initial coverage experience a larger abnormal return (11.13%) than large firms (4.13%). Third, the abnormal return is found to be positively related to normal trading volume. This is consistent with Bhushan (1989) that the price system of firms with higher expected trading volume contains more noise, but inconsistent with Barber and Loeffler (1993) that an order imbalance due to noise traders' response causes a larger price reaction for firms with less volume and less liquidity.

In second essay, market microstructure effects of analysts' initial coverages is examined. Since analysts' recommendations are usually disseminated to clients first and then released to the public, this provides a unique setting to empirically examine the behavior of informed trading. In particular, three issues are investigated. First, how quickly do stock prices incorporate private information ? Using a sample of 87 initial

coverages, most of abnormal returns on the release day occur at the opening trade and at trades within ten minutes after the opening trade. Second, comparing the efficiency of the call market and dealership market in reflecting private information, private information can be more efficiently revealed in the call market (NYSE/AMEX) than in the dealership market (NASDAQ). Third, when trade size choice of informed traders is investigated, the proportion of trades in medium size, ranging from 500 to 9,900 shares, increases significantly in the private information period. The results are consistent with Barclay and Warner's (1993) stealth trading hypothesis in that traders prefer to use medium size trades when they have private information.

Chapter 1

Introduction

Financial analysts' stock picking ability has long been a subject of controversy among practitioners and academics in the paradigm of the efficient markets hypothesis. However, extant studies (see, for example, Bjerring, Lakonishock and Vermalen (1983), Glascock, Henderson, and Martin (1986), Beneish (1991), and Barber and Loeffler (1993)) document that the market reacts positively (negatively) to analysts' favorable (unfavorable) recommendations.

There are several reasons why analysts can provide valuable information to market participants. Analysts search for and assess information about firms' prospects by contacting managements of firms repeatedly, not only formally but also privately. Sometimes, analysts are involved in investment banking decisions, such as initial public offerings (IPOs), seasonal offerings, and mergers and takeover events. Analysts can also obtain information from suppliers, regional distributors, and other sources. By accumulating information on a day-to-day basis, analysts can maintain an informational advantage over other market participants. Therefore, analysts' recommendations can be informative and valuable.

This dissertation, which contains two essays, extends this line of research to investigate the information content and market microstructure effects of analysts' initial coverages. In the first essay, the valuation effect of analysts' initial coverages is examined and the roles of trading volume and firm size in the revaluation process are

discussed. In the second essay, the market microstructure effect of the release of information contained in analysts' initial coverages is examined.

The plan of the dissertation is as follows. Chapter 2 reviews related literature. Chapter 3 explores information content of analysts' recommendations. Empirical tests on informed trading is discussed in Chapter 4. Finally, concluding remarks are presented in Chapter 5.

Chapter 2

Literature Review

Previous studies obtain analysts' recommendations from three sources: the Wall Street Journal (WSJ), the Value Line recommendations, and brokerage houses' recommendations (see, Table 1). Previous studies in each of the three sources are reviewed below.

2.1 The Wall Street Journal

Empirical studies on recommendations published in the WSJ (Davies and Canes (1978), Liu, Smith, and Syed (1990), Beneith and Maris (1992) and Barber and Loeffler (1993)) indicate that analysts' recommendations are of value, even though they are believed to be disseminated subsequent to private releases. Davies and Canes (1978) show that there is abnormal stock price performance on the day of publication of analysts' recommendations in the "Heard on the Street" column of the WSJ for the years 1970-1971. They conclude that analysts provide information to their clients and that the secondary dissemination of analysts' recommendation has a significant effect on stock prices.

Huth and Maris (1992) also report a similar price reaction to analyst recommendations in the WSJ "Heard on the Street" column. They demonstrate that firm size is an important variable for negative comments in the column, but not for the favorable comments. Huth and Maris (1992) attribute no size-effect associated with favorable recommendations to their small sample size.

Recently, Barber and Loeffler (1993) find an average abnormal return of 3.53% on the announcement of analysts' recommendations published in the monthly "Dartboard" column of the Wall Street Journal. They claim that the magnitude of the abnormal return in their study to be the largest among published studies on analysts' recommendations.

2.2 Brokerage Houses' Recommendations

As for the recommendations disseminated by research analysts of brokerage houses, Glascock, Henderson, and Martin (1986) examine a sample of E.F. Hutton's aggressive purchase recommendations. They find that over the 10 trading days following the announcement, 13 of the 16 recommendations generate a risk adjusted excess return of 4.5 percent and, over the 80 trading days after that, there is a 7.6 percent excess return. Thus, they suggest that analysts can forecast better than the overall markets.

Meanwhile, Bjerring, Lakonishok, and Martin (1986) evaluate the recommendations of a regional Canadian money management and investment service company, which since 1977 has published a weekly "recommended" and a "speculative" list of stocks, and a monthly "representative" list. For stocks recommended by the company, abnormal returns are observed, which are statistically and economically significant. Thus, they conclude that analysts' recommendations are valuable to investors.

Recently, Womack (1993) examined a long term price drift after brokerage houses' analysts' recommendations. He reports that initial price reactions are incomplete, and that there is a post-recommendation risk-adjusted price drift, implying analysts' recommendations provide tradable value for investors. His results are

inconsistent with those reported by Barber and Loeffler (1993) who show a price reversal after an initial positive price reaction to analysts' favorable recommendations.

2.3 The Value Line

The Value Line Inc. is the world's largest investment advisory publisher. The firm provides a range of investment information on approximately 1700 stocks. Copeland and Mayers (1982) evaluate the performance of the Value Line Investment Survey recommendations made between 1965 and 1978. They find an annual abnormal rate of return of about 6.8% for an investor who was long in portfolio 1 and short in portfolio 5. They also report a lag of up to two weeks in the market's adjustment to most Value Line recommendations. Excess returns are also found to spread over 13 weeks for changes to rank 5. Both of these lagged adjustments have modest statistical significance.

Stickel (1985) finds abnormal event period returns of +2.4% for firms added to Value Line rank 1 (the highest) and -0.3% for firms added to rank 5 (the lowest). He concludes that recommendations on the Value Line are of value.

Overall, abnormal returns on the announcement of recommendations from the WSJ, the Value Line, or brokerage houses indicate that analysts' recommendations carry valuable information to market participants.

2.4 Mechanism of Disseminating Analysts' Recommendations

Since this study focuses on analysts' recommendations released via the Dow Jones News Wire (DJNW), it would be helpful to review the mechanisms of brokerage houses disseminating analysts' recommendations to the DJNW. Marton (1987) outlines the

mechanisms as follows. First, analysts collect and assess various sources of information. When an analyst significantly changes an earnings forecast and recommend a buy or a sell on a stock, most brokerage houses first apply their internal compliance mechanisms. As a first check, the report must be submitted in writing to the head of the research department. If the change in opinion is rooted in something that might be construed as inside information, a discussion between the analyst and the head of research is usually mandatory to avoid any violation of rules and regulations.

Another issue that need to be considered is "front-running", which is a practice in that a research analyst shares or trades on material information before the firm's clients have access to the analyst's research. If a brokerage house does not prevent such "front-running", it violates the NYSE's rule 342 (b), which requires brokerage firms to provide appropriate supervisory control associated with analysts' research reports.

After approved by the head of research, recommendations are disseminated through the electronic communications network to ensure its simultaneous communication. It is usually during daily morning calls to both traders and institutional sales persons that research analysts spread their recommendations. For example, Marton (1987, p.147) states that "At E.F. Hutton & Co., after a new piece of research information is unearthed, it is communicated first and simultaneously to institutional salesmen and block traders before a special "profit line" is hooked up to Hutton's 400 retail offices across the country."

Once their clients' are informed and have traded on the information, analysts' recommendations may be released to the Dow Jones News Wire (Broad Tape). This is

done through one of two methods. First, analysts report to the Dow Jones News about their change of recommendations after disseminating their opinions to their clients first. In this case, staffs in the Dow Jones News release the news through the Wire, which can be accessed throughout the country by the subscribers. Second, recommendations are reported to the Dow Jones News Wire by the staffs in the Dow Jones News Services who, observing rumors in the Street, contact the brokerage house to verify the truth of recommendations. Then, after a series of screening processes, analysts' recommendations are reported through the Broad Tape.

Table 1

Previous studies on analysts' recommendations released from the WSJ, brokerage houses, and the Value Line.

I. Recommendations in the Wall Street Journal

* Colker (1963)
* Logue and Tuttle (1973)
* Davies and Canes (1978)
* Liu, Smith, and Syed (1990)
* Beneish (1991)
* Huth and Maris (1992)
* Barber and Loeffler (1993)

II. Recommendations by Brokerage Houses

* Groth, Lewellen, Schlarbaum, and Lease (1979)
* Bjerring, Lakonishok, and Vermaelen (1983)
* Glascock, Henderson, and Martin (1986)
* Womack (1993)

III. Recommendations on the Value Line

* Black (1973)
* Copeland and Mayers (1982)
* Stickel (1985)

Chapter 3

Information Content of Analysts' Initial Coverages: Firm Size and Trading Volume Effects

3.1 Introduction

Security analysts collect and disseminate information about firms they cover. The extant studies find that analysts have superior earnings forecasting ability over simple time-series models.[1] Also, the market tends to react positively (negatively) to analysts' buy (sell) recommendations.[2] The evidence suggests that security analysts, collectively, produce valuable information to market participants.

This essay extends this line of research to study the information content of analysts' initial coverages. This has not been previously explored in the literature. The purpose of this study is two-fold. First, I characterize the firms on which analysts initiate a coverage. Since initial coverages usually carry a buy recommendation, this could indicate that the firms were neglected by analysts and are currently undervalued. Hence, it is expected that the initially covered firms will be smaller and less followed by analysts than the firms currently in the brokerage houses' recommendation lists. Furthermore, the initial buy recommendations should induce substantial trading activity and generate revaluation for the firms' stocks.

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[1] Collins and Hopewood (1980), Givoly and Lakonishok (1984), Moyer, Chatfield,and Kelly (1985), and Armstrong (1983), among others.

[2] Glascock, Henderson, and Martin (1986), Davies and Canes (1978), Beneish (1991), Huth and Maris (1992), and Barber and Loeffler (1993).

In fact, a surprisingly large positive abnormal stock return of 7.46% occurs, on average, around the release of the analysts' initial coverages via the Dow Jones News Wire (DJNW). The magnitude of this abnormal return is about double the level of abnormal returns documented in previous studies. The largest average abnormal return documented in previous studies on analysts' recommendations is 3.53% by Barber and Loeffler (1993), who examine buy recommendations in the WSJ "Dartboard" column. Therefore, compared to other types of analysts' recommendations, the initial buy recommendations appear to have greater information content.

The second purpose is to examine the major determinants of the revaluation induced by initial buy recommendations. In particular, this dissertation explores, cross-sectionally, the role of firm size and trading volume in the revaluation.

Firm size is an important variable that needs to be considered in the revaluation process. Analysts' recommendations have an important certification effect, especially for small firms. Small firms usually do not attract financial analysts' attention. However, when an analyst initiates coverage on a small firm and recommends that investors buy the firm's stock, the recommendation may certify that the firm is a "good" firm to invest in. It is conceivable that small firms would benefit more from analysts' certification effect than large firms.

Furthermore, there is an asymmetry in press coverage; less news is reported about small firms than large firms. Large firms may also have a public relations department, which tends to voluntarily disclose the firms' prospects to the public. Hence, compared with large firms, small firms tend to have less information available. As a result, the

marginal information content of analysts' recommendations on small firms would be greater than on large firms.

Although the argument for the small firm effect is quite convincing, empirical evidence from studies on analysts' recommendations is mixed. Stickel (1985) shows that small firms exhibit larger price reactions on the announcement of Value Line ranking changes. However, Barber and Loeffler (1993) find that, after controlling for the effects of trading volume and return volatility, firm size is no longer an important variable in explaining variation in price reactions to the release of analysts' recommendations. This correct study may provide additional evidence to resolve this unsettled size issue.

Currently, there also are conflicting results regarding how the stock price reaction to an information release is related to trading volume. Intuitively, firms that are actively traded and have high trading volume are less likely to be mispriced. Since trading carries information, the information is likely to be quickly impounded into stock prices. Therefore, one would expect that actively traded stocks should have a smaller valuation effect on the release of analysts' recommendations.

Furthermore, liquidity is positively related to trading volume; i.e., actively traded stocks tend to be more liquid than thinly traded stocks. As Barber and Loeffler (1993) argue, if the release of analysts' recommendations creates buying pressure by naive investors, the order imbalance would cause greater price responses for stocks with less liquidity. Thus, this liquidity argument implies that the stock price reaction to the release of analysts' recommendations should be inversely related to normal trading volume measured before the recommendation. On the other hand, Bhushan (1989) models the

supply noise as the variability of liquidity-motivated trading in the shares of the firm. In his model, noise in stock prices increases with expected trading volume. An increase in noise benefits the collection of private information by analysts. Therefore, holding other things constant, Bhushan predicts that firms with higher expected trading volume have more information collected about them and have higher marginal information content of announcements. His model implies that firms with high normal trading volume should experience a larger revaluation at the release of analysts' recommendations. This prediction contradicts the above prediction that price reaction is negatively related to trading volume. The conflicting predictions motivate further empirical examination of the role of trading volume in the revaluation process.

This essay is organized as follows: Section 2 describes the sample selections and data. Section 3 discusses the methodology. Section 4 shows the empirical results. Sections 5 contains the summary and conclusions.

3.2 Description of Sample and data

3.2.1 Sample Selection

This study analyzes a sample of 94 initial coverages, and compares them with 380 upgrade recommendations and 141 downgrade recommendations. To obtain these samples, news of analysts' recommendations from the TEXT of the Dow Jones News Retrieval were searched using the key words "analyst$ and initial$ and cov$" for the initial coverage sample and "analyst$ and recommend$" for the upgrade and downgrade recommendation samples.[3] This resulted in 687 documents in total, which were

[3] $ sign is used as a wild card in searching documents from TEXT or TEXTM of the Dow Jones News Retrieval.

released through the Dow Jones News Wire in 1991. Among these documents, as shown in Table 4, 48 were excluded from the sample because of no time-stamp (6), no date (1), duplicates (2), or no relation to financial analysts' stock buy or sell recommendations (39).[4] Each document contains date and time of recommendation released to the Broad Tape, company symbol, name of the analyst and the brokerage house the analyst is affiliated with, and type of recommendation. A sample of the document is presented in Appendix C.

The 646 recommendations in the sample were disseminated by 84 brokerage houses. In terms of the number of recommendations, the top three in the list are Smith Barney, Merrill Lynch and Goldman Sachs, which issued 54, 49, and 42 recommendations, respectively. As shown in Appendix A, the top 20 brokerage firms account for 74.83 percent of the recommendations in the sample.

Among the 646 recommendations, 346 cases involve 255 firms listed on the NYSE and AMEX, and the remaining 269 cases involve 172 firms traded on the NASDAQ/OTC market. The three most frequently recommended stocks in the sample are Microsoft, Centocor, and Apple Computer with 11, 11, and 9 recommendations, respectively. All three stocks are traded in the NASDAQ/OTC market. The most frequently recommended stock for exchange-listed stocks in the sample is U.S. Surgical with 8 recommendations.

In the sample, favorable recommendations (474), including initial coverage and upgrade recommendations, are much more than downgrade recommendations (141). This

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[4] For example, recommendations made by political analysts or science analysts were excluded from the sample.

is similar to the estimates of Zack's Investment Research in Chicago. It reports that Wall Street analysts recommend about five stocks to buy for every one to sell (Mendes (1992)).

Also, an article on the "Heard on the Street" column of WSJ, Jan 8, 1991 highlights the facts of asymmetry between analysts' buy and sell recommendations:

> "Plenty of people on Wall Street have salty tongues. But not many will use a certain four letter word: Sell. .... A sell signal usually comes, way late. It's usually after the stock has already tanked. Most of the sell recommendations are after the fact. They are kicking (stocks) when they're down. There are plenty of reasons brokerage houses rarely make sell recommendations.
>
> Unlike buy ratings, sell ratings aren't a big commission generator; many investors just ignore them. But they do generate plenty of ill will. Saying "sell" can lose a Wall Street house lucrative corporate-finance business, such as issuing a company's stock or bonds, or advising a company on mergers. Finally, Wall Street analysts need to talk with corporate managements. And it isn't unusual for a company to stop talking to an analyst who has uttered the "s" word.
>
> As a result, some money managers view Wall Street recommendations as an elaborate code. According to several managers (and a few analysts), the translation goes something like this:
>
> -A "strong buy" really is a buy.
>
> -A "weak buy" or "buy/hold" means, "we like the company, but the stock is a little too high."
>
> -A "hold", or "neutral" rating is a euphemism for sell.
>
> -An outright "sell" recommendation means the company is a possible candidate for a trip to bankruptcy court.
>
> Professional money managers react to this state of affairs by learning to read subtle clues. They watch for "a change of inflection in an analyst's voice, or a less enthusiastic hold, or a downgrade" from buy to hold."

In short, this article suggests: first, analysts are reluctant to issue unfavorable

recommendations for a firm in fear of alienating current clients or losing future business with them. Second, buy or favorable recommendations tend to generate more commissions (for brokerage houses) than sell or unfavorable recommendations. Third, if news turns out to be false, firms may take legal actions against analysts or brokerage houses for issuing sell recommendations that depress their stock prices.

The sample includes analysts' initial coverages, along with upgrade (favorable) and downgrade (unfavorable) recommendations. Typical examples of headlines for each group of recommendations are given in Table 2.

Table 2

Examples of analysts' recommendations regarding initial coverages, upgrade, and downgrade recommendations.

A. Initial Coverage with "BUY" recommendations

"Morgan initiates coverage of A&W Brands with BUY recommend", 12:40 PM, 06/14/91, DOW JONES NEWS WIRE.

"Smith Barney issues initial BUY rate on Centex", 12:17 PM, 05/28/91, DOW JONES NEWS WIRE.

"First Boston issues initial BUY rate on Destec", 11:23 AM, 04/09/91, DOW JONES NEWS WIRE.

B. Upgrade recommendations

"Shearson upgrades JP Morgan, Bankers Trust NY to BUY", 10:34 AM, 05/28/91, DOW JONES NEWS WIRE.

"Kidder ups rating on National Presto Ind. to BUY from HOLD", 2:55 PM, 04/29/91, DOW JONES NEWS WIRE.

"Merrill, Goldman make positive comments on Apple Computer", 10:16 AM, 2/1/91, DOW JONES NEWS WIRE.

C. Downgrade recommendations (NYSE/AMEX: 86, NASDAQ/NMS: 57).

"Robertson Stephens lowers rate on Health Images to HOLD", 12:53 PM, 06/06/91, DOW JONES NEWS WIRE.

"Smith Barney removes Amdahl from BUY list", 1:02 PM, 04/02/91, DOW JONES NEWS WIRE.

"OpCo removes two fertilizer companies from recommended list", 11:11 AM, 04/01/91, DOW JONES NEWS WIRE.

Table 3

Name of brokerage house which issued stocks recommendations via The Dow Jones News Wire in 1991, and the frequency of the recommendations

Name of Brokerage House	Frequency of Recommendations
SMITH BARNEY	54
MERRILL LYNCH	49
GOLDMAN SACHS	42
SHEARSON LEHMAN	39
KIDDER PEABODY	35
MORGAN STANLEY	31
PRUDENTIAL	29
OPPENHEIMER	26
PAINWEBBER	25
DONALDSON LUFKIN JENRETTE	24
HAMBRECHT & QUIST	23
BEAR STERNS	20
COWEN AND CO	19
ALEX BROWN & SONS	19
FIRST BOSTON	17
SALOMON BROTHERS	15
DEAN WITTER	13
ROBERTSON STEPHENS	11
MONTGOMERY	10
KEMPER	9
WERTHEIM	8
MABON NUGENT	7
PIPER JAFFRAY	7
VECTOR SEC INTERNATIONAL	7
SOUNDVIEW	6
WEINSTEIN	6
C J LAWRENCE	5
Other brokerage houses [a]	89
Total	645

[a] There are 56 brokerage firms which issued less than 5 recommendations.

Table 4

Description of sample selection for analysts' recommendations which were released via the Dow Jones News Wire in 1991.

Total Documents [a] for the year 1991		687
Not Related:	39 [b]	
No Date:	1	
Duplicate:	2	
No Time Stamp:	6	
	-48	
Net Documents		639
Recommendations [c]:		646
Less 31 cases with insufficient observations in estimation period	-31	
Recommendations in the final sample		615
NYSE and AMEX:	346	
NASDAQ/NMS:	269	
Number of Firms in the Sample:		509
Number of Brokerage Houses:		72
Number of Initial Coverage [d]		94
Number of Upgrade Recommendations		381
Number of Downgrade Recommendations		141

[a] The sample data are collected from the TEXT of the Dow Jones News Services with codes of (ANALYST$ AND RECOMMEND$) or (ANALYST$ AND INITIAL$ AND COV$) , where $ sign is used as a wild card in selecting data.

[b] For example, political, medical or science analysts' recommendations.

[c] When recommendations are made more than once for a firm in a trading day, earlier announcements are used. In addition, we exclude the recommendations which are conflicting among analysts and which are not in the CRSP files.

[d] All of the initial coverage in the sample are "buy" or favorable recommendations.

3.2.2 Data

To test price and volume reactions, daily stock returns and volume data are obtained for the sample firms on the Center of Research in Securities Prices (CRSP) files. The number of analysts following a firm is obtained from the Institutional Investors Brokerage Estimate System (I/B/E/S) by Lynch, Ryan, and Jones, Inc. The number of institutional holders, percentage of institutional holding, number of insiders, and percentage of insiders' holding are obtained from the Disclosure. The reputation of brokerage houses is proxied by ranking of equity issue underwriters in 1991. The ranking of equity underwriters, announced in the *Institutional Investor* in February 1992, is made by giving full credit to the lead manager that is the investment bank with primary responsibility for the issue as shown in Table 5. Merrill Lynch and Goldman Sachs are number one and two in the ranking of equity underwriters in 1990 and 1991.

Table 5

Top 10 equity issue underwriters for 1991. primary responsibility for the issue.

Rank in 1990	Rank in 1991	Name of underwriters	Dollar volume (millions)	Number of issues
1	1	Merrill Lynch	$13,223	108
2	2	Goldman Sachs	12,110	71
8	3	Morgan Stanley	10,422	59
3	4	Alex. Brown & sons	7,305	63
4	5	Lehman Brothers	5,242	74
9	6	First Boston	4,687	48
5	7	Salomon Brothers	4,207	39
6	8	Smith Barney	2,027	45
7	9	Painwebber	1,618	41
12	10	Prudential Securities	1,549	16

3.2.3 Sample Characteristics

Panel A of Table 6 presents the frequency distribution of analysts' recommendations by time of the day and panel B presents the distribution by day of the week. Out of 646 announcements, only two are made before 9:30, while 52 are released after 4:30. 92 percent of recommendations are released during trading hours with the majority of recommendations occurring between 10:30 a.m. and 1:30 p.m. As for interday patterns, there is no particular concentration on any day of the week.

Table 7 presents summary statistics of average price, average daily trading volume, average market value of equity, and market capitalization in decile relative to all firms in the CRSP files for the sample firms in each subgroup. The capitalization and stock price for firms with upgrade recommendations are similar to those with downgrade recommendations. The median daily trading volume of firms with initial coverage is equal to 61,201 shares, which is smaller than those of firms with upgrade recommendations (213,577 shares) or downgrade recommendations (262,378 shares). Also, median capitalization of firms with initial coverage is $286 million, which is one sixth of the median capitalization of firms with unfavorable recommendations. This indicates that, on average, firms in the initial coverage sample are smaller than firms with upgrade or downgrade recommendations. However, the medians of the market value decile relative to all firms in the CRSP tapes for all three groups are no smaller than eight, implying that overall sample firms are relatively large in the markets.

The average number of analysts following a firm with favorable and unfavorable recommendations are 17.20 and 19.64, respectively. Whereas, for the initially covered

firm, the average number of analysts following is 8.69, which is less than half of the above numbers. This difference may be attributed to the size difference. This is consistent with Bhushan (1989) who shows that there is a positive relationship between firm size and number of analysts following. The average number of institutional investors for initially covered firms is 84.48 and the average percentage of institutional holdings for these firms is about 37 percent. Firms in the upgrade and downgrade samples have a higher percentage of institutional holding, about 50 percent on average. Insiders' holdings account for 19.49% of shares of initially covered firms, which is higher than 14.09% and 9.97% for firms with upgrade and downgrade recommendations, respectively.

Appendix B shows the distribution of sample firms by industry. In the upgrade and downgrade recommendation categories, firms in the computer industry are the most frequently recommended. Firms in the food processors industry are the most frequently recommended in the initial coverage category. In all three categories, firms in the drugs and biotechnology industries are also frequently recommended by analysts. That the distribution of recommended firms concentrates in biotechnology, computers, and drugs industries suggests that analysts tend to make recommendations for the firms, whose intrinsic values are difficult to estimate. Therefore, the service of analysts to market participants becomes more valuable in these industries.

Table 6

Distributions of the analysts' recommendations by time of the day and by day of the week.

Panel A: Announcement Time

Time of release	Upgrade Recomm.	Initial Coverage	Downgrade Recom.	Total
Before 9:30	1	0	1	2
9:30-10:29	26	14	23	63
10:30-11:29	58	17	32	107
11:30-12:29	61	18	18	97
12:30- 1:29	84	23	24	131
1:30- 2:29	37	10	11	58
2:30- 3:29	47	6	9	62
3:30- 4:29	26	4	13	43
After 4:30	40	2	10	52
Total	380	94	141	615

Panel B: Announcement Day

Day of release	Upgrade Recomm.	Initial Coverage	Downgrade Recom.	Total
Mon	74	10	26	110
Tue	72	21	43	136
Wed	85	19	30	134
Thu	79	24	22	125
Fri	70	20	20	110
Total	380	94	141	615

Table 7

Mean, median, and range of average price, daily trading volume, market capitalization, CRSP market capitalization decile, and number of analysts following of sample firms (N=645)

Panel A: Initial Coverage (N=94)

	Mean	Median	Range
Price [a] ($)	20.95	19.02	2.24-80.42
Volume [b] (shares)	126,113	61,201	4,566-865,115
Capital [c] $(000,000)	1,823	286	158-31,291
Number of [d] analyst following	8.69	6	1-32
Number of [e] institutional holders	84.48	48	9-441
Percentage of [f] institutional holding (%)	37.56	35.76	3.09-78.30
Number of [g] insiders	12.11	10	1-55
Percentage of [h] insiders' holding (%)	19.49	18.15	0.25-82.13

continued

Table 7

Panel B: Upgrade Recommendations (N=380)

	Mean	Median	Range
Price[a] ($)	31.27	24.66	0.39-122.45
Volume[b] (shares)	354,187	213,577	91.59-6,973,519
Capital[c] $(000,000)	5,142	1,279	371-95,224
Number of[d] analysts following	17.20	15	1-46
Number of[e] institutional holders	177.64	118	15-750
Percentage of[f] institutional holding (%)	52.48	56.36	5-87.59
Number of[g] insiders	20.76	17	2-97
Percentage of[h] insiders' holding (%)	14.09	6.66	1.17-75.48

continued

Table 7

Panel C: Downgrade Recommendation (N=141)

	Mean	Median	Range
Price [a] ($)	39.55	32.06	4.69-123.99
Volume [b] (shares)	380,564	262,378	18,758-2,274,961
Capital [c] $(000,000)	6,289	2,015	601-95,224
Number of [d] analysts following	19.64	18	2-46
Number of [e] institutional holders	213.11	160	6-750
Percentage of [f] institutional holding (%)	52.69	57.81	6.34-87.59
Number of [g] insiders	22.41	19	5-62
Percentage of [h] insiders' holding (%)	9.97	3.98	0.56-48.11

[a] Stock price of each sample firm is calculated with the average of the stock price in the estimation period, from t=-225 to t=-26.

[b] Trading volume for each sample firm is the mean of daily trading volume in the estimation period, from t=-225 to t=-26.

[c] Capitalization for each firm is the year-end capitalization, obtained from the CRSP tapes.

[d] Number of analysts following is the number of estimates for one year earnings forecasts, obtained from I/B/E/S file.

[e-h] These are obtained from the Disclosure.

Table 8

Number of recommendations and percentage of recommendations in the industries.

Panel A: Initial Coverages

Industry name	Number of Recommendations	Percentage of Recommendations
FOOD PROCESSORS	6	5.22
BIOTECHNOLOGY	4	3.48
COMPUTERS	4	3.48
RETAILING - GOODS	4	3.48
COMMUNICATIONS	3	2.61
OIL	3	2.61
AIRLINES	2	1.74
CHEMICALS	2	1.74
COSMETICS	2	1.74
DRUGS	2	1.74
ELECTRICAL	2	1.74
HOSPITAL SUPPLIES	2	1.74
HOSPITALS	2	1.74
INSURANCE	2	1.74
LEISURE	2	1.74
LEISURE PRODUCTS	2	1.74
SOFTWARE & EDP SERVICES	2	1.74
UNDESIGNATED CAPITAL	2	1.74
Others	67	58.28
Total	115	100%

continued

Table 8

Panel B: Upgrade recommendataions

Industry name	Number of Recommendations	Percentage of Recommendations
COMPUTERS	41	10.54
BIOTECHNOLOGY	28	7.20
HOSPITAL SUPPLIES	26	6.68
DRUGS	25	6.43
ELECTRONICS	21	5.40
OIL	19	4.88
RETAILING - GOODS	16	4.11
BANKING	13	3.34
CHEMICALS	11	2.83
SOFTWARE & EDP SERVICES	10	2.57
MACHINERY	9	2.31
HOSPITALS	8	2.06
INSURANCE	8	2.06
UNDESIGNATED TECH	8	2.06
FOOD PROCESSORS	7	1.80
AIRLINES	5	1.29
INVESTMENTS	5	1.29
AUTOMOTIVE MFG	4	1.03
CLOTHING	4	1.03
COMMUNICATIONS	4	1.03
ELECTRICAL	4	1.03
ELECTRICAL UTILITIES	4	1.03
HOME PRODUCTS	4	1.03
PAPER	4	1.03
TELEPHONE UTILITIES	4	1.03
AEROSPACE	3	0.77
LEISURE	3	0.77
UNDESIGNATED CONR SVC	3	0.77
Others	88	23.16%
Total	380	100%

continued

Table 8

Panel C: Downgrade recommendations

Industry name	Number of Recommendations	Percentage of Recommendations
COMPUTERS	15	10.64
DRUGS	14	9.93
FOOD PROCESSORS	11	7.80
BIOTECHNOLOGY	10	7.09
CHEMICALS	7	4.96
FOREST PRODUCTS	5	3.55
HOSPITAL SUPPLIES	5	3.55
PAPER	5	3.55
RETAILING - GOODS	5	3.55
SOFTWARE & EDP SERVICES	5	3.55
UNDESIGNATED TECH	5	3.55
ELECTRICAL UTILITIES	4	2.84
ELECTRONICS	4	2.84
OIL	4	2.84
COMMUNICATIONS	3	2.13
MACHINERY	3	2.13
AIRLINES	2	1.42
BANKING	2	1.42
BUILDING MATERIALS	2	1.42
HOSPITALS	2	1.42
LEISURE	2	1.42
RETAILING - FOODS	2	1.42
Others	24	17.02
Total	141	100%

Table 9

Review of the literature is presented for the researchers' name, estimation period, abnormal returns with t-values, and type of recommendations.

Researcher	Sample period	Abn. ret. amount (%)	Type of Recommendations
Kim (1994)	1991	7.46 (11.56)	Initial coverage release via the Dow Jones News Wire
Womack (1993)	1989-1991	2.91 (14.06)	"Added to the buy list" of 14 U.S. brokerage firms
Barber and Loeffler (1993)	1988-1990	3.53 (12.19)	Buy recommendations on the "Dartboard" of WSJ
Liu, Smith and Syed (1990)	1982-1985	1.54 (16.37)	Buy recommendations on the "HS" column of WSJ
Glascock, Henderson, and Martin (1986)	1982	1.20 (3.10)	E.F. Hutton's aggressive purchase recommendations
Stickel (1985)	1976-1980	0.86 (10.92)	Value Line rank changes from rank 2 to rank 1
Bjerring, Lakonishok, and Vermaelen (1983)	1977-1981	1.49 (3.76)	Canadian brokerage house recommendations (weekly data)
Groth, Lewellen, Schlarbaum, and Lease (1979)	1964-1970	1.56	Brokerage house recommendations (monthly data)

Abn. ret. amount, in most studies, refer to market adjusted abnormal returns. t-statistics are in the parentheses. The release returns are calculated on the day of the release.

3.3 Methodology

3.3.1 Measuring Abnormal Returns

To investigate the abnormal response associated with analysts' recommendations, the market model is used. This model assumes that realized returns are represented by the following:

$$R_{it}=\alpha_i+\beta_i R_{mt}+\varepsilon_{it}, \qquad (1)$$

where

R_{it} = return on common stock i on day t;

R_{mt} = return on the CRSP equally weighted market portfolio on day t;

ε_{it} = error term for firm i on day t;

α_i, β_i = regression coefficients.

The error term, $\varepsilon_{i,t}$ can be considered a measure of the abnormal return of security *i* on day t, since it represents the deviation of security *i*'s return from its expected return, conditional upon the realized return on the market portfolio. The estimated expected return for security *i* at time t given the realized market return is given by the following equation:

$$\hat{R}_{it}=\hat{\alpha}_i+\hat{\beta}_i R_{mt} \qquad (2)$$

For each sample observation, calendar time is converted to event time by defining

the date of dissemination of analysts' recommendations through the Dow Jones News Wire as day 0. These regression coefficients are estimated over 200 days in the estimation period from days -225 to -26. For firm i on day t, abnormal return, A_{it}, is given by the following equation:

$$A_{it}=R_{it}-(\hat{\alpha}_i+\hat{\beta}_i R_{mt}), \qquad (3)$$

The average abnormal return for the portfolio of N firms is given by:

$$AR_t=\frac{1}{N}\sum_{i=1}^{N} A_{it}, \qquad (4)$$

The AR_t are summed over event time to obtain a cumulative average abnormal returns:

$$CAR_t = \sum_{t=-25}^{+25} AR_t \qquad (5)$$

To provide a test of the statistical significance of the average abnormal returns, I employ Corrado's (1989,1992) nonparametric rank test.[5] In order to implement

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[5]. Corrado (1989) shows that the nonparametric rank test for abnormal security-price performance is preferable to the parametric t-test for a broad spectrum of fat-tailed security-returns distributions. Compared with its parametric tests and with standard nonparametric tests, his rank test offers improved specification under the null hypothesis and more power under the alternative hypothesis of abnormal security-price performance. As emphasized by Brown and Warner (1980, 1985), a problem with previous nonparametric tests, the signed rank and sign test, is the requirement that the excess-return distributions be symmetrical for correct test specification. The Corrado rank test is less affected by an event-date excess-returns variance increase than are the parametric tests.

Corrado's nonparametric rank test, I transform each security's time series of market model abnormal returns into their respective ranks.

Let K_{it} denote the rank of the abnormal return A_{it} in security i's time series of 261 abnormal returns.

$$K_{it}=Rank(A_{it}),\ t=-225,\ldots,+25 \qquad (6)$$

Where $A_{it} \geq A_{ij}$ implies $K_{it} \geq K_{ij}$ and $261 \geq K_{it} \geq 1$.

Ranks are standardized by dividing by one plus the number of nonmissing returns in each firm's abnormal returns time series,

$$U_{it}=K_{it}/(1+M_i) \qquad (7)$$

where M_t is the number of nonmissing returns for security i. This yields an order statistic for the uniform distribution with an expected value of one-half. The rank test statistic substitutes $(U_{it} - 1/2)$ for the abnormal return A_{it}, yielding the day 0 test statistic,

$$T=\frac{1}{\sqrt{N}}\sum_{i=1}^{N}(U_{i0}-1/2)/S(U) \qquad (8)$$

The standard deviation S(U) is calculated using the entire sample period.

$$S(U)=\sqrt{\frac{1}{261}\sum_{t=-225}^{+25}\left(\frac{1}{\sqrt{N_t}}\sum_{i=1}^{N_t}(U_{it}-1/2)\right)^2} \qquad (9)$$

where N_t represents the number of nonmissing returns in the cross-section of N-firms on day t in event time.

3.3.2 Measuring Trading Volume Effects

In order to measure the effect of analysts' recommendations on trading volume, the average daily trading volume in the estimation period is used as the benchmark:

$$\overline{V_i} = \frac{1}{240} \sum_{-250}^{t=-11} V_{it} \qquad (10)$$

The rate of abnormal trading volume for each stock in the event period is calculated as,

$$ABNVOL_{it} = (V_{it} - \overline{V_i}) / \overline{V_i} \qquad (11)$$

where $ABNVOL_{it}$ refers to the rate of abnormal trading volume for stock i at time t.

The average abnormal trading volume rate for each of the 20 days surrounding the event day is then estimated as,

$$AV_t = \frac{1}{N} \sum_{i=1}^{N} ABNVOL_{it} \qquad (12)$$

To provide a test of the statistical significance to the sample firms for each of the 51 days surrounding the event day, Corrado (1989) nonparametric rank test is similarly employed.

3.4 Empirical Results

3.4.1 Valuation Effects of Initial Coverages

Table 10 summarizes the abnormal returns with Corrado's nonparametric rank test and Boehmer's parametric test, percentage of positive abnormal returns, and cumulative abnormal returns during the 51 day window surrounding the releases of initial coverages in 1991. The average abnormal return on the release day of initial coverages is 7.46% with Corrado's rank test statistic of 11.61, which is significant at the 1% level. About 90 percent of the sample firms with an initial coverage have a positive price reactions on the release day. The market also reacts positively on day -1, one day before the DJNW release day. The abnormal return on day -1 is 1.23%, which is significant at the 1% level. The two-day, day -1 and 0, abnormal return is 8.69%, suggesting that substantial revaluation is associated with the release of analysts' initial coverages.

The magnitude of revaluation is much larger than abnormal returns documented in previous studies on analysts' recommendations. Table 7 summarizes abnormal returns found in previous studies using late 80's data and those using 60's and 70's data. The largest abnormal return documented in the previous studies is 3.53%, which is found by Barber and Loeffler (1993). They examine a sample of buy recommendations in the "Dartboard" of the WSJ. However, the abnormal return found in this study for analysts' initial coverage is about twice as large as that reported by Barber and Loeffler (1993). Thus, the results imply that analysts' initial coverages have greater marginal information content than buy recommendations in the WSJ "Dartboard" column.

In Table 10, except for day t=-1, there is no price run-up for the 9 days prior to the release, indicating no severe "front-running" associated with analysts' recommendations. This is consistent with the expectation that, as communication technology advances, and timing has become more important for investors, analysts' recommendations are disseminated to the clients simultaneously and investors react to the information in a fast manner. Furthermore, there is no indication of information leakage before the release day. The result is also in contrast with earlier studies using 1960's and 1970's data, which showed price run-ups several days before the public releases of analysts' recommendations.

3.4.2 Upgrade and Downgrade Recommendations

Table 11 reports valuation effects of analysts' upgrade recommendations released via the DJNW in 1991. The abnormal return on day 0 is 4.43%, significant at the 1% level. The abnormal return is 0.77% on day -1, significant at the 1% level. The two-day abnormal return of 5.20% is comparable to the abnormal return of 3.53% reported by Barber and Loeffler (1993) for WSJ "Dartboard" buy recommendations. Nonetheless, the valuation effects of analysts' initial coverage appears to be larger than that of analysts' upgrade recommendations. This is consistent with the argument that the marginal benefit is larger for firms covered by analysts for the first time than for firms which are already in the analysts' recommendation lists.

Table 12 summarizes abnormal returns associated with analysts' downgrade recommendations. The abnormal return on day 0 is -4.39% and is -2.1% on day -1, both significant at the 1% level. The results in Tables 11 and 12 indicate that while analysts'

upgrade recommendations tend to generate a positive revaluation, downgrade recommendations tend to generate a negative revaluation. These results are consistent with those reported by Davis and Canes (1978) and Liu, Smith, and Syed (1990), who examine both buy and sell recommendations in the WSJ "Heard on the Street" column.

Figures 1, 2, and 3 show the cumulative returns for the initial coverages, upgrade and downgrade recommendations, respectively, in the 51-day window surrounding the release day of analysts' recommendations. Consistent with Barber and Loeffler (1993), there is a price reversal for the sample of analysts' upgrade recommendations. However, no apparent price reversal for the sample of analysts' initial coverages is found, implying that there is more information content associated with analysts' initial coverages than with upgrade recommendations. Similarly, Figure 3 shows that more price decreases occur over 25 days after the release of the downgrade recommendations.

3.4.3 Trading Volume

Table 13 reports the abnormal trading volume for firms with initial coverage, upgrade recommendations, and downgrade recommendations. For all the three categories of recommendations, abnormal volume peaks on the release day and gradually decays for the 10 days subsequent to the release day. For the sample of initial coverages, the average abnormal volume on day 0 is about 286% of the normal volume. This suggests that the recommendations induce substantial trading activity.

The release of analysts' upgrade and downgrade recommendations also significantly increases trading activity. For the upgrade sample, the average abnormal volume is about 637% of the normal volume, and is about 326% of the normal volume

for the downgrade sample. Even though more information content is associated, upgrade recommendations create higher rate of abnormal trading volume. This may be due to the restrictions which many institutional investors face in investing less known firms.

Table 15 also shows cumulative excess returns over several selected intervals for analysts' recommendations. For firms with initial coverages, there is no statistically significant price reversal, whereas firms with upgrade recommendations indicate significant price reversal throughout the three intervals, pre-, event-, and post-event period. Downgrade recommendations show that there is no price reversal for the overall period.

3.4.4 Firm Size Effect

In this section, I show how firm size influences the valuation effects of analysts' recommendations. For each category of recommendations, I divide the sample firms into two equal subsamples: one for large firms, the other for small firms. Firm size is measured as total market value of equity as of the end of 1990 and obtained from the CRSP tapes.

Panel A of Table 14 reports the results for the sample of initial coverages. On days -1 and 0, the average abnormal return for the subsample of large firms is 4.96 percent. This is smaller than the abnormal returns for the overall sample (8.71%) on the release day. On the other hand, small firms experience a much larger abnormal return of 12.43% on the release day. This is consistent with the argument of Atiase (1985) and others who posit that since less information is produced about small firms, the expected

percentage change in stock prices in response to public release is a decreasing function of firm size.

Panel A also shows similar size effects associated with analysts' upgrade and downgrade recommendations. Small firms experience statistically significant 7.29 percent abnormal returns, whereas large firms have only a 3.11 percent return on the release day. Size effects for the firms with downgrade recommendations are similar. On the release day, there is -3.67 percent abnormal return for the large firms and -9.17 percent for the small firms. As shown in Panel A, the differences in valuation effects between large firms and small firms are statistically significant for all the three categories of analysts' recommendations. Overall, small firms experience larger market reactions to analysts' recommendations than large firms. This is consistent with previous studies (see, for example, Slovin, Johnson, and Glasscock (1992), Atiase (1985), Bajaj and Vijh (1990)), which show that smaller firms experience a larger price reaction to public announcements.

On the other hand, Panel B shows that there is no significant difference in the financial markets (NYSE/AMEX vs NASDAQ), even though abnormal returns for firms in the NASDAQ are large than those in the NYSE/AMEX.

3.4.5 Regression Analysis

I employ multivariate regressions to further investigate the major determinants of the valuation effects of analysts' recommendations. As discussed in the previous section, firm size is an important determinant. Furthermore, various theories indicate that, along

with firm size, trading volume and return volatility should also be major determinants of the valuation effects of announcements. The theories are presented below.

Trading volume, on the one hand, may proxy for liquidity and information flow. Hence, as noted by Barber and Loeffler (1993), the valuation effect of analysts' recommendations should be inversely related to trading volume. This is because firms with greater liquidity should be less affected by naive traders' trading on analysts' recommendations. Also, firms with greater information flow should be less likely to be mispriced.

On the other hand, as Bhushan (1989) points out, noise increases with trading volume. Hence, analysts' recommendations on firms with more normal trading volume should be more informative. Therefore, holding other things constant, the revaluation associated with analysts' recommendations would be larger for firms with more trading volume. Return volatility may proxy for two factors. First, it can proxy for noise in a firm's price system; i.e., the more the noise, the higher the volatility. Second, return volatility may reflect uncertainty in the firm's future prospects. These proxies suggest that t' ırginal information content of analysts' recommendations should be positively related to return volatility.

Table 16 presents the results from cross-sectional regressions for the initial coverage sample. The dependent variable in each regression is the two-day abnormal return of analysts' recommendations. The second regression in the table includes firm size, trading volume, and return volatility as explanatory variables. Firm size is measured as the market capitalization of the firm at the end of 1990. Trading volume

is the average daily trading in the estimation period from days -225 through -26. Return volatility is the standard deviation of daily returns, which is also estimated in the estimation period. In the regressions, I use the natural logarithms of firm size and of trading volume.

In EQ.2, as expected, the two-day abnormal return is inversely related to firm size, and is positively related to return volatility. Consistent with Bhushan's (1989) hypothesis, the two-day abnormal return is positively related to trading volume. Surprisingly, these three variables are able to explain more than 44.35% of cross-sectional variation in the two-day abnormal return associated with analysts' initial coverages.

After controlling for the effects of these three major determinants, the reputation of the brokerage house the analyst is affiliated with has a no significant effect on the two-day return. This no relation is inconsistent with the prediction of Klein and Leffler (1981). They posit that the market perceives "reputation" as a valuable asset, thus implying that recommendations by brokerage houses with more reputation induce larger price reactions from market participants.

The regression models do not include the number of analysts following a firm in this analysis because of multicollinearity. The correlation between this variable and firm size is about 0.8. When I include the number of analysts in a model, it causes the standard error to increase and lowers the significance level for most coefficients related to firm size, while the R^2 of the regression does not change. For any other pairs of variables used in the regressions, the correlation is no more than 0.5.

The regression results are quite similar for the sample of analysts' upgrade recommendations. Table 17 reports the regression results of the combined samples of initial coverages and upgrade recommendations. Even after controlling for firm size, trading volume, and return volatility, I find that the two-day return is higher for analysts' initial coverages than for upgrade recommendations. This confirms my earlier conclusion that, on average, initial coverages have greater marginal information content than upgrade recommendations.

Table 19 reports the results for the sample of downgrade recommendations. The two-day return is positively related to firm size, and is inversely related to trading volume. Since downgrade recommendations tend to generate negative revaluation, the results are consistent with the small firm effect; i.e., a downgrade recommendation has a larger negative effect on smaller firms. The results are also consistent with Bhushan's (1989) hypothesis in that analysts' downgrade recommendations have a greater negative effect on firms with higher normal trading volume.

3.5 Summary and Conclusion

In this essay, three important issues related to analysts' initial coverage were examined. First, I find that the average abnormal return on the release day of analysts' initial coverages via the DJNW is 7.46%. This magnitude of abnormal return is about twice the level of abnormal returns reported in earlier studies on analysts' recommendations. Also, the average abnormal return is greater than that of the upgrade recommendations (4.43%). The evidence is interpreted as indicating that initial

Table 10

Excess return, with Corrado's nonparametric rank test and Boehmer's parametric test, the proportion of positive excess returns, and cumulative excess returns for firms with analysts' initial coverages (N=94).

The recommendations were released through the Dow Jones News Wire in 1991. The event period is days -25 to +25 surrounding the release day of the news.

Event day	Excess return(%)	Corrado's non-param. rank test	Boehmer's parametric test	%(+)	Cumm. excess return
-25	-0.018	0.28	0.07	46.8	-0.018
-20	-0.320	-1.55	-1.06	41.5	0.022
-15	-0.104	-0.09	0.20	47.9	-1.505
-10	-0.146	-0.56	-0.41	44.7	-1.491
-5	0.178	-0.38	0.04	48.9	-1.369
-4	-0.169	-0.34	-0.49	44.7	-1.538
-3	0.466	0.88	0.64	50.0	-1.072
-2	0.007	0.32	-0.37	39.4	-1.065
-1	1.237	2.80***	1.93*	53.2	0.172
0	7.461	11.61***	9.53***	90.4	7.633
1	0.381	1.07	0.66	52.1	8.015
2	0.136	0.66	0.24	47.9	8.151
3	-0.090	0.48	0.36	52.1	8.061
4	-0.123	-0.89	-0.59	44.7	7.938
5	-0.172	-0.35	-0.29	42.6	7.766
10	0.520	1.98**	1.03	54.3	7.828
15	0.181	0.69	0.38	46.8	8.267
20	-0.798	-1.73	-1.35	39.4	7.073
25	0.418	0.99	0.69	54.3	7.171

* significant at 0.1% level
** significant at 0.05% level
*** significant at 0.01% level

Table 11

Excess return, with Corrado's nonparametric rank test and Boehmer's parametric test, the proportion of positive excess returns, and cumulative excess returns for firms with analysts' downgrade recommendations (N=141).

The recommendations were released through the Dow Jones News Wire in 1991. The event period is days -25 to +25 surrounding the release day of the news.

Event day	Excess return(%)	Corrado's non-param. rank test	Boehmer's parametric test	%(+)	Cumm. excess return
-25	0.082	0.35	0.51	50.35	0.082
-20	0.141	0.93	0.68	51.06	-0.297
-15	-0.418	-2.20**	-1.42	39.72	-1.911
-10	0.084	0.90	0.61	50.35	-1.960
-5	-0.281	-0.60	-0.59	41.84	-2.842
-4	0.110	0.27	0.62	50.35	-2.732
-3	0.114	0.80	0.54	51.06	-2.618
-2	0.234	1.90	1.39	56.03	-2.384
-1	-2.100	-6.08***	-4.33***	22.70	-4.485
0	-4.390	-11.91***	-9.06***	12.77	-8.875
1	-0.650	-1.85*	-0.84	43.97	-9.524
2	-0.325	-1.01	-0.39	46.10	-9.850
3	-0.125	-0.17	-0.02	47.52	-9.974
4	0.032	0.54	0.34	48.23	-9.942
5	-0.003	-0.29	-0.47	41.13	-9.945
10	-0.699	-3.05***	-2.22**	38.30	-11.411
15	-0.094	-1.16	-0.35	50.35	-13.038
20	0.049	0.85	0.30	43.97	-14.076
25	-0.414	-1.42	-0.78	42.55	-15.306

* significant at 0.1% level
** significant at 0.05% level
*** significant at 0.01% level

Table 12

Excess return, with Corrado's nonparametric rank test and Boehmer's parametric test, the proportion of positive excess returns, and cumulative excess returns for firms with analysts' upgrade recommendations (N=339).

The recommendations were released through the Dow Jones News Wire in 1991. The event period is days -25 to +25 surrounding the release day of the news.

Event day	Excess return(%)	Corrado's non-param. rank test	Boehmer's parametric test	%(+)	Cumm. excess return
-25	-0.066	-1.20	-0.63	0.437	-0.066
-20	-0.102	-0.61	-0.44	0.468	-1.019
-15	-0.018	-0.17	0.16	0.489	-2.047
-10	-0.167	-1.76	-1.10	0.424	-2.499
-5	-0.162	-0.71	-0.30	0.447	-3.551
-4	-0.235	-0.65	-0.55	0.447	-3.786
-3	-0.324	-1.87*	-0.86	0.447	-4.110
-2	-0.058	-0.77	-0.83	0.458	-4.168
-1	0.771	3.02***	2.21**	0.558	-3.397
0	4.437	12.95***	11.14***	0.834	1.040
1	0.443	2.29***	1.66*	0.550	1.482
2	-0.184	-1.39	-0.81	0.463	1.298
3	-0.327	-2.64***	-1.28	0.442	0.971
4	-0.423	-2.36**	-1.60	0.437	0.548
5	-0.243	-0.80	-0.32	0.479	0.305
10	-0.281	-2.48**	-1.38	0.439	-0.106
15	-0.274	-1.50	-0.91	0.449	-0.939
20	-0.167	-2.23**	-0.76	0.451	-2.123
25	-0.325	-1.41	-0.78	0.467	-3.560

* significant at 0.1% level
** significant at 0.05% level
*** significant at 0.01% level

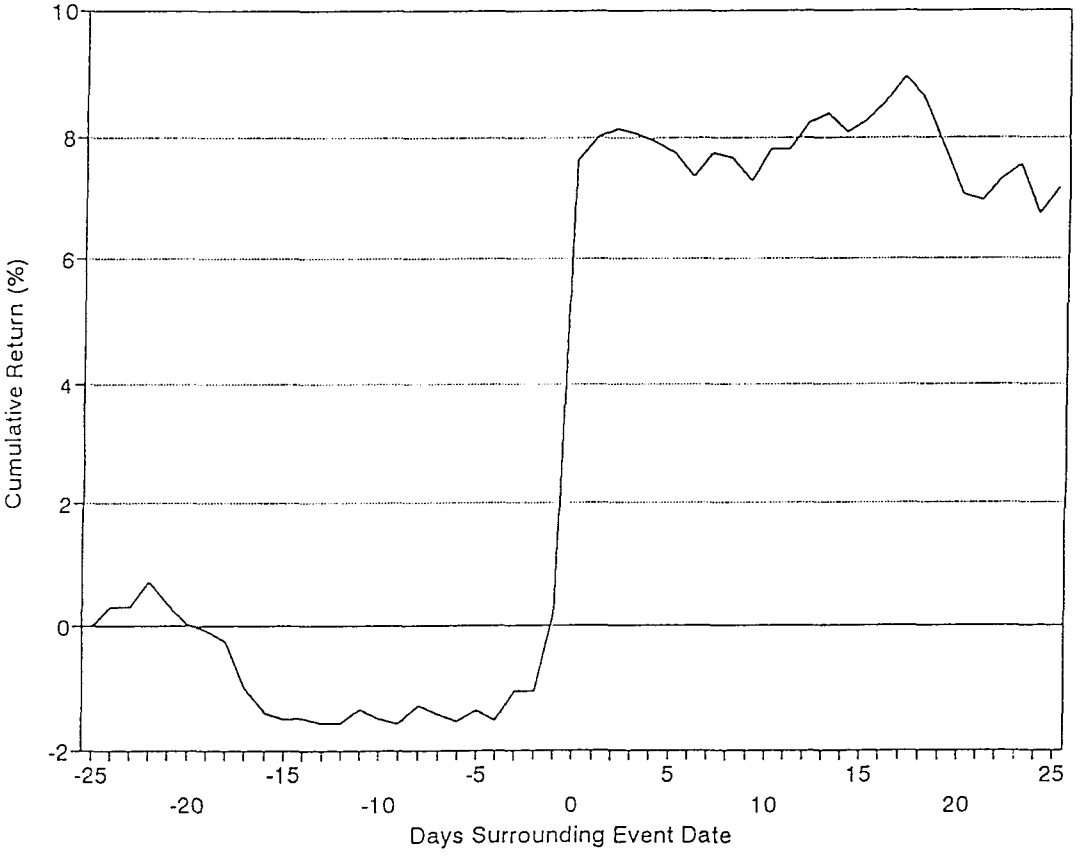

Figure 1: Cumulative abnormal returns for firms with initial coverages

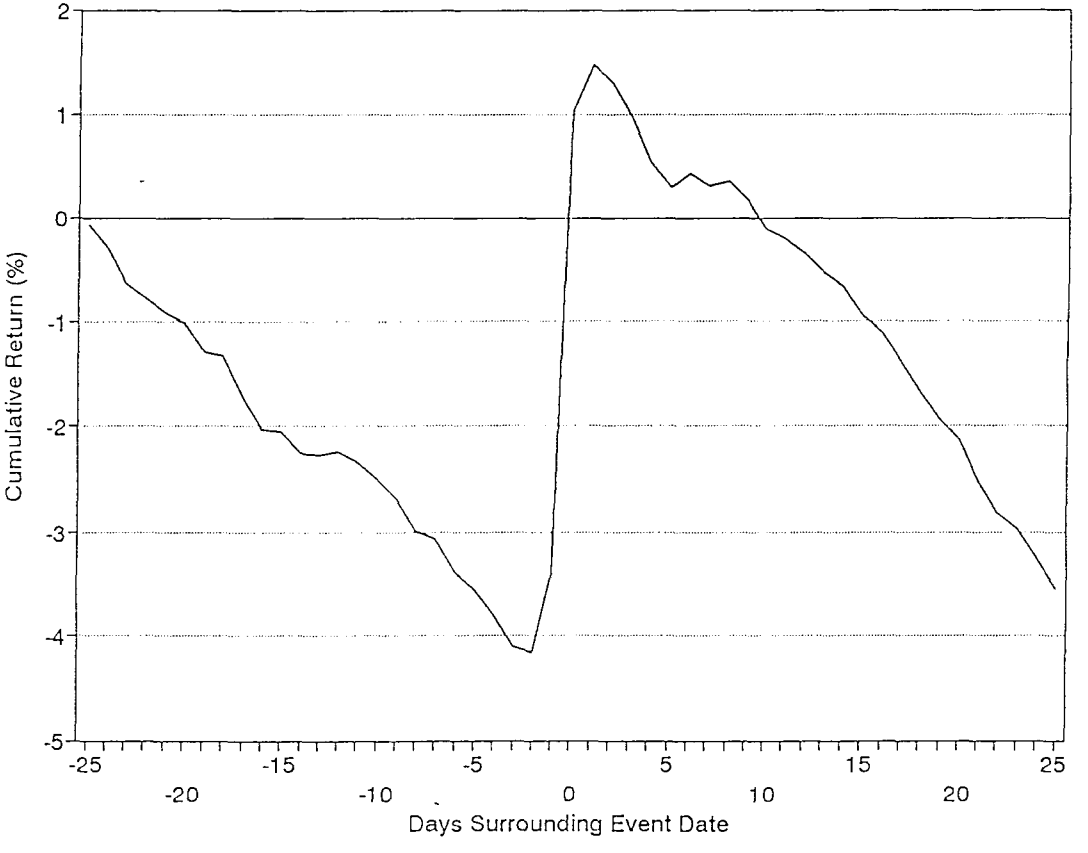

Figure 2: Cumulative abnormal returns for firms with upgrade recommendations

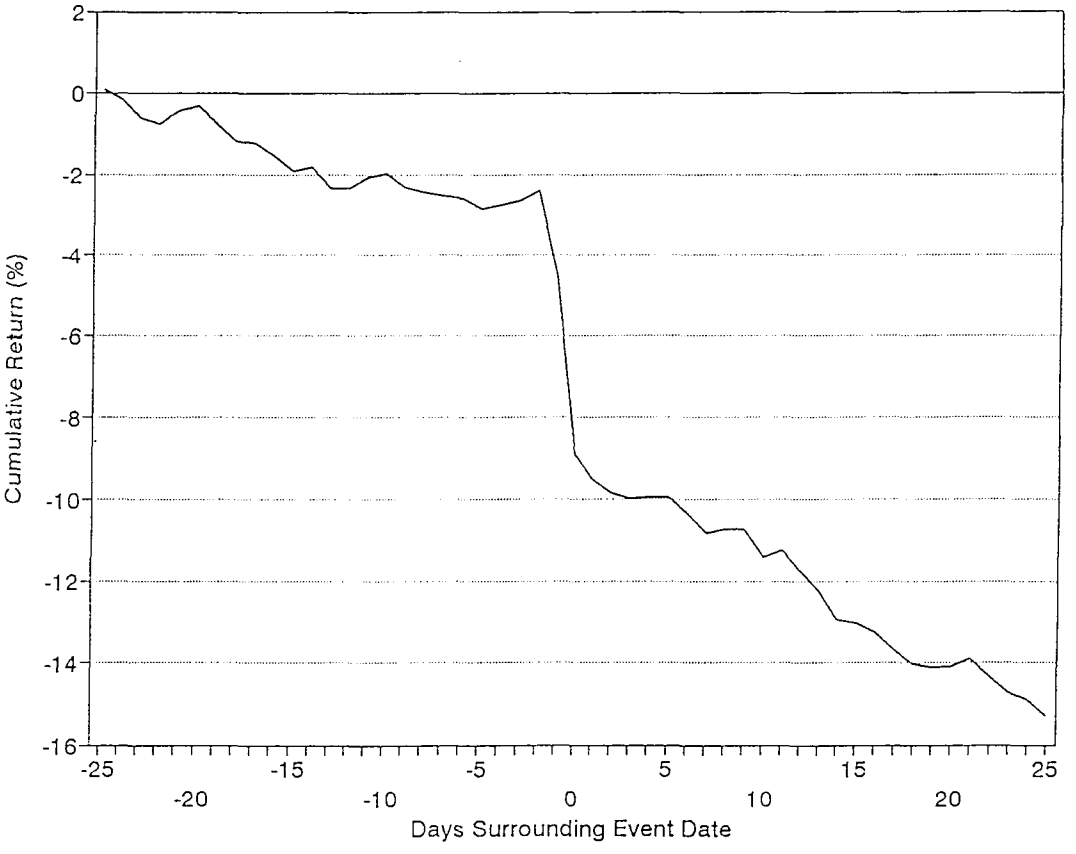

Figure 3: Cumulative abnormal returns for firms with downgrade recommendations

Table 13

Excess volume and Corrado's nonparametric rank test for firms with analysts' initial coverages, upgrade and downgrade recommendations.

The recommendations were released through the Dow Jones News Wire in 1991. The event period is days -25 to +25 surrounding the release day of the news.

	Initial coverage N=94		Upgrade recommendation N=380		Downgrade recommendation N=141	
Event day	Excess volume	Corrado's rank test	Excess volume	Corrado's rank test	Excess volume	Corrado's rank test
-25	26.12	0.94	28.37	0.32	10.87	0.45
-24	21.76	0.84	32.17	0.66	38.54	1.12
-15	23.80	0.63	0.59	-0.19	19.89	1.35
-10	87.32	0.95	60.45	0.55	13.61	0.44
-5	43.80	0.88	109.59	1.14	35.28	1.08
-4	56.13	1.09	62.36	0.71	35.43	1.11
-3	44.28	1.33	61.25	1.15	26.42	0.72
-2	46.01	1.40	108.94	1.44	56.58	1.08
-1	99.54	2.82***	132.35	1.83*	77.11	1.53
0	286.30	5.83***	637.16	5.33***	326.75	6.10***
1	158.62	4.21***	415.38	4.07***	149.06	4.20***
2	106.63	2.99***	241.50	2.57**	92.43	3.06***
3	98.01	2.89***	187.07	2.71***	77.80	3.04***
4	87.81	2.56**	135.91	2.35**	51.28	2.00**
5	71.50	2.07**	156.42	2.37**	48.68	1.57
10	42.22	1.92*	141.17	1.74*	55.82	1.81*
15	73.54	2.29**	174.74	2.03**	50.07	1.84*
20	56.82	1.99**	118.57	1.48	71.29	2.31**
25	57.00	1.66*	124.82	1.64	29.11	1.42

* significant at 0.1% level
** significant at 0.05% level
*** significant at 0.01% level

Table 14

Two-day announcement period excess returns by firm size and by market. Samples are subgrouped into small and large firms, based on the median size of the samples.

Panel A: by firm size

	Initial coverage	Upgrade recommendation	Downgrade recommendation
Excess returns for small firms (%)	12.43	7.29	-9.17
Excess returns for large firms (%)	4.96	3.11	-3.69
t-value	4.03***	4.85***	-4.57***

Panel A: by firm market

	Initial coverage	Upgrade recommendation	Downgrade recommendation
Excess returns for NYSE/AMEX firms (%)	7.16	4.87	-2.38
Excess returns for NASDAQ firms (%)	10.22	5.64	-2.99
t-value	-1.54	-1.54	0.25

* significant at 0.1% level
** significant at 0.05% level
*** significant at 0.01% level

Table 15

Mean cumulative excess returns (%) over selected intervals in analysts' recommendations with initial coverage, upgrade, and downgrade.

		Cumulative excess return from day i to day j - (i,j)					
		-25,-3	-1,0	1,5	6,10	11,25	1,25
Initial coverage	Mean	-1.07	8.69	0.13	0.06	-0.66	0.46
	t-stat	-0.90	12.15***	0.56	0.59	-0.89	-0.28
	% > 0	44.68	90.42	56.38	44.68	51.06	48.94
Upgrade recommend.	Mean	-4.11	5.21	-0.73	-0.41	-3.45	-4.59
	t-stat	-6.28***	11.51***	-1.95*	-1.69*	-5.17**	-5.19*
	% > 0	38.16	81.84	47.89	44.47	38.68	40.78
Downgrade recommend.	Mean	-2.61	-6.49	-1.07	-1.46	-3.89	-6.43
	t-stat	-2.31**	-12.36**	-1.35	-2.98***	-3.91***	-4.85***
	% > 0	41.13	10.63	49.65	39.01	34.04	30.49

* significant at 0.1% level
** significant at 0.05% level
*** significant at 0.01% level

Table 16

Results of regression of abnormal returns ($AR_{i,t=(-1,0)}$) on variables of firm size, trading volume, standard deviation of return, cumulative abnormal return in the post-announcement period, and reputation of brokerage house for a sample of 94 initial coverage recommendations for NYSE- and AMEX- listed and NASDAQ firms.

Independent variables	EQ.1	EQ.2	EQ.3
Size [a]	-0.038	-0.023	-0.018
	(-6.78)***	(-3.17)***	(-2.47)***
Trading [b] volume	0.039	0.021	0.017
	(5.07)***	(2.21)**	(1.89)*
σ of return [c]		2.250	2.450
		(3.37)***	(3.65)***
Reputation of [d] brokerage house			-0.005
			(-0.27)
Cumulative [e] return			0.099
			(2.23)**
Intercept	0.107	0.054	0.026
	(1.03)	(0.54)	(0.26)
Adjusted R^2	37.79%	44.35%	46.34%
F [f]	28.33	24.91	16.54

[a] firm size is the log of the market value of equity defined as share price multiplied by shares outstanding for the year, 1990.

[b] trading volume is defined as log of one plus mean trading volume over the estimation period, t=-225,-26.

[c] standard deviation of return over the estimation period, t=-225,-26.

[d] reputation dummy = 1 if included in top 10 equity underwriters in 1991, 0 otherwise.

[e] cumulative return in the period, t=-25,-3.

[f] all the F-values are statistically significant at α=0.05 level.

*,**,***, significant at α=0.1,0.05, and 0.01 levels, respectively.

Table 17

Results of regression of abnormal returns ($AR_{i,t=(-1,0)}$) on variables of firm size, trading volume, standard deviation of return, cumulative abnormal return in the post-announcement period, and reputation of brokerage house for a sample of 474 initial coverage and upgrade recommendations for NYSE- and AMEX- listed and NASDAQ firms.

Independent variables	EQ.1	EQ.2	EQ.3
Size [a]	-0.026	-0.016	-0.015
	(-10.44)***	(-4.77)***	(-4.66)***
Trading [b] volume	0.020	0.011	0.013
	(5.57)***	(2.96)***	(3.22)***
σ of return [c]		1.765	1.676
		(4.53)***	(4.34)***
Reputation of [d] brokerage house			-0.001
			(-0.07)
Cumulative [e] return			0.085
			(3.65)***
Initial coverage [f] dummy			0.018
			(1.91)*
Intercept	0.167	0.076	0.056
	(3.93)***	(1.65)	(1.21)
Adjusted R^2	18.90%	22.22%	24.72%
F [g]	54.58	44.79	26.17

[a] firm size is the log of the market value of equity defined as share price multiplied by shares outstanding for the year, 1990.

[b] trading volume is defined as log of one plus mean trading volume over the estimation period, t=-225,-26.

[c] standard deviation of return over the estimation period, t=-225,-26.

[d] reputation dummy = 1 if included in top 10 equity underwriters in 1991, 0 otherwise.

[c] cumulative return in the period, t=-25,-3.
[f] dummy = 1 if initial coverage, 0 otherwise.
[g] all the F-values are statistically significant at α=0.05 level.
*,**,***, significant at α=0.1,0.05, and 0.01 levels, respectively.

Table 18

Results of regression of abnormal returns ($AR_{i,t=(-1,0)}$) on variables of firm size, trading volume, standard deviation of return, cumulative abnormal return in the post-announcement period, and reputation of brokerage house for a sample of 380 upgrade recommendations for NYSE- and AMEX- listed and NASDAQ firms.

Independent variables	EQ.1	EQ.2	EQ.3
Size [a]	-0.021 (-7.79)***	-0.016 (-4.12)***	-0.016 (-4.24)***
Trading [b] volume	0.016 (4.00)***	0.012 (2.59)***	0.011 (2.64)***
σ of return [c]		1.185 (2.46)**	1.142 (2.38)**
Reputation of [d] brokerage house			0.001 (0.18)
Cumulative [e] return			0.077 (2.83)***
Intercept	0.151 (3.16)***	0.087 (1.61)	0.095 (1.76)*
Adjusted R^2	13.73%	14.90%	16.29%
F [f]	30.36	22.53	15.36

[a] firm size is the log of the market value of equity defined as share price multiplied by shares outstanding for the year, 1990.

[b] trading volume is defined as log of one plus mean trading volume over the estimation period, t=-225,-26.

[c] standard deviation of return over the estimation period, t=-225,-26.

[d] reputation dummy = 1 if included in top 10 equity underwriters in 1991, 0 otherwise.

[e] cumulative return in the period, t=-25,-3.

[f] all the F-values are statistically significant at α=0.05 level.

*,**,***, significant at α=0.1,0.05, and 0.01 levels, respectively.

Table 19

Results of regression of abnormal returns ($AR_{i,t=(-1,0)}$) on variables of firm size, trading volume, standard deviation of return, cumulative abnormal return in the post-announcement period, and reputation of brokerage house for a sample of 141 downgrade recommendations for NYSE- and AMEX- listed and NASDAQ firms.

Independent variables	EQ.1	EQ.2	EQ.3
Size [a]	0.025 (8.17)***	0.026 (5.43)***	0.026 (5.72)***
Trading [b] volume	-0.029 (-6.63)***	-0.029 (-6.20)***	-0.029 (-6.30)***
σ of return [c]		0.223 (0.30)	0.577 (0.79)
Reputation of [d] brokerage house			0.002 (0.23)
Cumulative [e] return			0.124 (3.56)***
Intercept	-0.038 (-0.60)	-0.052 (-0.66)	-0.072 (-0.94)
Adjusted R^2	38.26%	37.85%	42.47%
F [f]	43.77	29.01	21.38

[a] firm size is the log of the market value of equity defined as share price multiplied by shares outstanding for the year, 1990.
[b] trading volume is defined as log of one plus mean trading volume over the estimation period, t=-225,-26.
[c] standard deviation of return over the estimation period, t=-225,-26.
[d] reputation dummy = 1 if included in top 10 equity underwriters in 1991, 0 otherwise.
[e] cumulative return in the period, t=-25,-3.
[f] all the F-values are statistically significant at α=0.05 level.
*,**,***, significant at α=0.1,0.05, and 0.01 levels, respectively.

coverages convey more marginal information content than that of recommendations on firms already in the analysts' lists.

Second, firm size is an important factor in determining the valuation effect of analysts' initial coverages. When the sample of initial coverages are separated into two subsamples based on firm size, the abnormal return for small firms is 12.43%, whereas for large firms it is 4.96%. The difference in the abnormal returns of the two subsamples is statistically significant. A similar size effect is observed for the sample of upgrade recommendations. For the upgrade sample, the abnormal return for small firms is 7.29% and that of large firms is 3.11%.

Third, a positive relation exists between the normal trading volume and the abnormal return of firms with analysts' recommendations. The result is consistent with Bhushan (1989) who argues that noise increases with normal trading volume and that analysts' recommendations on high volume firms have higher marginal information content.

Chapter 4

Informed Trading: Empirical Tests

4.1 Introduction

Many brokerage houses and investment advisory companies employ financial analysts to collect and analyze information about firms they cover. Based on their assessments, analysts then make recommendations for clients to buy, hold, or sell firms' securities. Extant studies find that positive (negative) valuation effects are associated with buy (sell) recommendations, suggesting that analysts are able to produce valuable information for their clients.

Analysts' recommendations are usually sent to their clients first before the news is released to the general public. Hence, before the public knows the recommendations, the clients can be said to possess private information. The clients may act as informed traders and trade on the recommendations. The two-tier dissemination of analysts' recommendations thus provides a unique setting for examining issues related to informed trading.

The type of analyst recommendations studied in this essay is initial coverages with a buy recommendation, which were released via the Dow Jones News Wire (DJNW) in 1991. For this type of recommendation, the DJNW usually indicated when the recommendations were sent to clients and when the news was released via the DJNW to the public. In most cases, the recommendations were disseminated to clients in the early morning before the market opened, and later the news were reported on the DJNW on

the same day. Hence, there was several hours for informed traders to act on the recommendations.

The first objective of this study is to empirically examine the question: how quickly is private information incorporated into market prices? Kyle (1985) posits that, in a market with a monopolistic insider who attempts to maximize his/her profits, private information will be gradually incorporated into security prices. Holden and Subrahmanyam (1992) extend Kyle's model and hypothesize that competition among informed traders would cause them to trade so that private information will be rapidly impounded in security prices. Since brokerage houses' clients who receive analyst recommendations are likely to compete for profits, the data thus allow us to empirically test Holden and Subrahmanyam's hypothesis.

The second objective is to empirically compare the efficiency of the two trading mechanisms, the call market vs. the dealership market, in dealing with private information. Since analysts' recommendations are disseminated to clients before the market opens, it is important that the trading mechanism at the opening transaction is efficient in incorporating information. On the NYSE and AMEX, the opening transaction is conducted in a call clearing procedure.

That is, before the market opens, buy and sell orders can be submitted, and then batched for execution at the opening call. The specialist, based on accumulated buy and sell orders, determines a price to clear the market (see, for example, Amihud and Mendelson (1987) and Stoll and Whaley (1990) for details). However, the opening trade on the NASDAQ/OTC market is conducted in a dealership market where competing

market makers quote a bid price for sell orders and an ask price for buy orders. Madhavan (1992) posits that when there is high information asymmetry in the market, the call market is more efficient in reflecting private information than the dealership market. Madhavan's hypothesis is tested in this essay by comparing the price behavior in both the call market on the NYSE and AMEX and the dealership market on the NASDAQ/OTC market.

The third objective of this study is to examine the choice of trade size by informed traders. Recently, Barclay and Warner (1993) propose the stealth hypothesize in that informed traders choose their trades in medium size. They argue that it is unlikely that traders with valuable private information will limit their total trading activity to small positions because the profit potential from these positions is small.

On the other hand, because the price concession (or the expected price impact of trades) for a large trade by an informed trader could be substantial, large share positions are likely to be broken up into several trades. Transaction costs and delay costs would prevent informed traders from engaging in a sequence of small trade sizes. Therefore, Barclay and Warner suggest that the medium trade size (500 to 9,900 shares) is the most appropriate trade size for informed trades.

Barclay and Warner examine preannouncement trading for a sample of tender-offer targets and find evidence consistent with the stealth trading hypothesis. However, the preannouncement period may not be a good period to examine the behavior of informed trading since it is not known when and whether or not the private information about a tender offer is used in trading. This study's sample of analyst recommendations

does not have this drawback and, thus, can provide a stronger test of the stealth trading hypothesis.

The remainder of this study is planned as follows. Section 2 discusses the sample selection and data used in this study. Section 3 presents empirical evidence of the speed of the price adjustment to private information.

4.2 Data

4.2.1 Sample Selection

Our sample consists of 87 analysts' initial coverages with a buy recommendation, which were disseminated through the Dow Jones News Wire in 1991. The selection procedure is described as follows. Initially, a search was conducted for news on analysts' recommendations issued in 1991 through the Dow Jones News Retrieval using the key words "analyst$ and initia$ and cov$." This results in 115 documents of analyst initial coverages with a buy recommendation.[6] Each document contains the date and time of recommendations released to the Broad Tape, company symbol, name of the analyst and the brokerage house the analyst is affiliated with, and the content of the recommendation. Appendix A exhibits a typical initial buy recommendation.

In order to examine the behavior of informed traders, it is critical to know when a recommendation is privately accessible and when the information is public available. Hence, of the 115 recommendations, 87 cases are selected which meet the following two criteria: 1) the news released to the DJNW indicates that the recommendation was

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[6] In some cases, "buy" recommendations have different forms, such as "outperform", "strong buy", "favorable", or "trading buy". Some brokerage houses use a code system to recommend. For example, PaineWebber rates stocks on a five-point scale, from 1(buy) to 5(sell).

disseminated to clients early that day; (2) the firm was included in the 1991 ISSM tapes. Among the 28 cases discarded from the sample, 25 cases did not clearly indicate the time when the recommendations were released to clients; and three cases involve non-NMS firms. The transaction data of non-NMS firms are not included in the ISSM tapes.

The ISSM tapes are an amalgamation of several data sources, with the primary component, the trades and quotes data, coming from the Securities Industry Corporation (SIAC). Each trade or quote is time-stamped to the nearest second and carries a code identifying the originating exchange. Trades and quotes originating from regional exchanges are excluded. The transaction price and trading volume are provided for each trade; and for each quote, the bid price and ask price are available on the ISSM tapes. In this study, both the transaction price and the quote price series reactions in response to the release of analysts' recommendations are analyzed.

4.2.2 Sample Characteristics

The number of brokerage houses which issued initial coverages in the sample is 34. The top four brokerage houses on the list are Morgan Stanley, Shearson Lehman, Smith Barney, and Bear Sterns, which issued 10, 10, 9, and 8 recommendations in the sample, respectively. Among the 87 initial coverages, 42 are for firms listed on the New York or American Stock Exchanges, and 45 are for firms traded on the NASDAQ/OTC market.

The sample firm characteristics are presented in Table 20, which includes the following variables: average daily trading volume, average daily trading frequency, average trade price, average dollar bid-ask spread, and average relative bid-ask spread.

For each variable, I report the mean and median of the sample firms in three different periods: pre-event period from days -50 to -3, the event period (i.e., day 0), and the post-event period from days 3 to 10. For example, mean daily trading volume increases from 157,000 shares in the pre-event period to 423,100 shares on the release day of analysts' recommendations and then decreases to 225,500 shares in the post-event period. The mean trading frequency also substantially increases from 86 trades per day in the pre-event period to 219 trades per day in the event period and then decreases to 125 trades per day in the post-event period. It is interpreted that trading activity increases during the release day of analysts' initial coverage, compared with that in the pre-event period. The abnormal trading activity in the post-event period decreases to the level of pre-event period.

When spreads (dollar spread, effective dollar spread, relative spread, and effective relative spread) are measured for the three periods, spreads of the post-event period are smaller than those in the pre-event period. It appears that analysts' initial coverage reduces spreads which represents liquidity of stocks. Thus, it is interpreted that analysts' recommendations benefit the covered firms not only with price revaluation but also with liquidity increase.

4.3 The Speed of Price Adjustment

4.3.1 Transaction Prices

This section addresses the question of how quickly stock prices incorporate private information contained in analysts' recommendations. To answer the question, the return at the opening trade (i.e., the overnight return) and 5-minute return series on the release

Table 20

Statistics of the sample of firms which had favorable initial coverage by analysts in 1991. The sample consists of 42 NYSE/AMEX firms and 45 NASDAQ firms.

	Pre-event period (days -50 to -3)		Event-period (day 0)		Post-event period (days +3 to +10)	
Variables	Mean	Median	Mean	Median	Mean	Median
Daily trading volume (00)	1,570	656	4,231	2,862	2,255	1,108
Daily trading frequency	86	38	219	134	125	72
Avg. daily trade price	22.91	21.25	24.10	23.44	26.29	24.49
Avg. dollar [a] spread ($)	0.32	0.26	0.30	0.27	0.25	0.22
Avg. effective[b] dollar spread ($)	0.24	0.18	0.26	0.22	0.18	0.15
Avg. relative [c] spread (%)	1.88	1.47	1.53	1.30	1.18	1.03
Avg. effective[d] relative spread (%)	1.44	1.04	1.37	1.14	0.87	0.67

[a] dollar spread = ask price - bid price

[b] effective dollar spread = $2|P - Q|$, where P is the transaction price and Q=(ask + bid)/2

[c] relative spread = (ask price - bid price)/Q

[d] effective relative spread = $2|\log(P) - \log(Q)|$, where log is the natural logarithm.

day of analysts' recommendations are examined. The opening trade is important because, as described by Marton (1987), analysts' recommendations are usually disseminated to clients before the market opens at 9:30 a.m. Hence, the opening trade is the first trade that is going to reflect the private information. Since the trading mechanisms are different between the NYSE/AMEX and the NASDAQ/OTC market, the return series are analyzed separately for each markets.

The mean-adjusted method is used to compute abnormal returns. Wood, McInish, and Ord (1985) and Harris (1986) show that the opening trade returns and the last trade returns tend to behave differently from the returns of trades in between. For this reason, the intraday pattern is taken into consideration when computing mean-adjusted returns. Based on the intraday pattern of returns, three mean returns are computed for each firm in the estimation period from days -50 to -3.

They are the mean (overnight) return at the first trade, the mean return in the last five minutes, and the mean five-minute return in between. If a firm has no trade in a given five-minute interval, the return in that interval is set to zero. The abnormal return, or mean-adjusted return, for firm i at time
t is then measured as $AR_{it}=R_{it} - MR_{is}$, where $s=1$ if t is the opening trade, and $s=2$ if t is in the last five minutes, and $s=3$ if t is in between.

Table 21 reports average abnormal returns around the opening trade on the release day of analysts' recommendations for the NYSE and AMEX firms. The event time is set to be zero at the opening trade. The event time 1, 2, 3,..., indicates first, second,

and third five-minute intervals after the opening trade, and so on. Conversely, the event time -1, -2, -3, ..., indicates that the last, the second to the last, and the third to the last five-minute trading intervals one day before the news release day. The average abnormal return in a given interval is obtained by averaging across sample firms. A t-test (with standard error computed across sample firms in that interval) and a sum rank test to indicate the significance of the average abnormal return in that interval are used.

According to Table 21, the average abnormal return at t=0, i.e., the opening trade, is 3.78%, which is very significantly different from zero. About 93% of sample firms react positively at the opening trade. The average abnormal return at t=1 is 0.57%, which is also very significant. The average abnormal returns in other intervals are all very small. The results indicate that most of private information contained in analysts' recommendations is reflected in stock prices at the opening trade and trades within five minutes thereafter. The evidence is consistent with Holden and Subrahmanyam's (1992) hypothesis that competition among informed traders causes private information to be rapidly impounded into prices.

Similar results are found for the NASDAQ/OTC firms, as shown in Table 22 The average abnormal return at t=0, the opening trade, is 3.63%. The average abnormal returns in the next two five-minute intervals are 1.61% and 1.19%. These three abnormal returns are all significant at the 1% level. The abnormal returns in other intervals are very small and insignificant. The results suggest that most of the information of analysts' recommendations are incorporated into prices within ten minutes after the opening trade on the NASDAQ/OTC market.

The results in Table 21 and 22 imply that both the organized exchanges (i.e., NYSE and AMEX) and the OTC market react very quickly to informed trading. It takes only about five minutes for the NYSE and AMEX stocks and about ten minutes for the NASDAQ/OTC stocks to reflect the private information of analysts' recommendations. Nevertheless, in terms of the speed of price adjustment, the results appear to slightly favor the organized exchanges. The slower price adjustment on the NASDAQ/OTC market may be attributable to the fact that the fragmentation and multiple market makers on the OTC market allow informed traders to better conceal their trading. It is interpreted that this then leads market makers on the OTC market to a slower discovery of informed trading.

Although the opening trade is used as the starting point on both markets, the time of the opening trade on day 0, the release day of analysts' recommendations, on the NYSE/AMEX is quite different from that on the NASDAQ/OTC market. The opening trade for the average (median) firm in the NYSE/AMEX sample occurs about ten (seven) minutes after the market opens at 9:30 a.m. This result indicates that, on average, it takes about ten minutes for the specialist to clear the market at the opening trade. For the sample firms, the time ranges from zero minutes to a maximum of 55 minutes.

In the NASDAQ/OTC sample, the time between the opening trade and 9:30 ranges from zero to four minutes with the mean and median equal to 0.8 and 0 minute. The results indicate that the opening trade for most NASDAQ/OTC firms takes place at 9:30 a.m. when the market opens for trading.

The implication is that, although the call market used by the NYSE/AMEX in the opening trade is every efficient in revealing private information, it takes time for the specialist to clear the market. Furthermore, although the dealership market used by the NASDAQ/OTC market may not be as efficient as the call market, the dealership market is ready for trading when the market opens.

4.3.2 The Quote Midpoint

The results of the speed of price adjustment to private information are further examined using returns computed from the quote midpoint, the average of bid and ask prices. There are two advantages of using quote-midpoint returns. First, returns based on quote midpoints are less influenced by bid-ask bounces. Second, quote prices can be adjusted even with no trades.

Table 23 presents the average abnormal returns based on the quote midpoint for the NYSE/AMEX sample, and Table 24 for the NASDAQ/OTC sample. For the NYSE/AMEX sample, I set $t=0$ at the first quote revision, which usually occurs right after the opening trade. Hence, the return at $t=0$ reflects the overnight return, and the returns at $t=1, 2, 3, \ldots$ are the 5-minute returns. The average abnormal returns at $t=0$ and $t=1$ are large, 3.79% and 0.72%, and significant. Other abnormal returns are quite small and insignificant. The evidence suggests that market makers are able to incorporate most of the private information of analysts' recommendations within five minutes after the first quote revision.

For the NASDAQ/OTC market, it should be pointed out that I set $t=0$ to be 9:30. Since the OTC market opens at 9:30, I intend to see to what extent market makers adjust

quotes before the market opens. For most sample firms, I observe substantial quote revisions before the market opens at 9:30 on the news release day. Since traders can submit orders before the market opens, market makers can thus learn from traders even before the market opens. Appendix D shows a typical example of quote revisions before 9:30 on the news release day.

For the NASDAQ/OTC sample, the average abnormal returns are significant at t=0 (3.20%), t=1 (2.19%), t=2 (0.68%), and t=3 (0.34%). These results indicate that OTC market makers adjust quote prices to incorporate private information of analysts' recommendations within 15 minutes after the market opens. Surprisingly, about half of abnormal returns occur before the market opens. Since the average abnormal return at t=3 is relatively small, the previous statement that most of the information contained in analysts' recommendations is impounded into stock prices within ten minutes on the NASDAQ/OTC market is still valid.

On average, the private information period, i.e., the time between analysts' recommendations released to the public and the market opening at 9:30, is about two hours and 38 minutes in the NYSE/AMEX sample, and is about two hours and 51 minutes in the NASDAQ/OTC market. If it is true that stock prices quickly reflect private information of analysts' recommendations, no valuation effect would be expected at the time the news is released via the DJNW to the public.

Indeed, as shown in Table 25 for the NYSE/AMEX sample and in Table 26 for the NASDAQ/OTC sample, no abnormal returns when analysts' recommendations are released to the public.

4.3.3 Comparison of Efficiency (NYSE/AMEX vs NASDAQ)

Table 29 shows that dealers in the NASDAQ adjust before the market opens at 9:30 in the morning. On the other hand, specialists in the NYSE/AMEX do not adjust their quotes before the opening auction clears orders which have been accumulated since the previous market closing. The difference in their market mechanism is clearly demostrated in Tables 30-33, and Figures 6-9.

As Table 31 and Figure 7 show, there are significant increase in the quote adjustement before market opens when compared with the pre- and post-information period. In the NYSE/AMEX markets, there is no quote adjustmet before markets opens, whereas large increase in trading volume is observed. While slow adjustment in trading volume for firms in the NASDAQ occurs, fast adjustment occurs in the trading volume for firms in the NYSE/AMEX (Figure 8). Within 30 minutes of first trading, most abnormal trading activity occurs.

4.3.4 Discussion

In sum, the results in Tables 21 through 26 provide several implications. First, the average abnormal returns at the opening trades are more than 3%, implying that analysts' initial coverages have substantial information content.

Second, it takes at most 15 minutes for the market to absorb the information contained in analysts' recommendations, implying that stock prices rapidly adjust to private information. The evidence is consistent with Holden and Subrahmanyam's (1992) prediction.

Third, for the NYSE/AMEX sample, most of the abnormal returns occur at the opening trade. Besides the large trading activity in the opening call, abnormal returns are relatively small. These results can be interpreted that the call market at the opening transaction is able to reveal most of the information contained in analysts' recommendations.

Fourth, based on quote revisions, I find that about half of the abnormal return in the NASDAQ/OTC sample occurs before the market opens. This implies that market makers are able to perceive some private information even before trading begins.

Fifth, for the NASDAQ/OTC sample, the abnormal return at the first trade is large. However, I also observe relatively large abnormal returns after the opening trades. This implies that a relatively large portion of information is not revealed in the first trade in the dealership market. Thus, the call market appears to be slightly more efficient than the dealership market in reflecting private information. However, the dealership market is ready for trading when the market opens, while in the call market it takes about ten minutes for the specialist to clear the market. Therefore, there is a tradeoff between efficiency (or the amount of information revealed from one trade in a market) and time to complete the trade.

4.4 The Choice of Trade Size

In this section I test the stealth trading hypothesis proposed by Barclay and Warner (1993). They argue that informed traders tend to concentrate their trades in medium sizes, ranging from 500 to 9,900 shares. To test this hypothesis, I follow Barclay and Warner's procedure to divide trades into small size if a trade is from 100

Table 21

Five minute interval abnormal returns, proportion of positive returns, and cumulative abnormal returns of 42 NYSE/AMEX firms whose initial coverage appeared on the Broad Tape in 1991. 0 in five minute interval refers to the first trade (overnight return) of the news release day.

5 minute interval	Abnormal returns(%)	t-value	Proportion of positive returns(%)	Cumulative returns(%)
-20	-0.02	-0.28	0.33	-0.02
-15	-0.06	-1.51	0.40	-0.11
-10	0.02	0.35	0.40	-0.08
-9	-0.04	-0.95	0.33	-0.12
-8	0.11	1.73	0.45	-0.01
-7	-0.08	-1.54	0.38	-0.09
-6	0.08	1.67	0.45	-0.01
-5	0.02	0.36	0.40	0.02
-4	0.01	0.35	0.31	0.02
-3	0.04	0.96	0.36	0.07
-2	-0.06	-0.81	0.31	0.01
-1	-0.02	-0.91	0.40	-0.01
0	3.78	6.30**	0.93	3.77
1	0.57	2.93**	0.57	4.34
2	0.16	0.95	0.45	4.49
3	0.10	0.57	0.40	4.60
4	0.01	0.08	0.33	4.61
5	0.20	0.79	0.43	4.81
6	-0.01	-0.03	0.40	4.81
7	0.32	2.01*	0.48	5.13
8	-0.15	-1.38	0.40	4.98
9	-0.11	-1.38	0.38	4.87
10	0.01	0.06	0.48	4.87
15	0.02	0.41	0.38	5.02
20	-0.03	-0.46	0.43	5.46

* significant at $\alpha=0.05$ level
** significant at $\alpha=0.01$ level.

Table 22

Five minute interval abnormal returns, proportion of positive returns, and cumulative abnormal returns of 45 NASDAQ firms whose initial coverage appeared on the Broad Tape in 1991.

5 minute interval	Abnormal returns(%)	t-value	Proportion of positive returns(%)	Cumulative returns(%)
-20	0.35	1.66	0.44	0.35
-15	0.04	0.22	0.33	0.12
-10	0.46	1.97*	0.39	0.43
-9	-0.13	-0.81	0.28	0.30
-8	-0.02	-0.14	0.33	0.28
-7	0.09	0.50	0.39	0.36
-6	-0.23	-1.82	0.22	0.13
-5	-0.06	-0.37	0.33	0.07
-4	0.25	1.04	0.28	0.32
-3	0.13	1.38	0.33	0.45
-2	-0.01	-0.06	0.42	0.43
-1	0.06	0.32	0.33	0.50
0	3.63	4.68**	0.78	4.13
1	1.61	3.25**	0.69	5.74
2	1.19	2.98**	0.69	6.93
3	0.49	1.54	0.50	7.42
4	0.25	0.67	0.36	7.66
5	-0.03	-0.13	0.36	7.63
6	0.26	0.97	0.44	7.89
7	-0.30	-1.07	0.36	7.59
8	0.09	0.35	0.47	7.67
9	0.19	0.87	0.39	7.86
10	0.15	0.71	0.42	8.01
15	-0.22	-1.00	0.31	7.94
20	0.08	0.26	0.36	8.27

* significant at $\alpha=0.05$ level

** significant at $\alpha=0.01$ level.

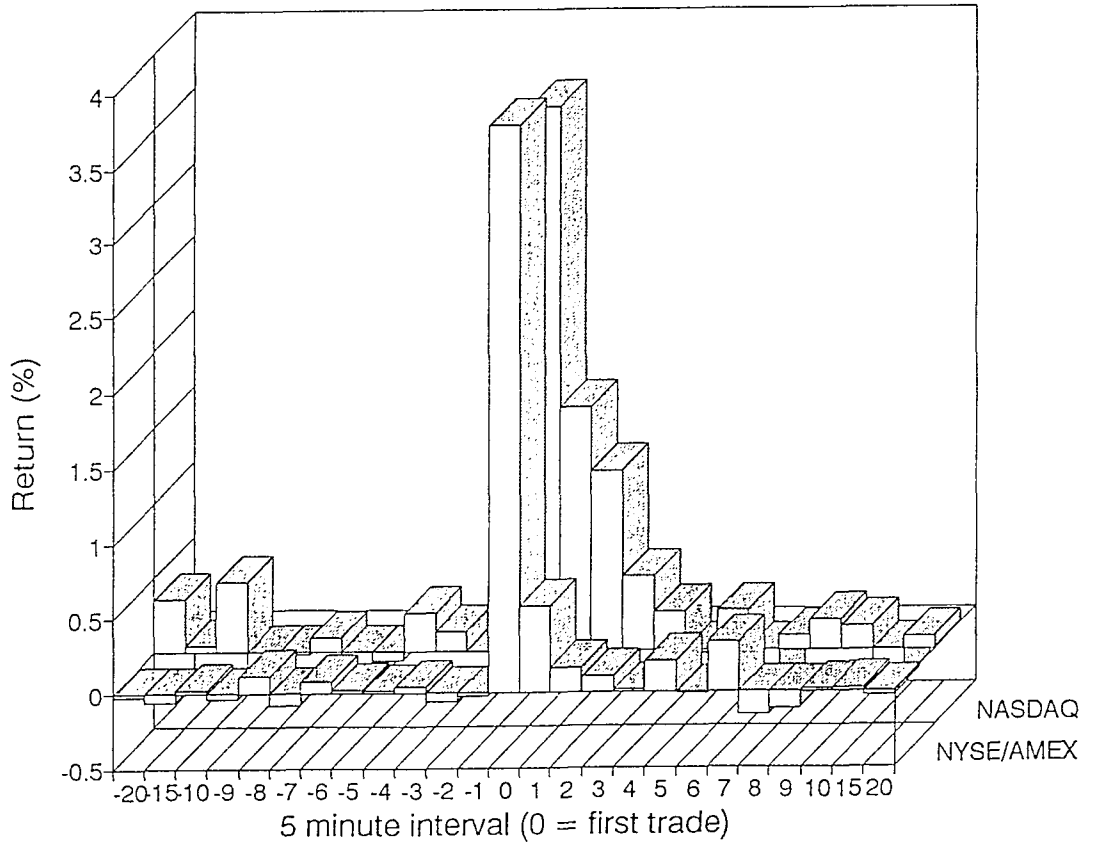

Figure 4: Abnormal returns for stocks in the NYSE/AMEX vs NASDAQ

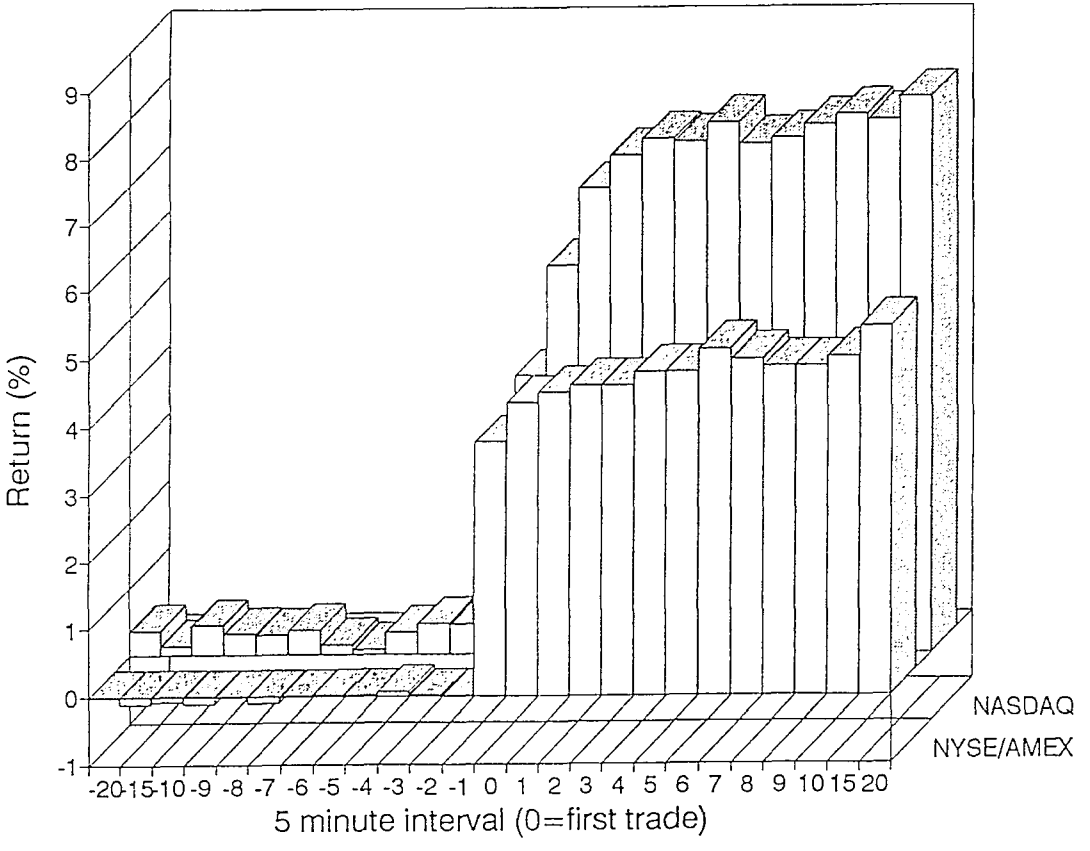

Figure 5: Cumulative abnormal returns for firms in the NYSE/AMEX vs NASDAQ

Table 23

Five minute interval quote mid-point returns, proportion of positive returns, and cumulative abnormal returns of 42 NYSE/AMEX firms whose initial coverage appeared on the Broad Tape in 1991.

5 minute interval	Abnormal returns(%)	t-value	Proportion of positive returns(%)	Cumulative returns(%)
-20	-0.05	-1.04	0.31	-0.05
-15	0.02	0.39	0.45	-0.11
-10	-0.01	-0.13	0.43	-0.03
-9	0.01	0.25	0.43	-0.02
-8	0.04	1.13	0.40	0.02
-7	-0.03	-0.90	0.40	-0.01
-6	0.02	0.48	0.40	0.01
-5	-0.03	-0.70	0.36	-0.03
-4	0.01	0.52	0.33	-0.01
-3	-0.01	-0.78	0.38	-0.03
-2	0.02	1.85	0.43	-0.01
-1	-0.00	-0.60	0.38	-0.01
0	3.79	6.79**	0.95	3.78
1	0.72	3.06**	0.60	4.50
2	0.11	0.82	0.45	4.61
3	0.00	0.06	0.38	4.62
4	0.10	1.33	0.52	4.72
5	0.10	0.45	0.43	4.82
6	0.07	0.66	0.40	4.89
7	0.02	0.22	0.48	4.91
8	0.06	0.47	0.48	4.97
9	-0.06	-1.28	0.38	4.91
10	-0.12	-1.07	0.43	4.78
15	0.06	1.10	0.43	5.07
20	0.04	0.73	0.52	5.42

* significant at $\alpha=0.05$ level

** significant at $\alpha=0.01$ level.

Table 24

Five minute interval quote mid-point return, proportion of positive returns, and cumulative abnormal returns of 45 NASDAQ firms whose initial coverage appeared on the Broad Tape in 1991.

5 minute interval	Abnormal returns(%)	t-value	Proportion of returns(%)	Cumulative returns(%)
-20	-0.02	-1.21	0.30	-0.02
-15	-0.02	-0.44	0.30	-0.04
-10	0.01	0.74	0.30	0.14
-9	0.02	0.86	0.32	0.16
-8	0.03	0.72	0.32	0.18
-7	0.06	0.82	0.32	0.24
-6	-0.01	-0.32	0.32	0.24
-5	0.07	0.79	0.34	0.31
-4	0.02	1.56	0.34	0.33
-3	0.11	1.50	0.39	0.44
-2	0.10	2.16*	0.43	0.54
-1	0.07	1.82	0.41	0.61
0	3.20	4.80**	0.84	3.81
1	2.19	4.81**	0.70	6.00
2	0.68	3.29**	0.57	6.68
3	0.34	2.47*	0.43	7.02
4	0.29	1.41	0.39	7.31
5	-0.02	-0.21	0.30	7.28
6	-0.05	-0.70	0.32	7.23
7	-0.09	-0.60	0.34	7.15
8	0.12	1.48	0.36	7.27
9	0.05	0.99	0.34	7.32
10	-0.02	-0.50	0.34	7.29
15	-0.03	-0.59	0.32	7.37
20	0.13	1.33	0.34	7.54

* significant at $\alpha=0.05$ level

** significant at $\alpha=0.01$ level.

Table 25

Five minute interval abnormal returns, proportion of positive returns, and cumulative abnormal returns of 42 NYSE/AMEX firms whose initial coverage appeared on the Broad Tape in 1991.

5 minute interval	Abnormal returns(%)	t-value	Proportion of positive returns(%)	Cumulative returns(%)
-20	0.23	1.19	0.48	0.23
-15	0.23	1.10	0.39	0.77
-10	-0.11	-1.37	0.32	0.84
-9	0.23	0.97	0.41	1.07
-8	0.13	0.89	0.36	1.20
-7	0.30	1.95	0.55	1.50
-6	0.04	0.65	0.43	1.54
-5	0.34	0.94	0.43	1.89
-4	0.08	0.61	0.45	1.96
-3	-0.03	-0.21	0.34	1.94
-2	0.18	1.67	0.45	2.11
-1	0.03	0.30	0.43	2.15
0	-0.06	-1.22	0.36	2.08
1	0.03	0.29	0.41	2.11
2	0.09	1.00	0.48	2.20
3	0.16	2.01*	0.52	2.36
4	-0.03	-0.35	0.45	2.33
5	0.12	1.65	0.41	2.45
6	0.01	0.17	0.41	2.46
7	0.01	0.15	0.41	2.47
8	-0.14	-1.49	0.41	2.32
9	-0.09	-1.39	0.39	2.23
10	0.07	0.75	0.36	2.30
15	0.15	1.50	0.43	2.33
20	0.06	1.11	0.44	2.42

* significant at $\alpha=0.05$ level
** significant at $\alpha=0.01$ level.

Table 26

Five minute interval abnormal returns, proportion of positive returns, and cumulative abnormal returns of 45 NASDAQ firms whose initial coverage appeared on the Broad Tape in 1991. 0 in 5 minute interval refers to the first trade after the news appeared on the Broad tape.

5 minute interval	Abnormal returns(%)	t-value	Proportion of positive returns(%)	Cumulative returns(%)
-20	-0.04	-0.18	0.36	-0.04
-15	0.21	0.66	0.33	1.34
-10	-0.03	-0.17	0.36	1.69
-9	0.41	2.08*	0.48	2.10
-8	0.13	0.54	0.32	2.23
-7	-0.01	-0.08	0.39	2.22
-6	0.20	1.25	0.41	2.42
-5	-0.05	-0.32	0.30	2.37
-4	-0.10	-0.50	0.36	2.27
-3	-0.30	-1.36	0.36	1.97
-2	0.19	1.00	0.41	2.16
-1	0.02	0.25	0.36	2.18
0	-0.18	-1.54	0.32	1.99
1	0.12	0.91	0.41	2.12
2	-0.00	-0.03	0.32	2.11
3	0.32	1.59	0.45	2.43
4	-0.07	-0.37	0.40	2.35
5	-0.05	-0.23	0.40	2.31
6	-0.06	-0.45	0.34	2.25
7	0.10	0.40	0.36	2.35
8	-0.65	-1.54	0.30	1.69
9	0.33	0.78	0.39	2.02
10	0.23	1.17	0.47	2.25
15	-0.20	-1.54	0.32	2.12
20	0.21	0.88	0.41	2.10

* significant at $\alpha=0.05$ level
** significant at $\alpha=0.01$ level.

Table 27

Five minute interval raw volume, abnormal volume of 42 NYSE/AMEX firms whose initial coverage appeared on the Broad Tape in 1991. 0 in 5 minute interval refers to the opening trade of the news release day.

5 minute interval	Raw volume (100s)	Abnormal volume(100s)	t-value
-20	29.29	15.07	2.13*
-15	16.64	2.43	1.93
-10	5.26	-8.95	3.02**
-9	10.10	-4.98	1.76
-8	12.64	-1.69	2.44*
-7	17.60	2.38	2.89**
-6	17.81	3.59	2.59**
-5	23.81	6.07	2.65**
-4	8.81	-6.15	2.80**
-3	14.98	-4.19	2.15*
-2	7.74	-13.22	2.49*
-1	3.24	-11.80	1.23
0	268.21	193.81	5.82**
1	66.57	52.35	4.07**
2	128.76	114.55	4.47**
3	122.90	108.69	4.95**
4	120.05	105.83	3.18**
5	93.55	79.33	3.95**
6	84.64	70.43	3.63**
7	48.69	34.47	4.12**
8	57.17	42.95	3.84**
9	36.52	22.31	4.03**
10	46.81	32.59	4.06**
15	38.60	24.38	2.11*
20	28.57	14.35	3.80**

* significant at $\alpha=0.05$ level
** significant at $\alpha=0.01$ level.

Table 28

Five minute interval raw volume, abnormal volume of 38 NASDAQ firms whose initial coverage appeared on the Broad Tape in 1991. 0 in 5 minute interval refers to the opening trade of the news release day.

5 minute interval	Raw volume (100s)	Abnormal volume(100s)	t-value
-20	12.17	-0.85	-0.12
-15	13.97	1.59	0.27
-10	20.22	7.63	0.64
-9	21.64	9.65	0.83
-8	15.39	3.40	0.38
-7	27.67	14.94	1.27
-6	9.86	-2.90	-0.87
-5	19.83	6.55	1.19
-4	64.78	52.79	1.12
-3	22.44	6.04	0.89
-2	34.81	17.40	1.31
-1	24.75	2.75	0.30
0	17.88	-18.05	-2.67**
1	153.06	141.07	6.99**
2	229.61	217.62	5.30**
3	117.81	105.82	5.70**
4	149.08	137.09	2.97**
5	152.44	140.46	3.89**
6	145.39	133.40	3.31**
7	94.83	82.84	4.20**
8	74.72	62.73	3.48**
9	43.75	31.76	2.88**
10	77.14	65.15	2.67**
15	44.86	32.87	2.34*
20	61.78	49.79	2.16*

* significant at $\alpha=0.05$ level
** significant at $\alpha=0.01$ level.

Table 29

Firm symbol, calendar day, time, ask and bid quotes, and cumulative seconds extracted from the ISSM files for a firm which received analysts' initial coverage in 1991. Event day 0 is the day the intial coverage appeared on the Dow Jones News Wire.

FIRM SYMBOL	EVENT DAY	TIME (Hr:Min)	ASK	BID	QUOTE-MID POINT
BIOX	-1	8:16	18.75	18	18.375
BIOX	-1	11:27	18.75	18.25	18.5
BIOX	-1	11:58	19	18.25	18.625
BIOX	-1	12:10	19	18.5	18.75
BIOX	-1	14:03	19.25	18.5	18.875
BIOX	-1	14:04	19.25	18.75	19
BIOX	-1	14:06	19.5	18.75	19.125
BIOX	-1	14:06	19.5	19	19.25
BIOX	-1	14:11	19.75	19	19.375
BIOX	-1	14:14	19.75	19.25	19.5
BIOX	-1	14:15	20	19.25	19.625
BIOX	-1	14:15	20	19.5	19.75
BIOX	-1	14:35	20.25	19.5	19.875
BIOX	-1	15:10	20	19.5	19.75
BIOX	-1	15:37	20.25	19.5	19.875
BIOX	0	8:16	20.25	19.5	19.875
BIOX	0	8:56	20.25	19.75	20
BIOX	0	9:03	20.25	20	20.125
BIOX	0	9:13	20.75	20	20.375
BIOX	0	9:13	20.75	20.5	20.625
BIOX	0	9:13	21	20.5	20.75
BIOX	0	9:13	21	20.75	20.875
BIOX	0	9:14	21.25	20.75	21
BIOX	0	9:15	21.25	21	21.125
BIOX	0	9:16	21.5	21.25	21.375
BIOX	0	9:18	21.75	21.5	21.625
BIOX	0	9:24	22	21.5	21.75
BIOX	0	9:24	22	21.75	21.875
BIOX	0	9:27	22.25	21.75	22
BIOX	0	9:28	22.5	21.75	22.125
BIOX	0	9:29	22.5	22	22.25
BIOX	0	9:44	22.5	21.75	22.125
BIOX	0	10:02	22.25	21.5	21.875
BIOX	0	10:03	22	21.5	21.75
BIOX	0	10:04	21.75	21	21.375
BIOX	0	10:04	21.5	21	21.25
BIOX	0	10:05	21.5	20.75	21.125

Table 30

Frequency of quote revisions at 5 minute interval in the NYSE/AMEX on the release day (via the Dow Jones News Wire) of analysts' initial coverages in 1991.

Three information periods are categorized; Pre-information period (days -50,-3), private-information period (day 0), and post-information periods (days +3,+10). Time interval 0 refers to the first quote on the announcement day. Statistical tests are performed between pre- and private-information period, and between pre- and post-information period.

Time interval	Pre-inform. period	Private-inform. period	Post-inform. period
0	1.00	1.00	1.00
1	2.08	3.61++	2.28
2	2.13	3.78++	2.49++
3	2.06	3.83++	2.20
4	2.01	3.00+	2.12
5	2.00	3.75++	2.21
6	2.00	3.36+	2.01
7	1.87	3.03+	2.10
8	1.85	2.87+	2.00
9	1.81	2.36	1.96
10	1.82	2.45	2.16
11	1.88	2.71	2.17
12	1.82	2.53+	1.97
13	1.85	3.52++	2.07
14	1.77	2.60+	1.90
15	1.72	2.30	2.27++
16	1.80	2.54	2.20
17	1.76	2.31	2.14+
18	1.72	2.18	1.85
19	1.75	1.96	2.04+
20	1.83	1.92	1.82

+, ++	positively significant at α=0.05, and α=0.01 level, respectively
-, --	negatively significant at α=0.05, and α=0.01 level, respectively

Table 31

Frequency of quote revisions at 5 minute interval in the NASDAQ on the release day (via the Dow Jones News Wire) of analysts' initial coverages in 1991.

Three information periods are categorized; Pre-information period (days -50,-3), private-information period (day 0), and post-information periods (days +3,+10). Time interval 0 refers to before 9:30 a.m. on the announcement day. Statistical tests are performed between pre- and private-information period, and between pre- and post-information period.

Time interval	Pre-inform. period	Private-inform. period	Post-inform. period
0	2.86	6.79++	2.66
1	2.03	5.18++	2.28
2	1.96	3.41++	1.65
3	1.76	2.00	1.86
4	1.68	3.13+	1.73
5	1.90	2.15	1.97
6	1.67	2.27	1.87
7	1.76	3.90	1.82
8	1.84	2.71	1.99
9	1.50	2.00	1.74
10	1.71	2.00	1.57
11	1.49	2.67	2.24
12	1.66	1.55	2.13
13	1.53	1.50	1.88
14	1.83	2.20	1.40
15	1.54	1.83	2.11
16	1.63	1.33	1.82
17	1.66	1.20	2.00
18	1.48	1.50	1.33
19	1.49	1.29++	1.28--
20	1.46	1.83	1.49

+, ++	positively significant at α=0.05, and α=0.01 level, respectively
-, --	negatively significant at α=0.05, and α=0.01 level, respectively

Table 32

Trading volume at 5 minute interval in the NYSE/AMEX on the release day (via the Dow Jones News Wire) of analysts' initial coverages in 1991.

Three information periods are categorized; Pre-information period (days -50,-3), private-information period (day 0), and post-information periods (days +3,+10). Time interval 0 refers to the first quote on the announcement day. Statistical tests are performed between pre- and private-information period, and between pre- and post-information period.

Time interval	Pre-inform. period	Private-inform. period	Post-inform. period
0	64.37	259.70++	57.44
1	55.36	92.76++	40.50
2	69.55	154.50++	41.50
3	79.52	139.50+	59.84
4	59.69	144.10	59.11
5	55.06	122.80+	50.50
6	53.03	122.60+	53.35
7	50.52	70.52	45.35
8	55.58	75.03	52.20
9	44.10	59.00	47.19
10	41.41	63.42	42.17
11	44.92	41.13	52.01
12	39.60	68.94+	41.15
13	49.63	53.68	38.71
14	44.04	29.70	48.76
15	45.95	67.54	47.91
16	36.79	67.97	63.10
17	38.89	36.65	47.03
18	36.81	34.96	59.79
19	36.95	75.03	49.12
20	42.25	42.86	39.87

+, ++ positively significant at α=0.05, and α=0.01 level, respectively
-, -- negatively significant at α=0.05, and α=0.01 level, respectively

Table 33

Trading volume at 5 minute interval in the NASDAQ on the release day (via the Dow Jones News Wire) of analysts' initial coverages in 1991.

Three information periods are categorized; Pre-information period (days -50,-3), private-information period (day 0), and post-information periods (days +3,+10). Time interval 0 refers to before 9:30 a.m. on the announcement day. Statistical tests are performed between pre- and private-information period, and between pre- and post-information period.

Time interval	Pre-inform. period	Private-inform. period	Post-inform. period
0	11.47	6.08--	8.57
1	80.86	166.20++	44.70-
2	88.18	229.60++	52.85
3	81.88	121.20	42.58--
4	66.37	162.60	41.55--
5	76.05	189.20+	37.39-
6	64.10	193.90+	47.57
7	61.33	113.80	29.06--
8	61.41	89.67	36.82-
9	60.15	58.33	38.56
10	54.91	95.76	32.69--
11	57.14	67.28	48.03
12	77.21	100.20	55.99
13	48.41	69.46	78.30
14	46.66	65.75	77.25
15	61.96	80.75	39.43
16	49.36	57.71	51.74
17	54.00	131.70	47.80
18	42.65	68.81	82.44
19	37.30	57.90	44.40
20	48.42	88.96	37.59

+, ++	positively significant at α=0.05, and α=0.01 level, respectively
-, --	negatively significant at α=0.05, and α=0.01 level, respectively

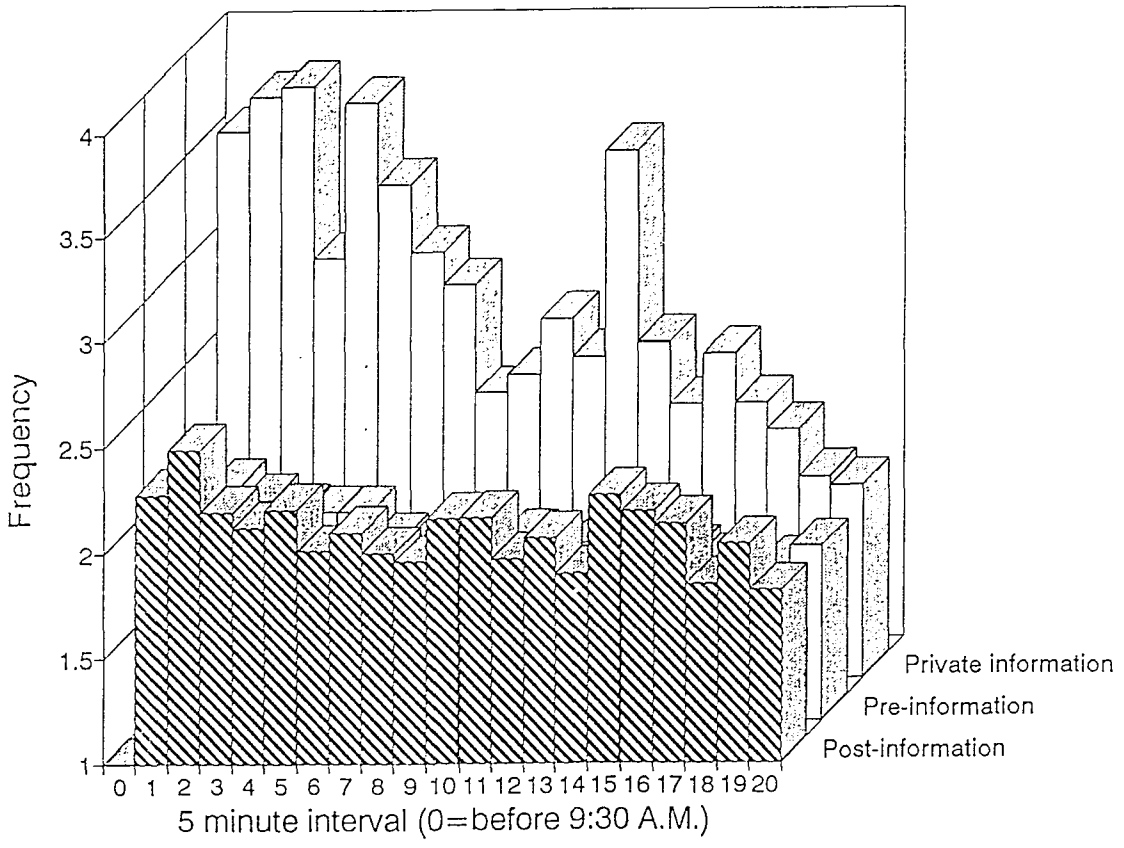

Figure 6: Frequency of quote changes for firms in the NYSE/AMEX

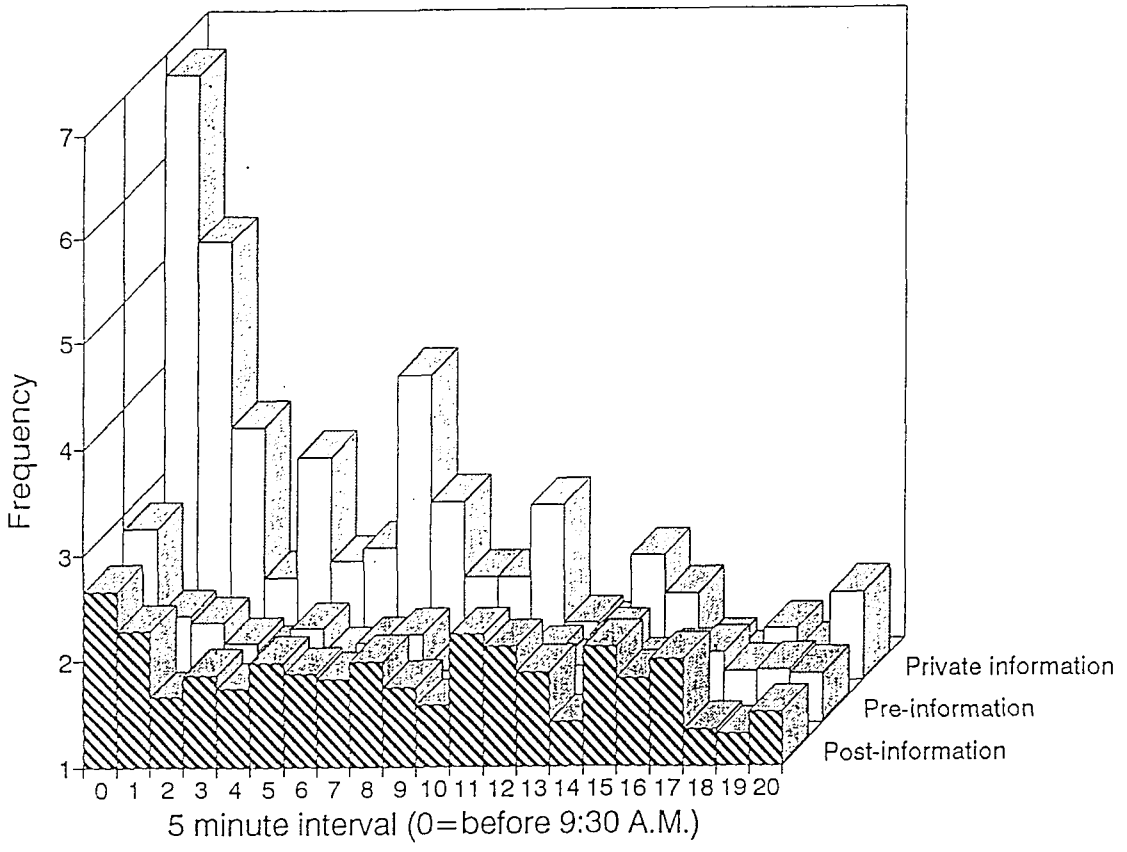

Figure 7: Frequency of quote changes for firms in the NASDAQ

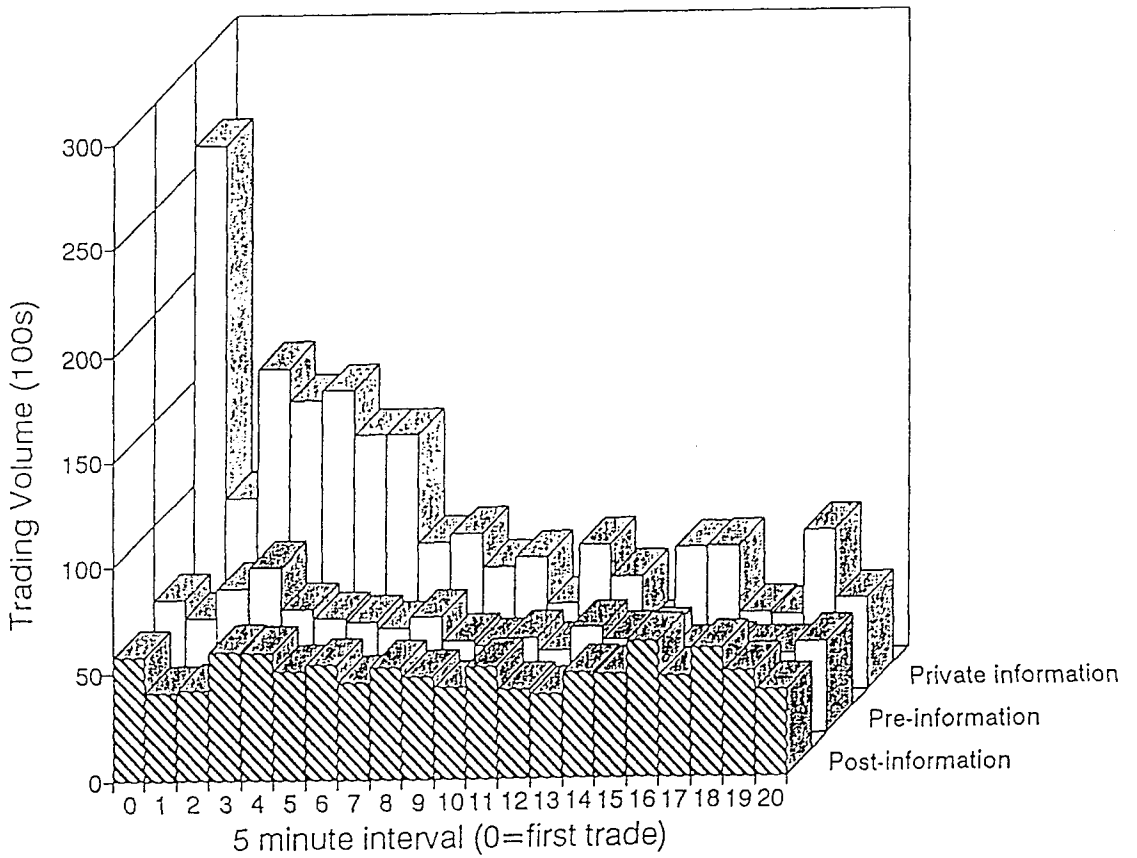

Figure 8: Trading volume for firms in the NYSE/AMEX

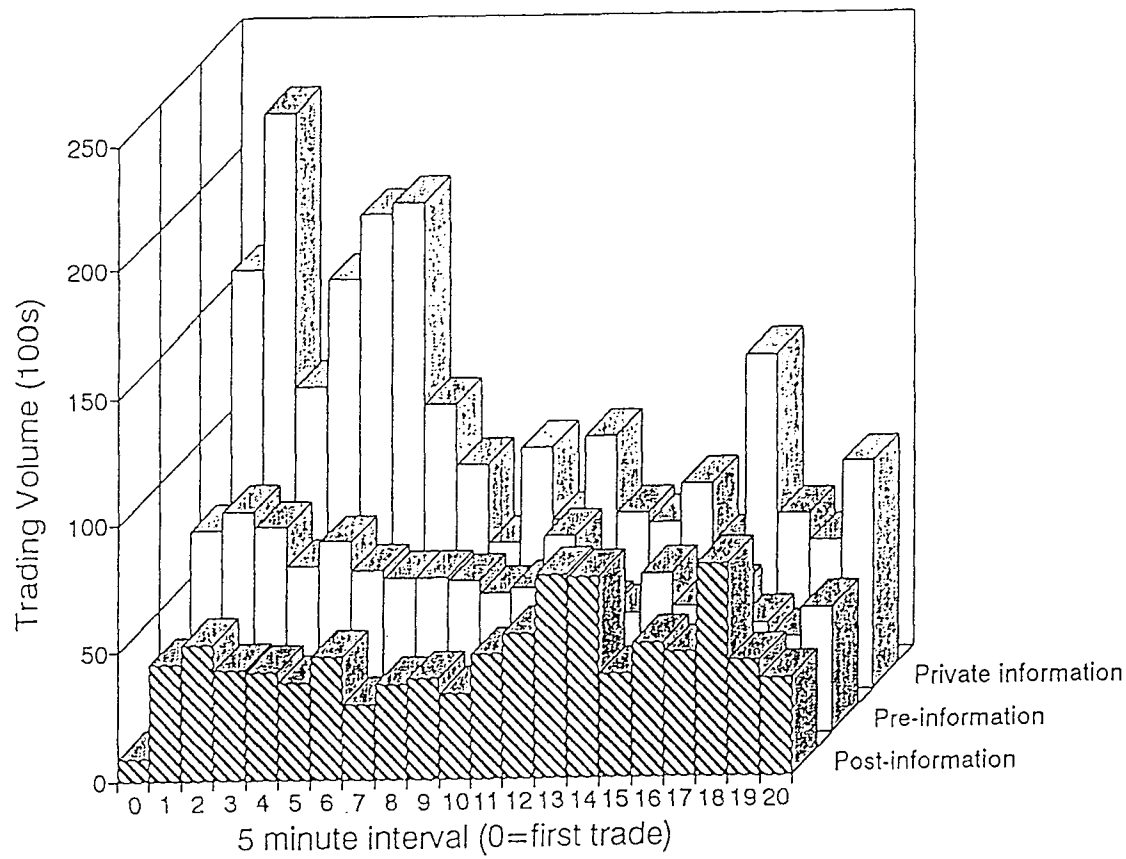

Figure 9: Trading volume for firms in the NASDAQ

to 400 shares, medium size if a trade is from 500 to 9,900 shares, and large size if a trade is 10,000 shares or more.

As discussed earlier, analysts' recommendations tend to be privately sent to clients in the early morning. Hence, I define the private information period as from market opening to the time that analysts' recommendations are released to the public. I also define the pre-information period from days -50 to -3, and the post-information period from days 3 to 10. To be comparable to the private information period, I include in analysis only trades within the period from opening to the release time in both the pre- and post-information periods. For example, if an analyst's recommendation on a firm is released to the public at 2:00 p.m., for this firm, only trades occurring in the period from opening to 2:00 p.m. each day are included in the analysis. This selection takes intraday trading patterns into consideration.

Table 34 reports the proportion of trades in each trade size category. For the NYSE/AMEX sample, the proportion of medium size trades significantly increases from 49% in the pre-information period to 64% of all trades in the private information period, while the proportions of small and large trades are significantly decreased. Similar results are presented in Panel B for the NASDAQ/OTC sample. The evidence thus supports Barclay and Warner's stealth trading hypothesis in that informed traders prefer to use medium size trades when they have private information.

The medium size trades range from 500 shares to 9,900 shares. In fact, we can further narrow down the informed traders' preference of trade size to 1,000 to 4,900

shares, since the increase in the proportion of trades in the private information period is, most apparently, in this trade size range.

Table 35 shows the proportion of trading volume in each trade size category. The results based on trading volume are also consistent with Barclay and Warner's hypothesis.

4.5 Summary and Conclusion

In this essay I have examined several issues related to informed trading. The main results are summarized as follows. First, the market is quite efficient in the strong-form sense. On average, it takes about five minutes for NYSE/AMEX stocks and about ten minutes for NASDAQ/OTC stocks to reflect most of private information contained in the analysts' recommendations. These results are consistent with Holden and Subrahmanyam's (1992) prediction that competition between informed traders tend to cause private information to be rapidly incorporated into stock prices.

Second, on the NYSE/AMEX the opening trade is conducted in the call market, while on the NASDAQ/OTC market the opening trade is conducted in the dealership market. Based on the magnitude of abnormal returns after the opening trade, the call market appears to be more efficient than the dealership market in dealing with private information. The evidence is consistent with Madhavan's (1992) model in that when information asymmetry is high, the call market is more efficient. However, the disadvantage of the call market is that it takes time for the specialist to clear the market, while the dealership market is ready for trades when the market opens.

Third, there is a substantial increase in proportion of medium size trades in the private information period, starting from the opening trade to the release of analysts' recommendations to the public. The evidence is consistent with Barclay and Warner's stealth trading hypothesis in that informed traders tends to concentrate their trades in medium size, ranging from 500 to 9,900 shares. In the private information period, the most significant increase is for trades in size from 1,000 to 4,900 shares, suggesting that this is the size the informed traders prefer to use when they have private information.

Table 34

Time-series behavior of proportion of daily trade frequency for individual securities, by size of trade. Sample: 42 NYSE/AMEX and 38 NASDAQ firms with initial coverage in 1991. Daily data are estimated from the first trade until the coverages appeared on the Dow Jones News Wire

Proportion of Trade Frequency

Size		Pre-inform. period (days -50,-3)		Private-inform. period (day=0)		Post-inform. period (t=3,10)
Panel A: NYSE/AMEX						
SMALL						
100		13.79		20.18++		15.58++
200		11.77		13.52		12.06
300	**41.03**	8.59	**45.03+**	5.64--	**42.37+**	8.03
400		6.86		5.69		6.70
MEDIUM						
500		10.36		10.04		11.10
600- 900		9.06		9.57		8.00
1,000-1,900		14.99		17.02		16.07
1,900-4,900	**43.30**	11.87	**52.01++**	9.53	**51.13++**	11.73
5,000-9,900		7.08		5.87		6.37
LARGE						
OVER 10,000		5.70		2.97--		4.35--
Panel B: NASDAQ						
SMALL						
100		12.70		9.06--		13.76
200		9.52		9.53		10.48
300	**34.55**	7.12	**25.95--**	5.16--	**35.77+**	6.86
400		5.14		2.20--		4.67
MEDIUM						
500		8.63		8.66		8.84
600- 900		5.92		3.61--		5.32
1,000-1,900		22.01		34.41++		23.56
1,900-4,900	**57.02**	12.04	**68.50++**	13.50	**57.41**	12.21
5,000-9,900		8.40		8.12		7.48
LARGE						
OVER 10,000		8.42		5.54--		6.82--

++ and + (-- and -) indicate that proportion of trade frequency is significantly larger (smaller) than that in the pre-information period at the 1% and 5% level, respectively. The numbers in bold character refer to the average total proportion of trade frequency in each size category.

Table 35

Time-series behavior of proportion of daily trade volume for individual securities, by size of trade. Sample: 42 NYSE/AMEX and 38 NASDAQ firms with initial coverage in 1991. Daily data are estimated from the first trade until the coverages appeared on the Dow Jones News Wire

Proportion of Trade Volume

Size		Pre-inform. period (days -50,-3)		Private-inform. period (day=0)		Post-inform. period (t=3,10)
Panel A: NYSE/AMEX						
SMALL						
100		0.77		3.12+		1.17++
200		1.29		3.64+		1.76+
300	**4.96**	1.41	**13.66+**	1.83	**6.54+**	1.82
400		1.49		5.07		1.79
MEDIUM						
500		2.76		5.16		4.20
600- 900		3.42		7.63		3.77
1,000-1,900		9.24		16.00+		13.90-
1,900-4,900	**50.83**	16.36	**63.76++**	16.22	**61.69++**	18.95
5,000-9,900		19.05		18.77		20.87
LARGE						
OVER 10,000		44.20		22.55--		31.78--
Panel B: NASDAQ						
SMALL						
100		0.63		0.70		0.78
200		0.90		1.43++		1.18+
300	**3.45**	0.97	**3.94+**	1.14	**4.07+**	1.09
400		0.95		0.67		1.01
MEDIUM						
500		2.01		2.90++		2.41+
600-900		1.96		1.92		1.98
1,000-1,900		10.70		21.16++		13.56++
1,900-4,900	**46.79**	13.39	**66.79++**	19.34++	**53.17+**	15.61
5,000-9,900		18.73		21.47		19.61
LARGE						
OVER 10,000		49.76		29.29--		42.76-

++ and + (-- and -) indicate that proportion of trade frequency is significantly larger (smaller) than that in the pre-information period at the 1% and 5% level, respectively. The numbers in bold character refer to the average total proportion of frequency in each size category.

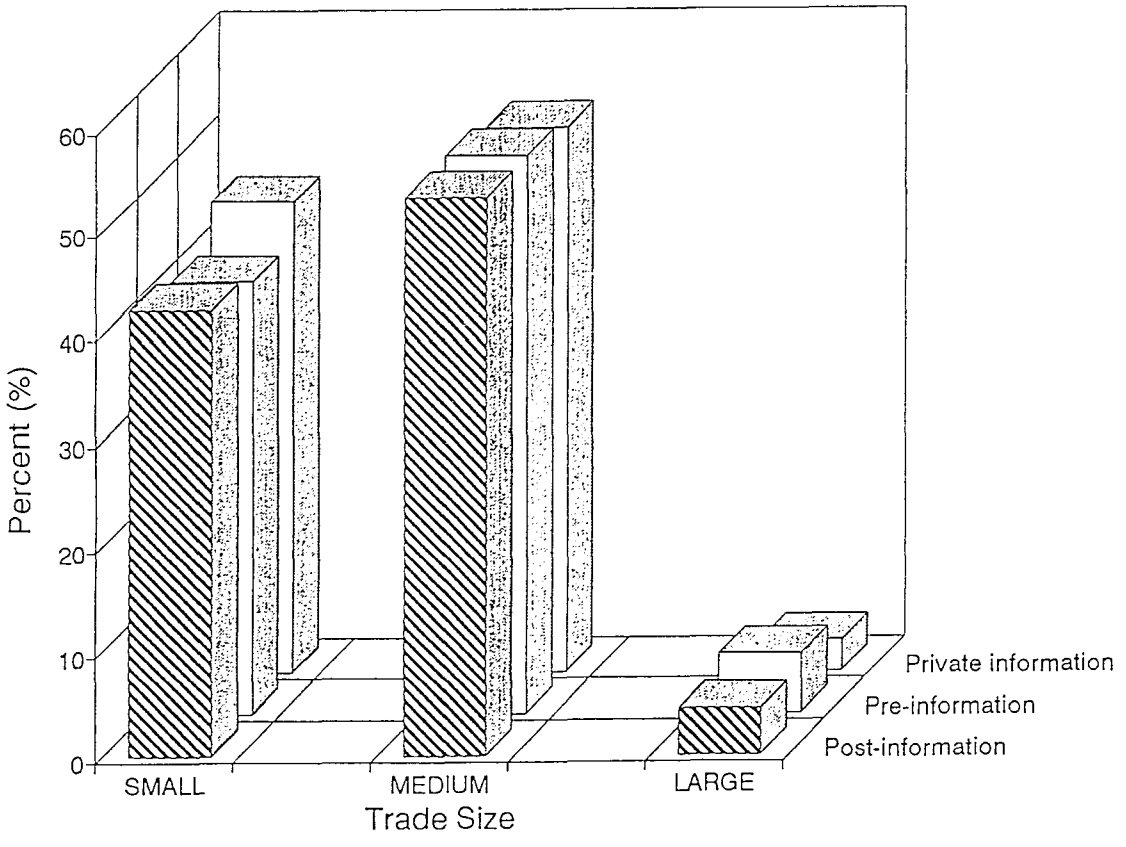

Figure 10: Proportion of trade frequency for firms in the NYSE/AMEX

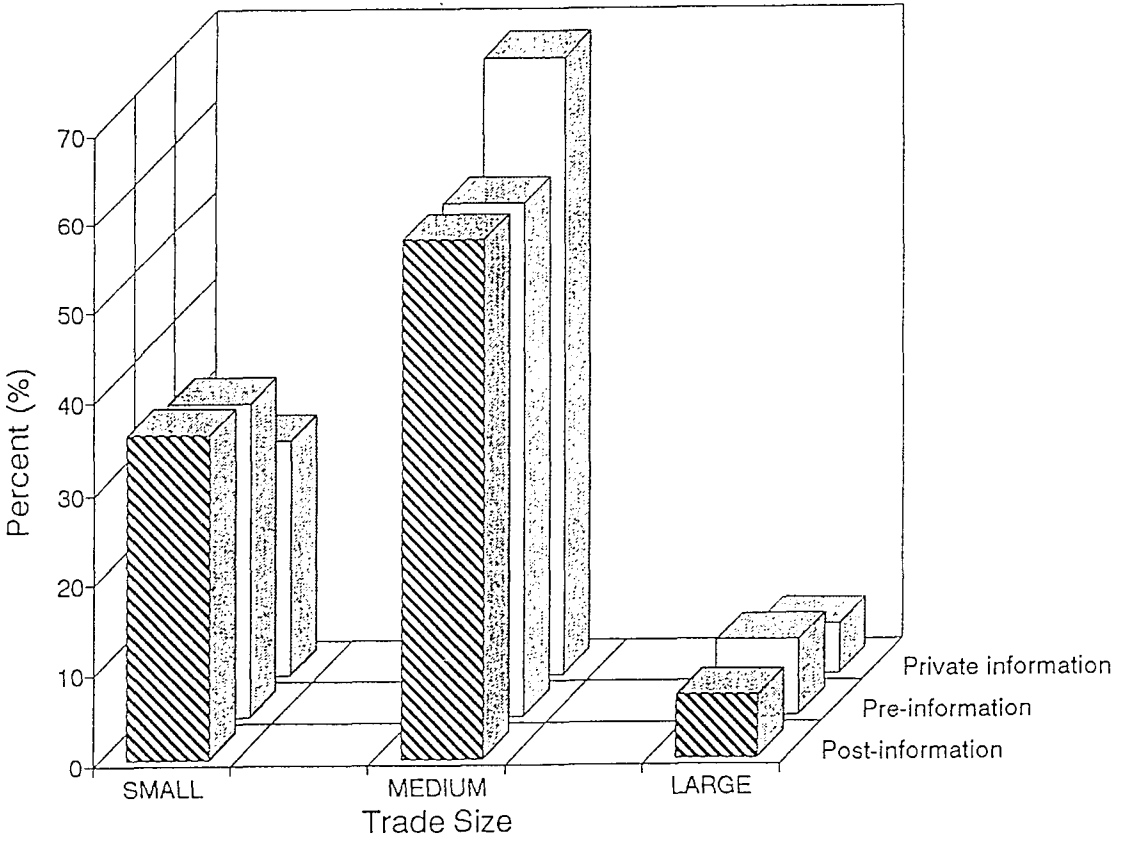

Figure 11: Proportion of trade frequency for firms in the NASDAQ

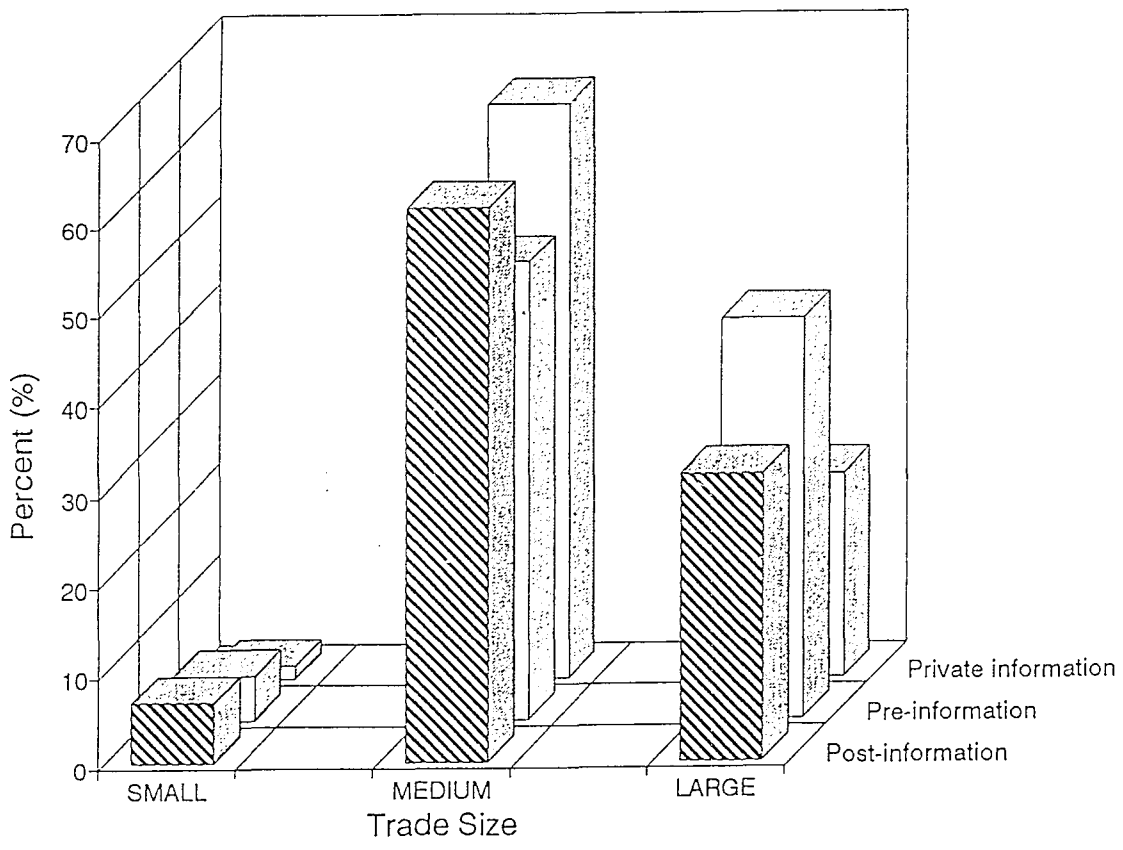

Figure 12: Proportion of trading volume for firms in the NYSE/AMEX

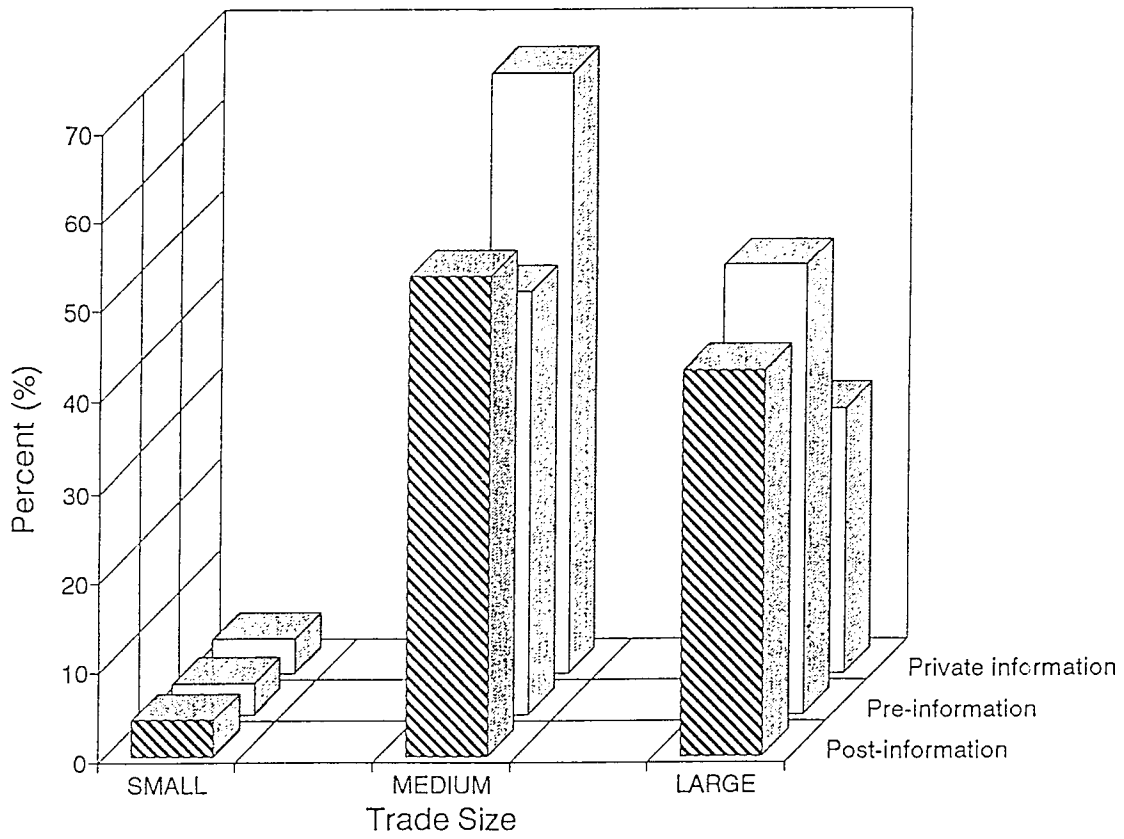

Figure 13: Proportion of trading volume for firms in the NASDAQ

Chapter 5

Concluding Remarks

This dissertation has explored the information content and market microstructure effects of analysts' initial coverages. Its contributions can be summarized as follows. First, I find that a large abnormal return is associated with the release of analysts' initial coverages. The abnormal return is much larger than the abnormal returns found in previous studies on analysts' buy recommendations. The evidence implies that analysts' initial coverages have substantial marginal information content and that it is greater than the marginal information content of buy recommendations on firms already in the analysts' lists.

Second, I find that firm size is an important determinant of the abnormal return on the release day of analysts' recommendations. The results are consistent with Stickel (1985), Atiase (1985), and Slovin, Johnson, and Glascock (1992), which show that marginal information contents of public announcements are larger for small firms than for large firms.

Third, I find that there is a positive relation between the information content of analysts' initial coverages and normal trading volume. The result is in support of Bhushan's (1989) argument that the price system of firms with high volume carries more noise. Hence, the marginal information content of analysts' recommendations is greater for firms with higher volume.

Fourth, with the use of intraday transaction and quote data, I find that the U.S.

stock markets are quite efficient in the strong form. On average, it takes about five minutes for NYSE/AMEX stocks and about ten minutes for NASDAQ stocks to reflect most of private information contained in the analysts' recommendations. The evidence is consistent with Holden and Subrahmanyam (1992) who posit that private information will be quickly incorporated into stock prices when there is competition between informed traders.

Fifth, by examining abnormal returns at the first trade and subsequent trades, I find that private information can be more efficiently revealed in the call market than in the dealership market. However, in the call market, on average, it takes about ten minutes from opening at 9:30 a.m. for the specialist to clear the market. On the other hand, the dealership market is ready for trades when the market opens. The evidence thus suggests a tradeoff between the efficiency of a market and the time to complete a trade in that market.

Sixth, there is a substantial increase in proportion of trades in medium size, ranging from 500 to 9,900 shares, in the private information period, starting from the opening trade to the release of analysts' recommendations to the public. The evidence is consistent with Barclay and Warner's stealth trading hypothesis that informed traders tend to concentrate their trades in medium size.

The overall evidence in this study suggests that although analysts' initial buy recommendations have a significant valuation effect, the profitability of following analysts' recommendations may be not be large. For one thing, most of the abnormal returns occur at the opening trade. This suggests that the price (informed) traders pay

to buy shares at the opening already reflects most of the private information. Furthermore, the rest of the private information is quickly impounded into stock prices. If transaction costs, including brokers' commissions, dealers' bid-ask spreads, and time and efforts of receiving and implementing analysts' recommendations, are taken into account, the net profit is likely to be small. Therefore, the valuation effect of analysts' recommendations and its economic value for informed traders should be interpreted with caution.

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Appendix

A sample of document, which is extracted from the TEXT of Dow Jones News Services for a firm with initial coverage in 1991.

DOCUMENT= 29
AN 190524-1755.
HL * Dean Witter Issues Initial Buy Rating On Coventry; Stk Up
DD 05/24/91
SO * DOW JONES NEWS WIRE (DJ)
CO CVTY
LP By Phillip E. Nalbone
Dow Jones Staff Reporter
TX NEW YORK -DJ- Peter Small, senior vice president of marketing and public relations at Coventry Corp., says the company's stock apparently is higher in response to a report * today by Dean Witter Reynolds Inc. analyst Todd Richter.
"If the stock is up, it's probably due to the issuance of a favorable report by Mr. Richter," Small says, adding he hasn't seen a copy of the report. Small says there haven't been any recent corporate developments that might have triggered today's activity in the stock. Dean Witter was the managing underwriter of Coventry's
* April 17 initial public offering of 3 million common shares at a price of $14.50 a share. Small says the other lead underwriters of the offering - Donaldson Lufkin & Jenrette Securities and Smith Barney, Harris Upham & Co. - haven't yet published reports on Coventry. Coventry, based in Nashville, Tenn., is a managed health care company with health-maintenance organizations in Pittsburgh and Harrisburg, Pa., and St. Louis. Coventry also operates an individual health benefits company, Fort Worth, Texas-based American Service Cos., which provides insurance coverage to individuals and small businesses in 42 states. Today, the stock is up 1 3/4, or 10.8 pc, at 18 1/2 on 121,700 shares, compared with average daily volume of about 229,000. Today's high of 18 1/2 is the stock's highest level
* since the initial offering and represents a 28 pc gain over the offering price. Dean Witter's Richter tells Dow Jones Professional
* Investor Report that he initiated coverage of Coventry today with a "buy" recommendation. He notes that the health management group has been strong the past several trading sessions, but that Coventry's shares haven't participated in the group's upward move. At yesterday's closing price of 16 1/4, Richter says, the stock was trading at a multiple of less than 10 times estimated 1992 earnings of $1.65 a share. That multiple, he says, represented "way too wide a gap" from the other stocks in the group, which have tended to trade recently in a multiple range of 13 to 15 times estimated 1992 earnings. * For 1991, the Dean Witter analyst is estimating earnings of $1.40 a share, compared with 1990 earnings of $1.18.
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Vita

Sok Tae Kim received a Bachelor of Arts in English Literature from Dong-Guk University in 1984. After working as an English instructor in a foreign language institute, he came to America in 1985. He matriculated in the University of New Orleans' Masters of Business Administration program and received an MBA in the spring of 1988. In 1990, he entered Louisiana State University and completed his doctoral degree four years later in the summer of 1994. He has accepted a position of manager in Dongsuh Securities co. in Seoul, Korea, effective August 1, 1994.

DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Sok Tae Kim

Major Field: Business Administration (Finance)

Title of Dissertation: Information Content and Market Microstructure Effects of Analysts' Recommendations

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination:

May 18, 1994