The Adjustment of Stock Returns to Block Trading Information

Reena Aggarwal
Georgetown University

Son-Nan Chen
University of Maryland

Abstract

This study examines the adjustment of stock returns to block trading information. The results indicate that most block trade information does not result in statistically significant excess returns or return volatility. There is a slight indication of increased variability. A depressed price pressure is found to cause a longer period of increased volatility for minus tick blocks. Larger blocks are not found to take longer adjustment times. Despite all the recent publicity given to intraday stock market volatility due to actions taken by institutional investors, the study suggests that block trading by institutional investors does not disrupt the market.

Introduction

A market in which prices fully and instantaneously reflect all available relevant information is called efficient. Fama [4] defines three types of efficiency to operationalize the concept of capital market efficiency. The three types differ with respect to the information that is considered to be relevant. In weak form efficiency, the historical price information cannot be used to achieve excess returns. Semistrong form efficiency states that no investor can earn excess returns from trading rules based on publicly available information (such as annual reports or earnings announcements). Strong form efficiency rules out excess returns based on any information, whether private or public. The adjustment to new information must be accomplished in a short time period in efficient markets. In practice, however, the adjustment process cannot be completed instantaneously. Thus, the speed of adjustment is an important aspect of market efficiency.

Block trades allow study of the behavior of institutional investors--pension funds, insurance companies, endowments, mutual funds, bank trust departments, security dealers, and money management firms. Institutions and dealers account for 80 percent to 90 percent of all stock exchange trading. As a result of their size and access to information, they play a central role in influencing stock prices. The individual investor is no longer the dominant force in the market.

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The study of block trades helps to assess whether this institutional activity disrupts the market.

This paper examines the adjustment of security returns to block trade information. The adjustment process to the release of this new information is examined using daily data; therefore, no conclusions are made regarding intraday trading.[1] The first objective is to determine the beginning and ending time of the adjustment process due to block trades. The difference between the ending time and beginning time provides an estimate of the total adjustment time. In addition, the adjustment process associated with the block trades is examined by the size of the transaction and by plus, minus, and zero tick blocks. All securities are perfect substitutes for each other in perfect capital markets. Therefore, the number of shares traded in a given security should have no effect on its price. If capital markets are not perfect, however, the block trade could have two effects. If the block is believed to carry new information, stock prices will change permanently. If buyers must incur extra costs to accept the block, price may decline temporarily to reflect price pressure. The price pressure hypothesis implies that the larger the number of shares traded in a block trade, the greater the necessary inducement. This study tests the above hypotheses empirically.

The use of monthly trading data in many previous event studies (e.g., Fama, Fisher, Jensen, and Roll [5] and Charest [1]) obscured much of the information concerning returns around the announcement time. Daily price data are employed for the year 1977[2]--no previous empirical models are used in the study. In addition, all previous empirical studies on block trades have used data collected before negotiated commissions took effect (1968-1969). Data for a time period after the negotiated commissions are used. A robust methodology shows how volatility and return of securities change around the block trading time.

Previous Research

Previous studies relating to speed of adjustment are limited in number. Patell and Wolfson [9] examine the effects of earnings and dividend announcements on intraday stock price behavior. Two types of analysis are conducted to detect any systematic influences of the announcements on stock prices. First, the stochastic process tests compare the time series properties of

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[1]The authors wish to thank an anonymous referee for his or her insightful comment regarding the intraday impact of block trading.

[2]Data are used for 1977 because of their availability. The sample results in 2,015 blocks, which is a sufficiently large sample.

consecutive price changes during disclosure and nondisclosure periods. Next, they determine the increased variability of stock returns. Their results indicate that the major adjustment occurs within 15 minutes of an earnings release. Essentially an entire trading day is taken to absorb an earnings announcement. Large variance increases persist up to four hours after the disclosure, and smaller but significant variance increases continue into the following day. Dividend announcements did not induce large increases in variance, but significant disturbances occur at the announcement of dividend changes.

Dann, Mayers, and Raab [3] provide empirical evidence about the price effects of block trading. They perform tests of a trading strategy for the period July 1968 to December 1969 based on the notion that large block trades signal predictable dependencies in subsequent stock prices. The open-to-block price decline was at least 4.56 percent for each block in their sample. The results indicate that investors would have to react within five minutes of the announcement in order to earn a positive return. This is not practical because of the approximate 15-minute time lag between the appearance of a block on the ticker and the time when an investor can implement an order. Once an investor observes a block appearing on the ticket, the investor must tell his or her broker to purchase the appropriate number of shares. The broker in turn must submit the order to a floor representative of the firm, who in turn proceeds to the specialist's post. Dann *et al.* do not refute the ability of New York Stock Exchange (NYSE) members, who pay substantially reduced transaction costs, to earn excess profits. This evidence lends support to previous documentation about potential strong form market inefficiency.

Hillmer and Yu [6] devise a cumulative sum technique that can be used to measure the speed of adjustment of any market behavior variable, e.g., the mean or the variance of stock returns, the frequency of transactions, the volume of transactions, etc. They measure adjustment intervals for five specific events.[3] They find that either the stock prices did not change following the announcements or the change was completed rapidly. Therefore, little or no opportunity was available to profit from the announcements. The market, however, was found to be in an apparent state of disturbance. Increased variability was found with respect to each event, but excess returns were not found. The size of the company appeared to be a factor in determining the speed

[3]The five events were: reaction of Rockwell International and Boeing Co. to the news on June 30, 1977 that the B-1 bomber was going to be scrapped; IBM's report on April 13, 1977 of a 5.3 percent rise in first quarter earnings; General Motors' quarterly earnings report on February 8, 1978; and the announcement of an award of $150.8 million defense contract on March 1, 1977 to Todd Shipyards.

of adjustment in their sample of five firms. The technique devised by Hillmer and Yu will be used in this study.

Methodology and Data

The Model

The cumulative sum tests that were first proposed by Page [8] traditionally have been concerned with detecting parameter changes. Hillmer and Yu extend the ideas in cumulative sum tests to obtain an unbiased estimate of the disturbance interval. That price changes are distributed independently and identically is a required assumption. The operational procedure of the cumulative sums tests is stated briefly below.[4]

Let $(\tilde{X}_t \mid t = t_S, \ldots, t_1, t_1 + 1, \ldots t_m)$

be an observed sequence of market behavior of variable X.
Then, define

$$S_k = \sum_{t=t_S}^{k} (X_t - u) = \sum_{t=t_S}^{k} Y_t, \qquad Y_t = \tilde{X}_t - u$$

where

S_k = the cumulative sum of deviations from the mean
u = the mean value of variable X.

From Donsker's theorem, S_t for $T_S \leq t_1$ is approximately a symmetric Weiner process. $S_t - S_{t1}$ for $t > t_1$ is approximately a Weiner process with a drift $u_c - u$, where u_c is the new mean value. Let α be the probability of wrongly detecting a parameter change given no change in the mean value. Then,

$$B_k = -\sqrt{K}\, \sigma\, Z_{\alpha/2}$$

where

σ^2 = variance in the non-announcement period.

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[4]See Hillmer and Yu [6] for details.

If $S_k < B_k$ for some period, a change in parameter value is signalled from u to u_c. S_k fluctuates around zero until time t_1, but after t_1, S_k drifts downward. At time T, a statistically significant change in the parameter occurs. An estimate of the change time is given by

$$t_1 = T - B_T/(u_c-u)$$

where

$B_T/(u_c-u)$ = the first passage time, as shown by Cox and Miller [2].

If the aim is to detect a decrease in the mean return after information is released (a preliminary estimate of t_1, for example), t'_1, is obtained by observing the actual data.

An estimate of u_c is

$$u_c = \frac{1}{t_m - t'_1} \sum_{t=t'_1+1}^{t_m} X_t$$

and

$$t_1 = T - B_T/(u_c-u)$$

u_c is reestimated based on the new t_1. The estimation of t_1 and u_c is repeated until estimates of t converge.

In order to estimate t_2 (the ending time of adjustment), the cumulative sum technique is applied backward from $t'_2 > t_2$ until a change is signalled. When an increase in the parameter has to be tested, the only change is in the sign of B_k. That is, $B_k = + \sqrt{k}\, \sigma\, Z_{\alpha/2}$. A change in the return variance can be detected by a similar procedure, as outline by Hillmer and Yu [6].

The above test procedure of adjustment time is applied to the data of block trades. Possible cases examined are:

- Mean increases (decreases) and variance is unchanged
- Mean is unchanged and variance increases (decreases)
- Mean increases (decreases) and variance increases (decreases)
- Mean and variance are unchanged.

The Data

The NYSE collects information on all block trades over 10,000 shares made on the exchange. The sample consists of all block trades with 20,000 shares or more on the NYSE during the time period January 1, 1977 to December 30, 1977. The total sample consists of 2,005 block trades in 105 companies. The data on the date, the price of the block, the price of the immediately preceding trade, and the number of shares are obtained from *Barron's*. The daily return data are obtained from the CRSP (Center for Research in Security Prices) tapes. Standard & Poor's COMPUSTAT tapes are used to obtain the number of common shares outstanding.

Whether a block of shares is sold is an ambiguous concept--every trade has a buyer and a seller. Blocks of trades usually are classified into three groups: those that trade at a price equal to the price prior to the block (zero tick), those that trade at a price above the price prior to the block (plus tick), and those that trade at a price below the price prior to the block (minus tick). As discussed by Kraus and Stoll [7], blocks on minus ticks can be interpreted reasonably as being initiated by sellers and blocks on plus tick as being initiated by buyers. Seven hundred eighty blocks traded on zero tick, 417 on plus tick, and 818 on minus tick. The large number of minus ticks is consistent with the notion that most blocks are sold.

Empirical Analysis

Mean and Variance Tests

The mean and variance tests are designed to determine the duration of the change in mean returns and/or change in volatility of stock returns that accompanies block trade announcements. Inferences are drawn concerning the speed of adjustment by examining the cumulative sum of deviations from the mean of the pre-announcement period. The pre-announcement period is considered to be -150 days to -50 days. The total period examined is -150 days to +60 days, where day 0 is the day of the block trade. The effect of information release is captured by allowing for a change in the mean and variance of daily returns. Unlike other events such as a merger, a block trade usually has no economic significance. Institutional investors and dealers commonly deal in large blocks of shares. As a result, their transactions should not disrupt the market in a significant manner. There should be no significant change in either the mean or the volatility of returns for most block trades.

The frequency of mean and variance changes for the total sample, identified by the cumulative sum technique, are reported in Table 1. The evidence shows

that the majority of announcements (1,408 cases) did not result in excess returns or volatility because no increase in the mean or variance of stock returns was found. Only 178 cases of a decline in mean returns and 59 cases of an increase in mean returns were found. Thus, block trading appears not to depress stock returns of the underlying stocks. On balance, however, more declines in mean returns were found than increases in mean returns.

The 339 cases of variance increases indicate that, to a small extent, block trades are associated with a period of increased volatility and disturbance. Variance increases may reflect increases in market speculative activity during the period of block trading. To examine the 339 cases of variance increases further, the mean beginning and ending times of the adjustment period are estimated. This illustrates how long the increased volatility lasts. The results partitioned by tick sign are presented in Table 2 below. The adjustment process starts, on average 35 days before the block trading period and continues for 86 days after the announcement for blocks trading on minus tick. The total adjustment time is 121 days for minus tick blocks, 115 days for plus tick blocks, and 112 days for zero tick blocks.

A depressed price pressure associated with minus tick blocks explains why the adjustment time is a little longer for minus tick blocks than for the other two types of block trades. The results suggest that large blocks of shares are to some extent sold/bought in companies that are undergoing changes that result in increased volatility for a period. These differences in adjustment times for the three groups are not significant.

The long period of increased volatility is obviously not due to the block trade itself but to some other activities in the company that may cause the block trade. While examining the adjustment time due to a block trade, it is important to note that this event is not as well publicized as a merger or a stock split announcement. Determining which parties are involved in the transaction is difficult. As a result, the return volatility lasts longer than usually thought. No change in returns or volatility should be expected for most block trades.

The Adjustment Time and Size Classification

The sample is divided into ten block size categories. The purpose is to test the price pressure hypothesis empirically which implies that the stock return impact should be correlated with block size. The measure of size used is the dollar value of a block. The ratio of the number of shares traded in block to the total number of shares outstanding ranged from .003 percent to 2.0 percent. The composition of each size category in terms of block value and the number of variance increases are presented in Table 3. The smallest block trade has a value of $210,000 and the largest $10.5 million. In the smallest size group, 39

blocks of 200 exhibit evidence of increases in variance.[5] The largest size group shows a smaller proportion of variance increases--30 of 215. The adjustment of each size group is examined and reported in Table 4. This table shows that an increase in return variance starts anywhere from 50 days to 16 days before the actual announcement. The smallest block size group takes the shortest adjustment time, while the median and large size groups exhibit a similar adjustment time. These results provide little evidence that volatility lasts longer with larger block values. This result is consistent with Scholes' [10] findings on secondary distributions.

Summary

This paper examines the adjustment of stock returns to block trading information. The article examines whether any change occurs in stock returns or volatility of returns due to the trading of large blocks by institutional investors. The results indicate that this activity by institutional investors does not disrupt the market. Using a statistical model proposed by Hillmer and Yu [6], it is found that most block trades do not result in either excess returns or volatility. To a small extent, the results indicate that blocks of shares are sold/bought in companies that may be undergoing changes causing their stock returns to be volatile. The period of increased volatility cannot be attributed to the block trade itself but may be due to some company-specific activities that result in a block trade. The period of increased volatility is longest for minus ticks and shortest for plus ticks, lending some support to the price pressure hypothesis. This analysis does not find larger block sizes to result in a longer period of increased volatility. These findings are consistent with previous empirical evidence. This research supports the efficient markets hypothesis and indicates no cause for alarm due to increased block trading activity in the market.

[5]Each block value in Tables 3 and 4 consists of 200 blocks except the largest size group which has 215 blocks. The total number of blocks is 2,015.

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Table 1
Frequency of Mean and Variance Changes

Factor	The Number of Block Trade Announcements*
No Change in both Mean and Variance	1,408
Variance Increase	339
Variance Decrease	38
Mean Increase	59
Mean Decrease	178

*The number of observations is greater than 2,015 because some announcement had a change in both mean and variance.

Table 2
Estimated Adjustment Times*
(Variance Increases)

	Minus Tick	Plus Tick	Zero Tick
Number of Blocks Traded	818	417	780
Number of Variance Increases	156	63	119
Mean of Beginning Adjustment Time	-35	-35	-36
Mean of Ending Adjustment Time	+86	+80	+76
Mean of Total Adjustment Time	121	115	112

*In days relative to zero being the announcement day.

Table 3
Composition of Size Groups

Block Value Group	Value Range ($000)	Number of Variance Increases
1	210 - 509	39
2	509 - 624	50
3	624 - 757	42
4	757 - 883	32
5	883 - 1,050	38
6	1,050 - 1,237	31
7	1,237 - 1,437	26
8	1,437 - 1,725	26
9	1,725 - 2,545	26
10	3,656 - 10,496	30

Table 4
Estimated Volatility Adjustment Times for Value Groups

Block Value Group	Mean Adjustment Times in Days		
	Beginning	Ending	Total
1	-16	+68	84
2	-39	+80	119
3	-35	+86	121
4	-35	+67	102
5	-35	+95	130
6	-50	+78	128
7	-43	+82	125
8	-46	+77	123
9	-34	+96	130
10	-35	+94	129